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Walla Walla District

United States
Environmental Protection Agency
Region 10

Supplemental Environmental Analysis For Purposes of 2003-2004 Dredging

(Lower Snake and Clearwater Rivers, Washington and Idaho)

July 2003

Executive Summary

The purpose of this Supplemental Environmental Analysis for Purposes of 2003-2004 Dredging (SEA-03/04) is to (1) identify actions (during the 2003-2004 work window) the United States Army Corps of Engineers, Walla Walla District (Corps), deems necessary to adequately maintain the lower Snake River navigation system for the near term; (2) present the environmental analyses and compliance addressing these specific actions; and (3) present new or updated information supporting these proposed dredging actions. The Environmental Protection Agency (EPA) is a cooperating agency with the Corps in development of this SEA-03/04. This SEA-03/04 relies on, and incorporates by reference, the factual environmental analyses contained in the 2002 Dredged Material Management Plan/Environmental Impact Statement (2002 DMMP/EIS), with regard to these specific short-term maintenance actions. However, this SEA-03/04 does not incorporate any of the conclusions set forth therein, other than those relating to short-term environmental impacts.

In this SEA-03/04, the Corps proposes to conduct routine navigation and maintenance dredging on the lower Snake River and at the mouth of the Clearwater River during the winter in-water work window, 15 December 2003 to 1 March 2004. The proposed maintenance activities would occur in the States of Washington and Idaho, and would include both dredging and dredged material disposal for the creation of shallow-water habitat and a woody riparian planting bench. The purpose of the dredging is to restore the navigation channel to its authorized depth for navigation and safety reasons, restore a portion of the flow conveyance in the Lewiston-Clarkston area, and restore access to ports and other public-use areas.

The 2003-2004 proposed dredging is a routine operation and maintenance activity, necessary for operating the lower Snake River projects at the minimum operating pool (MOP) called for in the National Marine Fisheries Service's (NMFS) Biological Opinion, *Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin* (NMFS 2000 FCRPS Biological Opinion). Although the current operational deviation (MOP+1) from the MOP constraint in the lower Snake River reservoirs may have mitigated some impacts to navigation, the continued deviation from MOP constraint cannot be assumed. Even at this current operational level (MOP+1), the transportation industry is experiencing some difficulty with navigation depths that are less than the authorized 14 feet. Thus, the dredging proposed for 2003-2004 becomes a crucial component of maintaining the viability of the navigation system in the four lower Snake reservoirs, and of meeting the MOP operation called for in the NMFS 2000 FCRPS Biological Opinion.

This SEA-03/04 sets forth supporting rationale for the need to conduct the 2003-2004 dredging activities including, but not limited to, sedimentation rates and shoaling within the navigation channel, potential restrictions to navigation expressed by navigation system users, and economic impacts to the region.

Formal consultation under the Endangered Species Act (ESA) is underway with NMFS [also known as National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries)]. A new biological assessment (BA), which focuses on the 2003-2004 dredging and disposal activities, was transmitted to NMFS (see Attachment A). In the BA, the Corps determined that the proposed dredging activities *"May Affect, But Are Not Likely To Adversely Affect"* individuals of Snake River sockeye; and *"May Affect, And Are Likely To Adversely Affect"* Snake River spring/summer and fall chinook salmon, and/or Snake River Basin steelhead evolutionarily significant units (ESU). The Corps concluded that the proposed action would not jeopardize the continued existence of these fish, or preclude their survival or recovery through potential adverse modification of spawning, rearing, and migration components of their critical habitat.

Because the lower Snake River has been designated as critical habitat for threatened Snake River fall chinook salmon, dredging in the lower Snake River reservoirs and the tailraces of Lower Granite and Lower Monumental Dams will technically be altering critical habitat for spawning, rearing, and migrating fall chinook salmon. However, the vast majority of the areas to be dredged are not suitable for spawning, are not the habitat chinook typically use for rearing, and would not be significantly impacted for migrating juvenile fish. In addition, it is expected that in-water disposal of dredged material would enhance critical rearing habitat for fall chinook salmon.

This determination is based on the limited nature of the work[1] and its implementation within the designated winter in-water work window to minimize potential effects on listed species. The dredged material removal and disposal activities and their effects (*e.g.*, short-term turbidity plumes) would be easily avoidable by either juveniles or adults of any listed salmonid stock that would be rearing or migrating within the mainstem Snake River. Harm associated with the mechanical dredging activities should be minimal to the listed species and their critical habitat. The proposed in-water disposal of dredged material will be used to increase the elevation of the current mid-depth bench in the Lower Granite reservoir; will not adversely affect critical habitat for the listed stocks of Snake River chinook and sockeye salmon or Snake River steelhead; and should be beneficial to Snake River fall chinook salmon juvenile rearing by increasing available, suitable, and functional habitat with open sand and increased macroinvertebrate production over the existing condition.

[1] The area impacted by dredging is less than 0.5 percent of the total surface area of the lower Snake River reservoirs affected. This very small percentage indicates the relative scale of the area impacted by dredging, when compared with the total available aquatic habitat area.

The U.S. Fish and Wildlife Service has been contacted concerning consultation, and provided the current biological assessment determinations. These determinations are as follows: bald eagle *(Haliaetus leucocephalus) – "May Affect But Is Not Likely To Adversely Affect;"* bull trout *(Salvelinus confluentus) – "May Affect But Is Not Likely To Adversely Affect;"* Ute ladies' tresses *(Spiranthes diluvialis) – "no effect;"* and Spaulding's silene *(Silene spaldingii) – "no effect. "* Since the last consultation, the proposed critical habitat rule was published for bull trout populations in the Columbia River Basin. The portions of the Snake River proposed for dredging activities in 2003-2004 are included in the proposed critical habitat designation for bull trout. The proposed dredging areas, however, are *not* part of the spawning areas or resident habitat for bull trout. The large impounded Snake River does provide important habitat for migrant populations and for some sub-adults, for portions of the year, near tributaries that are also critical habitat for this species. Although the activity may cause temporary effects to resident fish and some anadromous fish populations in the vicinity of the dredge and/or fill actions, the Corps concludes there will be "no effect" to the critical habitat for bull trout in the proposed work areas, since overall food supply and water quality will be relatively unchanged after the work is completed. There will be some small-scale improvements for the food supply due to the techniques used for the bench development at Snake River Mile 116.

It is anticipated that NMFS will issue a biological opinion this summer. A letter of concurrence from USFWS is also expected.

The Corps has conducted the evaluations necessary to determine specific environmental consequences, socioeconomic costs, and biological data pertinent to this short-term maintenance dredging activity. This report includes an evaluation of these issues and consideration of public concerns; and takes into account environmental and public needs. All references or information necessary to comply with applicable laws and regulations including, but not limited to, the National Environmental Policy Act (NEPA), Clean Water Act (CWA), and the Endangered Species Act (ESA), regarding the 2003-2004 short-term maintenance dredging and disposal activities, are also included.

The reasonableness and feasibility of measures such as sediment reduction, sediment flushing, and light-loading were also evaluated for application to the proposed short-term activities. New data or science applicable to this proposed short-term maintenance dredging has been reviewed and added to this analyses, where appropriate.

The 2003-2004 dredging is considered an independent action, designed to address existing and immediate navigation and maintenance problems. A later programmatic plan will address strategies for long-term management issues.

This SEA-03/04 also includes conclusions based on analyses contained in both this document and that portion of the 2002 DMMP/EIS that addresses short-term dredging. It also summarizes the rationale for proceeding with a short-term maintenance dredging and disposal activity during the 2003-2004 season.

The SEA-03/04 describes the need for, and associated impacts of, the proposed 2003-2004 routine maintenance dredging. For example, it describes:

- Increasing safety concerns and risks to life and property;
- Minimal impacts to ESA-listed species from proposed short-term dredging and disposal activities;
- Numerous locations within the Federal navigation channel where depths are less than the authorized 14 feet (based on MOP operations);
- Negative impacts to the economy of the region as a result of the operational constraints caused by current channel conditions;
- A gradual increase in the risk of overtopping the Lewiston Levee system;
- The limited, direct impact of the proposed dredging (less than 0.5% of the total surface area of the lower Snake River reservoirs affected);
- The avoidance of cultural resources;
- Minimal and short-term impacts to water quality; and
- Monitoring plans to verify impacts

The proposed action takes into account both the need to maintain the navigation channel and environmental resource concerns. The disposal activities, which include the construction of shallow-water habitat and a woody riparian planting bench, were developed based on years of research; and are anticipated to provide long-term benefits to listed salmon stocks.

While this SEA-03/04 addresses the environmental compliance evaluation of the 2003-2004 short-term maintenance dredging and disposal activities, the Corps and EPA are concurrently developing a programmatic supplement (PDMMP/SEIS) to the 2002 DMMP/EIS that addresses long-term dredged material management issues.

Attachments to this SEA-03/04 provide more detailed technical information pertinent to the proposed activity, as well as administrative and process information.

The SEA-03/04 will be available to the public for a 30-day review period. Comments received during this period will be evaluated and addressed, as appropriate. Once all comments are evaluated and considered, a decision is anticipated to implement the proposed 2003-2004 short-term maintenance dredging and dredged material disposal activities. The resulting decision document will be available on the Corps website (*www.nww.usace.army.mil/dmmp*), and a limited number of hard copies will be available by request.

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Attachments

A Biological Assessment for Anadromous Fish Species
B Sampling and Quality Assurance Plan, Physical and Chemical Characteristics of the Sediments in Areas of the Lower Snake River Proposed for Dredging in 2003/2004
C Monitoring Plan
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Section 1 – Introduction

1.1 Purpose and Need

The purpose of this Supplemental Environmental Analysis for Purposes of 2003-2004 Dredging (SEA-03/04) is to (1) identify actions (during the 2003-2004 work window) the United States Army Corps of Engineers, Walla Walla District (Corps), deems necessary to adequately maintain the lower Snake River navigation system for the near term; (2) present the environmental analyses and compliance addressing these specific actions; and (3) present new or updated information supporting these proposed dredging actions. The Environmental Protection Agency (EPA) is a cooperating agency with the Corps in development of this SEA-03/04. This SEA-03/04 relies on, and incorporates by reference, the factual environmental analyses contained in the 2002 Dredged Material Management Plan/Environmental Impact Statement (2002 DMMP/EIS), with regard to these specific maintenance actions. However, the SEA-03/04 does not incorporate any of the conclusions set forth therein, other than those relating to short-term impacts.

The Corps proposes to conduct necessary routine navigation and maintenance dredging in the lower Snake River and at the mouth of the Clearwater River during the winter in-water work window, 15 December 2003 to 1 March 2004. The in-water work window has been established through coordination with state and federal resource agencies as that time period in which in-water work can be conducted and have the least impact on ESA-listed salmon and steelhead stocks. The proposed maintenance activities would occur in the States of Washington and Idaho, and would include both dredging and dredged material disposal for creation of shallow-water habitat and woody riparian planting bench at Snake River Mile (RM) 116. The purpose of the 1-year maintenance dredging is to restore the navigation channel to its authorized depth for transportation and safety reasons,[2] restore a portion of the flow conveyance in the Lewiston-Clarkston area,[3] and restore full access to port areas and other public use areas.[4]

This SEA-03/04 documents the short-term, immediate navigation maintenance needs, addresses current physical conditions, and ensures compliance with applicable laws and regulations [including National Environmental Policy Act (NEPA), Clean Water Act (CWA) and the Endangered Species Act (ESA)]. This SEA-03/04 also explains the authorization and demonstrated need to conduct

[2] 2002 DMMP/EIS, Section 1.2, *Purpose and Need*; and Section 1.4, *Existing Federal Project Authority*.
[3] 2002 DMMP/EIS, Section 1.2, *Purpose and Need*; Section 1.7.2, *Conveyance Capacity*; and Appendix E, *Levee Modification/Extension Analysis*.
[4] 2002 DMMP/EIS, Section 1.2, *Purpose and Need;* and Appendix N, Section 2.0, *Description of Dredging Areas.*

this routine maintenance dredging of the authorized channel and public-use areas in the near-term. Additional discussion relating to the effectiveness of non-dredging alternatives in resolving the short-term need to restore authorized depths to the navigation channel is also included. The areas proposed for the 2003-2004 maintenance dredging are identical to those proposed for 2002-2003,[5] except for the deletion of one dredging site and the substitution of RM 116 (Knoxway Canyon) for the Chief Timothy option as a dredged material disposal location. This document relies on, and incorporates by reference, information and analyses from the 2002 DMMP/EIS that pertains to this proposed 2003-2004 maintenance dredging. The process for the proposed short-term maintenance dredging includes the preparation of this document; as well as a biological assessment (BA), a biological opinion (BIOP), and any other required evaluations relating to 2003-2004 dredging.

Formal consultation under the ESA is in progress with National Marine Fisheries Service (NMFS) [also known as National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries)]. A new BA, which focuses on the 2003-2004 dredging and disposal activities, was transmitted to NMFS (see Attachment A). In this BA, the Corps has determined that the proposed dredging activities *"May Affect, But Are Not Likely To Adversely Affect"* individuals of Snake River sockeye; and *"May Affect, And Are Likely To Adversely Affect"* Snake River spring/summer and fall chinook salmon, and/or Snake River Basin steelhead Evolutionarily Significant Units (ESUs). The Corps concluded that the proposed action would not jeopardize the continued existence of these fish, or preclude their survival or recovery through potential adverse modification of spawning, rearing, and migration components of their critical habitat.

This determination is based in part on all work being performed within the designated winter in-water work window, when the fewest individuals of ESA-listed stocks would be present. The dredged material removal and disposal activities and their effects (*e.g.*, short-term turbidity plumes) should be easily avoidable by either juveniles or adults of any listed salmonid stock that would be rearing or migrating within the mainstem Snake River. Harm associated with the mechanical dredging activities should be minimal to the listed species and their critical habitat. The proposed in-water disposal of dredged material to increase the elevation of the current mid-depth bench in the Lower Granite reservoir would not adversely affect critical habitat for the listed stocks of Snake River chinook and sockeye salmon or Snake River steelhead, and should be beneficial to Snake River fall chinook salmon juvenile rearing because it increases available, suitable, and functional habitat in open sand with increased macroinvertebrate production.

[5] 2002 DMMP/EIS, Section 1.3, *Description of the Study Area; Section* 2.8.1.1, *Lower Granite Reservoir* Section 2.8.1.2, *Little Goose Reservoir*; Section 2.8.1.3*, Lower Monumental Reservoir*; Section 2.8.1.4, *Ice Harbor Reservoir*; Section 2.8.1.5, *McNary Reservoir*

The U.S. Fish and Wildlife Service (USFWS) has been contacted to initiate consultation, and has been provided the current biological assessment determinations. These determinations are as follows: bald eagle *(Haliaetus leucocephalus) – "May Affect But Is Not Likely To Adversely Affect;"* bull trout *(Salvelinus confluentus) – "May Affect But Is Not Likely To Adversely Affect;"* Ute ladies' tresses *(Spiranthes diluvialis) – "no effect;"* and Spaulding's silene *(Silene spaldingii) – "no effect."* Since the last consultation, the proposed critical habitat rule was published for bull trout populations in the Columbia River Basin. The portions of the Snake River proposed for maintenance dredging activities in 2003-2004 are included in the proposed critical habitat designation for bull trout. The proposed dredging areas, however, are *"not"* part of the spawning areas or resident habitat for bull trout. The large impounded Snake River does provide important habitat for migrant populations and for some sub-adults for portions of the year near tributaries that are also critical habitat for this species. Although the activity may cause temporary effects to resident fish and some anadromous fish populations in the vicinity of the dredge and/or fill actions, the Corps concludes there will be "no effect" to the critical habitat for bull trout in the proposed work areas since overall food supply and water quality will be relatively unchanged after the work is completed. There will be some small-scale improvements for the food supply due to the techniques used for the bench development at Snake RM 116.

It is anticipated that NMFS will issue a BIOP this summer. A letter of concurrence from USFWS is also expected.

1.2 Background

Congress mandated creation of a navigation channel in the lower Snake River, and authorized the Corps to operate and maintain a navigation system and attendant locks and dams from Lewiston, Idaho, to the McNary pool (Lake Wallula) on the Columbia River. Also authorized are Corps managed and maintained public-use areas for recreation (*i.e.*, marinas and swimming beaches), irrigation intake facilities for wildlife Habitat Management Units (HMUs), and port access within the lower Snake River and McNary reservoirs. Historically, the Corps has routinely dredged accumulated sediments from the navigation channel and the other facilities noted above in order to maintain their operational efficiency. This is consistent with authorized project purposes. Maintenance dredging actions are in response to a variety of conditions: emergency situations that would result in an unacceptable hazard to navigation, planned periodic dredge maintenance of known persistent shoal areas that impede navigation or function of facilities, and removal of sediment that presents a hydraulic flow impediment.

This SEA-03/04 covers an area encompassing four locks and dams of the lower Snake River navigation project: Ice Harbor Lock and Dam (Ice Harbor), Lower Monumental Lock and Dam (Lower Monumental), Little Goose Lock and Dam (Little Goose), and Lower Granite Lock and Dam (Lower Granite) for the 2003-2004 dredging activities.

Although the Corps has dredged port berthing areas in the past, those areas are a non-Federal responsibility and the ports fund that activity. Such non-Corps dredging and disposal activities do, however, require federal permits—a function of the Corps regulatory office. The regulatory requirements for dredging and disposal activities—whether conducted by the Corps or by others under Corps permit—are substantively the same, differing only in that the Corps does not issue itself a permit. In recent years, guidance at the national and regional level on the management of dredged material has become more collaborative, especially between the Corps and EPA. The efforts by the Walla Walla District and EPA Region 10 in the development of the 2002 DMMP/EIS continued to formalize that collaboration.

1.3 Existing Federal Project Authority

The lower Snake River projects addressed in this SEA-03/04 were authorized by Section 2 of the River and Harbor Act of 1945 (Public Law 79-14, 79th Congress, 1st Session); 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; and
- Lower Granite Lock and Dam - Lower Granite Lake, Snake River, Washington.

Each of these projects is authorized to provide for navigation, irrigation, hydroelectric power generation, recreation, and fish and wildlife. Subsequent to the original authorizing statutes or enabling legislation, other statutes have also addressed specific aspects of these projects. For example, Public Law 87-874, Title II - Flood Control Act of 1962, October 23, 1962, states:

> The projects and plans for the Columbia River Basin… substantially in accordance with the recommendations of the Chief of Engineers in House Document Numbered 403, Eighty-seventh Congress: *Provided*, That the depth and

> width of the authorized channel in the Columbia-Snake River barge navigation project shall be established as fourteen feet and two hundred and fifty feet, respectively, at minimum regulated flow.

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 between 733 to 738 feet mean sea level (fmsl) in the Lewiston, Idaho, and Clarkston, Washington, areas. The backwater levees were constructed around Lewiston to protect the city from inundation during the occurrence of a Standard Project Flood (SPF), and to provide flow conveyance capacity.

It is necessary to meet the intent of Congress and serve the public needs in maintenance of such projects. The Corps has developed implementing guidance, Engineer Circular 1165-2-200, *Dredged Material Management Plans* (which addresses the development of DMMPs for federal navigation projects, groups of inter-related harbor projects, and systems of inland waterway projects). This guidance has since been incorporated in Engineer Regulation 1105-2-100, *Planning Guidance Notebook*. It is Corps policy to dispose of dredged material associated with project construction or maintenance dredging of navigation projects in a manner that is the least costly, consistent with sound engineering practice, and meets Federal environmental standards. Engineer Regulation 1105-2-100 also provides the requirements, as well as principles and guidelines, for conducting planning studies within the Corps Civil Works program and ensuring environmental compliance through the planning process. Section 3-2 of Engineer Regulation 1105-2-100 provides specific guidance on the maintenance of navigation projects and the preparation of dredged material management plans.

1.4 Lower Snake River Navigation History

Navigation on the Columbia and Snake Rivers has historically provided an important route of access into and from the interior Columbia and Snake River Basins. As a part of its congressional mandate, the Corps has maintained and operated navigational improvements on the Columbia and Snake Rivers, including channels, locks and dams providing access to the ports, moorage, and recreational areas along these rivers.

Each of the four lower Snake River projects is authorized to provide navigation facilities, including locks with dimensions of 86 feet [26.2 meters (m)] in width and over 665 feet (202.7 m) in length[6] to allow the passage of a tug with the four-barge tow commonly used in river navigation. These locks and dams provide between 98- and 100-foot (29.9- and 30.5-m) lifts, raising navigation from elevation 265 fmsl below McNary Dam to elevation 738 fmsl in the Lower Granite

[6] See project descriptions in the 2002 DMMP/EIS, Section 1.3, *Description of the Study Area*

reservoir. This portion of the waterway extends approximately 179 miles [(288.1 kilometer (km)] from McNary Dam to Lewiston, Idaho. Sill depths at the navigation locks limit the passage of commercial or recreational vessels on the Columbia and Snake Rivers. At most of the projects, upstream sills are 15 feet [4.6 meters (m)] below Minimum Operating Pool (MOP). Operating the reservoirs at MOP provides the clearance needed over the sills to safely accommodate a loaded barge.

The Corps uses periodic maintenance dredging at several locations along the Snake and Columbia Rivers to maintain the authorized channel depth. In the eight-year period from 1991 through 1998, there were navigation-related dredging activities in all of the reservoirs within the study reach. Some of these dredging projects were directed toward cleaning out berthing areas, turning basins, and access channels for individual ports; and restoring the authorized depth in the main navigation channel. The Corps also maintains recreation facilities as part of the lock and dam projects, and has periodically dredged boat launch facilities and swimming beaches at the recreation sites to remove accumulated sediment.

Table 1 presents a history of dredging by the Walla Walla District in the Columbia and Snake Rivers system.

Table 1
History of Dredging in Lower Snake River and McNary Reservoirs

Dredging Location	Year	Purpose	Amount Dredged (cubic yards) (m^3)	Disposal
Excavation of Navigation Channel Ice Harbor Lock and Dam, Part I and II, Channel Construction	1961	Navigation	3,309,500 (2, 530 294)	Unavailable[1]
Navigation Channel, Ice Harbor Lock and Dam, Part III, Channel Construction	1962	Navigation	120,000 (91 746.6)	Unavailable[1]
Downstream Navigation Channel, Ice Harbor Lock and Dam	1972	Navigation	80,000 (61 164.4)	Unavailable[1]
Downstream Approach, Navigation Channel, Lower Monumental Lock and Dam	1972	Navigation	25,000 (19 113.9)	Unavailable[1]
Navigation Channel Downstream of Ice Harbor Lock and Dam	1973	Navigation	185,000 (141 442.6)	Unavailable[1]
Downstream Approach Channel Construction, Lower Monumental Lock	1973	Navigation	10,000 (7 645.5)	Unavailable[1]
Downstream Approach Channel Construction, Ice Harbor Lock	1978	Navigation	110,000 (84 101)	Unavailable[1]
Downstream Approach Channel Construction, Ice Harbor Lock	1978/81/82	Navigation	816,814 (624 499.1)	Unavailable[1]
Recreation Areas (Corps)	1975-present	Recreation	20,000 (15 291.1)	Upland Sites
Port of Lewiston – Lower Granite Reservoir (Corps)	1982	Navigation/Maintain Flow Conveyance Capacity	256,175 (195,859.8)	Upland Sites
Port of Clarkston – Lower Granite Reservoir (Corps)	1982	Navigation	5,000 (3 822.8)	Upland Sites
Downstream Approach Channel Construction, Ice Harbor Lock	1985	Navigation	98,826 (75 557.9)	In-Water
Confluence of Clearwater and Snake Rivers (Corps)	1985	Maintain Flow Conveyance Capacity	771,002 (589 473.3)	Wilma HMU

Table 1 (continued) History of Dredging in Lower Snake River and McNary Reservoirs				
Dredging Location	**Year**	**Purpose**	**Amount Dredged (cubic yards) (m^3)**	**Disposal**
Port of Lewiston – Lower Granite Reservoir (Corps)	1986	Navigation/Maintain Flow Conveyance Capacity	378,000 (289 001.7)	Upland Sites
Confluence of Clearwater and Snake Rivers (Corps)	1988	Maintain Flow Conveyance Capacity	915,970 (700 309.3)	In-Water
Confluence of Clearwater and Snake Rivers (Corps)	1989	Maintain Flow Conveyance Capacity	993,445 (759 543.2)	In-Water
Schultz Bar – Little Goose Reservoir (Corps)	1990	Navigation	27,335 (20 899.1)	Not Applicable
Confluence of Clearwater and Snake Rivers (Corps)	1992	Maintain Flow Conveyance Capacity	520,695 (398 099.9)	In-Water
Ports of Lewiston (Lower Granite Reservoir), Almota, and Walla Walla	1991/92	Navigation	90,741 (69 376.5)	Unavailable[1]
Boise Cascade – McNary Reservoir near Wallula, WA	1992	Navigation	120,742 (92 313.9)	In-Water
Port of Kennewick – McNary Reservoir	1993	Navigation	6,130 (4 686.7)	Not Applicable
Schultz Bar – Little Goose Reservoir (Corps)	1995	Navigation	14,100 (10 780.2)	In-Water
Confluence of Clearwater and Snake Rivers (Corps)	1996/97	Navigation	68,701 (52 525.7)	In-Water
Confluence of Clearwater and Snake Rivers (Corps)	1997/98	Navigation	215,205 (164 536)	In-Water
Greenbelt Boat Basin, Clarkston – Lower Granite Reservoir	1997/98	Navigation	5,601 (4 282.3)	In-Water
Port of Lewiston – Lower Granite Reservoir (Port)	1997/98	Navigation	3,687 (2 818.9)	In-Water
Port of Clarkston – Lower Granite Reservoir (Port)	1997/98	Navigation	12,154 (9 292.4)	In-Water
Lower Granite Navigation Lock Approach	1997/98	Navigation	2,805 (2 144.6)	In-Water
Lower Monumental Navigation Lock Approach	1998/99	Navigation	5,483 (4 192.1)	In-Water
Source: U.S. Fish and Wildlife Service (USFWS), August 1998/Corps, July 19, 1995, and September 2, 1999 [1]Data for this dredging activity is unavailable.				

1.5 Current Navigation System Status

1.5.1 Sediments

Several major tributaries enter the Snake and Columbia Rivers within the study area, and most are heavy sediment contributors in high runoff years. In the 2002 DMMP/EIS, the Corps conducted an analysis of the current rates of sedimentation in the lower Snake reservoirs and McNary reservoir on the Columbia River.[7]

Sediment buildup occurs throughout the three downstream lower Snake River reservoirs, but only certain areas become problematic due to sediment deposition. Deposition causes maintenance concerns in the upstream ends of the reservoirs (where the water depths are shallower), or at locations along the

[7] 2002 DMMP/EIS, Appendix A: *Hydrologic Analysis*

edges of the river (where water velocities are slower and suspended material tends to settle out). Examples of these locations are the downstream approach channels to the navigation locks and recreation areas (*e.g.*, boat landings and swim beaches).

The most upstream lower Snake River reservoir, Lower Granite, has more extensive maintenance concerns due to the heaviest loads of sedimentation. The following discussion focuses on conditions in the Lower Granite reservoir, as the quantity of sediment that collects there far exceeds quantities observed depositing in any of the other lower Snake River reservoirs. The upper reach of the Lower Granite reservoir serves as a sediment trap for most of the material carried in suspension in the free-flowing reaches of the contributing rivers.

- **Lower Granite Sedimentation**

Lower Granite, the most upstream of the four lower Snake River dams, provides navigation to the cities of Lewiston, Idaho, and Clarkston, Washington. Because it is the most upstream in the lower Snake River system, it is the predominant sediment collection area for a large sediment-contributing drainage area that includes the Salmon, Grande Ronde, and Imnaha Rivers; the mainstem Clearwater River; and the local drainage of the Snake River between the Hells Canyon complex and Lower Granite.

To monitor sedimentation within the Lower Granite reservoir, hydrosurveys are taken on a regular basis to determine the locations and extent of shoaling. Shoaling typically occurs at the same locations throughout the system. Based on the last extensive sediment range hydrosurvey (completed in 2000), the Lower Granite reservoir now contains an estimated 68 million cubic yards (cy) of sediment. This represents an increase of 21 million cubic yards since 1995, and 8 million cy since the 1997 surveys. The overall average yearly sediment volume, based on data collected since completion of the project in 1975, is 2.6 million cubic yards per year. Sediment buildup between the years 1974 (pre-project) and 2000 is illustrated in Figure 1.

Selective hydrosurveys were taken in 2002 to determine channel conditions at suspected problem areas. Additional selective channel condition surveys will be conducted in Fall 2003. It is anticipated that data from the pending sediment range hydrosurvey would continue to show continued trends observed in previous surveys.

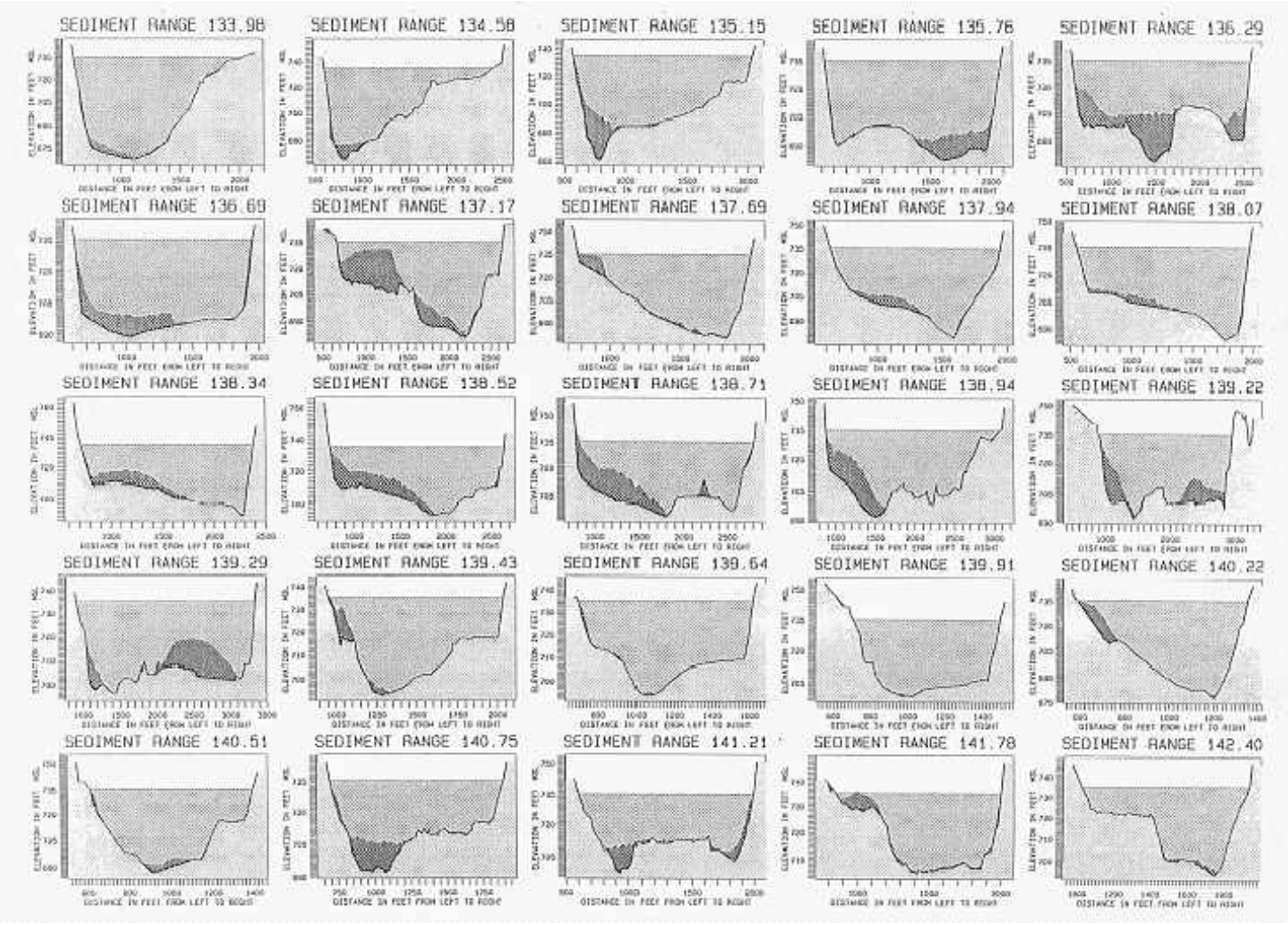

Figure 1. Lower Granite Pool Sediment Ranges: 1974 and 2000 Surveys Compared

- **Lewiston Levee System**

The deposition of sediments at the upstream end of the Lower Granite reservoir also impacts the effectiveness of the backwater levee system constructed in the city of Lewiston. This backwater levee system was built as part of the Lower Granite project in lieu of relocating the business district of Lewiston. It was designed and constructed to be an upstream extension of the dam, to allow the Lower Granite reservoir to pass a standard project flood (SPF) event while protecting Lewiston from inundation. The current build-up of sediment decreases the ability of these levees to withhold a significant flood event from the City of Lewiston.

The levee system was designed to provide a minimum freeboard of 5 feet (1.5 m) during the SPF event of 420,000 cubic feet per second (cfs) [11 893.1 cubic meters per second (m^3/s)] on the Snake River below the confluence of the Clearwater River. Sediment deposition has gradually reduced channel capacity, so that the SPF event cannot pass without seriously encroaching into the levee freeboard and increasing the risk of overtopping. Less than 3 feet (0.9 m) of the originally-designed 5 feet (1.5 m) of levee freeboard remain.[8] Approximately 2.2 million tons (2.0 metric tons), or 3.2 million cubic yards (cy) (2.4 million m^3) of sediment collects in the reservoir annually. Although maintenance dredging is not a complete solution, each dredging activity restores a small portion of this lost freeboard.

- **Disposal of Dredged Material**

The disposal of dredged material within the Lower Granite reservoir is problematic due to limited availability of upland disposal sites, and the immediate need for development of acceptable solutions to the sedimentation problems has long been apparent. Several beneficial uses of dredged materials were evaluated and, based on biological benefits, creation of shallow-water habitat was determined to be the most viable solution. Creating shallow-water habitat may provide foraging opportunities and short-term rearing for downstream migrating salmonids, as well as spawning and rearing habitat for resident fish. The use of dredged material from the upper reservoir is potentially beneficial in creating such shallow-water habitat.

From 1985 to 1993, a dredging and experimental in-water disposal test program was conducted in coordination with EPA and other resource agencies. This test, along with a comprehensive monitoring program, was designed to assess the value of using dredged material for fish habitat enhancement in the lower Snake River. As a part of this test, an underwater bench and island (Centennial Island) were constructed at mid-depth (20 to 60 feet/6.1 to 18.3 m), with additional disposal at a deep-water site (greater than 60 feet/18.3 m) between RM 120 and

[8] Further discussions on long-term actions to address this issue (such as proposed levee modification) will be included in the Programmatic DMMP/Supplemental EIS (PDMMP/SEIS).

Lower Granite. Fish assemblages were sampled before the test began in 1985, and again after construction of the disposal island in 1993, to assess local changes in community structure. The results of this test suggest that construction of shallow-water habitat using dredged material has the potential to increase habitat suitability in the Lower Granite reservoir. To briefly summarize the test results, it was indicated that maximum benefit could be derived from shallow-water disposal (*i.e.*, island or shallow shoreline construction), with few negative effects anticipated. The Corps believes a carefully planned and executed shallow in-water disposal will increase shallow-water habitat and, in turn, increase productivity of the reservoir system, benefiting various resident and anadromous fish species. This proposal is included in the ESA consultations with NMFS (see Attachment A).

1.5.2 Project Operating Ranges

Authorized operating ranges of the lower Snake River reservoirs must be considered in determining navigation system needs. The four lower Snake River projects are considered run-of-river projects, which means that the river flows into the project and equal flows are released through the project. While the design of the lower Snake River projects includes some small allowance for pool fluctuations [3 to 5 feet (0.91 to 1.52 m), see Table 2, below], these run-of-river projects provide minimal storage capacity. During the juvenile fish migration season, April through August, these projects are generally operated at MOP. The navigation industry has built its port facilities and commercial shipping fleet, and manages barge capacity, around the parameters of the authorized 14-foot clearance.

The four lower Snake River projects are to be operated at MOP Constraint because of an action item in the Reasonable and Prudent Alternative contained in the NMFS 2000 BIOP. For the past 2 years, the Ice Harbor and Lower Granite projects have been operated above the MOP Constraint, from MOP+1 foot to MOP+2 feet, to raise the water level in order to provide a 14-foot draft over the high spots caused by sediment build-up in the navigational channel. The deviation from MOP constraint was coordinated through the Technical Management Team (TMT), an inter-agency technical group established in NMFS' 1995 BIOP *Reinitiation of Consultation on 1994-1998 Operation of the Federal Columbia River Power System and Juvenile Transportation Program in 1995 and Future Years* (NMFS 1995 BIOP) that is responsible for making recommendations on dam and reservoir operations. Concerns are typically raised about these requests by the regional fish management agencies (federal, states, tribes) due to the potential to negatively impact juvenile salmon survival.

Current operation of the system at MOP+1 allows the navigation industry to continue operations with a lower risk of equipment damage and with a higher level of crew safety, and decreases the risk of environmental damage resulting

from cargo spillage, but it does not eliminate the problem. Also, the MOP+1 deviation for the summer 2003 operation is considered temporary, and cannot be the assumed operation in future years.

1.5.3 Transportation Industry and Safety Information

The Corps has recently discussed potential hazards within the lower Snake River navigation system with the U.S. Coast Guard, barge and towboat operators, and related associations. Attachment I contains letters from these operators indicating their concerns regarding operational safety. Several potentially hazardous locations have been identified, including the lock approaches, the Snake/Clearwater confluence area, and various port access channels.

Table 2.
Reservoir Operating Ranges

	Normal Operating Range	MOP Constraint[1]	Summer 2003 Operating Range[2]
McNary	335-340 fmsl[3]	None	
Ice Harbor	437-440 fmsl	437-438 fmsl	438-439 fmsl
Lower Monumental	537-540 fmsl	537-538 fmsl	537-538 fmsl
Little Goose	633-638 fmsl	633-634 fmsl	634-635 fmsl
Lower Granite	733-738 fmsl	733-734 fmsl	734-735 fmsl

[1]Action called for in the Federal Columbia River Power System 2000 Biological Opinion.
[2]As established in the April 16, 2003 TMT meeting.
[3]feet mean sea level
NOTE: Outmigration Period: April – August (with the exception of Lower Granite, which runs April – September/October, depending on yearly conditions)

The U.S. Coast Guard has been notified of problems within the system, and participated in a review of problem areas identified by navigation interests in April 2003. U.S. Coast Guard documentation of a barge-grounding incident is located in Attachment I.

In a request for pool elevation increase to the TMT, dated April 15, 2003, the Columbia River Towboat Association (CRTA) identifies safety and economic concerns of its members. Regarding safety, CRTA refers to “near miss incidents including bumping bottom and irregularities in the controllability of tows. It is the feeling of many of the operators that there is very little margin for safety left. We are running on the edge.”

Further addressing its safety concerns, CRTA advises:

> As the width and depth of the navigation channel continues to constrict due to lack of dredging, it has become increasingly difficult for operators to navigate their 84-foot-wide by 640-foot long tows within the confines of the 250-foot wide channel. This is particularly problematic for down-bound tows fighting to maintain steerage in strong following currents. The tow actually crabs down the navigation

> channel to make their course, effectively utilizing all if not more of the available navigation channel. Up bound tows must provide a wider and wider berth to down bound tows to avoid risk of collision. At times of high flows and irregular spill patterns it could soon become impossible…The safety of our crews and the increased risk of a serious marine incident are nearing unacceptable levels.

As to the economic effects associated with a diminished navigation channel, CRTA stated:

> We have been light-loading barges for two years now, which is eroding the economics of the region's transportation system supply chain. Resultant cost impacts are beginning to drive commerce away. If something doesn't change soon, the cruise boat industry will not be able to operate out of Lewiston in another year.

The CRTA further states:

> 13 million tons of mostly agricultural products, valued in the billions, are barged down the Snake to Columbia River Ports for export overseas annually. Rail and/or trucks and related infrastructure are not suitable alternatives structurally or economically. The economies of 13 states and U.S. strategic and tactical economic interests are at stake as well as thousands of family wage jobs and hundreds of farming families.

Similarly, describing light-loading as "a short-term approach akin to rearranging the deck chairs on the Titanic," Dixon Shaver of Shaver Transportation explains in a letter dated June 18, 2003:

> To begin with, the unique marine equipment transiting this river is designed, built, and financed around the parameters… wherein each lock chamber can accommodate a tug and four barge tow… almost fourteen feet deep. The economics of cargo carriage require you to achieve maximum draft and volume to recover your costs. Thus, to make barging viable, you have to 'max out' the lock chamber.

Rick Davis, manager of the Port of Clarkston, in a letter dated 26 June 2003 (see Attachment I), states:

> At minimum operating pool plus one, the barges arrive at our port crane facility at the current level, and they are dragging bottom.
>
> The sawdust barge drafts 12.5 feet of water when it is light loaded. If the barge were filled complete as prior barges were, it would not be able to come into the Port of Clarkston…
>
> One hundred feet off our cruise boat dock we had an occurrence, that the Queen of the West boat stated he had only four feet of water under the boat. The Queen of the West drafts 8 feet of water. In the same area of the Snake River there is a shoal building, and after next springs runoff they will not be able to arrive at the dock…

1.6 Previous Environmental Documents and Related Programs

1.6.1 Prior Project NEPA Documents

The operation and maintenance of the lower Snake River projects, including navigation, recreation, and fish and wildlife facilities, have been addressed in a number of environmental compliance documents since these projects were constructed. These documents include the original EIS for each project, which evaluated routine operation and maintenance activities. Additional NEPA documents have been prepared as needs arose, or conditions or requirements changed, particularly requirements related to ESA-listed salmon and steelhead. Environmental compliance has also been updated in response to other regulations (*e.g.*, CWA). A listing of some of these subsequent environmental documents is provided in Table 3. Actions taken prior to 1970 do not have NEPA documentation, as NEPA was not in effect until 1970.

The following paragraphs describe the two most recent system EISs with information relevant to lower Snake River navigation.

1.6.2 1992 Options Analysis EIS (OA/EIS)

The Corps, in cooperation with Bonneville Power Administration (BPA) and the Bureau of Reclamation (BOR), prepared the OA/EIS on the effects of operational changes at certain Federal multi-purpose water projects in the Columbia River Basin system. The data collected in the OA/EIS have proven very valuable in analyzing drawdown proposals. The actions implemented as a result of this analysis have led to lower pool levels. This, in turn, has a critical effect on the

Table 3. Partial Listing of Previous Environmental Impact Statements and Environmental Assessments Addressing Lower Snake River Navigation
Environmental Impact Statements
Little Goose Lock & Dam EIS, 1974
Lower Granite Lock & Dam EIS, 1975
Lower Monumental Lock & Dam EIS, 1976
Ice Harbor Lock & Dam EIS, 1979
Lower Granite Interim Navigation and Flood Protection Dredging SEIS, 1988
Options Analysis/EIS, 1992
Lower Snake River Juvenile Salmon Migration Feasibility Study/EIS, 2002
2002 DMMP/EIS
Environmental Assessments
Lower Granite Reservoir Dredging, 1985
1991 Schultz Bar Navigation Channel Project, Little Goose Lock and Dam, 1990
1991 Lower Monumental Lock Navigation Channel Project, 1991
1994 Schultz Bar Navigation Channel Maintenance, 1994
1997-1998 Lower Snake and Clearwater Rivers Navigation Dredging, 1997
1998 Lower Monumental Navigation Channel Dredging, 1998
Lower Snake and Clearwater Rivers Dredging Supplement, 1998
1997-1998 Lower Snake and Clearwater Rivers Navigation Dredging, Supplement 1, 1998
Interim Lower Snake, Clearwater, and Mid-Columbia Rivers Dredging, 2000

Corps ability to maintain authorized depths throughout the navigation system, and has relevance to any analyses that discuss drawdown. The preferred alternative for 1992 included drafting all four lower Snake River projects to MOP from April 1 to July 31, and conducting a drawdown test. A one-month test was conducted in March 1992, involving the Lower Granite and Little Goose reservoirs.

Public Law 102-580, Water Resources Development Act of 1992, Section 109, authorized the Secretary of the Army to maintain navigation access to, and berthing areas at, all currently operating public and private commercial dock facilities associated with, or having access to, the federal navigation project on the Columbia, Snake, and Clearwater Rivers from Bonneville Lock and Dam (Bonneville) to, and including, Lewiston, Idaho, at a depth commensurate with the federal navigation project. The 1991 Senate Report (102 S.Rpt. 80) noted the congressional understanding with regard to salmon and navigation when authorizing drawdowns:

> The Committee understands that the Corps of Engineers in cooperation with the affected States, Bonneville Power Administration, Bureau of Reclamation, Indian tribes, and other affected river users, and consistent with the agreements reached by the salmon summit, has developed and begun to

implement a plan designed to facilitate the outmigration of anadromous fish which includes substantially changing river flows and the operation of the projects on both the Snake and Columbia Rivers for extended periods of time at lower reservoir levels. The Committee is concerned that the operation of the projects on the Columbia/Snake River system at these lower pool levels may prohibit navigation access from the channel and operation of existing cargo handling facilities. Failure to preserve our current export facilities at these current operating levels could substantially damage U.S. export capabilities. Therefore, the Committee has included language in the bill providing, on a one-time basis, for maintenance dredging to ensure the operation of these facilities on the Columbia/Snake Rivers system at depths commensurate with the authorized main navigation channel.

1.6.3 Lower Snake River Juvenile Salmon Migration Feasibility Study/EIS (Feasibility Study)

In February 2002, the Corps issued the Final Lower Snake River Juvenile Salmon Migration Feasibility Study/Environmental Impact Statement (Feasibility Study). Several key aspects relating to navigation, economics, hydrology, and water quality impacts are discussed in the Feasibility Study and the 2002 DMMP/EIS. The Feasibility Study is incorporated by reference because the analyses of the resource areas are comprehensive and are relevant to these 2003-2004 dredging activities.

The recommendations in the Feasibility Study concerning management of the lower Snake River reservoirs were considered with regard to the proposed 2003-2004 near-term dredging activities. It was determined that some short-term maintenance dredging of the lower Snake River projects would be necessary, regardless of the final decisions regarding dam breaching.

1.6.4 The 2002 DMMP/EIS

The 2002 DMMP/EIS, following Corps policy guidance,[9] evaluated navigation maintenance needs over a 20-year timeframe to determine cost effective, environmentally acceptable, and beneficial management of dredged material for the McNary and lower Snake River project area. The 2002 DMMP/EIS also described the short-term needs specifically outlined as planned 2002-2003 dredging activities in Appendix N of the report.

The analyses included effects on various environmental resources[10] and alternatives[11] and measures[12] were discussed. These measures included, but were not limited to, sediment reduction measures such as changing upstream land uses and sediment controls, reservoir drawdown to flush sediments with higher velocity flows, and various dredging and non-dredging measures.[13] Various disposal options associated with dredging were also evaluated, including in-water disposal for the creation of improved fish habitat[14] and levee raising measures (to increase flow conveyance in the Lower Granite reservoir).[15]

These various measures were further "screened," based on a set of evaluation criteria[16] ranging from cost effectiveness to environmental impacts. This evaluation process resulted in the removal of some measures from further consideration, while other alternatives were carried forward that were considered reasonable and feasible and within the stated purpose and need. Each of the alternatives formulated retained maintenance dredging as a primary measure.

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[9] The rationale for the development of programmatic dredging plans is set forth in Corps regulation, ER 1105-2-100(8) (Corps, 2000), which states that dredged material management planning for all Federal harbor projects is conducted by the Corps to ensure that maintenance dredging activities are performed in an environmentally acceptable manner, use sound engineering techniques, are economically warranted, and that sufficient confined disposal facilities are available for at least the next 20 years. These plans address dredging needs, disposal capabilities, capacities of disposal areas, environmental compliance requirements, potential for beneficial usage of dredged material, and indicators of continued economic justification. Ultimately, the plan's purpose is the management of sediment from an authorized project and, if possible, the reduction of the volume of sediment that requires management.

[10] 2002 DMMP/EIS, Section 3, *Affected Environment*

[11] 2002 DMMP/EIS, Section 2, *Alternatives*

[12] 2002 DMMP/EIS, Section 2.2, *Measures Considered*

[13] 2002 DMMP/EIS, Section 2.2, *Measures Considered*

[14] 2002 DMMP/EIS, Section 2.2.4.1, *Dredging With In-Water Disposal*; and Section 2.8.5.1, *Beneficial Use Option*

[15] 2002 DMMP/EIS, Section 2.8.6, *Levee Raise*

[16] 2002 DMMP/EIS, Section 2.3*, Formulation of Alternatives to be Considered in Detail*; and Section 2.3.1, *Screening Process*

- ***National Wildlife Federation v. National Marine Fisheries Service et al.***

The 2002 DMMP/EIS was developed in cooperation with EPA and was completed in July 2002. The Corps signed a Record of Decision (ROD) in September 2002 and awarded a contract for the 2002-2003 dredging activity. Mobilization had begun when the National Wildlife Federation *et al.*[17] filed a lawsuit and a motion for preliminary injunction in November 2002, against the Corps and NMFS, challenging the adequacy of the 2002 DMMP/EIS and the 2002 Biological Opinion.

Several groups, a tribe, and others joined the lawsuit. The Lower Granite Navigation Coalition,[18] filed a motion to intervene in November 2002, to protect interests in the continued navigability and operation of the Snake River system. The Nez Perce Tribe participated in an *amicus curiae* status, citing as reasons their interest in fish and wildlife and cultural resources, supporting the plaintiffs' request for declaratory and injunctive relief.

On December 12, 2002, the U.S. District Court, Western District of Washington, granted plaintiffs' motion for preliminary injunction. The Court enjoined the Corps from initiating dredging or disposal activities in the lower Snake River, as set forth in the 2002 DMMP/EIS and ROD, and NMFS from authorizing incidental take of ESA-listed species for the DMMP project until such time as the Court rules on the merits of plaintiffs' claims.

On April 17, 2003, the parties involved asked the Court to stay the case in a joint status report. The Corps decided to withdraw the September 2002 ROD, and NMFS decided to withdraw their BIOP for the DMMP. The Corps then decided to look at the short-term 2003-2004 dredging needs in this SEA-03/04, while concurrently addressing the long-term programmatic sediment management plan in the PDMMP/SEIS.

[17] Washington Wildlife Federation, Idaho Wildlife Federation, Idaho Rivers United, Pacific Coast Federation of Fishermen's Associations, and Institute for Fisheries Resources

[18] Lewis-Clark Terminal, Inc., Cargill/Louis Dreyfus, Port of Benton, Port of Clarkston, Port of Kennewick, Port of Lewiston, Port of Morrow, Port of Pasco, Port of Umatilla, Port of Walla Walla, Port of Whitman County, Shaver Transportation Company, and Potlatch Corporation

Section 2 - Environmental Compliance Evaluation

2.1 Summary

This SEA-03/04 sets forth the rationale for the proposed 2003-2004 dredging activities, which is an independent action designed to address immediate navigation and maintenance problems.

The analyses in the 2002 DMMP/EIS was prepared to address both long- and short-term maintenance needs of the projects, the latter of which is utilized in this SEA-03/04.

In addition to the preparation of this SEA-03/04, the Corps and EPA are engaged in a separate process to develop a long-term programmatic plan for dredged material management. This PDMMP/SEIS will be developed through cooperation with EPA, including ESA consultation with NMFS and USFWS. The PDMMP/SEIS will incorporate, by reference, the information already contained in the 2002 DMMP/EIS; and include new information and data, as appropriate. The PDMMP/SEIS will address alternatives, as well as describe the process for tiering subsequent site-specific activities. A new ROD adopting a programmatic long-term management plan is anticipated.

Alternatives and issues to be clarified or expanded in the PDMMP/SEIS would contain measures identified and described in the 2002 DMMP/EIS, including dredging and disposal activities, habitat creation, barge light-loading, and levee-raising measures; sediment reduction measures, including bendway weirs, silt curtains, and watershed erosion reduction; and sediment flushing measures at various drawdown scenarios.

The PDMMP/SEIS will support decisions for the long-term planning and management of sediment and material placement, which the Corps and EPA see as an efficient and desirable goal. However, in the short-term, proceeding with the 2003-2004 dredging activities will not affect the scope of the environmental evaluation in the PDMMP/SEIS. Committing to short-term dredging activities will not preclude the evaluation or selection of reasonable alternatives in the PDMMP/SEIS.

2.2 Proposed 2003-2004 Lower Snake River Routine Maintenance Dredging

2.2.1 Overview

The purpose of the proposed 2003-2004 lower Snake River maintenance dredging is to temporarily restore the authorized depth of the navigation channel, remove sediment from port areas, and maintain public-use areas. Shoaling has

now hindered barge navigation; and caused unsafe conditions in the navigation channel, port access channels, boat basins, and other facilities since the previous maintenance dredging in 1997-1998. Local port authorities have expressed concern about the recent lack of maintenance, and are becoming increasingly alarmed about the potential economic effects on local communities (see Attachment I).

The proposed 2003-2004 maintenance dredging is comparable to the proposed 1-year site-specific action in the 2002 DMMP/EIS.[19] For this SEA-03/04, the Corps reevaluated the existing information and analyses. Any other relevant environmental concerns or impacts were also verified and/or further explained. This proposed action would involve the dredging and disposal of approximately 320,000 cy of sediment from the four lower Snake River reservoirs. The work would occur during the in-water winter work period from 15 December 2003 to 1 March 2004. The Corps policy is to use dredged material beneficially when it is the least costly disposal method, is consistent with sound engineering practice, and meets federal environmental standards. This dredging action can utilize dredged material for beneficial uses by the creation of improved aquatic riparian habitat for ESA-listed fish and improved riparian habitat for fish and wildlife.

While dredging may not be the only option conceivable for 2003-2004, it is the most feasible and reasonable alternative; and has proven to result in limited impact to the environment. Results from dredging can be accurately predicted and measured, which makes it a desirable alternative. Dredging in some form and in some quantity will, in all likelihood, always be needed to meet congressional intent to provide for navigation, regardless of any other method of sediment management.

The activity identified for the 2003-2004 period is summarized as follows:

- Conduct maintenance dredging of navigation channels to provide the authorized 14-foot depth.
- Conduct maintenance dredging at selected ports and public-use areas.
- Dispose of dredged material primarily through beneficial activities in the vicinity of RM 116, creating shallow-water habitat for listed species.
- Dispose of any dredged material unsuitable for beneficial uses at an upland site.

In-water disposal for habitat creation is preferred as the primary disposal option because of interest by NMFS in developing this beneficial use as a means to offset dredging impacts. Studies of various in-water disposal methods and locations have been ongoing since 1987. The results of these studies (Bennett *et al.*, 1995b) indicate high potential for improved salmon habitat through in-water disposal at the proposed location.

[19] 2002 DMMP/EIS, Appendix N, *Dredging Proposed 2002-2003*.

2.3 Consideration of Measures and Alternatives

The Corps has a responsibility to maintain the federal navigation channel. Congress, as set forth in Public Law 87-874, authorized a 14-foot-deep navigation channel. Maintaining the navigation channels at less than the authorized 14-foot depth is not consistent with congressional intent. The current commercial navigation industry depends on the full 14-foot draft throughout the system, and derives economic viability based on the certainty assumed with the authorization of a 14-foot channel (see Attachment I). The Corps responsibility is to maintain a viable navigation system, but it should be noted that the Corps believes it has some discretion concerning how and when the navigation channels should be maintained. At present, the Corps believes maintenance dredging is necessary to temporarily restore the authorized depth, especially in light of the contentious nature of MOP deviations.

This SEA-03/04 provides an analysis of the measures or alternatives necessary for the Corps to meet its responsibility for maintenance of the authorized navigation channel in 2003-2004. The Corps recognizes that alternatives determined to be reasonable and feasible cannot be disregarded merely because they are not a complete solution to the identified problem. At the same time, the Corps does not need to consider an alternative where the effect cannot be reasonably ascertained, and where the implementation is deemed remote or speculative.

2.3.1 Non-Dredging Measures Considered

Three particular non-dredging activities that have been suggested—sediment reduction, sediment flushing, and light loading—are discussed regarding their applicability to the proposed near-term 2003-2004 dredging activity.

2.3.1.1 Sediment Reduction

Over the last 15 to 20 years, several agencies and groups have strongly promoted upstream land treatment as an alternative to dredging, presuming it would greatly reduce or even eliminate the need for dredging. Current information indicates that sediment reduction measures could have some beneficial aspects if implemented effectively; however, these measures would not eliminate the need for some dredging. Land treatment could potentially reduce dredging costs and frequency but, given current information, the viability of this measure is uncertain and speculative. The Corps recognizes the potential benefits of this measure for long-term implementation, and has begun the process to request congressional authority and appropriations for a basin-wide study, as discussed below.

Formal analyses of land treatment measures is somewhat limited, with the exception of a Soil Conservation Service (SCS) study of sediment sources and sediment yield in the basin upstream of the Lower Granite reservoir (Reckendorf, 1988).

One element of the 1985 Food Security Act was a program that compensated farmers for removing highly-erodible lands from production. Although the SCS study provides useful information concerning the sediment yield from the highly-erodible lands, considerable difficulties were experienced in attempting to match SCS estimates with observed sediment accumulation and measured sediment transport. This effort demonstrated the difficulty involved in accurately estimating the erosion and runoff from a large basin and highlights the need to conduct additional studies.

The Walla Walla District has started the process to request authority and appropriations to conduct a 5-year study to (1) identify and evaluate significant sources of sediment in the Lower Snake River Basin; (2) quantify the natural processes and other activities affecting mobilization, transport, and deposition of those sediments on land and water in the Lower Snake River Basin; and (3) formulate and evaluate alternatives to reduce sediment inflow into the lower Snake River so as to reduce future dredging requirements for navigation and levee protection.

This study is to include six subbasins: (1) the Snake River; (2) the Grande Ronde River; (3) the Salmon River; (4) the Clearwater River; (5) the Tucannon River; and (6) the Palouse River. Not included in this study are the subbasins above Hells Canyon Dam on the Snake River and above Dworshak Dam on the North Fork of the Clearwater River.

The study components proposed include computer modeling to assist in (1) identification of sediment yield (*i.e*. sediment sources, types and quantities); (2) identification and quantification of transport and deposition of sediment; and (3) examination of the effectiveness of alternative management measures in reducing sediment inflow into the lower Snake River. Research will be conducted to improve the understanding of (a) processes affecting sediment transport; (b) influences on sediment soil type, climate, vegetation cover, and modifications to stream drainage network; and (c) river hydrodynamics, in relation to sediment transformations, retention, transport, and deposition. Also planned are pilot projects to test the effectiveness of actions to reduce sediment inflow into feeder streams, separating and removing sediment from flow in the higher order tributary channels, or other sediment control actions deemed appropriate based on data gathered in the first two years of the study. These actions would be implemented during the last three years of the study period.

The information obtained from this study will be valuable in answering the questions of whether it is reasonable or feasible to use sediment reduction as a long-term strategy, which will be addressed in the PDMMP/SEIS. Because additional study is needed to develop an implementation strategy for this measure, consideration of a sediment reduction strategy is not timely for implementation, even as a partial solution, within the timeframe necessary to meet the needs for maintaining the navigation channel in the near-term.

Other factors considered in determining the viability of this measure include the following: (1) it must be applied over a very large drainage basin to be effective; (2) it requires broad cooperation and the participation of thousands of private land owners to be effective; (3) there is no Corps authority to require implementation on private land; (4) cost-benefit rationale would be difficult to quantify; and (5) it must be subject to inevitable changes in circumstances involving changing landowners, local and state political climates, and congressional appropriations.

The Corps has already taken steps to encourage land treatment initiatives. For instance, the Corps has officially reviewed and sent letters of support regarding soil conservation proposals by other government agencies (*e.g.*, land management agencies), because it was recognized that these proposals had long-term potential to reduce sediment inflow to Corps-administered project areas.

2.3.1.2 Drawdown/Sediment Flushing

An alternative measure considered for this 2003-2004 dredging was reservoir drawdown/flushing. The concept of a drawdown/sediment flushing measure is to draw the Lower Granite reservoir down 10 to 15 feet below MOP, thus increasing water velocity in an attempt to move sediment downstream out of the navigation channel in lieu of dredging. The increased water velocity should resuspend some of the deposited sediment material into the water column, as well as move bedload downstream. This proposed measure could be partially effective in reducing the need for dredging in portions of the navigation channel. However, there are two issues with implementation of this measure for the 2003-2004 dredging that preclude it being a solution, or even a partial solution for removing the sediment that has accumulated in the navigation channel. One of the drawbacks to the drawdown/sediment flushing proposal is the potential impact to the ESA-listed species that would be present during the time of year when drawdown was proposed for implementation (approximately 2-3 weeks during the spring freshet, typically May/June). The second issue with implementation of a partial drawdown is the question of its effectiveness in resolving the sediment accumulation already existing within the defined navigation channel. The next several paragraphs discuss the potential biological impacts and effectiveness of a partial drawdown.

- **Biological Aspects**

Although a drawdown would have some effectiveness in moving sediment to avoid dredging, other environmental impacts during the flushing would occur. With the inability to control how much material will move or where it will go, sediment could resettle in the channel, over spawning beds or other valuable habitat. The material that goes into suspension during a flushing event may have an adverse effect on ESA-listed species.

The total amount of sediment mobilized and suspended with a drawdown may be harmful to the sensory and respiratory systems of fish. The volume of material that could be moved by flushing in a time period of 2 to 3 weeks during the spring outmigration of juvenile salmonids would likely have more detrimental impacts to the fish migrating through the lower Snake River; exceeding those associated with the proposed dredging, which would be conducted within the defined areas and within the approved in-water work window when listed fish are less likely to be present. The current BA (Attachment A) contains a discussion of potential impacts to listed species, which include disrupting the use of the juvenile fish bypass system and significant harmful effects to fish from exposure to suspended sediment.

A 10- to 15-foot (3.05 to 4.57-meter) reservoir drawdown during the juvenile salmon outmigration period would render the juvenile fish bypass system at Lower Granite Dam inoperable. There are two alternatives for fish passage in the absence of the juvenile bypass systems: the turbines and the spillway. These alternatives may exhibit potential passage problems greater than the ones associated with bypassing fish.

In addition, a large number of fish would be trapped in the gatewells during a drawdown. The primary opportunity for exit from the gatewells would be to physically capture and remove the fish. This can be very physiologically stressful, and a great number of fish could eventually die. Depending on the gatewell environment, conditions (such as turbulence) can be detrimental if fish spend too much time there. Dipping fish from gatewells can be successful for moving fish around dams, but only for a much smaller number of fish that would be anticipated in this scenario. The Corps does not support this means of fish passage during what is typically the peak of the juvenile outmigration. In an average year, 8 to 9 million juveniles enter the collection system at Lower Granite Dam; therefore, the number of fish affected would be too high to make this a feasible option.

The NMFS 2000 FCRPS Biological Opinion indicates that NMFS predicts a 90- to 93-percent survival at each dam for turbine passage under any powerhouse condition (NMFS, 2000). Although the mortality rate of fish passing through the turbines at a 10- to 15-foot drawdown may not be significantly different from the mortality rate through the turbines at normal pool levels, the number of fish

passing through the turbines would be greatly increased because of the inoperability of the juvenile bypass system. Fish survival through turbines has not been measured at suggested drawdown levels; however, pulling fish screens and letting fish go through the turbines at the proposed forebay elevation would have unknown but likely adverse effects on juvenile fish survival.

In the absence of an operational juvenile bypass system (which requires the operation of turbines), the spillway would be an alternative passage route. Without a powerhouse (turbine) operation; however, a large eddy would develop in the tailrace of the dam. As an eddy develops, it has the potential to continually cycle juvenile fish through it, resulting in longer periods of exposure to predators. The Corps agrees that certain turbine operations, in conjunction with spill operations, could help disrupt an eddy, potentially improving spillway passage survival. However, this has never been tested during a drawdown scenario.

The Corps has evaluated the most current and best scientific information available concerning fish passage survival, and has determined a drawdown/flushing operation is likely to adversely affect listed salmonid species and is contrary to the Reasonable and Prudent Alternative in the NMFS 2000 FCRPS Biological Opinion.

Additionally, without a functional juvenile bypass system, the Corps cannot transport juvenile fish, which are collected via the bypass system, around the dams. One of the survival benefits attributed to transporting juvenile fish from Lower Granite Dam to downstream of Bonneville Dam is the reduced time that fish spend migrating through the river fending off predators and other problems associated with their migration (*e.g.*, dam passage). Because the Corps has the ability to collect fish for transportation and deliver them to the estuary at a higher survival rate and in better condition than fish traveling in-river, drawing the reservoir down for extended periods during any of the juvenile fish migration seasons would most likely have a negative impact on fish runs.

- **Hydraulic Aspects**

There are two main hydraulic issues with the potential effectiveness of the proposed drawdown/sediment flushing measure. First, implementation of this measure may not be effective in removing the material from the defined navigation channel or the public-use areas with sediment problems. Second, there is no control over where material is picked up from the river channel and where it is re-deposited.

Although implementation of a drawdown/flushing measure would be effective in moving some material downstream, it would not remove the material necessary to restore a 14-foot depth to the defined navigation channel. The limited drawdown would be most effective in removing material from the historic, or pre-reservoir, river channel. The defined navigation channel does not coincide with

the historic river channel throughout the Clearwater/Snake River confluence area. Plate 2 shows the defined navigation channel in the Snake/Clearwater River confluence area overlaid on 1958 aerial photography, which indicates a pre-reservoir condition. See an expanded discussion of this issue in Attachment G, *Hydrology*.

The other primary issue with implementation of the drawdown/sediment flushing measure is the lack of control of where material is removed from the riverbed and where material may be deposited. Material that currently resides in the river channel upstream of the Snake/Clearwater River confluence area (upstream of any impact to the federal navigation channel) may be mobilized and pushed down into the confluence area, where it could contribute to problems with sedimentation in the navigation channel. Additionally, most of the material that is moved down from the confluence area would likely be deposited in the Snake River no further downstream than Silcott Island (Snake RM 131). Any material deposited in this reach would have a negative impact on the water surface profile in the Lewiston area during a high-flow event – potentially increasing the risk of overtopping the levee system. Plate 1 includes a comparison of the reservoir conditions of the 36-foot drawdown (tested in 1992), at the proposed 15-foot drawdown, and the reservoir under its normal operating conditions. Plate 1 also illustrates two significant concerns. The plate shows that a 10- to 15-foot drawdown would increase velocities significantly in only the upper 9 miles out of the 40-mile reservoir. Additionally, a 10- to 15-foot drawdown at lower discharges would most likely have a limited effect on the velocities in the Snake/Clearwater confluence area.

- **The 1992 Lower Granite/Little Goose Reservoir Drawdown Test**

In March 1992, a drawdown test was conducted using the Lower Granite and Little Goose projects on the lower Snake River, as documented in *1992 Reservoir Drawdown Test, Lower Granite and Little Goose Dams*) (Corps, 1993). The test was designed to gather information regarding the effects of substantially lowering existing reservoirs to help downstream migrating juvenile salmon, as proposed by various entities in the Pacific Northwest. Since the hydroelectric projects on the lower Snake River are not currently equipped to safely pass adult and juvenile fish at lowered pool elevations, this test was primarily designed to provide information regarding the physical effects of such an operation on the dam and reservoir structures. Information on a variety of physical features was gathered; and environmental data, including effects on water quality and aquatic organisms, were also obtained. Some anadromous fish were present in the reservoirs during March, so efforts were also made to minimize test impacts on these fish and to gather information that would help in evaluating the long-term effects of reservoir drawdown. Major efforts were made to accomplish as much as possible during the March drawdown, recognizing the importance of evaluating the concept as a means to improve Snake River salmon runs.

Effects to projects and reservoir facilities are thoroughly described in the drawdown report (Corps, 1993), and summarized in the following paragraphs. The Lower Granite and Little Goose Dams suffered no physical changes or movements during the test. However, engineered fill embankments such as dam embankments, railroad and road embankments, ports, private facilities, docks, *etc.*, suffered damages. On October 2, 1992, the Energy and Water Development Appropriations Act, 1993,[20] addressed the damages to public and private entities, and stated the following:

> That using $2,000,000 of the funds appropriated herein to remain available until expended, the Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to pay such sums or undertake such measures as are necessary to compensate for costs of repair, relocation, restoration, or protection of public and private property and facilities in Washington and Idaho damaged by the drawdown undertaken in March 1992 by the United States Army Corps of Engineers at the Little Goose and Lower Granite Projects in Washington.

Claims payable were limited to the type of damages described in the act; and no loss of business, loss of use, mental anguish, and other such non-physical damages were payable. After processing the qualifying claims, approximately $1.3 million dollars was paid to public and private entities for damages associated with the 1992 drawdown.

The report concluded that, to prevent damage to the spillway, modifications related to the stilling basin would be required even for long-term drawdown proposals that rely primarily on powerhouse passage. Modifications would have to be made to other project structures, port, and private facilities to minimize damage from repeated drafting and refill should regular reservoir drawdowns be implemented.

Examples of the damages included Whitman County Road 9000, which was adversely affected during the drawdown period. Thirty-three areas with extensive movement, as evidenced by cracking, depressed and raised areas within the road, and guardrail movement, were noted during drawdown and re-impoundment. These cracks were 1/8 of an inch to 15 inches in width, and up to several hundred feet long.

[20] Public Law 102-377, 106 Stat. 1315, 1321.

With regard to environmental issues, the extra spill would result in increased dissolved gas supersaturation levels, which have the potential to affect all aquatic organisms; and turbulent conditions at adult fish passage facility entrances, as well as downstream of the dam where the adult salmon approach the projects.

The March 1992 reservoir drawdown had substantial negative impact on some benthic organisms residing in the drawdown zone, particularly the less mobile ones (*e.g.*, mussels). The effects of these impacts on the ecosystem, including the food webs for resident and anadromous fish, are unknown but likely significant. The effects of the drawdown test on some resident fish populations may also have been substantial, but cannot be quantified at this point in time.

Photo 1. Typical cracking in Whitman County Road 9000, March 1992

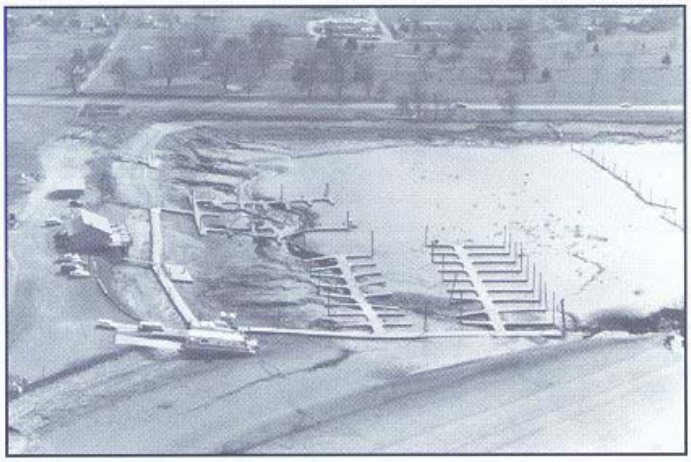


Photo 2. Damage to a private marina, March 1992

The drawdown report indicates that future studies will need to consider the resuspension of contaminated sediments, turbidity, erosion, and protection of cultural resources. The Lower Granite and Little Goose reservoirs are now disturbed ecosystems. This will affect future studies designed for continued environmental evaluation of the reservoir drawdown concept.

The report addressed drawdown with regard to transporting sediment, and concluded that only minimal increases in sediment transport occurred on the Snake River within the reservoir until maximum drawdown (36 feet – Lower Granite Dam forebay elevation 733 fmsl to 697 fmsl).

Photo 3. Alpowa Creek delta erosion, March 1992

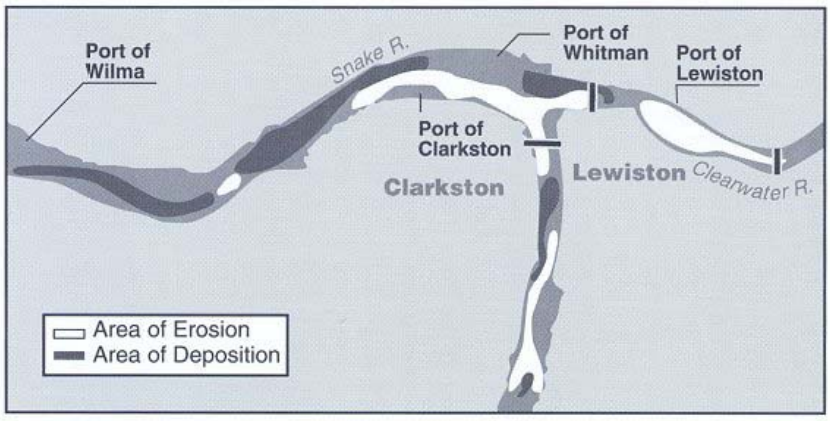


Photo 4. Areas of sediment erosion and deposition resulting from the development of a free-flowing river stretch during the March 1992 drawdown test

While large amounts of sediment were picked up and moved, redeposition occurred within short distances. Therefore, future reservoir drawdowns would not eliminate the need for regular dredging in the Snake and Clearwater Rivers confluence area.[21] Dredging would still be needed to maintain the Lewiston Levee freeboard.

- **Summary of Drawdown/Sediment Flushing**

In summary, the potential adverse biological impacts and the probable inability to restore the 14-foot channel depth, combined with the expected economic impacts of implementation, make the proposed drawdown/sediment flushing measure one that the Corps does not support as part of the 2003-2004 routine maintenance activity. It is anticipated there will be much less adverse impact, both biologically and economically, from dredging the problem areas in the channel and using a planned disposal area, than there would be from a limited 10- to 15-foot drawdown with the resulting uncontrolled sediment movement—particularly since the proposed disposal area has a research-supported potential to be beneficial to anadromous species as shallow-water habitat.

2.3.1.3 Light Loading

An alternative presented to the Corps for analysis is "light-loading," rather than dredging the federal navigation channel. Light loading is the act of reducing the cargo on a barge in order to compensate for water depths less than anticipated when the barges were designed. Consequently, less cargo is transported than planned for based on the assumption that the navigation channel would be maintained at the authorized 14-foot depth.

Light loading is an action taken by barge operators and others who rely on the navigation channel as a *consequence* of the diminishment of the navigation channel, rather than as an alternative to routine maintenance dredging. The Corps has no authority to direct barge owners/operators to light load.

An economic analysis was conducted that evaluated effects on the navigation industry with the reduction of water depths to 12 and 13 feet. A summary of the cost-benefit analysis[22] on the authorized federal navigation project, regarding whether the project remained economically feasible, is included in Attachment H. For cost-benefit analysis, federal navigation channels, with shallower, controlling depths of 13 feet and 12 feet, were assumed to result from termination of maintenance dredging. Grain shipments, representing 78.8 percent of the commerce on the Snake River from 1987 to 1996, were selected to represent the impacted commerce. Grain barge costs for shipments from the various ports on the Snake River system were developed to reflect light loading to accommodate

[21] 1992 Reservoir Drawdown Report, Chapter 5, paragraph c(2)(c).
[22] 2002 DMMP/EIS, Appendix C, Section 4, *Benefit-Cost Analysis*.

the shallower channels. Reduced cargo capacity of the standard 3,600-ton grain barge (274 feet long, 42 feet wide, and 13.5-foot draft), with drafts of 12.5 feet and 11.5 feet, were determined to be 3,270 tons and 2,950 tons, respectively. The impact of this reduced capacity would be to raise per-ton barge costs by 10 percent and 22 percent, respectively.

The economic viability of the navigation channel is compromised without maintenance activities. In the near-term, one proposed 2003-2004 dredging activity provides the most certainty in accomplishing the Corps responsibility for maintaining the navigation purpose of the Lower Snake River Project.

In addition to the economic effects on the navigation industry, the reduction in the channel depth would increase unsafe conditions, risking a higher likelihood of groundings, barge accidents, and possible cargo spills.

The Corps has been directed by Congress to maintain the navigation channel. After taking into consideration the relevant factors including, but not limited to, the economic viability and reduction of hazards to the navigation industry, the Corps believes the currently proposed maintenance activity is necessary.

2.3.1.4 Prior Documentation of Non-Dredging Measures

The issues relating to drawdown, light-loading, and sediment sources have been evaluated for years. For example, the *Schultz Bar Navigation Channel Project – Environmental Assessment*, 7 September 1990, CENPW-PL-ER (1165-2-26a) MFR, light-loading,[23] sediment control at the source,[24] and lower pool during high flows to transport sediment[25] was discussed. Later that year, light-loading was again addressed in *Lower Monumental Lock Navigation Channel Project – Environmental Assessment*, 8 November 8 1990, CENPW-PL-ER (1165-2-26a) MFR.[26] The *Columbia River System Operation Review Final Environmental Impact Statement,* dated November 1995 (SOR, 1995) discussed the potential impacts of a seasonal (4.5-month) drawdown.[27] Some of the impacts identified for this seasonal, 30- to 35-foot drawdown, would still be considered a potential impact for a 10- to 15-foot drawdown. The following impacts would be anticipated: large increase in erosion; damage to embankments and port facilities; a moderate decrease in the water table, affecting groundwater wells; increases in the number of days with high water temperature; total dissolved gas levels increasing with extra spill; uncontrolled movement of contaminants; and exceedances of multiple water quality parameters in the water column. In addition, the diversion and transport of anadromous salmon and steelhead would be eliminated at Lower Granite; conditions for resident fish would worsen;

[23] Schultz Bar EA, page 6.
[24] *Ibid.*, page 7.
[25] *Ibid.,* page 7.
[26] 1990 Lower Monumental EA, page 7.
[27] SOR, Section 4, *System Operating Strategies*.

juvenile fish could potentially be stranded in pools; wildlife habitat and resources would be decreased and degraded; there would be an increased rate of cultural site exposure; most water-based recreation facilities would be hampered; navigation access to the lower Snake River locks would be prevented; annual shipping costs would increase; substantial capital cost would be required prior to drawdown; higher flood risk would occur; and there would be increased impact to the local economy from reduced employment and regional income.

2.3.1.5 Summary of Non-Dredging Measures

This SEA-03/04 incorporates by reference the environmental effects analyses of the alternatives evaluated in the 2002 DMMP/EIS, including the summary comparison chart, to the extent applicable to this 2003-2004 Proposed Action.[28] This SEA-03/04 has included additional environmental effects in Table 4, below, to compare the potential effects of the non-dredging measures considered.

Table 4.
Environmental Effects of Non-Dredging Measures

Resource	Light-Loading	Sediment Reduction	Sediment Flushing
Water Quality	This measure would likely not impact water quality over current practices.	Sediment reduction measures such as managing upstream land uses would likely have some positive effect on lower Snake River water quality, as it would reduce input of fine-grained sediments that may contain pesticides from farm or forest practices. This action could also reduce turbidity during high runoff evens.	Drawdown and sediment flushing could result in increased water quality impacts over current dredging practices. Drawdown/flushing could expose previously undredged sediments that may contain contaminants to the water column. Turbidity would likely be greatly increased and extend for a significant distance downstream under this measure.
Economics	This measure would directly impact the economy of the region by increasing the cost of shipping cargo. Light loading would require the use of more barges to carry the same cargo.	Land use management over the vast area required to have a measurable effect on sediment reduction would be a significant undertaking and involve a high initial cost. The benefit or long-term cost savings is extremely difficult to measure. The reduction of environmental effects (from potentially reduced dredging) is also very difficult to quantify.	This measure would negatively impact barge passage for up to several months of the year. This impact would result in higher barging costs and create an unreliable transportation system for commodity movement through the system. This measure would not flush out sediments from boat basins, side channels and recreation areas and only affect a portion of the main navigation channel. Lower head elevation during flush would result in lower power generation, and may lower generation capability if sufficient water is not available to replace water used for flushing.

[28] 2002 DMMP/EIS, Section 2.5, Table 2-8.

Table 4. (continued) Effects of Non-Dredging Measures			
Resource	Light-Loading	Sediment Reduction	Sediment Flushing
Sediment Quality	Would have no direct effect on sediment quality.	This measure could result in reduced introduction of upstream contaminants such as pesticides which may deposit within the lower Snake River. It would have no effect on sediments already in the system or on sources of contaminants originating in the system such as potential sources from commercial shippers or recreational boaters.	May remove contaminated sediments from the confluence area, but would redistribute contaminants to other locations in the lower Snake and/or Columbia Rivers.
Fish	May result in minor benefit to fish by eliminating or reducing dredging needs. May result in negative impacts if the number of barges are increased to compensate for lighter loads.	May reduce sediment deposition in spawning gravels and improve spawning success. Potential for reduced dredging may result in minor benefit to fish. May improve water quality and indirectly benefit fish.	This measure would likely result in more detrimental impacts to fish than current practices. The drawdown required to be effective would negatively affect fish passage success at the dams since downstream migrants would be forced to pass through the turbine areas. A drawdown would also not allow barge transportation of juvenile salmon during critical times. Sediment flushing would create large turbidity plumes over an extended period of time, with likely impacts to fish respiratory functions.
Navigation Safety	May affect navigation safety, as more barges may be used to compensate for the lighter loads. Increased barge traffic could result in increased safety incidents.	Would have no measurable benefit to navigation safety. The uncertainty associated with this measure would affect the reliability of the barge transportation system. Dredging for navigation safety would still likely be required at some locations.	The drawdown associated with this measure would likely render the navigation system unsafe or unusable for several months of the year. Flushing is expected to be only partially effective in the confluence area, and may cause more shoaling further downstream. Some dredging would likely need to occur despite a drawdown.

2.3.2 Alternatives Considered

2.3.2.1 No Dredging

Under this alternative, the Corps would not perform routine maintenance dredging in 2003-2004. The navigation channel would remain partially filled in with sediment, and would continue to fill in as more sediment is deposited. Barges would continue to experience grounding problems, and barge operators would need to continue to light load. The boat basins would continue to fill with

sediment until boat ramps and basins would be unusable, and boaters would have to use other facilities. The ports would need to pursue other means of dredging their sites. This alternative does not address the Corps responsibility to provide for navigation, an authorized project purpose; therefore, this alternative will not be discussed further. For the purposes of this SEA-03/04 only, this alternative is considered the No Action alternative.

2.3.2.2 Dredging With Traditional Disposal Protocols

Under this alternative, the Corps would perform necessary dredging and would continue to dispose of dredged material in-water, using the same method used for the 1997-1998 dredging. In general, material would be scooped from the river bottom and loaded onto a bottom-dump barge. Once the barge arrived at the appropriate disposal site, the bottom would be opened to dump the material all at once. Disposal of all dredged material (except as noted above for small dredging activities) would be in-water, in one of three types of in-water disposal areas: (1) shallow-water disposal; (2) mid-depth disposal; and (3) deep-water disposal.

This alternative was removed from further consideration because it includes disposal of silt in the deep-water disposal sites, which has little to no environmental benefit. While this plan would adequately dispose of the expected dredged material, it was not considered the optimum plan because the CWA specifies that placing fill within the waters of the United States should be avoided if there is a practicable alternative. However, Region 10 of EPA has stated that in-water disposal of dredged material would be acceptable if the material was used in a beneficial way.

2.3.2.3 Routine Maintenance Dredging With Beneficial Use of Dredged Material

To address the short-term maintenance dredging needs in the lower Snake River in 2003-2004, the Corps believes the reasonable and feasible proposed action available is to dredge the navigation channel to the authorized 14-foot depth, along with recreation marinas and boat launches, using in-water disposal of the dredged material for beneficial uses.

2.4 Details of Proposed Action

2.4.1 The 2003-2004 Dredging Locations and Quantities

The following are descriptions of dredging activities planned for the in-water work window of 2003-2004 (see Table 5). Plate 3 shows the location of each dredging and disposal site included in Table 5. There are no dredging templates for the public-use sites, but dredging in the boat basins would attempt to restore the original design contours and depths of the boat basins. Note that, within those dredging templates defined in the federal navigation channel, material will only

be removed at those locations where sediments have accumulated and raised the bottom elevation to the point that available water depths are less than 16 feet when the reservoir water surface elevation is at MOP. A 16-foot depth is used as the maximum dredging depth in the Federal navigation channel, in order to maintain a consistent 14-foot depth. Of the additional 2 feet, 1 foot is defined as advance maintenance (the additional depth and/or width specified to be dredged beyond the project channel dimensions for the purpose of reducing overall maintenance costs and impacts by decreasing the frequency of dredging), and 1 foot is defined as allowable overdepth (additional depth below the required section specified in a dredging contract, and permitted because of inaccuracies in the dredging process) (Corps, 1991). This overdepth dredging is standard procedure,[29] and helps prevent the need for more frequent and intermittent dredging of high spots. Other public use areas are dredged to depths based on their specific needs.

Table 5. Sites Proposed for Dredging in 2003-2004 and Estimated Quantities for Each

Site Number	Site to be Dredged	Quantity to be Dredged (cy)	Total Surface Area of Site (Acres)	Predominant Sediment Type (Percent)
1	Federal Navigation Channel at Confluence of Snake and Clearwater Rivers	250,500	63.2	Sand (85-90)
2a	Port of Clarkston	9,600	0.9	Silt (90)
2b	Port of Lewiston	5,100	1.8	Silt (90)
3a	Greenbelt Boat Basin	2,800	1.0	Sand (45) Silt (35)
3b	Swallows Swim Beach/Boat Basin	16,000	2.2	Sand (56-67) Silt (21-27
3c	Lower Granite Dam Navigation Lock Approach	4,000	1.5	Cobble/Rock (100)
3d	Lower Monumental Dam Navigation Lock Approach	20,000	6.06	Rock/Cobble (100)
4a	Illia Boat Launch	1,400	1.0	Silt (86-95)
4b	Willow Landing Boat Launch	6,200	1.4	Sand (56-67) Silt (21-27)
Totals		**315,600**[1]	**79.06**[2]	

[1]2000 Data. These figures are representative of the estimated 2003-2004 dredging quantities.
[2]The area impacted by dredging is less than 0.5 percent of the total surface area of the lower Snake River reservoirs affected. This very small percentage indicates the relative scale of the area impacted by dredging when compared with the total available aquatic habitat area.

- **Site 1: Confluence of Snake and Clearwater Rivers (Federal Navigation Channel)**

The Corps anticipates dredging up to 250,500 cy (191,521.0 m^3) of material from the federal navigation channel at the confluence of the Snake and Clearwater Rivers in winter 2003-2004. Dredging would be aimed at restoring the navigation channel to authorized depth by dredging to a depth of no more than 16 feet (4.9

[29] Engineer Regulation 1130-2-307, *Dredging Policies and Practices, Interim Guidance*, Section 7.1., *Project Dimensions*.

m) in the area designated in Plate 4. Dredging has occurred in this area since 1985; and conveyance dredging[30] was done in 1988, 1989, and 1992. Sediment surveys in June 2000 discovered that 85 to 90 percent of the substrate at this location was sand, and 10 to 15 percent was silt and/or organic material. Dredging this area is expected to remove an estimated 63.2 surface acres (25.6 hectares), or 12.8 percent, of sandy substrate from the nearly 500-acre bank-to-bank confluence area (see Figure 2).

- **Site 2a: Port of Clarkston**

The Corps anticipates dredging up to 9,600 cy (7,339.7 m^3) of material from the Port of Clarkston in winter 2003-2004. Dredging would be aimed at restoring the port to a depth of no more than 15 feet (4.9 m) in the area designated on Plate 5. Dredging has occurred in this area since 1982, and it was last dredged in 1998. Sediment surveys in June 2000 discovered that sediment composition was more than 90-percent silt. Dredging at this location is expected to remove 0.9 acre (0.4 hectare) of shallow-water silt substrate.

- **Site 2b: Port of Lewiston**

The Corps anticipates dredging up to 5,100 cy (3,899.2 m^3) of material from the Port of Lewiston in winter 2003-2004. Dredging would be aimed at restoring the port to a depth of no more than 15 feet (4.9 m) in the area designated on Plate 6. Dredging has occurred in this area since 1982, and it was last dredged in 1998. Sediment surveys in June 2000 discovered that sediment composition was 90-percent silt. Dredging at this location is expected to remove 1.8 acres (0.7 hectare) of shallow-water silt substrate.

- **Site 3a: Greenbelt Boat Basin**

The Corps anticipates dredging up to 2,800 cy (2,140.8 m^3) of material from the Greenbelt Boat Basin in winter 2003-2004. Dredging would be aimed at restoring the basin to a depth of no more than 7 feet (2.1 m) in the area designated on Plate 7. Dredging has occurred in this area since 1975, and it was last dredged in 1998. Sediment surveys in June 2000 discovered that sediment composition was 45-percent sand and 35-percent silt. Although the template in Plate 7 shows that up to 33.3 acres (13.5 hectares) of shallow-water sand and silt substrate would be removed, construction drawings indicate that all dredging would occur no farther than 25 yards (22.9 m) from shore, and within 175 yards (160.0 m) downstream of the boat basin. Total acreage to be dredged is approximately 1 acre (0.4 hectare).

[30] Conveyance dredging involves dredging both the navigation channel and areas outside the navigation channel [historically, up to 1,300 feet (396.24 m) in total width] in an attempt to enlarge the river cross-section and increase the flow conveyance capacity of the river in that reach.

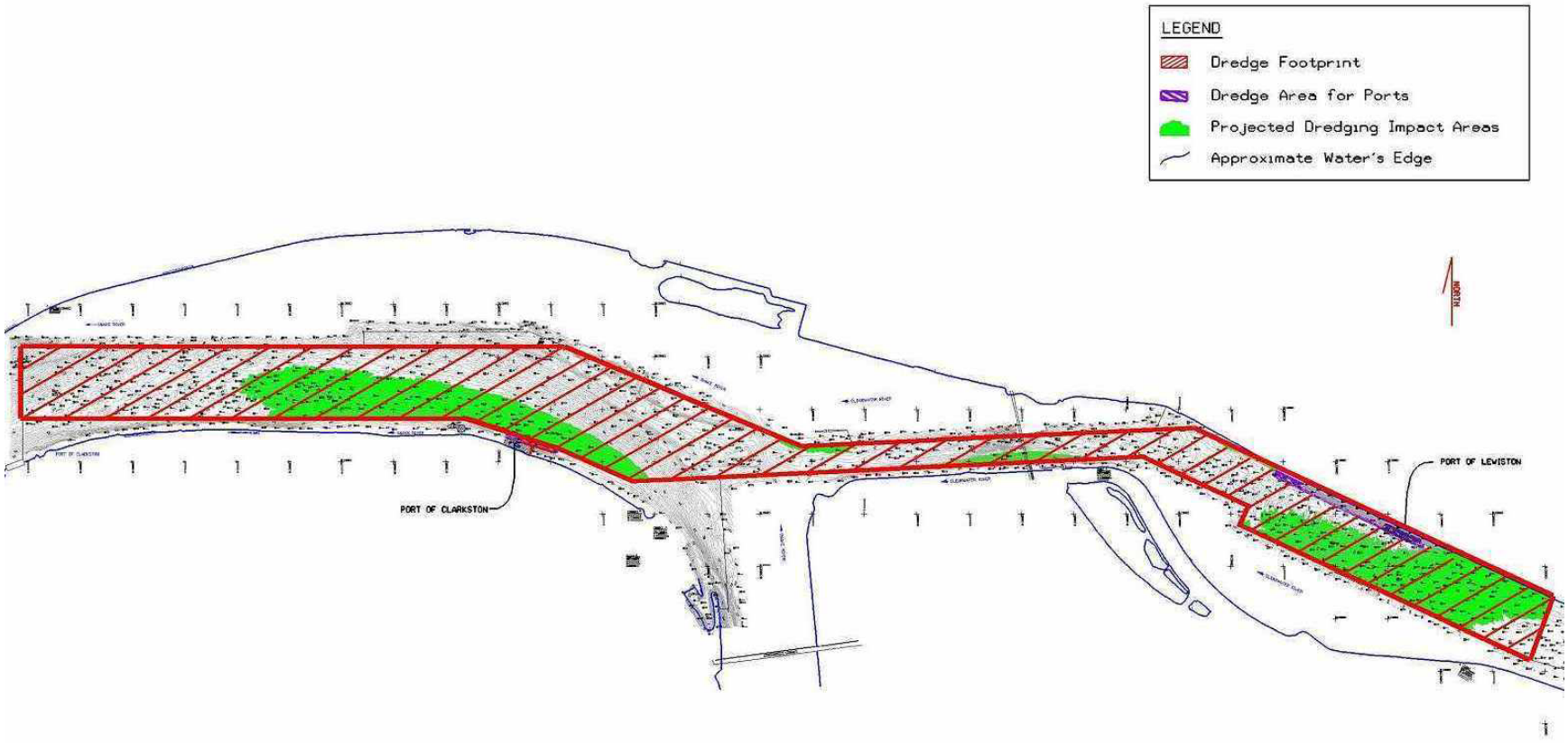


Figure 2: 2003-2004 Proposed Dredging Areas in the Federal Navigation Channel at the Confluence of the Snake and Clearwater Rivers

- **Site 3b: Swallows Swim Beach/Boat Basin**

The Corps anticipates dredging up to 16,000 cy (12,232.9 m^3) of material from the Swallows Swim Beach and Boat Basin in winter 2003-2004. Dredging would be aimed at restoring the boat basin to a depth of no more than 8 feet (2.4 m), and the swim beach to a depth of no more than 5 feet (1.5 m) in the template outlined on Plate 8. Dredging has occurred in this area since 1975, and it was last dredged in 1999. Sediment surveys in June 2000 discovered that sediment composition was 56- to 67-percent sand and 21- to 27-percent silt. Dredging at this location is expected to remove 2.2 acres (0.9 hectare) of shallow-water sand and silt substrate.

- **Site 3c: Lower Granite Dam Navigation Lock Approach**

The Corps anticipates dredging up to 4,000 cy (3,058.2 m^3) of material from the Lower Granite Dam navigation lock approach in winter 2003-2004. Dredging would be aimed at restoring the navigation channel to the authorized depth by dredging to a depth of no more than 16 feet (4.9 m) in the area designated on Plate 9. Dredging has occurred in this area since 1975, and it was last dredged in 1998. Sediment surveys in June 2000 discovered that sediment composition was large rock substrate and 1- to 6-inch [2.5- to 15.2-centimeter (cm)] cobbles. Although the navigation lock approach dredging template covers 28 percent of the tailrace area downstream from Lower Granite Dam, the total surface area to be dredged in the navigation lock approach in 2003-2004 comprises only 1.2 percent of the entire tailrace area. Dredging this area is expected to remove an estimated 1.45 surface acres (0.59 hectare), or 1.2 percent, of shallow-water rock and cobble substrate from the nearly 120-acre bank-to-bank tailrace area (see Figure 3).

- **Site 3d: Lower Monumental Dam Navigation Lock Approach**

The Corps anticipates dredging up to 20,000 cy (15,291.1 m^3) of material from the Lower Monumental Dam navigation lock approach in winter 2003-2004. Dredging would be aimed at restoring the navigation channel to the authorized depth by dredging to a depth of no more than 16 feet (4.9 m) in the area designated on Plate 10. Dredging has occurred in this area since 1972, and it was last dredged in 1999. Sediment surveys in June 2000 discovered that sediment composition was large rock substrate and 1- to 6-inch (2.5- to 15.2-cm) cobbles. Although the navigation lock approach dredging template covers 26 percent of the tailrace area downstream from Lower Monumental Dam, total surface area to be dredged in the navigation lock approach in 2003-2004 comprises only 3.4 percent of the entire tailrace area. Dredging this area is expected to remove an estimated 6.06 surface acres (3.57 hectares), or 3.4 percent, of shallow-water rock and cobble substrate from the nearly 178-acre bank-to-bank tailrace area (see Figure 4).

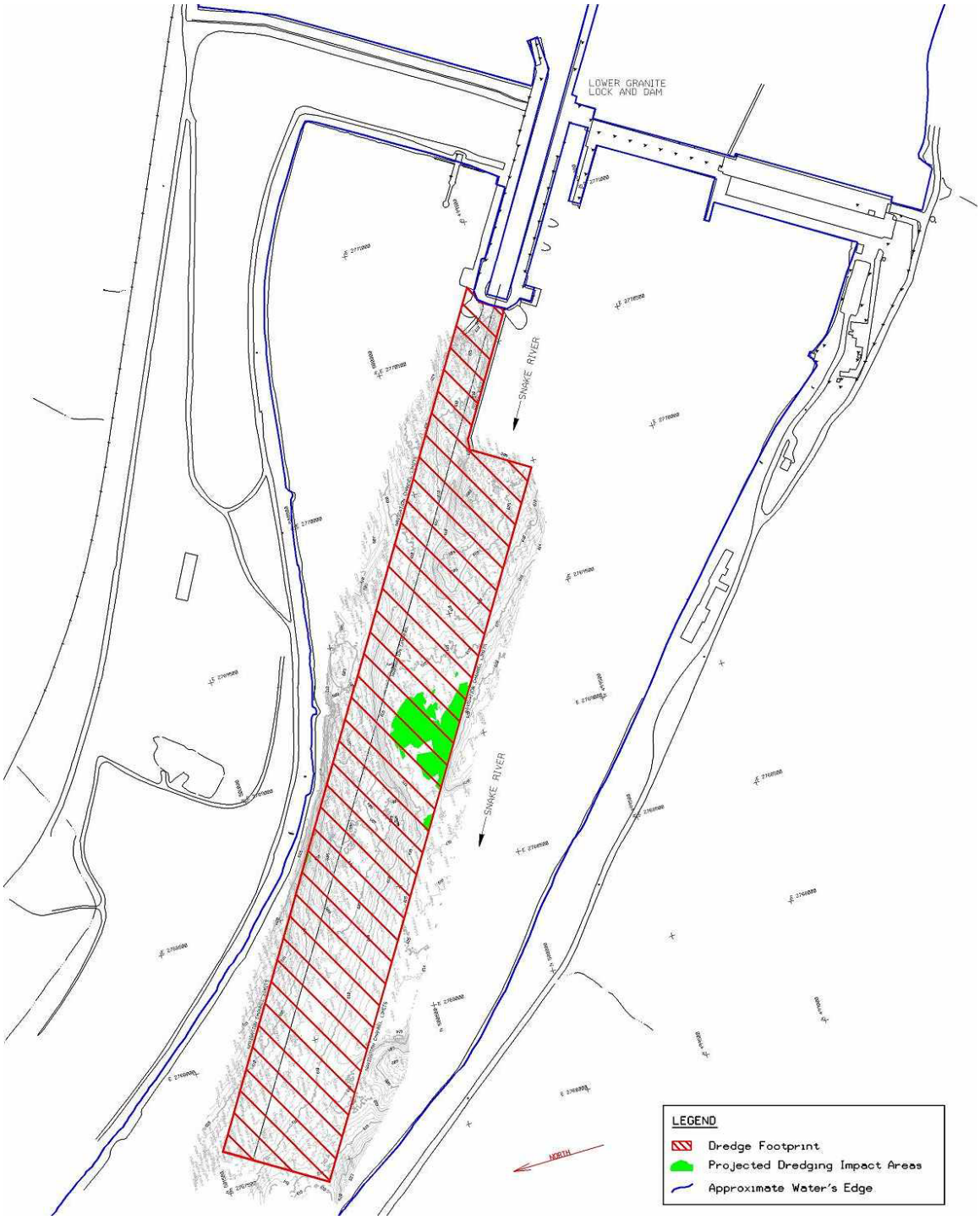


Figure 3: 2003-2004 Proposed Dredging Areas in the Navigation Lock Approach at Lower Granite Dam

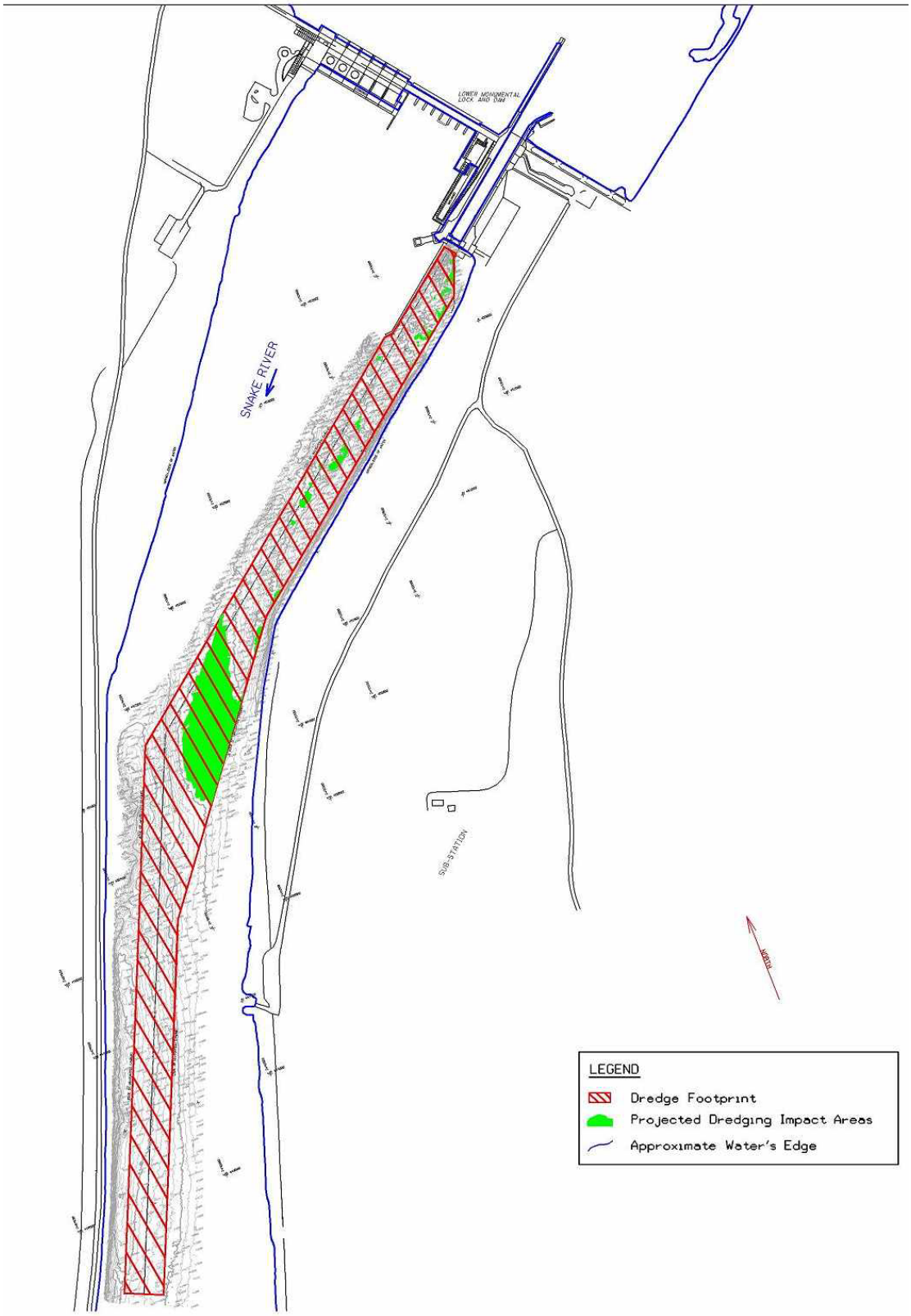


Figure 4: 2003-2004 Proposed Dredging Areas in the Navigation Lock Approach at Lower Monumental Dam

- **Site 4a: Illia Boat Launch**

The Corps anticipates dredging up to 1,400 cy (1,070.4 m^3) of material from Illia Boat Launch (see Figure 5) in winter 2003-2004. Dredging would be aimed at restoring the basin to a depth of no more than 8 feet (2.4 m) in the area designated on Plate 11. Dredging has never occurred at this boat launch. Sediment surveys in June 1997 discovered that sediment composition was 86- to 95-percent silt and 5- to 14-percent sand. Dredging at this location is expected to remove 1.0 acre (0.4 hectare) of shallow-water silt substrate.

Figure 5: Illia Boat Launch—Dredging Area Circled

- **Site 4b: Willow Landing Boat Launch**

The Corps anticipates dredging up to 6,200 cy (4,740.2 m^3) of material from the Willow Landing Boat Launch in winter 2003-2004 (see Figure 6). Dredging would be aimed at restoring the basin to a depth of no more than 8 feet (2.4 m) in the area designated on Plate 12. Dredging has never occurred at this boat launch. Sediment surveys in June 2000 discovered that sediment composition was 56- to 67-percent sand and 21- to 27-percent silt. Dredging at this location is expected to remove 1.4 acres (0.6 hectare) of shallow-water sand and silt habitat.

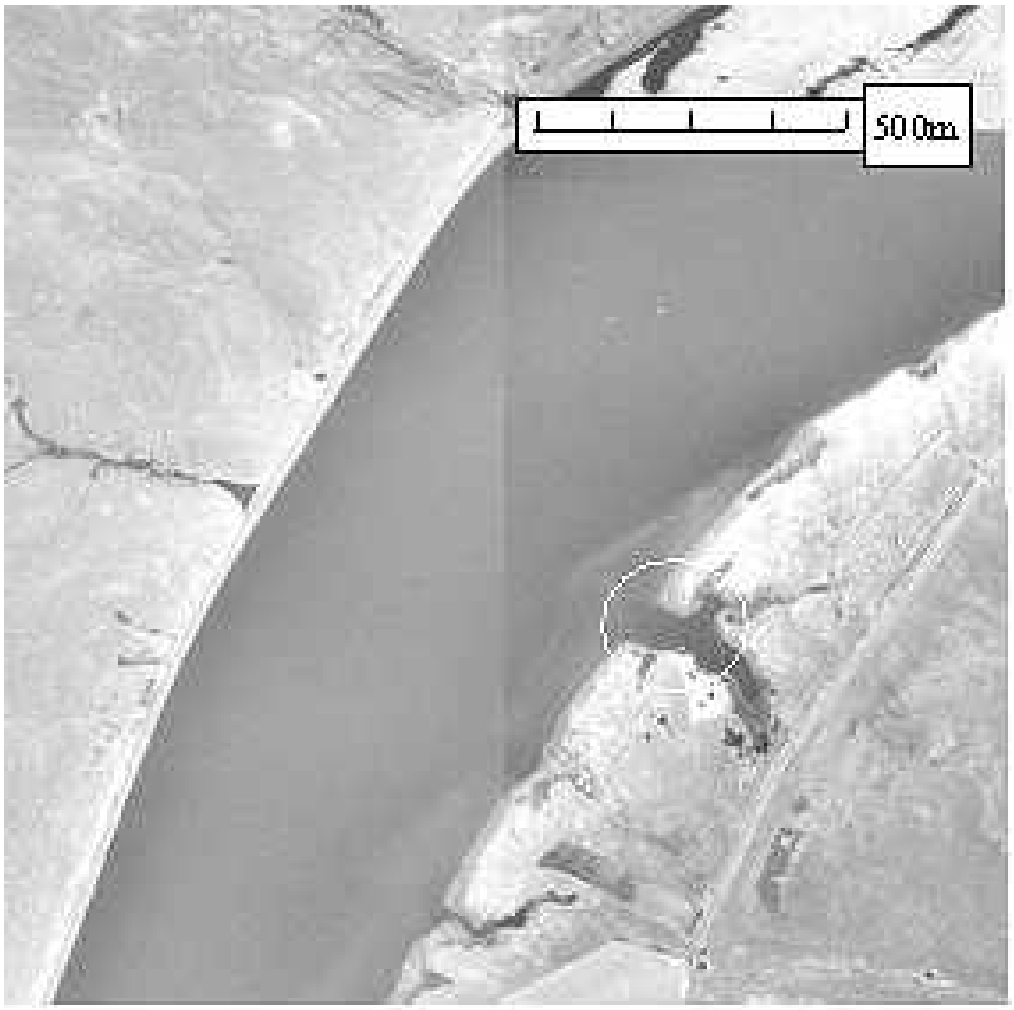


Figure 6: Willow Boat Launch—Dredging Area Circled. Note Adjacent Shallow-Water Habitat Along the Shoreline

2.4.2 Dredging Methods and Timing

For the dredging proposed for the navigation channels, slips, and berths of the Snake and Clearwater Rivers navigation system in 2003-2004, mechanical dredging would be used. Mechanical dredging methods could include clamshell,

dragline, backhoe, or shovel/scoop. Based on previous dredging activities, however, the clamshell method would most likely be used for the larger quantities.

Clamshell dredges of approximately 15-cy (11.5-m^3) capacity, and barges with a capacity of up to 3,000 cy (2.293.7 m^3) and with maximum drafts of 14 feet (4.3 m), would be used. The Corps estimates it could take about 6 to 8 hours to fill a barge. The expected rate of dredging is 3,000 to 5,000 cy (2.293.7 to 3,822.8 m^3) per 8-hour shift. Material would be scooped from the river bottom and loaded onto a bottom-dump barge for in-water disposal, or a bin-type barge for upland disposal. While the barge is being loaded, the contractor will be allowed to overspill excess water from the barge, discharged a minimum of 2 feet (0.6 m below the river surface.

The barge would then be pushed by a tug to the disposal site. No material or water would be discharged from the barge while in transit. If the disposal location is an in-water site, when the barge arrived and is properly positioned, the bottom would be opened to dump the material all at once. If the disposal location is an upland site, the barge would be pushed to a port facility and unloaded using mechanical equipment. Once unloaded, the barge would be returned to the dredging site for additional loads.

The contractor could be expected to work between 10 and 24 hours per day, 6 to 7 days per week. Dredging in the navigation channels, slips, and berths would be performed within the established in-water work window (currently December 15 through March 1 in the Snake and Clearwater Rivers). Multiple-shift dredging workdays would be used when necessary to ensure that dredging was completed within these windows.

2.4.3 Dredged Material Disposal

This section will address proposed methods of disposal and placement, and the biological effects of each. Included in the discussion of in-water disposal will be shallow-water habitat and woody riparian bench creation. Upland disposal will also be discussed within this section.

Disposal methods and dredged material placement were addressed in the biological assessment forwarded to NMFS. In that document, it was determined that in-water disposal is preferred to upland disposal. While the degree of benefit to the Lower Granite system is based on the type of in-water disposal method used, maximum benefit would accrue from shallow-water disposal, whereas the least benefit would accrue from deep-water disposal. As in-water tests (see Attachment A) have indicated, carefully planned and executed shallow in-water disposal will increase shallow-water habitat and, in turn, increase productivity of the reservoir system, benefiting both resident and anadromous fish species.

In-water disposal sites at several locations were evaluated in 2002.[31] The preferred site identified in that report was at RM 132, in the vicinity of Chief Timothy HMU. Subsequent studies determined that this location was being utilized as rearing habitat by ESA-listed salmon stocks. Due to the adaptive management aspect of the Corps process, an alternative in-water disposal site in the vicinity of RM 116, near Knoxway Canyon, was substituted. This site was evaluated, and determined to be of low habitat value to rearing salmon. It has a mid-depth silty substrate, and has great potential for creating higher value shallow-depth sand-gravel habitat using dredged material. There is also potential for creating a woody riparian bench at this location.

2.4.3.1 Beneficial Use – Creation of Shallow-Water Habitat and Woody Riparian Planting Bench

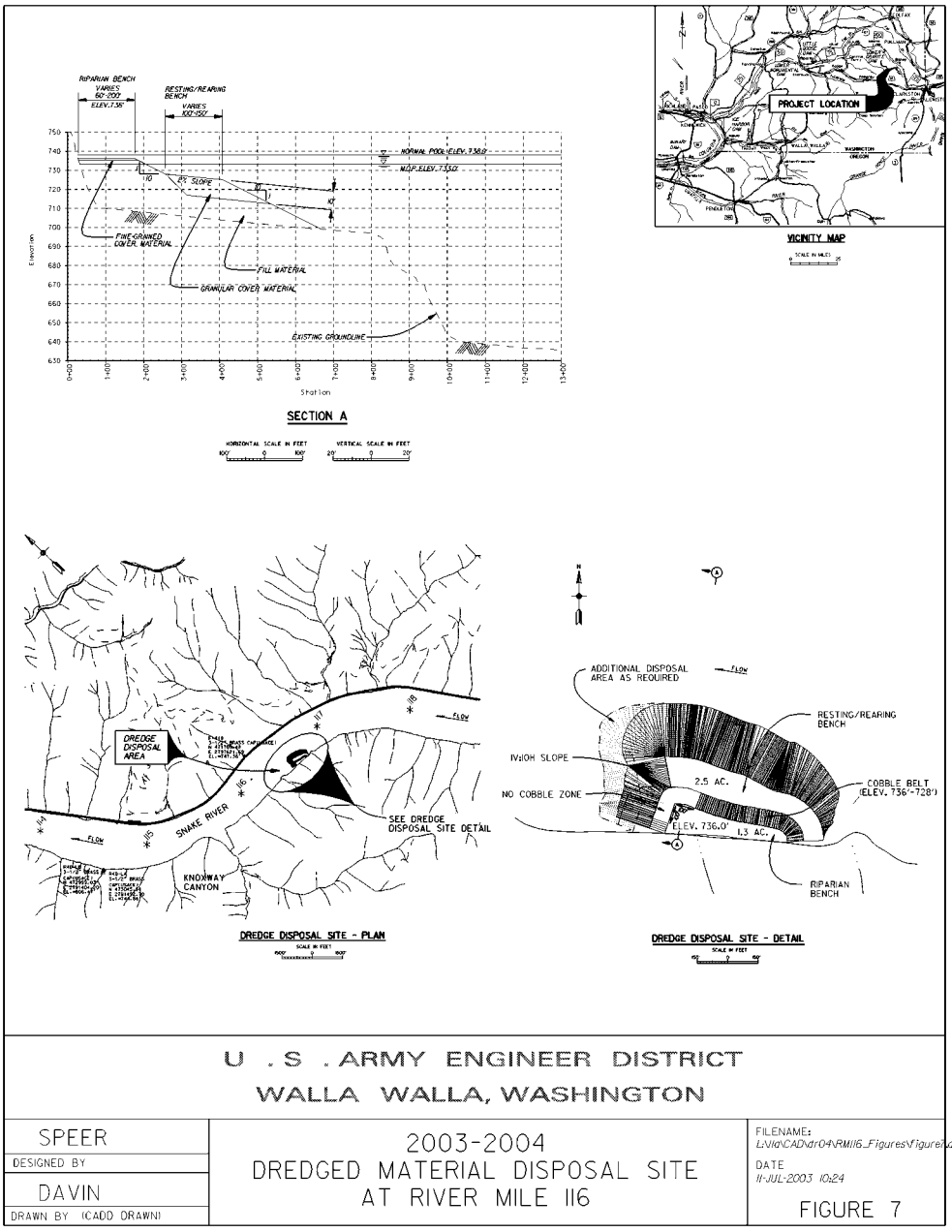
For the short-term dredging activity proposed for 2003-2004, the Corps plans to use dredged material for beneficial use. This use is consistent with Corps policy to secure the maximum practicable benefits through the use of material dredged from navigation channels. The Corps proposes to use in-water disposal for the dredged material to create shallow-water habitat and woody riparian planting benches (see Figure 7).

2.4.3.1.1 Shallow-Water Habitat

Juvenile fall chinook salmon prefer shallow, open, sandy areas along shorelines for rearing (Bennett *et al*., 1997). Bennett showed that fall chinook salmon used the shallow-water habitat created with in-water disposal of dredged material that surrounds Centennial Island (Lower Granite reservoir, near RM 120). 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 disposal. Bennett reported that fall chinook salmon were most commonly collected over lower gradient shorelines that have low velocities and sandy substrate. Habitat having these physical characteristics can be effectively constructed in any of the lower Snake River reservoirs with the appropriate placement of dredged material.

The disposal process is dependent on the physical characteristics of the dredged material, as well as the potential to optimize the benefit for fish. Dredged materials would be composed mostly of sediment containing a mixture of silts, sands, gravels, and cobbles. Sediment samples have been taken from the areas to be dredged in 2003-2004, and were evaluated for particle size, contaminant levels, and suitability for in-water disposal. Particle-size analysis identified the dredging sites or portions of sites that contain mostly silt, as well as the ones that

[31] 2002 DMMP/EIS, Section 2.5.2.1, *General Description*.



contain mostly sand or coarser material. Based on previous experience, 85 percent of the material is expected to be sands [grains greater than 0.0024 inch (0.062 millimeter) in diameter] and gravels and cobbles; while 15 percent of the material is expected to be silts and finer-grained material.

The disposal location would be at RM 116 in the Lower Granite reservoir. This site is a mid-depth bench on the left bank of the Snake River, just upstream of Knoxway Canyon. The Corps selected this site because it is close to the confluence (where most of the dredging would occur), could provide suitable resting/rearing habitat for juvenile salmon once the river bottom is raised, would not interfere with navigation, would not impact submerged cultural resources, and is of sufficient size to accommodate the anticipated dredged material disposal volume.

The Corps recognizes that it may take several dredging operations over a period of years to complete the construction of one shallow-water site. However, the site would be completed in stages, meant to provide viable rearing habitat immediately after the 2003-2004 dredging. Therefore, once the Corps starts to create shallow-water habitat, it would become a high priority to use available dredged material at that site until the maximum amount of shallow-water habitat has been created. This assumption is based on dredging continuing as the means of addressing sediment input, and would not necessarily be applicable if another long-term management strategy was implemented.

2.4.3.1.2 Woody Riparian Planting Bench

For the woody riparian planting bench, the placement methods would be proposed by the contractor and approved by the Corps; and may use a combination of four methods: (1) bottom dumping from hopper barges; (2) dozing the material from flat-deck barges; (3) hydraulic conveyance from a pump scow; and/or (4) dragline.

Cobbles, silt, and silt/sand mixture placement in 2003-2004 would occur in a manner that would extend the shore riverward along the proposed disposal site (RM 116). This would ultimately result in the creation of a planting bench for riparian plant species that would be submerged within the water surface elevation range between 736 and 738 fmsl. The Lower Granite reservoir maximum operating pool is elevation 738 fmsl, and MOP is elevation 733 fmsl. The overall plan is to place the sands in the below-water portion extending riverward of the riparian embankment. Riverward to the riparian bench, sand would be placed to enhance the rearing suitability of the mid-depth habitat bench, by decreasing the depth at a 1 vertical to 10 horizontal slope across the newly-created shallow-water rearing habitat.

Most of the riparian bench above 736 fmsl would be capped with silt. The outer slope would be at the angle of repose for the material placed (about 1 vertical to 10 horizontal), and shaped to form a relatively smooth surface. Cobbles from the dredging of the navigation lock approaches would be placed around the perimeter of the bench in a 1-foot-thick by approximately 30-foot-wide band to cover the maximum fluctuation in pool elevation (between elevation 733 and 736). The cobbles would cover about 1/4 to 1/6 the total width of the shallow-

water habitat, acting as armoring to protect the bench from wave action by wind or passing barges/boats. Cobble placement would start at the upstream end of the bench, where it would be tied into the existing shoreline. The final riparian bench surface would be left in an undulating condition to provide variable root zone conditions for final planting. Final shaping of the above-water surface and planting would occur once the material had consolidated.

The plantings will be performed using a combination of cuttings, bare root and tubling stocks depending on the species of plant used. Planted areas will be overstocked to allow for natural and unnatural attrition, usually five-foot spacing between shrubs and ten-foot spacing between trees. Plastic mulch may also be employed if weedy competition is anticipated. Trees and shrubs will be interplanted together to produce a more natural growth structure and distribution throughout the planting site. Species used would include black cottonwood (*Populus trichocarpa*), coyote willow (*Salix exugia*), wood's rose (*Rosa woodsii*), buffalo berry (*Shepherdia* sp.), golden current (*ribes aureum*), chokecherry (*Prunus virginiana*), and serviceberry (*amelenchier* sp.).

- **Bottom Dumping From Hopper Barges**

Bottom dumping from hopper barges is the preferred placement method. It would result in the least amount of turbidity, and would be the most efficient placement method. However, this method requires a water depth of about 8 to 10 feet, so use of this type placement method would only be effective in bringing material to within roughly 8 feet of the water surface. One method employed to overcome water depth would be to bottom dump in deeper water and use a dragline to move the material into the desired position.

- **Dredged Material Dozed From Flat-Deck Barges**

Dredged material dozed from a flat-deck barge would be similar to bottom dumping. Turbidity may be slightly higher than a bottom dump barge because material would be shoved off the barge deck in several clumps, compared to one clump from a bottom-dump barge. While water depth may still be an issue (about 6-foot depth required), the flat-deck barge could reach somewhat shallower depths than a bottom-dump barge. Moving the material a second time with a dragline would again be an option.

- **Hydraulic Conveyance**

Hydraulic conveyance is a process of liquefying the dredged material and pumping to the desired discharge location. Depending on the material being pumped, the slurry would be about 80-percent water. This method does not have depth as a limiting factor, because the slurry would be transported through a floating pipeline routinely repositioned, except that some form of underwater containment berm would need to be constructed using either bottom dumping or

clamshell placement. Also, moving the floating-discharge-point pipeline would require a boat or crane. This method has the highest potential for turbidity, and would likely require weirs between the shore and the containment berm to form cells to act as settling catchments, and possibly silt fence deployment.

- **Dragline**

Dragline is a method that would employ a crane and bucket for excavation of material bottom-dumped in deeper water, then placed in its final location in the embankment. The dragline would be positioned to reach the dumped material, scoop it up, and place it in the fill. Turbidity associated with the dragline operation is not expected to exceed regulatory limits, but the Corps would monitor the disposal site to determine if turbidity containment measures were required.

2.4.3.2 Placement Plan

The standard practice employed by the Corps for contracting this type of work is to specify the environmental protection requirements and final design specifications that must be met by the contractor, but allow the contractor to determine the exact construction methods that would be used to meet the contract requirements. The contract for the proposed 2003-2004 dredging would focus on requirements (*i.e.*, turbidity level, work window, slope of underwater fill, placement of a silt cap for the riparian bench and a sand cap for the aquatic habitat) rather than placement methods, to allow the contractor to be as innovative as possible. Prior to any work being performed in the field, the contractor will be required to submit a work execution plan, including how they intend to meet environmental requirements. Until the contractor submits a plan, the exact placement method is undetermined, but the most likely placement scenarios have been included in the following sections.

2.4.3.2.1 Shallow-Water Habitat Creation

The sequence of dredged material disposal is designed to dispose of silt in a beneficial manner by creating shallow-water habitat for juvenile salmon and woody riparian habitat to benefit salmon and other species. To accomplish this, the dredged material would be placed in steps. The first step would be to use the silt [less than 0.0024 inch (0.062 mm) in diameter], in a mixture with sand and gravel/cobble, to fill the mid-depth portion of a site and form a base embankment (Figure 8). Prior to dredging, the sediment would be analyzed to determine the percentage of sand or silt in order to ensure that the mixture in the embankment was not more than 30-percent silt.

The dredged material would be transported to the disposal area, where the material would be placed within the designated footprint. This footprint would be close to the shoreline, so that the river bottom could be raised to create an

underwater shelf about 10 feet (3.0 m) below the desired final grade. The second step is to place sand on top of the sand/silt embankment. An area of sand would be reserved as the final area to be dredged during the dredging activity.

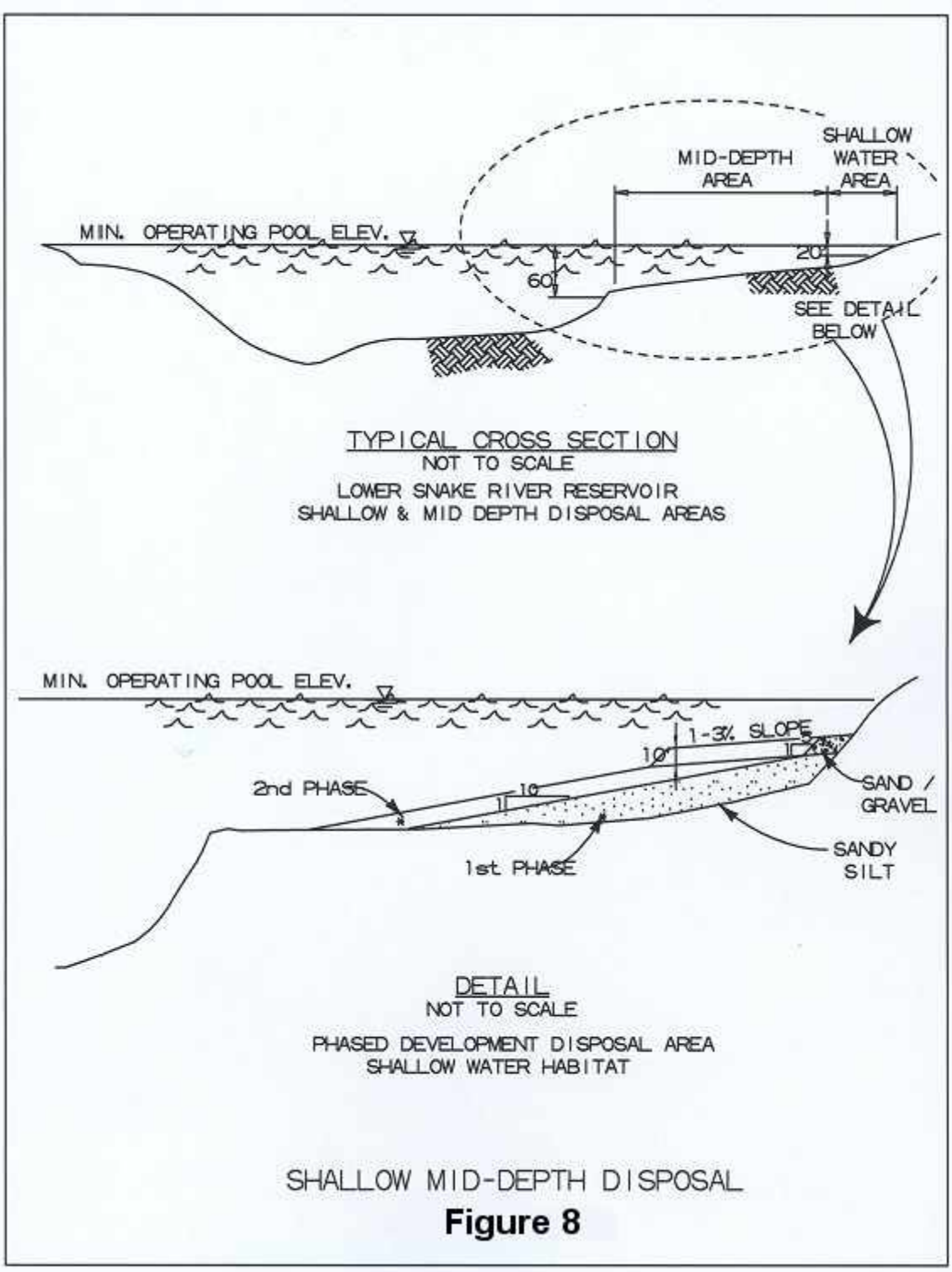
Sand would be placed on top of the base embankment in sufficient quantity to ensure that a layer of sand at least 10 feet (3.0 m) thick covers the embankment once the final step of the process is completed (Figure 9). The footprint of the disposal area would be sized so that the maximum amount of shallow water habitat is created with the estimated quantities of material to be removed during that dredging activity.

The final step involves flattening and leveling the tops of the mounds to form a smooth, gently-sloping (3 to 5 percent) shallow area with water depths up to 20 feet (6.1 m), as measured at MOP (Figure 10). The sand cap layer would be created with a minimum thickness of 10 feet (3.0 m) to ensure that the most desirable substrate (sand with limited fine-grained or silt material) is provided for salmonid-rearing habitat.

Monitoring embankment stability would be accomplished by taking cross-section soundings soon after disposal was complete and, again, in the summer after high flows to determine if the embankment slumped or moved. The Corps would use this information to make adjustments in the percentage of silt allowable for potential future dredged material disposal, and to determine whether or not a berm should be constructed around the toe of the embankment to prevent movement.

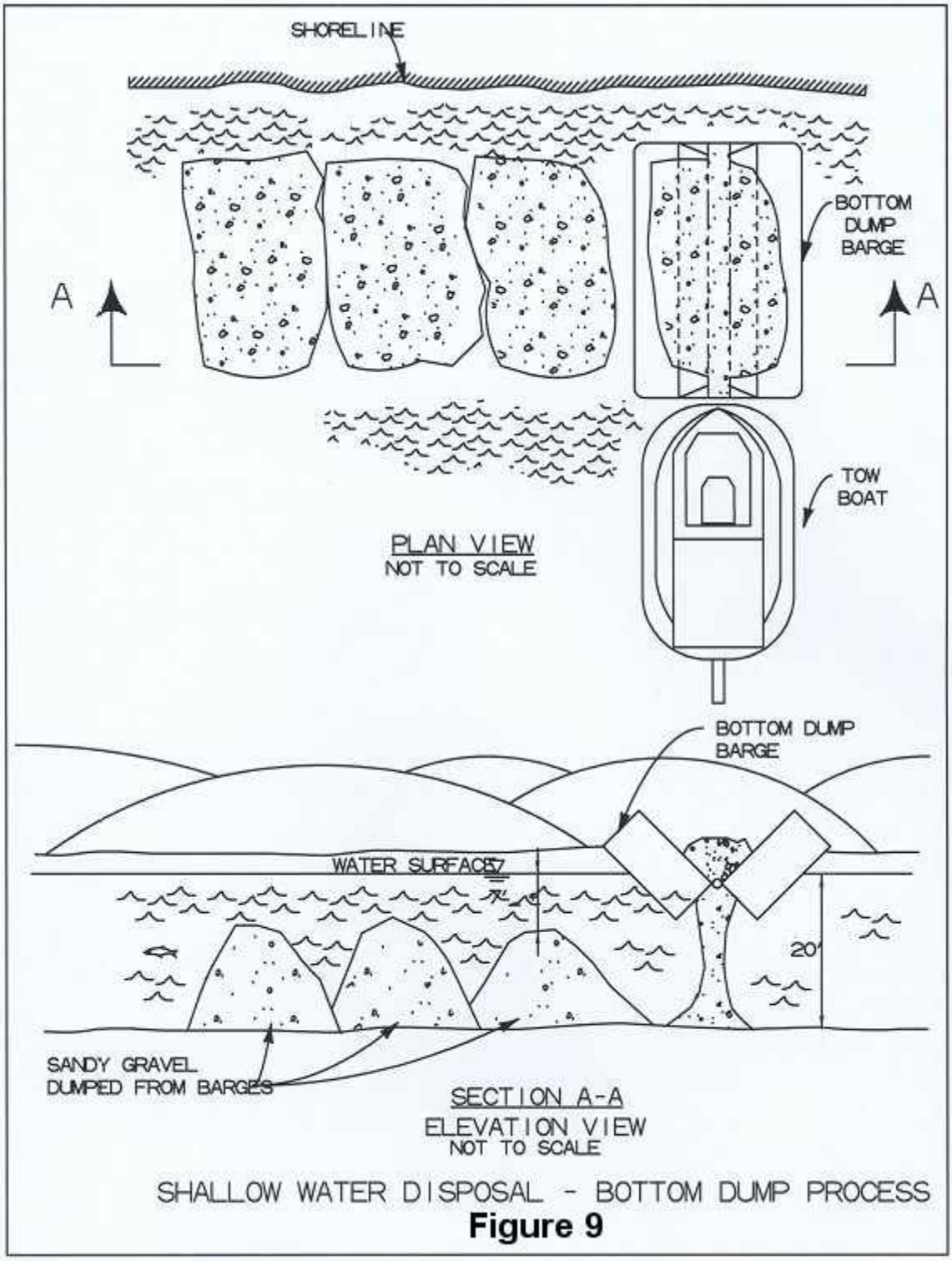
2.4.3.2.2 Creation of Woody Riparian Planting Bench

For the creation of the woody riparian planting bench, the Corps has identified four possible placement scenarios: 1) construction of earthen cells and hydraulic placement of material within the cell; 2) silt curtain cells used with hydraulic placement; 3) a combination of silt curtain and earth embankment with hydraulic placement; and 4) placement using a bottom dump with clamshell or dragline. Each of these methods is discussed in subsequent paragraphs. In addition to these scenarios, it may be advantageous to raise and/or lower the Lower Granite pool during placement operations within the designated in-water work window. For example, a deeper pool would allow barge access closer to shore. Lowering the pool may facilitate placement of the silt cap on the riparian bench.



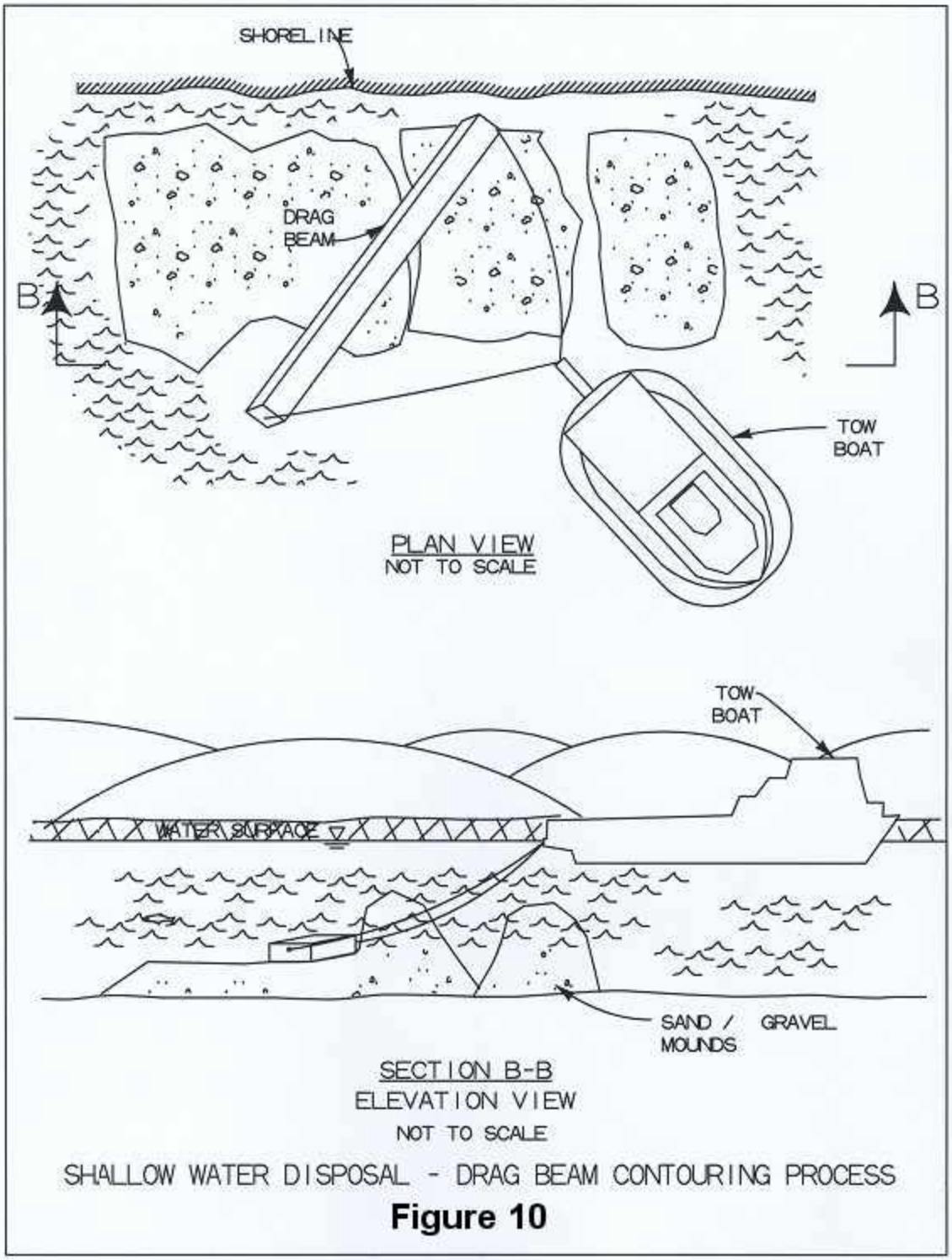
SHALLOW MID-DEPTH DISPOSAL

Figure 8



SHALLOW WATER DISPOSAL - BOTTOM DUMP PROCESS

Figure 9



SHALLOW WATER DISPOSAL - DRAG BEAM CONTOURING PROCESS

Figure 10

- **Scenario 1 - Construction of earthen cells and hydraulic placement within the cells.** This method employs all of the placement methods mentioned above. First, an earth berm would be constructed along the outer edge of the disposal area. This would be accomplished by pushing dredged material off flat-deck barges or bottom-dump scows. Boats would be used to position the floating dragline, which would then be set up on the inside of the earth berm. Once the berm was constructed to a depth that precluded placement from a flat-deck barge or bottom-dump scow, the dumps would be made outside of the berm. The dragline would be used to scoop the dumped material and place it on top of the berm. This would be repeated until the berm was above the water surface. Cross berms would be constructed using the dragline perpendicular to shore, between the shore and the berm. This would create containment cells. Once the containment cells were complete, all remaining dredged material would be placed hydraulically. Placement would begin at the upstream cell and work downstream. It is expected that the cells would contain any turbidity that might occur during placement. Materials used for berm construction would be mostly sand, with some gravels and cobbles intermixed. The fill inside the cells would be mostly sand to just above the water surface. The shoreline portion of each cell, which defines the riparian bench, would then be capped with hydraulically-placed silt from the recreation sites and ports.

- **Scenario 2 - Silt curtain cells used with hydraulic placement.** This would be similar to Scenario 1, except the containment cells would be formed using a geotextile fabric draped to the river bottom to act as a silt barrier. If necessary, the bottom edge would be anchored. Material would be hydraulically placed within the geotextile containment cell. Placement would proceed until material within the cell was at the existing water surface. The geotextile fabric would be moved downstream, and an adjacent cell would be similarly formed. This would continue for the length of the disposal area. Once the fill had been brought up to the water surface, the shoreline portion of each cell (which defined the riparian bench) would be capped with silt material from the dredging operations. A silt fence would be installed on the fill, and material would be placed hydraulically inside the silt fence.

- **Scenario 3 - Lower Granite pool would be raised to the maximum operating pool.** Placement would be performed from flat-deck barges or bottom-dump scows, as much as possible, in the depth provided. Once the placement reached an elevation where flat-deck barges or bottom-dump scows could no longer place their load, a silt curtain would be installed and a containment cell formed, as discussed above. Dredged material would be placed hydraulically within the silt curtain. Once the platform within that cell

- reached the water surface, the silt curtain would be relocated to form the next cell. Once the fill had been brought to the water surface, the shoreline portion of each cell (which defined the riparian bench) would be capped with silt material from the dredging operations. A silt fence would be installed on the fill, and silt would be placed hydraulically.

- **Scenario 4 - Placement using a dragline.** The Lower Granite pool would be raised to the maximum operating pool. A dragline would be moved as close to shore as possible. Flat-deck barge or bottom-dump scow placement would be performed, as much as possible, in the depth provided. As the bench is brought to the water surface, and depths are inadequate for dumping directly from the barge, the dumping would occur on the river side of the dragline. After each dump, the dragline would excavate that material and place it in the fill. This would continue until a section of the bench was complete within the reach of the dragline. The silt cap would be similarly placed once the riparian bench had been brought to the water surface. A silt containment structure, such as a silt fence or other barrier, may be needed to prevent suspended sediments from re-entering the river.

2.4.4 Final Shaping

Some underwater grading and final shaping would be required by the contractor once the bench and slope was completed. Shaping of the in-water slopes most likely would be accomplished by floating dragline. A boat-towed beam may also be used. Above-water surface shaping of the capped area would be by conventional grading equipment (*i.e.*, dozer, rubber tired loader, or backhoe), and would be performed sometime after placement of the dredged material was complete. Some surface undulations would be desired to provide differing root zone conditions for the riparian species planted.

Once the final shaping of the shoreline was complete, the gravel and cobbles excavated from the navigation lock approaches would be placed around the perimeter of the bench to form a protective zone from erosion. This would likely be performed using a clamshell and a flat-deck barge. The material would be brought by barge to the disposal site, and the clamshell would lift the gravel and cobbles off the barge and place them in a band within the selected elevations along the shoreline. The gravel and cobble zone would be ”final shaped” to a relatively smooth surface into the sand mixture to mimic a naturally-formed, smooth, exposed sandbar.

2.4.5 Upland Disposal

If dredged material is determined to be unsuitable for in-water disposal, depending on the level and type of contamination, it could be disposed of upland, either at a licensed disposal facility or at a suitable Corps site. Contaminants are discussed in Section 2.5.1.2, *Sediment Analysis*.

Silt suitable for in-water disposal and found in excess of the maximum permitted during construction of the base layer for the habitat site (not to exceed 30 percent of the total base material) would be considered for other beneficial uses. One of these uses would include using the silt material to provide a planting layer for developing woody riparian habitat on top of the planting bench.

2.5 Affected Environment

The following discussion of affected resources is provided to clarify or expand upon that information pertaining to the proposed 2003-2004 maintenance dredging. The previous analysis of the affected environment found in the 2002 DMMP/EIS, including a discussion of biological, physical, and socioeconomic resources, [32] is incorporated by reference to the extent applicable to this one-time dredging activity.

2.5.1 Aquatic Resources

2.5.1.1 Fish

Adult fall chinook salmon have the potential to spawn in the existing navigation channel due to the gravel substrate, but no spawning is anticipated in the area proposed to be dredged in 2003-2004, primarily due to lower water velocities that typically occur within the navigation channel. The tailraces of the dams were surveyed each year between 1993 and 1997 and, once again, in 2002; and no redds were found in the federal navigation channel or in the tailraces of the dams (Mueller, 2003).

Although the lower velocities reduce the likelihood of spawning, it should be noted that, in 1992, while dredging the access channel to the juvenile fish facility at Lower Monumental Dam (an area outside the defined navigation lock approach channel), a redd was inadvertently destroyed. However, monitoring during the process of dredging has improved over the last 10 years and, under current practices, the destruction of spawning redds is not anticipated.

The proposed in-water disposal site at RM 116 is a mid- to shallow-depth bench composed of silt accumulated on the left bank. Since visual inspection of this site in 1992, during the experimental drawdown of the Lower Granite reservoir, habitat suitability has been poor for rearing and overwintering. This is primarily due to the thick silt layer accumulating at about 2 inches (5.1 cm) per year over the last 25 years [approximately 4 feet (1.2 m)] over a sand base (less than 20-percent composition). Habitat suitability for spawning is nonexistent. See Section 2.8 for the pre- and post-disposal monitoring plan, Section 2.6.2 for Aquatic Resources, and Section 2.6.6 for Threatened and Endangered Species.

[32] 2002 DMMP/EIS, Section 3, *Affected Environment*.

2.5.1.2 Sediment Analysis

In addition to sampling particle size, the Corps had a series of analyses performed on samples collected in 2000 and again, in 2003, to determine chemical content of sediments at potential dredging sites in the lower Snake River and in the confluence of the Snake and Clearwater Rivers. In 2003, chemical tests included polynuclear aromatic hydrocarbons (PAHs); organophosphorus pesticides; acid herbicides; oil, grease, and total petroleum hydrocarbon (TPH); polychlorinated biphenyls (PCBs); ammonia; dioxin; and metal analyses.

The sediments at sixty-eight sites in the lower Snake River and a segment of the Clearwater River were evaluated during the latter part of April 2003. Samples from twenty-five of these sites were further processed for Tier IIB analyses based on total volatile solids (TVS) concentrations and particle size distribution.

The majority of the provisional results were either below instrument detection limits or less than established sediment criteria. The twenty-two metals that constitute the target analyte list (TAL) were at concentrations less than the Puget Sound Dredge Disposal Analysis (PSDDA) criteria and typically lower than state-wide averages. Approximately 200 organic herbicides, pesticides, and industrial compounds were considered. All of them, including dichlorodiphenyltrichloroethane (DDT), dioxin, and polychlorinated biphenyls (PCBs), were either not detected or were present in quantities that are not considered harmful to the environment. The TPH-diesel concentrations were all ≤ 82 parts per million (ppm).

One compound, ammonia, does warrant further consideration. This nitrogen species was present in concentrations ranging from 18 to 128 milligrams per liter (mg/L). The relative concentrations of ammonia and ammonium that will be present in the water column during winter dredging will be further investigated prior to distribution of the final report in August. Additionally, ammonia levels will be monitored downstream from the dredging and disposal sites.

For further information, refer to Attachments B and E. In addition, a final, and more comprehensive, report will be available in August 2003. This document will include the verified data sets, a comparison of 2003 information to that previously collected, and quality assurance/quality control documentation.

2.6 Environmental Impacts of 2003-2004 Dredging and Disposal Activities

2.6.1 Summary

Water quality impacts and impacts to aquatic organisms, in particular ESA-listed fish, are the principle environmental concerns affected by the proposed dredging and disposal activities. Socioeconomic concerns, if routine maintenance dredging did not occur, are also addressed. Water quality parameters that are most likely to be affected are turbidity and ammonia concentrations and, to a lesser degree, pH, dissolved oxygen, and temperature. Dredging and disposal of fine-grained sediments would potentially have the most impact on water quality, as a small percentage of the fine material could be suspended in a turbidity plume and may be more likely to contain contaminants (*e.g.*, ammonia). See Section 2.6.5, *Water Quality*, below, for a discussion of contaminants.

The Corps has collected sediment samples from the areas to be dredged and identified sites or portions of sites that contain mostly silt, as well as those that contain mostly sand or coarser material. Dredged material from the navigation channel is expected to be predominately sand (>80 percent). Some cobbles and gravels would be removed from the navigation lock channels, while a higher percentage of silt would be dredged from the recreation sites and port areas. Detailed sediment sampling results can be found in Attachment E.

Aquatic organism concerns, other than those related to water quality, are the impacts to fish during construction of the planting bench and the configuration of the submerged habitat once construction is complete. During construction, care would be taken to avoid trapping fish within the disposal site. After construction, the underwater area would be gently sloping and fairly smooth to facilitate rearing by juvenile fall chinook without providing hiding cover for fish that prey upon this species.

Table 6, below, presents a summary of environmental impacts of the proposed dredging activity in comparative form. In addition, the following section, along with information above, contains an analysis that has been prepared to provide more information and clarity.[33]

2.6.2 Aquatic Resources

Dredging and disposal activities would have both direct and indirect impacts on aquatic species. Most of these impacts would be short-term, but some impacts are expected to be long-term and positive. Indirect effects to aquatic species are also anticipated, and the majority of these effects are considered positive. Most

[33] 2002 DMMP/EIS, Section 2, *Alternatives*.

of the impacts expected to occur would be beneficial to fish and aquatic populations through the development of woody riparian habitat and creation of shallow water habitat. Any negative impacts are expected to be temporary and short-term.

Macroinvertebrates in the removal and disposal areas would be directly impacted by the dredging activities. With the removal of the dredged material, animals of various species (oligochaetes, crayfish, *etc.*) would also be removed from the dredging areas and redistributed or buried during the disposal process. In addition, invertebrates at the disposal site(s) would be buried. It has been routinely shown, however, that macroinvertebrates displaced by dredged material removal aid in colonizing or supplementing existing populations at in-water disposal sites. Populations at the removal site also become re-colonized relatively rapidly, depending on the season. Both locations are also influenced through the mechanism of drift (Bennett *et al.*, 1990, 1991, 1993a, 1993b, 1995a, 1995b; Bennett and Nightingale, 1996). Dredging and disposal would cause a temporary and short-lived reduction in prey items for fish at both the dredging and disposal locations.

The dredging would most likely be completed mechanically, using a clamshell. Due to the characteristics of this equipment, it is generally accepted that clamshell buckets are not likely to entrain fish. Specifically, the clamshell bucket descends to the substrate in an open position. The force generated by the descent drives the jaws of the bucket into the substrate, and the jaws grab the sediment upon retrieval. During the descent, the bucket cannot trap or contain a mobile organism because it is entirely open.

Table 6.
Environmental Effects Summary

Discipline	Environmental Effects, Based on 2003-2004 Proposed Dredging Activities
Aquatic Resources	Direct and indirect, minor, short-term effect on food source for aquatic species; no long-term negative effects anticipated. Potential beneficial effects from creation of shallow water fish and woody riparian habitat.
Terrestrial Resources	Indirect, short-term minor effects on terrestrial wildlife and habitat, and potential long-term positive effects from beneficial use of dredged material to create upland habitat and woody riparian habitat.
Endangered Species	*Fish* - "May affect and would likely adversely affect" salmonids but no jeopardy to listed species; "may affect, not likely to affect" bull trout. *Terrestrial Wildlife* - "May affect, not likely to adversely affect" bald eagle. *Plants* - "May affect, not likely to adversely affect" Ute ladies' tresses and water howellia; " no effect" on Spalding's silene.
Recreation	Minor, short-term impact on access to portions of the river for recreational boats near proposed dredging and disposal activities. Maintains ability to use recreational facilities.
Cultural Resources	Known submerged cultural properties would be avoided during dredged material disposal and management activities.
Socioeconomics	Positive effect from maintenance of navigation channel and recreation areas. Minor effects could occur. Low-income and minority populations not disproportionately affected. Additionally, dredging will increase flow conveyance capacity, which should reduce the risk of flood damage resulting from major flood events.

Table 6. (continued) Environmental Effects Summary	
Discipline	**Environmental Effects, Based on 2003-2004 Proposed Dredging Activities**
Transportation	Maintains existing transportation systems.
Geology and Soils	Local displacement of soil and alluvial material. Potential short-term effects on soils from construction of woody riparian bench.
Water Quality/Water Resources	*Water Quality* - Direct, minor, short-term effects due primarily to turbidity, and placement of fill in shoreline areas for woody riparian habitat creation. *Wetlands* – No impacts to wetlands. *Flood Plains* - No impact to floodplain from either in-water disposal or woody riparian development.
Hazardous, Toxic, and Radioactive Waste	No likely effects, as no hazardous, toxic, and radioactive waste sites are known to exist within the lower Snake River reach.
Air Quality	Direct, minor, short-term effects to local air quality due to dredging and disposal equipment operation.
Noise	Direct, minor, short-term effects due to noise from dredging and disposal equipment operation.
Aesthetics	Direct, minor, short-term effects from dredging and disposal activities.
Native American Tribal Communities	Potential positive effects on salmon fishing from creation of salmon rearing habitat. Cultural resources to be avoided.
Cumulative Effects	Potential positive effects on salmonids and other fish from creation of shallow-water fish and woody riparian habitat. Other resources were evaluated regarding cumulative effects, and nothing was determined to preclude the selection of this alternative.

Both resident and anadromous fish could use the areas upstream and downstream of the sites where dredging and disposal activities would occur. The dredging and disposal activities would not be a continuous activity confined to a single location, and fish displaced in the activity areas would be expected to return shortly after completion of the project. The following describes likely ESA-listed fish impacts at each of the proposed dredging sites (see Attachment A).

- **Site 1. Confluence of Snake and Clearwater Rivers**

Bennett (1997) reported that juvenile fall chinook salmon in the Lower Granite reservoir prefer sandy substrates, but typically along shorelines. Most dredging in this area would be done in the thalweg of the river, and would avoid the shoreline areas. Therefore, in-water sites known to provide rearing habitat for fall chinook salmon (*e.g.*, Port of Wilma) would not be disturbed. Long-term negative impacts to habitat used by threatened and endangered salmonids, including rearing, migratory, and overwintering behavior, would not be anticipated at this dredging location.

- **Site 2a. Port of Clarkston**

Bennett (1997) reported that juvenile fall chinook salmon in Lower Granite reservoir prefer sandy substrates. The location of the port on the reservoir is such that it continually collects silt. Although Easterbrooks (1995-1998) found

some chinook salmon overwintering in backwater areas of the Columbia River, dredging this area is expected to have little to no short- or long-term deleterious consequences to fish populations or their habitat.

- **Site 2b. Port of Lewiston**

Bennett (1997) reported that juvenile fall chinook salmon in Lower Granite reservoir prefer sandy substrates. The location of this port on the reservoir is such that continually collects silt. Although Easterbrooks (1995-1998) found some chinook salmon overwintering in backwater areas of the Columbia River, dredging this area is not expected to have short- or long-term deleterious consequences to fish populations or their habitat.

- **Site 3a. Greenbelt Boat Basin**

In 2002, Bennett (Unpublished Data--Report In Progress) found a notable number of juvenile salmonids at this location. Specifically, a total of 369 chinook, 10 sockeye, and 2 steelhead were collected, primarily in May and June of that year. However, since the work would be conducted during the winter when these species are not likely to be present, it is anticipated that dredging this area would have only minor impacts to these fish populations or their habitat.

- **Site 3b. Swallows Swim Beach/Boat Basin**

In 2002, Bennett (Unpublished Data--Report In Progress) found a notable number of juvenile salmonids at this location. Specifically, a total of 89 chinook and 9 steelhead were collected, primarily in June of that year. However, because of the small size of the boat launch at Swallows, the large shallow waters nearby and, given that dredging would occur during the winter in-water work window, it is anticipated that dredging this area would have only minor impacts to fish populations or habitat.

- **Site 3c. Lower Granite Dam Navigation Lock Approach**

Although adult fall chinook salmon have the potential to spawn in the existing navigation channel, no spawning is anticipated based on lower water velocities in this area (see Figure 3). The tailraces of the dams were surveyed each year between 1993 and 1997, and once again in 2002. No redds were found in the federal navigation channel. The Corps plans to repeat the redd survey in 2003, just prior to the dredging activity, to ensure no redds would be disturbed. It is anticipated that dredging this area would have only minor impacts to fish populations or habitat, because dredging would occur during the winter in-water work window.

- **Site 3d. Lower Monumental Dam Navigation Lock Approach**

Although adult fall chinook salmon have the potential to spawn in the existing navigation channel, no spawning is anticipated based on lower water velocities in this area. In 1992, while dredging the channel to the juvenile fish facility (an area outside the defined navigation lock approach channel), a redd was inadvertently destroyed (Figure 4 at arrow). However, the tailrace of the dams were surveyed each year from 1993 to 1996, and again in 2002. No redds were found in the federal navigation channel or in the tailrace of the dam (Mueller, 2003). The Corps plans to repeat the redd survey in 2003, just prior to the dredging activity, to ensure no redds would be disturbed. It is anticipated that dredging this area would have only minor impacts to fish populations or habitat.

- **Site 4a. Illia Boat Launch**

In 2002, Bennett (Unpublished Data--Report In Progress) found a notable number of juvenile salmonids in and around Illia Boat Launch. Specifically, a total of 123 chinook, 14 sockeye, and 4 steelhead were collected, primarily in June of that year. However, because of the small size of the boat launch, the large amount of shallow waters adjacent to the boat launch and, given that dredging would occur during the winter in-water work window, it is anticipated that dredging this area would have only minor impacts to fish populations or habitat.

- **Site 4b. Willow Landing Boat Launch**

In 2002, Bennett (Unpublished Data Report In Progress) found a notable number of juvenile salmonids this location. Specifically, a total of 246 chinook, 1 sockeye, and 2 steelhead were collected, primarily in June of that year. However, because of the small size of the boat launch at Willow and the large amount of shallow waters adjacent to the boat launch (Figure 6), it is anticipated that dredging this area would have only minor impacts to fish populations or habitat, because dredging would occur during the winter in-water work window.

An indirect effect expected to be beneficial is the use of dredged material to create woody riparian habitat and shallow-water fish habitat. New habitat areas are expected to benefit aquatic resources through the presence of shoreline vegetation, providing nutrients and structure to the aquatic ecosystem. Created shallow-water habitat would attract resident and anadromous fish to shallower areas for rearing by creating warmer shallow-water temperatures, feeding areas, and refugia (*i.e.,* shelter). In-water disposal, designed to enhance fall chinook salmon rearing areas, would not only provide areas of rearing for resident and anadromous fish, but would limit the habitat for adult predacious fish in the disposal area. Turbidity and water quality problems are expected to have minimal impacts on aquatic life, since all dredging and disposal would occur in the winter during low periods of productivity and fish abundance.

Creating additional shallow-water habitat could increase the availability of warmer waters in the Lower Granite reservoir. Currently, water temperatures are below optimum throughout the growing season for resident fish. Higher water temperatures could enhance annual growth increments, and possibly result in higher survival and higher standing crops of resident or fish. Although resident fish are attracted to higher temperatures, the lack of cover found in the shallow-water habitat created by the disposal activity allows salmonids to escape predation.

Effects of higher water temperatures in shallow waters on anadromous salmonids are related to the date at which a threshold in water temperature is achieved. Curet (1994) reported that subyearling fall chinook salmon migrate from shallow shoreline areas to deeper waters in the spring/summer, when shoreline temperatures attain 64 degrees Fahrenheit (°F) [18 degrees Celsius (°C)]. These data indicate that, if water temperatures warmed earlier in the spring up to 64 °F (18 °C), growth rates of subyearling fall chinook salmon, and possibly their survival, might be enhanced by cueing them to outmigrate earlier in the season, when predators are less active.

Recolonization by invertebrate species would follow completion of dredging at both the dredging and disposal areas. Increased macroinvertebrate production would occur at the dredging site locations, and on the disposed material, during the following growing season. These species would be available as food organisms to resident and anadromous fish the following spring.

The Corps believes that creating shallow-water sandbars along the shorelines is an improvement to the juvenile salmonid habitat currently in the lower Snake River. The new habitat structure proposed for Knoxway Canyon (RM 116) will most likely require some amount of cobble to stabilize the bank against wave action. This may have some benefits to invertebrates and, therefore, salmonids. The proposed riparian area at this site may also serve to allow more structure in the water as trees progress through their life cycle. However, the Bennett *et al.* (1995a) report on created habitat indicated that fall chinook prefer areas of open, sandy substrate that does not have hiding places for predators.

Although it is recognized that increased temperatures may cause health problems in fish, the localized temperature impact should be limited to the immediate vicinity of the resting/rearing habitat. As stated previously, the increased temperature associated with the construction of habitat is expected to have a beneficial, rather than negative, impact on ESA-listed species. Combined with the increased depth in the confluence area, and considering the amount of water exchange occurring in the reservoir, the Corps does not anticipate any appreciable increase in overall reservoir temperatures. The benefits to fall chinook, however, of having these small areas where the temperatures may be

slightly higher than the rest of the reservoir, includes greater food production, increased growth rates, and increased overall survivability through the hydrosystem on their downstream migration. Monitoring of temperature is an integral part of these activities, including the habitat areas constructed as a part of this plan.

Negative impacts to aquatic species as a result of dredging and disposal of material would be short-term and minor. Positive impacts are expected to be long-term and major, far outweighing the negatives. Of the negative impacts, the primary effect would be the temporary displacement of organisms during the dredging and disposal activities. The disposed dredged material will be used to create valuable shoreline ecosystems, and shaped to provide a relatively smooth, sandy bottom, with depths and slopes beneficial to invertebrate and fish rearing. Impacts to fish habitat are expected to be long-term and beneficial, with the placement of dredged material forming shallow-water habitat. Monitoring of beneficial in-water disposal sites would be conducted to confirm the effectiveness of habitat creation.

2.6.3 Terrestrial Resources

The proposed dredging and disposal activities would not prevent terrestrial wildlife from obtaining food or otherwise using the areas adjacent to dredging and disposal activities. Dredging and disposal activities would occur within the approved in-water work window and, following dredging and disposal, wildlife would return to areas affected by these activities.

Construction activities associated with the development of woody riparian habitat at the site near RM 116 would have localized impacts on terrestrial resources. Adverse impacts to terrestrial wildlife would be short-term and limited to the immediate area of the construction site. The development of additional woody riparian habitat would have a long-term beneficial effect on terrestrial resources.

It is anticipated that there will be no long-term negative direct or indirect impacts because of dredging or disposal activities. In addition, long-term positive impacts are expected to be indirect, due to the creation of habitat to benefit terrestrial species.

2.6.4 Cultural Resources

Dredging and disposal activities proposed for 2003-2004 are identical to those proposed for 2002-2003, except for the elimination of one dredging site (Hells Canyon Resort Marina) and one disposal site (Chief Timothy). Dredging will be done in both Washington and Idaho.[34] In Washington locations, some dredging will be done in close proximity to archaeological sites, but should not directly

[34] 2002 DMMP/EIS, Appendix N, *Dredging Proposed for Winter 2002-2003;* and Section 1.1.3, *Description of the Study Area*.

impact any of them. This is based on the fact that, except for the Illia and Willow sites, all other identified locations were previously dredged to the same depths planned for the proposed 2003-2004 dredging season. In addition, the selected dredging method will not go below accumulated sediments into riverbed material. In Idaho, two locations will be dredged. Each location has a portion of an archaeological site included within the project area but, again, it is not anticipated that dredging activity will impact cultural properties for the following reasons: (1) both locations were previously dredged several times to the same depths proposed for the 2003-2004 dredging season; and (2) available information indicates that both archaeological sites were destroyed by the placement of rip-rap, levee construction, and other development activities. In addition, the selected dredging method will not go below accumulated sediments into original riverbed material. Proposed disposal of dredged material will be done in-water at Snake RM 116 (just upstream of Knoxway Canyon). This area was previously cleared for disposal activity by the Washington State Historic Preservation Office (Log No. 092300-11-COE-WW).

Based on the above information, and pursuant to Section 106 of the National Historic Preservation Act (NHPA), the Corps made a "no historic properties affected" determination for the 2002-2003 dredging season. The Corps Section 106 determination, along with pertinent project information, was provided to identified consulting parties—Washington and Idaho State Historic Preservation Offices (SHPO), Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation, Yakama Nation, Confederated Tribes of the Colville Reservation, and the Wanapum. Both the Washington and Idaho SHPOs concurred with the Corps 2002-2003 "no historic properties affected" determination. Given that the same locations and conditions exist for the proposed 2003-2004 dredging season (with the exception of the elimination of two locations mentioned above), the Corps will also make a "no historic properties affected" determination and will consult/coordinate with the same consulting parties.

2.6.5 Water Quality

The proposed 2003-2004 dredging project is expected to have a temporary direct effect on water quality in both the Snake and Clearwater Rivers, mostly because of turbidity plumes caused by the dredging and disposal. A 404(b)(1) evaluation of the proposed 2003-2004 dredged material discharges is included as Attachment F, and presents a detailed discussion of the anticipated water quality effects of the proposed activities.

Dredging and disposal activities are temporary and would cause localized impacts by increasing turbidity and suspended solids. Although dredging operations may create a detectable plume extending 1,000 feet (304.8 m) downstream, operations causing a 5-nephalometric turbidity unit (NTU) increase

over background (10-percent increase when background is over 50 NTUs), at a point 300 feet (91.4 m) downstream, would not be allowed. Background turbidities in the lower Snake River and McNary reservoirs, generally do not exceed 10 NTUs.

Van Oosten (1945) concluded from a literature survey that average turbidities as high as 200 NTUs are harmless to fish. Based on the disparity between the turbidity increases anticipated as part of the dredging and disposal operation and the levels reported to be harmful to fish, it is determined that dredging and disposal operations would not affect salmon and steelhead as a result of increased turbidity. For salmonids, turbidity elicits a number of behavioral and physiological responses that indicate some level of stress (Bisson and Bilby, 1982; Sigler *et al.*, 1984; Berg and Northcote, 1985; Servizi and Martens, 1992). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35-150 NTU) accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

The dredging at the ports and in the boat basins is expected to have the most impact, as the sediments in these areas are expected to contain fine sediments. The Corps anticipates that dredging operations may create a detectable turbidity plume extending up to 1,000 feet (304.8 m) downstream. This plume would dissipate when dredging ceases for the day or when the dredge is moved to a new location. However, operations causing a 5-nephelometric turbidity unit (NTU) increase over background (10 percent increase when background is over 50 NTUs) at a point beyond the allowed mixing zone [300 feet (91.4 m) downstream] are not expected. If conditions exceeding these limits are observed, the dredging operation will be modified until levels drop back within the acceptable range.

The dumping of the dredged material at the disposal sites is also expected to cause turbidity plumes. The plumes are expected to be of short duration, as the dumping of a barge is a singular event as opposed to the continuous operation of the dredge. Previous disposal actions have shown that the material tends to stay in a clump as it drops from the barge to the riverbed, further minimizing the size of the plume.

Dredging has the potential to raise ammonia levels in the water column, as ammonia is present in some of the finer-grained sediments that would be dredged. Actual ammonia contamination levels that could be released into the water are site specific, dependent upon temperature and pH of the water, and vary considerably due to the particle size of the material being dredged. Finer-grained sediment (*i.e.,* silt) would be expected to have ammonia concentrations, and would be more likely to release higher levels of ammonia into the water. The amount of ammonia that would be released is difficult to quantify. However, ammonia releases would be very low during the winter months when dredging

would occur. The Corps has taken steps to reduce the possible impacts by monitoring ammonia levels in the water during dredging. If the levels reached critical concentrations, the Corps would stop operations and modify dredging activities to lower the ammonia levels in the water.

Maintenance dredging of the navigation channel downstream of Lower Granite and Lower Monumental Dams should have little effect on water quality, as the material to be removed is expected to be river cobble 2 to 6 inches (5.1 to 15.2 cm) in diameter, with few fines; and possibly some larger rock up to 18 inches (45.7 cm) in diameter. Disposal of this material is also expected to have little impact, but may cause a small turbidity plume. No suspended contaminants are anticipated.

The Corps prepared a monitoring plan for the proposed 2003-2004 dredging and disposal activities (see Attachment C). Various sampling activities are included. As an example, water samples would be taken and turbidity measured twice per day during active dredging. Samples would be taken 1 hour after dredging begins and 1 hour before dredging ends each day. Samples would be taken 300 feet (91.4 m) upstream from the dredging operation and 300 feet (91.4 m) directly downstream from the point of dredging. Two measurements would be taken at each location: 3.3 feet (1 m) below the water surface and 3.3 feet (1 m) above the river bottom. The allowable increase in turbidity at the downstream sampling point would be 5 NTUs over background when background is 50 NTUs or less, or no more than a 10-percent increase in turbidity when the background is more than 50 NTUs. Background is measured 300 feet (91.4 m) upstream of the dredging operation. Immediately upon determining any exceedance of this NTU limit, the dredging operation would be altered and monitoring of turbidity would continue at the downstream location until NTU levels returned to an acceptable limit above background. If NTU levels did not return to an acceptable limit, dredging would stop until NTU levels dropped, whereupon dredging would resume.

2.6.6 Threatened and Endangered Species

The ESA-listed threatened and endangered species that may be found in the project area can be divided into anadromous fish, non-anadromous fish, and terrestrial species. Of the four ESA-listed anadromous fish evolutionarily significant units (ESUs) present in the proposed dredging areas for winter 2003-2004, one is listed as endangered (Snake River sockeye salmon) and three are listed as threatened (Snake River fall chinook salmon, Snake River spring/summer chinook salmon, and Snake River Basin steelhead). In the winter 2003-2004 project area, the following are also present: one non-anadromous fish listed as threatened (bull trout); three other species listed as threatened (bald eagle, Ute ladies' tresses, water howelia); and one species proposed for listing (Spalding's silene).

The Corps has determined that the proposed dredging and disposal *"may affect and would likely adversely effect"* the threatened anadromous species; and has entered into formal consultation with NMFS. Actions that have the most potential to impact listed anadromous fish species include dredging of backwater areas and dredging in the tailrace areas of the dams. During the winter, dredging in backwater areas has the potential to disturb a few juvenile salmonids using these areas for overwintering habitat. However, few if any juvenile chinook salmon and steelhead are expected to use backwater areas of the Snake River during the winter, and this is not expected to be a significant problem.

Dredging in the tailwater areas of the dams has the potential to disturb and/or destroy redds of fall chinook salmon, which have been known to sporadically spawn in the tailraces of the dams in very small numbers. Salmon redd surveys were conducted in December 2002 in the area proposed for dredging within the navigation lock approaches, and no redds were located. Further surveys will be conducted prior to in-water work during the 2003-2004 dredging activities to avoid disturbances. If the surveys indicate the areas are being used for spawning by fall Chinook, and if redds are found, consultation with NMFS would occur immediately. No sockeye salmon would be expected to be impacted by these actions, and only a few chinook salmon or steelhead individuals are expected to be disturbed by dredging activities.

Because the lower Snake River has been designated as critical habitat for threatened Snake River fall chinook salmon, dredging the tailraces of Lower Granite and Lower Monumental Dams will technically be altering critical habitat for spawning, rearing, and migrating fall chinook salmon. However, the vast majority of the tailrace areas to be dredged are not suitable for spawning, are not the habitat chinook typically use for rearing, and would not be significantly impacted for migrating juvenile fish.

Dredging during the in-water work window of December 15 to March 1 would avoid nearly all adult fall chinook (as most have spawned and died by December 15), would avoid the vast majority of rearing fish, would not impact any migrating fall chinook, and thorough redd surveys (coupled with a general lack of suitable habitat and being the least populated spawning area in the Snake River) would avoid any redds that may have been built.

The navigation lock approaches in the Lower Granite and Lower Monumental Dam tailrace areas were last dredged in the winters of 1997-1998 and 1998-1999, respectively. The dredging proposed for 2003-2004 would occur within roughly the same footprint as in previous years, and would remove between 0 and 3 vertical feet of substrate that had been deposited in the channel since the last dredging event. The primary concern for dredging the navigation lock

approaches is the adverse modification of ESA-listed threatened fall chinook spawning habitat. However, as indicated previously, although a redd was found in the tailrace of Lower Monumental, no redds have ever been found ***in*** the navigation lock approaches at these dams.

According to a report written in 1998 by Dr. Dennis Dauble at Battelle's Pacific Northwest National Laboratory (Dauble *et al.*, 1998), the overwhelming majority of the area that is proposed for dredging in 2003-2004 is not suitable habitat for spawning in any year. Dr. Dauble's research examined water depth and velocity, river bottom substrate, and slope; parameters that are well-documented habitat criteria for determining the suitability of habitat for many species of fish, including fall chinook. Using Geographic Information Systems (GIS) technology, Dr. Dauble overlaid all of the required suitable parameters to determine the areas where spawning may be possible in the tailraces of the dams, and also overlaid the dredging template for 2002-2003 for this determination.

Although dredging the navigation lock approaches has the potential to remove some suitable spawning habitat for fall chinook, the total suitable spawning area that would be impacted by dredging is extremely small. In addition, due to the low velocities in the dredging footprints, even if left alone, the habitat does not have the potential to recruit fish to spawn in these areas.

Battelle was contracted to conduct redd surveys again in 2002, and found no redds in the tailraces of the Lower Monumental or Lower Granite dredging footprints, and no redds in front of the powerhouse at Lower Granite Dam. They ran a second survey the week of 15 December 2002, and again found no redds (Mueller, 2003).

In addition, Battelle also reported, "Redds found downstream of Lower Snake River dams did not represent a significant proportion of production relative to other areas in the Snake River system during the survey years." This indicates that, although fall chinook occasionally use this tailrace area for spawning, very low numbers of fish and percentages of the Snake River population would be expected to spawn in these locations.

Because the critical habitat was (1) disturbed within the last 6 years; (2) does not offer suitable spawning habitat; (3) has never been known to contain redds; and (4) has been and will be surveyed prior to every dredging event covered under the 2002 DMMP/EIS, the Corps does not believe that harm will come to fall chinook or their redds by dredging these navigation lock approaches at Lower Monumental and Lower Granite Dams.

Bennett and Shrier (1986) and Bennett *et al.* (1988, 1990, 1991, 1993a, 1993b) captured subyearling fall chinook over low gradient, low velocity, sandy substrates in the Lower Granite reservoir. In addition, subyearlings rearing along

the shoreline of the Lower Granite reservoir during the spring exhibit a strong selection for substrata consisting of primarily sand, and a moderate avoidance of cobble and talus-dominated substrate (Curet, 1994).

Because juvenile fall chinook use shallow, sloping shorelines of sand for rearing, and the navigation lock approaches are relatively deep and composed of cobble and boulder, the Corps will not be impacting suitable rearing habitat for fall chinook. In addition, working during the in-water work window would limit the number of rearing fish exposed to the dredging and disposal process, because the vast majority of individuals of these fish are not present in the river at that time. Juvenile fall chinook rearing habitat was extensively discussed.[35]

The Corps recognizes that the navigation channel is in the migratory corridor for fall chinook salmon and that it is included in the designated critical habitat. However, the Corps does not believe that dredging the navigation lock approach depth by a maximum of 3 feet would have any significant impact on the migration of juvenile salmonids. Removing up to 3 feet of depth from a small portion of a river the size of the Snake is not thought to influence the water velocities in those areas. In addition, dredging during the in-water work window would limit the number of fish exposed to the dredging and disposal process because the vast majority of individuals are not present in the river at that time. The Corps anticipates that NMFS will issue a biological opinion this summer on the proposed 2003-2004 action.

The Corps has determined that the proposed dredging and disposal activities *"may affect, but not likely to adversely affect"* bull trout, bald eagles, water howelia, or Ute ladies' tresses or their habitats. The Corps has also determined the proposed activities would have *"no effect"* on Spalding's silene. In their letter of July 27, 2001, USFWS concurred with these determinations for the proposed dredging and in-water discharge at the RM 116 site. The USFWS was provided with updated information with regard to the dredging in 2003-2004, as well as the proposed woody riparian habitat creation site at this location.

The main subpopulation of bull trout associated with the four lower Snake River reservoirs spawns and rears in the Tucannon River Basin (the confluence of the Snake and Tucannon Rivers is at Snake RM 62). Migratory bull trout from the Tucannon River may be present in the mainstem Snake River below Lower Granite during the winter in-water work window. A few bull trout from the Clearwater River or other tributaries could potentially be present in the vicinity of the confluence of the Snake and Clearwater Rivers. Any bull trout present in the dredging or disposal areas would be able to easily avoid the work areas. The use of mechanical dredging methods would minimize the possibility of entraining any bull trout. Maintaining turbidity at levels within state standards would also minimize impacts to bull trout.

[35] 2002 DMMP/EIS, Appendix K, Section 2.2.2, *Habitat Preference.*

Bald eagles are known to winter in the lower Snake River area and roost in black locust or black cottonwood trees, where available. The proposed dredging and disposal activities would have a minimal impact on bald eagles. The proposed activities do not include removal of any shoreline vegetation. The proposed development of woody riparian habitat would, in the future (20 years), provide additional perch trees at RM 116. Prey species such as fish or waterfowl may be temporarily displaced, but the impacts would be short-term and localized. The dredging and disposal activities would add to the existing amount of human-generated noise and activity in the river channel and on the shoreline, but these impacts would also be short-term and localized.

Bald eagles do nest in the region, but the only documented attempts that occurred within the work area were on Strawberry Island, near the mouth of the Snake River. This is approximately 6 miles downstream of the closest proposed dredging area (at Ice Harbor Dam). Since the in-water work window is outside of the nesting season (February 1 to August 15), there will be no impact to nesting eagles.

Ute ladies' tresses is a lowland orchid typically occurring beside or near moderate gradient, medium-to-large streams and rivers in the transition zone between mountains and plains. It is not found along slow meandering streams out in the flats. The communities where it is often found tend to be typical of riparian habitat in the area. The species tends to occupy graminoid (grasses, rushes, and sedges) dominated openings in shrubby areas. The Corps has surveyed the woody riparian habitat development area for Ute ladies' tresses, and has determined that this species would not be affected by the proposed action.

Water howelia grows in wetlands associated with ephemeral glacial pothole ponds and former river oxbows. The study area does not exhibit habitat that could be used by this species.

Spalding's silene is a flowering plant that occurs primarily within open grasslands with a minor shrub component and, occasionally, with scattered conifers. It is commonly found in the Idaho fescue/snowberry plant association at elevations of 1,900 to 3,050 feet (579.1 to 929.6 m), which is well above the maximum reservoir elevation of 738 feet (224.9 m) for the Lower Granite reservoir. The proposed 2003-2004 activities would have no effect on Spalding's silene, as none of the activities would take place within suitable habitat for the plant species.

The USFWS concurred with these finding regarding bull trout, bald eagle, Ute Ladies' tresses, water howelia, and Spalding's silene with regard to the 2002-2003 dredging activities. This concurrence was received by the Corps on June

27, 2002. An updated concurrence for the proposed 2003-2004 dredging activities was requested on June 25, 2003. It is anticipated that concurrence will be received in the near future from USFWS.

2.6.7 Socioeconomic Effects

2.6.7.1 Navigation Safety

Dredging is now needed in several areas of the navigation channel to remove existing sediments. If this dredging is further delayed, the potential for navigation hazards increase, risking life and property damage. The local ports have already reported that fixed keel sailboats have struck ground at some locations, and barges have grounded (see Attachment I). Grounding can cause a range of damage to vessels, including rips or holes in hulls that take on water and sink the vessel. Accordingly, grounding puts human life at risk. On commercial barges, grounding also can result in leakage or loss of cargo into the river. There is a significant environmental concern, since petroleum products and fertilizer are among the top five commodities carried on the Snake and Columbia Rivers.

These incidents will continue, probably with increasing frequency. For example, a barge grounded in the approach to Lower Monumental navigation lock in January 2001, in an area the Corps planned to dredge in 2002-2003. (See Attachment I, Foss Maritime Tug Grounding, “Clarkston” Grounding memo, January 5, 2001.) The Coast Guard has buoyed off that area until it can be dredged, but other areas also pose hazards. Delays in maintenance of the navigation channel increase the likelihood of injury to persons, property, and the environment.

Known spots from Corps hydrograph surveys where grounding may occur are as follows: (1) a high spot of 1.5 feet juts up into the navigation lock approach channel at Lower Monumental; (2) the channel area between the Port of Clarkston and Port of Lewiston around the railroad bridge has high spots along the south shore out into the navigation lanes; (3) at the Port of Lewiston, a spot rears 3.5 feet into the authorized 14-foot navigation channel; and (4) similarly, high spots averaging 3 to 3.5 feet pose impediments and potential navigation hazards at the Port of Clarkston. Additionally, see Attachment I, Thirteenth Coast Guard District, 03 December 2002, Notice No. 49/02, Monthly Edition for Coast shoaling reports. These areas will be reexamined when the results of the new hydrographic surveys become available in August 2003 to verify that sediment is encroaching on the authorized channel.

The effects of delayed maintenance dredging in the lower Snake River over the past several years have been the subject of recent regional and local level discussions. Several recent meetings of the Technical Management Team (TMT) discussed water elevations with regard to navigation concerns in the lower Snake River (the TMT invited membership includes members from the Corps,

BPA, BOR, Federal and state resource management agencies, and the tribes). In the interest of navigation safety, as well as economic concerns, the TMT recommended approval of commercial navigation interests' request for higher water surface levels, by allowing three of the four lower Snake River reservoirs to be operated at levels 1 foot above the MOP constraint during the summer. Minutes from the relevant TMT meetings and letters from the barge operators are included in Attachment I.

2.6.7.2 Economics

Lack of routine maintenance of the federal navigation channel has impacted commercial navigation, and continued lack of maintenance may result in millions of dollars of negative impact, having an indirect ripple effect on the economy of the area. These impacts include losses to hotels, motels, restaurants, dock workers, *etc*. Cruise boats and tourism are being affected. Currently, three cruise ships would be impacted if reservoir levels were kept at MOP. The Ports have notified the Walla Walla District that two new boats are planned with one already under construction that drafts 12 feet. The cruise ships cannot dock at port facilities given the current condition (12 feet), and they may also scrape at places within the navigational channel and turning basin.

The Port of Clarkston has notified the Walla Walla District that a cruise ship, *Empress of the North*, is expected to arrive in September 2003. This ship drafts 12.5 feet, which may cause clearance problems at the Gateway dock. In addition, barges carrying sawdust arrive three times per month at the Port of Clarkston's crane industrial dock. They draft 13.5 feet, and are currently light-loading to 12.5 feet at MOP+1. Barge crews have indicated that the barges are scraping bottom at that location. The Port of Clarkston also indicated that Potlatch Corporation plans to ship woodchips to the Port for unloading at the crane industrial dock. The Port is currently working with a company from Northern Idaho on shipments of clay to the Portland area. Full barge loads are necessary to maintain the feasibility of shipping this product by the river system while staying competitive with rail and trucks. Rock shipments from the Port of Clarkston would also be a potential source of revenue, if the barges could be fully loaded (see Attachment I).

Significant cargo carrying capacity is lost by a rate of 707 bushels per inch if the draft is reduced. For example, estimated loss with a grain barge for each inch of draft lost represents $3,200 market loss of cargo plus $208 loss of tariff income to shippers. Considering the typical barge traffic with a 2-foot light load over 6 months of the year, the loss of tariff income could add up to $10 million.

If the Corps does not maintain the navigation channel for an extended length of time and barge transportation is substantially reduced, terminated or nor longer feasible, the transportation effects could be extreme. The Feasibility Study has an extensive economic analysis that considers the shift of commodity transport

from river to rail or truck. It is estimated that 126.6 million bushels of grain would need to be transported by rail or truck if river transport cannot be used. (Feasibility Study, Table 5.9-1, page 5.9-2). Non-grain commodity transportation costs would increase an average of 5.07 percent (Feasibility Study, Table 5.9-5, page 5.9-6). It also estimated that grain shipments alone would increase traffic on the mainline railroad routes from an estimated 840 to 940 additional railcar-trips per month. Assuming a train size of 108 cars, this represents an increase of about 8 to 9 additional trains per month destined to ports on the lower Columbia River. This would be a significant increase in rail traffic and improvements to the existing mainline system may be needed (Feasibility Study, Section 5.9.2.1, page 5.9-8). For rail, additional storage at grain elevators would be necessary to accommodate from 140 to 325 additional railcars. The estimated costs associated with providing this storage range from $2.0 million to $4.1 million (1998 cost basis) (Feasibility Study, Section 5.9.2.5, page 5.9-9). Other possible impacts include necessary improvements to infrastructure of roadways and rail systems.

Adequate flood protection at Lewiston is based on a combination of dredging and a future levee raise. Because raising the levees is not included in the proposed 2003-2004 activity, the absence of maintenance dredging may increase the risk of overtopping the existing levy in the City of Lewiston. Each year maintenance dredging is delayed increases the risk of flooding. A large runoff or flood event in the next 2 years could provide enough sediment accumulation to produce a 1.5-foot change in the water surface elevation.

On a historical note, the current sedimentation concerns are similar to those experienced in previous years. For example, in 1984 and 1981, sedimentation was discussed. The *Lower Granite Project: Snake River, Washington and Idaho Sedimentation Study – Interim Report*, February 1984, page: 5, set forth the problems facing the Corps in 1984:

> f. Observed Problems. Serious navigation problems have been developing due to Lower Granite reservoir sedimentation, in addition to the concerns about levee adequacy. Dredging at the Ports of Lewiston and Clarkson and at several of the reservoir's marinas has been required to maintain adequate water depths for water traffic. Periodic constraints on operating pool levels have also been imposed to maintain adequate navigation depths. Dredging to maintain the navigation channel on the Clearwater River in the vicinity of the Camas Prairie Railroad Bridge can be expected in the near future based on observed deposition patterns in that area.

The conclusions, with regard to the levee system, are set forth on page 17:

> b. Remedial action such as an effective dredging program, levee raising, an economic combination of dredging and levee raising, or other remedial structural measures is necessary to enable the levee system to continue to provide SPF protection to the leveed areas in the vicinity of the Snake-Clearwater Rivers' confluence. Because of the shortcomings or uncertainties of the current one-dimensional HEC-6 model, initial action should concentrate on maintenance dredging instead of structural measures until more model confidence can be developed since dredging would provide a more flexible plan of action. Dredging program modifications would involve changing the locations and/or the magnitude of the dredging activities, both of which are not permanently fixed and are readily altered as required. However, structural measures involve lengthy designing and construction processes and the resulting structures are more difficult to change, once constructed, than is modifying dredging programs.
>
> c. The time period before the SPF encroaches upon the levee freeboard is in the immediate future, with model predictions indicating that freeboard encroachment could possibly occur as early as 1984. By the year 2000, i.e., in 16 years, only about 3 feet of freeboard would be available during the SPF, which is considered to be the maximum encroachment that should be allowed in any condition. The stated time period is dependent on streamflow sequences being similar to 1970-81. A higher streamflow sequence would shorten this time frame.
>
> d. Extensive dredging will be required in the future to maintain adequate navigation depths in the vicinity of the Snake–Clearwater Rivers' confluence at Lewiston–Clarkston. Material previously removed from this area has been predominately fine sand, as have been bed samples take in the confluence area by the Corps. This grain size appears to be a predominate contributor to increased water surface levels as it falls out in the upper reservoir reaches and must ultimately be removed to maintain design water surface profiles at the leveed areas unless the levees

> themselves are raised. It is concluded that the trapping and dredging of the fine sands at the confluence area, including the port areas, are effective flood control measures since, otherwise, the sand would eventually have to be dredged after it migrated further downstream into deeper portions of Lower Granite reservoir.

Additional historical sedimentation information can be found in the *Lewiston – Clarkston Dredging and Disposal Report*, October 1981, discussing sedimentation resulting from above Lower Granite Reservoir (page 3-5):

> Above Lower Granite Lake the Snake River meanders through narrow steep canyons, and coarse alluvial material are clearly in evidence in the many vertical banks and gravel bars along the river. During high water stages river banks erode and gravel bars in the river channel shift; consequently, much of the bank and river-bar material will eventually move into the lake as bedload.
>
> The Clearwater River is confined to narrow, heavily timbered canyons with some barren areas. Materials through which the river flows are largely rocky. However, during heavy runoff, large quantities of sediment and bedload are carried which will be deposited in the lake area.
>
> Fairly comprehensive sedimentation studies were made in the Walla Walla, Tucannon, and Palouse River Basins. Those field investigations showed that suspended sediment concentrations were not significant, except during flood periods. In addition to the sediment studies, resurveys of sediment ranges showed that considerable deposition does occur in the reservoir arms of these tributary streams. Based on sediment studies for the Snake and Clearwater Rivers, it has been concluded that sedimentation and bedload deposition will occur and possibly have an appreciable effect on the elevation of the water surface profile in the Lewiston area of the Lower Granite Lake. The frequency of dredging on the Snake River tends to give validity to these reports.

2.7 Cumulative Effects

This cumulative effects analysis addresses how other past and future actions, when considered in combination with the proposed dredging and disposal action, could cumulatively have significant impacts on environmental resources. Other past, present, and reasonably foreseeable projects or actions that could result in cumulative impacts include past, present, and future dredging and disposal activities undertaken by the Corps, and past, present, and potential future federal and non-federal dredging for maintenance of ports, boat basins, and other public or private facilities within the four lower Snake River reservoirs.

Cumulative effects of the proposed dredging and disposal for 2003-2004 would most likely be associated with aquatic resources. Benthic communities would continue to be displaced in the immediate areas of the dredging activities and temporarily buried at the site of the disposal activities. However, these communities would be expected to re-establish within 6 months to a year. The dredging and disposal would have the potential to negatively impact ESA-listed fish species, but these impacts would be minimized because few individuals of the listed species would be present during the in-water work period. The proposed woody riparian habitat development would provide long-term benefits for terrestrial and aquatic ecosystems. In addition, the potential in-water disposal of the dredged material is expected to result in the creation of additional rearing habitat for juvenile fall chinook salmon, which may contribute to improved survival of the juveniles.

The proposed 2003-2004 dredging and dredged material management activities are not anticipated to have substantial cumulative impacts on the human and natural environment.[36]

2.8 Monitoring

The Corps has prepared a monitoring plan for the proposed 2003-2004 dredging and disposal activities (see Attachment C). The monitoring plan addresses the impacts of dredging and disposal on water quality and fish use (salmonids, in particular) of the work areas, and determines physical stability or potential movement of the disposed material.

Monitoring will be performed in three phases: pre-dredging, during dredging and disposal activities, and post-dredging and disposal. Pre-dredging activities would include redd surveys and rearing habitat surveys. Redd surveys would be performed in November/December 2003, just prior to dredging to determine if

[36] 2002 DMMP/EIS, Section 4.15, *Cumulative Effects*. Future maintenance of the navigation channel is being evaluated in the long-term programmatic plan, which will include an evaluation of the cumulative impacts of a selected preferred alternative.

any fall chinook spawning has occurred in the navigation lock approaches and identify the location of the redds. If a redd were found in the proposed dredging footprint, the Corps would either modify the dredging footprint to avoid the redd, or postpone dredging to a later date after emergence of young fish from the redd.

The Corps would conduct pre-dredging surveys of planned dredging and disposal sites to determine their potential usage as rearing habitat by fall chinook. If more than 20 endangered juvenile salmonids or other endangered fish are found to inhabit any of the proposed disposal sites during one sampling period, the site for disposal will need to be re-examined, with an attempt to choose a site that would be less detrimental to the specific species found. If any endangered salmonids or other endangered fish are found inhabiting backwater areas prior to dredging, the site for dredging will need to be re-examined, with an attempt to choose an in-water work window that would be less detrimental to those species.

During the proposed dredging and disposal activities, the Corps will perform water quality monitoring, grain size analysis, and lamprey monitoring. Water quality monitoring will be conducted during the performance of dredging and disposal activities to determine if these activities are meeting the conditions of the 401 water quality certification and any reasonable and prudent actions resulting from ESA consultation. The Corps will monitor depth, turbidity, ammonia, pH, temperature, dissolved oxygen, and conductivity. Water quality monitoring will be performed before, during, and after all in-river work at each dredging site and at the disposal site. Monitoring locations for all parameters will follow the requirements of Washington Administrative Code (WAC) 173-201A. If water quality standards are not being met, the dredging contractor will alter the dredging or disposal operation to correct the problem, and continue monitoring. If the standards are still not being met, the Corps may issue an order stopping all or part of the work until satisfactory corrective action has been taken.

Grain size analysis of the material being dredged will be performed to gather additional information on the physical characteristics of the material. This analysis will be compared to the grain size analysis performed in June 2000 during the pre-dredging sediment sampling and contaminant analysis. The samples taken during dredging will be analyzed for physical characteristics only, not for chemical contamination.

Although data on Pacific lamprey is currently very scarce, the Corps realizes that dredging sand and silt from the lower Snake River reservoirs has the potential to entrain Pacific lamprey ammocoetes (juveniles residing in sedimentary material). Although Pacific lamprey are not currently listed under the endangered species act, reduced counts of returning adult fish at Bonneville Dam in recent years indicate that their listing under the ESA may be warranted in the near future. In

an effort to determine the possible impacts of dredging and disposal on juvenile lamprey in the future, the Corps will perform some limited monitoring of dredged material for lamprey ammocoete presence in the backwater areas (boat basins, boat launch areas, and Swallows swim beach).

Pre- and post-dredging biological monitoring will be implemented to reduce uncertainty and minimize any potential impacts to ESA-listed or candidate species. Specific monitoring actions will include pre-dredging salmon redd surveys within the navigation lock approaches, turbidity and sediment chemistry (particularly ammonia) analysis during dredging and disposal operations and surveys to determine the presence of any rearing fall chinook salmon. The detailed monitoring plan is included in Attachment C of this SEA-03/04

Post-dredging and disposal monitoring performed within 6 months of completion of dredging and disposal activities will consist of sediment sampling at the disposal area to determine grain size composition of the materials and to verify the in-place conditions of the sediments. Sediment samples will be taken using vibracore drilling. The results of the core sampling of the disposal site will be used with other future monitoring of the disposal site to assess slope stability and long-term structural stability of the disposal area. Future monitoring will include soundings at the disposal area to determine river bottom elevations. Changes in elevations would indicate movement of material. The Corps will compare the core sampling records to the locations of material movement to determine the composition of the dredged material (*i.e.,* percent sand vs. percent silt) disposed at that location. Based on the results of the comparison, the Corps may modify its disposal plans for future dredging. Modifications could include altering the percent of silt in in-water disposal areas, or constructing a berm of sand or cobble at the toe of the disposal area slope. The complete monitoring plan description is included in Attachment C.

2.9 Compliance With Applicable Environmental Laws

2.9.1 National Environmental Policy Act

As previously stated, the proposed 2003-2004 dredging is a routine maintenance action. The original EISs prepared for these lock and dam projects assume and address the maintenance of the projects over their functional lifetime.

Over the years, environmental assessments have been prepared to address current conditions. This SEA-03/04, with its reliance on the analysis, input, and information contained in the 2002 DMMP/EIS for the short-term dredging, and additional information, adequately addresses the requirements of NEPA for the proposed 2003-2004 maintenance dredging.

This SEA-03/04 sets forth information on past dredging activities and the NEPA compliance associated with each (see Tables 1 and 3). The Corps references current scientific information, and provides additional analysis in this SEA-03/04. The Corps relies on the analysis presented in the 2002 DMMP/EIS for 2002-2003 dredging activities;[37] and this SEA-03/04 sets forth the rationale for, and applicability to, the 2003-2004 dredging activities. The Corps has not made substantial changes in the proposed site-specific action, and there are no new circumstances relevant to the environmental concerns that bear on the proposed action or its impacts.

The Corps uses an independent utility test to determine whether it is required to consider multiple actions in a single NEPA review pursuant to CEQ regulations. For example, the Corps looked at whether the proposed 2003-2004 dredging and the programmatic plan were connected actions. It was determined that they are not, as the 2003-2004 dredging could proceed with or without the long-term programmatic plan and, thus, has independent utility.

2.9.2 Endangered Species Act

An ESA consultation with NMFS is currently in progress. On 23 June 2003, a draft biological assessment was delivered to NMFS, and initial consultations have begun, including clarification of statements and the intent for dredging. The final biological assessment is anticipated to be completed in July 2003. A Biological Opinion from NMFS is expected during Summer 2003.

On 25 June 2003, the Corps submitted a letter to USFWS, Central Washington Field Office, notifying them of the change in work schedule and requesting a determination of effects for bull trout critical habitat during the proposed 2003-2004 dredging activities. The Corps has determined that these proposed activities *"may affect, not likely to affect"* the critical habitat for bull trout in the proposed work areas, since overall food supply and water quality will be relatively unchanged after the work is completed. The Corps expects to receive a letter of concurrence from USFWS in the near future.

2.9.3 The Clean Water Act

The Corps has prepared a Section 404 (b)(1) evaluation for the 2003-2004 dredging (see Attachment F). In the spring of 2003, the Corps took sediment samples from all of the proposed dredging locations, and analyzed the samples for contaminants. The results of the contaminant analysis indicated that any contaminants present in the samples were at concentrations low enough to meet state standards and appropriate for in-water disposal of the dredged material. The Corps is requesting an amendment to the CWA Section 401 water quality certification that was issued by Washington Department of Ecology on October 17, 2002, for the proposed 2002-2003 dredging and disposal. The Corps is

[37] 2002 DMMP/EIS, Section 5.1.13, *National Environmental Policy Act (NEPA)*.

issuing a revised public notice for this action, as the dredging and disposal locations remain the same as those proposed for 2002-2003. The expected impacts to water quality remain the same as those identified in the 2002 DMMP/EIS for short-term maintenance dredging.

2.9.4 Pacific Northwest Electric Power Planning and Conservation Act

The Corps continues to meet its responsibilities under the Pacific Northwest Electric Power Planning and Conservation Act. Through its consideration of the Northwest Power Planning Council's (NPPC's) Fish and Wildlife Program, the Corps will continue to provide input to the NPPC's periodic review and update. Where the requirements of the biological opinions and NPPC's Fish and Wildlife Program are not consistent, the Corps will continue its dialogue with the NPPC. The 2003-2004 activities are consistent with the current program.

2.9.5 National Historic Preservation Act

Pursuant to Section 106 of the National Historic Preservation Act, the Corps made a "no historic properties affected" determination for the 2002-2003 dredging season. The Corps Section 106 determination, along with pertinent project information, was provided to identified consulting parties—Washington and Idaho State Historic Preservation Offices, Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation, Yakama Nation, Confederated Tribes of the Colville Reservation, and the Wanapum. Given that the same locations and conditions exist for the proposed 2003-2004 dredging season, the Corps will again make a "no historic properties affected" determination, and will consult/coordinate with the same consulting parties.

2.9.6 Summary of Compliance with Other Laws, Executive Orders and Regulations

This SEA-03/04 addresses compliance with all other laws, executive orders and regulations applicable to the proposed action, and incorporates by reference previous analyses.[38] (see Section 5 of the Main Report). The following discussion expands on some of those laws and executive orders for the proposed 2003-2004 maintenance dredging.

- **Fishery Conservation and Management Act of 1976**

The Essential Fish Habitat components were evaluated for the proposed dredging and disposal actions. The in-water disposal with potential creation of higher value salmon rearing habitat along with woody riparian habitat, has high potential to benefit overall habitat components.[39]

[38] 2002 DMMP/EIS, Section 5, *Compliance With Applicable Environmental Laws and Regulations*.
[39] 2002/DMMP/EIS, Section 5.1.10, *Fishery Conservation and Management Act of 1976.*

- **Executive Order 11988, Floodplain Management Guidelines, May 24, 1977**

Since the proposed dredging and disposal actions would result in a net fill of zero, floodplains or effects on downstream flooding are anticipated to result in no effect. Any localized change in water elevation in the vicinity of RM 116 would be extremely small, and have no effect on the floodplain at that specific location.

- **Executive Order 12898, Federal Actions to Address Environmental Justice in Minority populations and Low-Income populations, February 11, 1994**

The proposed in-water disposal and habitat creation at RM 116 has potential to result in indirect positive impacts to affected minority and low-income populations if benefits are realized regarding the salmon. Otherwise, no impacts are anticipated.

2.9.7 Summary of 2002 Final DMMP/EIS Comments and Responses

This SEA-03/04 includes the comments received on the Final 2002 DMMP/EIS, as some pertain to the activities included in the proposed 2003-2004 dredging. The Corps is republishing these comments in this document to extend another opportunity for others to see previous comments. The comment letters and Corps responses are included, in their entirety, in Attachment D.

2.9.8 Other Coordination and Consultation

2.9.8.1 Government-to-Government Consultation

The Corps will initiate Government-to-Government consultation as expeditiously as possible. The following tribes will be notified:

Confederated Tribes and Bands of the Yakama Indian Nation
Confederated Tribes of the Colville Reservation
Confederated Tribes of the Umatilla Indian Reservation
Nez Perce Tribe

2.9.8.2 Local Sediment Management Group

Policy and procedures are currently under development for the Northwest Regional Dredging Team (RDT), as referred to in the April 26, 2002, policy letter jointly signed by Brigadier General David A. Fastabend, Corps of Engineers, Northwestern Division Commander, and L. John Iani, EPA Region 10 Administrator. In coordination with EPA, the Corps has formed a Local Sediment Management Group (LSMG) that will operate as a subgroup under the Northwest RDT, and focus on the Mid-Columbia and lower Snake River project area. The

LSMG has been formed to assist in the development and adoption of appropriate method(s) for management of dredging, and use and/or disposal of dredged material from federal navigation and maintenance projects and dredging activities regulated under Section 404 of the CWA. In the formulation of these management policies, LSMG would be asked to consider key environmental laws and regulations involved in this process; consider the responsibilities of other federal, state, and local resource agencies; and help develop a coordination process for dredging and beneficial use of dredged material. In addition, LSMG would assist the Corps in evaluating dredging and dredged material management activities and options consistent with an adaptive management approach.

The LSMG has been identified as a forum for discussion of possible measures to reduce sedimentation in the lower Snake River system and McNary reservoir. To facilitate these discussions, land management and conservation agencies (*i.e.*, U.S. Forest Service, the Natural Resources Conservation Service, and others that may have a role in sediment reduction strategies) will be asked to participate in LSMG.

The LSMG has not been involved in the preparation of this report, since the last LSMG meeting, on 10 December 2001, considered the dredging sites and disposal location proposed for the 2002-2003 dredging, which has been carried forward as the proposed 2003-2004 dredging. However, this report will be mailed to members of the LSMG. Comments received will be considered and responses will be included in the Corps decision document, as appropriate.

2.9.8.3 Other Considerations

- **Regional Acceptability**

The acceptability of maintenance dredging by states, other federal agencies, stakeholders, special interests, local governments, tribes, and the general public was assessed through the public review process for the 2002 DMMP/EIS for the proposed 2002-2003 dredging. Approximately 28 comments on the Draft DMMP/EIS were considered in the final document, an additional 13 comments were received on the Final 2002 DMMP/EIS, and were included in the 2002 ROD. These comments have been re-published in this SEA-03/04 as Attachment D.

It seems to be generally accepted that maintenance dredging and disposal of resulting dredged material is appropriate in order to maintain the current navigation activities. Overall, regional acceptability seems to favor dredging.

- **Short-term Uses and Long-term Productivity**

This analysis looked at the relationship between short-term uses of environmental resources and the maintenance and enhancement of long-term productivity. All of the alternatives evaluated in the 2002 DMMP/EIS would cause some mix of short-term impacts including, but not limited to, water quality and fish. However, these are expected to be minimal with the proposed 2003-2004 dredging activities, and some beneficial effects on long-term productivity would occur in the continued availability of a viable navigation channel, and the biological use and productivity of the shallow-water habitat and the woody riparian planting bench. The intended benefits to anadromous fish, if realized, would be a long-term productivity gain.

- **Irreversible and/or Irretrievable Commitment of Resources**

Irreversible commitments are decisions affecting renewable resources (*i.e.*, soils, wetlands, and riparian areas). Such decisions are considered irreversible because their implementation would further deteriorate a resource to the point that renewal can occur only over a long period and at great expense; or because they would cause the resource to be destroyed or removed. Regarding the implementation of the proposed 2003-2004 dredging activities, no impacts are anticipated that would be an irreversible or irretrievable commitment of resources. There is an anticipated benefit to the riparian areas in the disposal area.

- **Best Information or Science Available**

There are some uncertainties and controversy in the scientific information regarding the biology (specifically, effects to listed species), as well as water quality impacts and economics. However, the information provided in this SEA-03/04 is the best information available to date, and is sufficient to support the proposed 2003-2004 dredging activities.

- **Environmentally Preferable Alternative**

The Corps believes the preferred alternative identified in this SEA-03/04 is also the environmentally preferred alternative.

- **Short-Term and Long-Term Effects**

Under proposed 2003-2004 dredging activities, short-term implementation is presumed to result in near-term negative impacts with long-term benefits associated with shallow-water habitat and the woody riparian planting bench.

Section 3 - Conclusions

This SEA-03/04 has taken into consideration the environmental consequences, socioeconomic costs, and biological data pertinent to the proposed maintenance dredging action. This report demonstrated that adequate Congressional authority, NEPA documentation, and scientific rationale exist to implement the proposed 2003-2004 maintenance dredging of the four lower Snake River projects. The Corps will not begin dredging until all necessary compliance documents are received (*i.e.*, water quality certification). The Corps proposes to proceed with this dredging beginning December 15, 2003.

The SEA-03/04 informs and alert the public to what the Corps is proposing. The Corps has taken a hard look at the environmental impacts of dredging and disposal, and considered the reasonable and feasible alternatives for resolving existing, current problems in the navigation system.

The proposed maintenance dredging takes into account the Northwest treaty tribes' fishing rights, the United States' trust responsibility to Native American Indian Tribes, and the United States' responsibility to act in a manner consistent with its responsibility to the tribes.[40] The Corps plans to complete Government-to-Government consultation prior to signing a decision document.

The actions the Corps will implement are designed for routine maintenance of the navigation channel and associated public use areas, as well as maintain flow conveyance. The beneficial uses associated with the shallow-water habitat, designed to assist the listed salmon species, should potentially have beneficial results to the treaty tribes' fishery and benefits to the Northwest region as a whole.

The SEA-03/04 describes the need for, and associated impacts of, the proposed 2003-2004 routine maintenance dredging. For example, it describes:

- Increasing safety concerns and risks to life and property;
- Minimal impacts to ESA-listed species from proposed short-term dredging and disposal activities;
- Numerous locations within the Federal navigation channel where depths are less than the authorized 14 feet (based on MOP operations);
- Negative impacts to the economy of the region as a result of the operational constraints caused by current channel conditions;
- A gradual increase in the risk of overtopping the Lewiston Levee system;
- The limited, direct impact of the proposed dredging (less than 0.5% of the total surface area of the lower Snake River reservoirs affected);

[40] 2002 DMMP/EIS, Section 4.4.14*, Native American Tribes and Communities;* and Section 6.6.4, *Tribal Consultation*.

- The avoidance of cultural resources;
- Minimal and short-term impacts to water quality; and
- Monitoring plans to verify impacts

The proposed action takes into account both the need to maintain the navigation channel and environmental resource concerns. The disposal activities, which include the construction of shallow-water habitat and a woody riparian planting bench, were developed based on years of research; and are anticipated to provide long-term benefits to listed salmon stocks.

The conclusions in this SEA-03/04, associated BA, and the NMFS BIOP will take into account the differing scientific opinions and interpretations of available information, including the research on salmonid habitat creation. The Corps plans to rely on the biological information contained in the NMFS 2003 BIOP and the consultation with USFWS; and is based, in part, on NMFS and USFWS consideration of the differing scientific (biological) information and their expertise on the effects on other species for the 2003-2004 dredging.

The relevant evaluations and documentation[41] have sufficient analyses to support the recommended 2003-2004 maintenance dredging with beneficial use of dredged material for improving salmon rearing habitat. The Corps has determined that these actions, taken together, will meet the Corps responsibilities under the ESA to avoid jeopardy to the listed anadromous species: the Snake River spring/summer chinook salmon, fall chinook salmon, steelhead, sockeye salmon, Upper Columbia Basin steelhead, Middle Columbia Basin steelhead, and Upper Columbia Basin spring run chinook salmon. Also, these actions may affect, but are not likely to adversely affect other species listed under the ESA (*i.e.*, bull trout, bald eagles, Ute ladies' tresses or water howellia), and will have no effect on Spalding's silene.

The Corps has reviewed, analyzed, and incorporated by reference the best information and science available at this time, and sets forth a reasoned evaluation of relevant factors in this SEA-03/04.

There are some uncertainties and controversy in the scientific information regarding the biology (specifically, effects to listed species), as well as water quality impacts and economics (see Attachment D). Pre- and post-dredging monitoring will be implemented to reduce uncertainty and minimize any potential impacts to ESA-listed or candidate species. Specific monitoring actions will include pre-dredging salmon redd surveys within the navigation lock approaches, turbidity and sediment chemistry analysis (particularly ammonia) during dredging and disposal operations, and surveys to determine the presence of any rearing fall chinook salmon. The detailed monitoring plan is included in Attachment C of this SEA-03/04.

[41] Including documents incorporated by reference.

Because the lower Snake River has been designated as critical habitat for threatened Snake River fall chinook salmon, dredging the tailraces of Lower Granite and Lower Monumental Dams will technically be altering critical habitat for spawning, rearing and migrating fall chinook salmon. However, the vast majority of the tailrace areas to be dredged are not suitable for spawning, are not the habitat chinook typically use for rearing, and would not be significantly impacted for migrating juvenile fish. In addition, it is expected that in-water disposal of dredged material would enhance critical rearing habitat for fall chinook salmon. All in-water work will be performed during the designated in-water work window.

Although non-dredging measures were addressed in the 2002 DMMP/EIS, some of these measures (sediment reduction, drawdown/sediment flushing and light loading) will be further considered in the PDMMP/SEIS for long-term dredged material management. However, they do not address the short-term navigation safety and economic needs and, therefore, they do not represent reasonable and feasible alternatives for the proposed 2003-2004 dredging needs.

The evaluation in this SEA-03/04 does not foreclose the opportunity to consider other alternatives in the programmatic DMMP/SEIS. By selecting a preferred alternative that is site-specific and unconnected, it does not irretrievably commit resources. The Corps also considered the extent of the interrelationship among the two actions and the practical considerations regarding the feasibility of not proceeding with an interim dredging activity.

The Corps conducted a thorough economic analysis,[42] applicable to this 2003-2004 dredging. The Corps has updated its evaluation and included some recent economic data as part of this SEA-03/04. Some of this data is referenced and discussed in Attachment D, *Comments and Responses on the Final Dredged Material Management Plan, July 2002*.

Several other factors including, but not limited to, regional acceptability, implementation impacts, short-term uses and long-term productivity, irreversible and irretrievable commitment of resources, short-term and long-term effects, and indirect, direct and cumulative impacts were considered.

Based on the information included in this SEA-03/04, the updated biological assessment, and the analyses referenced from previous environmental documents,[43] the Corps has determined that the proposed 2003-2004 maintenance dredging and beneficial use disposal is a fully justifiable action, and would increase navigation safety and reduce economic impacts. The Corps anticipates that the NMFS' Biological Opinion will arrive at a *No Jeopardy* determination for listed salmon and steelhead species.

[42] 2002 DMMP/EIS, Appendix C, *Economic Analysis.*
[43] Including, but not limited to, the 2002 DMMP/EIS.

The SEA-03/04 will be available to the public for a 30-day review period. Comments received during this period will be evaluated and addressed, as appropriate. Once all comments are evaluated and considered, a decision document is anticipated for 2003-2004 short-term maintenance dredging and dredged material disposal activities. The resulting decision document will be available on the Corps website (*http://www.nww.usace.army.mil/dmmp)*, and a limited number of hard copies will be available by request.

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