U.S. Army Corps of Engineers
Walla Walla District

Lower Snake River Draft Programmatic Sediment Management Plan Environmental Impact Statement

Lower Snake and Clearwater Rivers, Washington and Idaho

EXECUTIVE SUMMARY

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LOWER SNAKE RIVER
PROGRAMMATIC SEDIMENT MANAGEMENT PLAN
DRAFT ENVIRONMENTAL IMPACT STATEMENT

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Lead Agency. U.S. Army Corps of Engineers, Walla Walla District
Type of Action. Administrative

Abstract. This draft Programmatic Sediment Management Plan (PSMP) and Environmental Impact Statement (EIS) presents the U.S. Army Corps of Engineers' (Corps) plan for managing sediment within the lower Snake River system to meet the authorized project purposes that are affected by sediment deposition. The Corps is preparing this EIS to evaluate a long-term plan for management of sediment accumulation that affects authorized purposes of the four lower Snake River lock and dam projects in southeastern Washington and north central Idaho. This EIS also addresses an immediate need action, consistent with the plan, to reestablish the navigation channel in four locations.

The purpose of the proposed action is to establish a programmatic framework to evaluate and implement potential sediment management measures to address problem sediment accumulation. The PSMP provides a long term plan to manage, and prevent if possible, the accumulation of sediment that interferes with authorized project purposes. The immediate need action to reestablish the navigation channel to the Congressionally-authorized dimensions will be consistent with the PSMP.

The Corps formulated a range of alternatives by identifying and evaluating sediment management measures, then assembling the feasible and effective measures into groupings based on how measures could be implemented and what agencies could implement them. The alternatives are programmatic and describe broad categories of actions that could be implemented to meet the purpose and need. The Corps identified Alternative 7 – Comprehensive (Full System and Sediment Management Measures) as the preferred alternative. The alternative includes dredging and dredged material management along with other sediment and system management measures, and provides the Corps with a complete toolbox for addressing sediment that interferes with the authorized purposes of the four projects.

Draft Copy. The draft copy of this report was officially filed with the Director, Office of Federal Activities, U.S. Environmental Protection Agency on December 14, 2012.

Comments. Comments on the draft report are due on February 8, 2013, 55 days from December 21. 2012, the expected the date of U.S. Environmental Protection Agency's publication of Notice of Availability in the Federal Register. Comments are to be directed to the following:

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Further Information. Additional information on the Draft Environmental Impact Statement and related documents also may be obtained from the above. The documents are also available on the Corps web site at www.nww.usace.army.mil/Missions/Projects/ProgrammaticSedimentManagementPlan.aspx .

EXECUTIVE SUMMARY

Introduction

The Walla Walla District of the U.S. Army Corps of Engineers (Corps) is identifying and evaluating sediment management strategies for the lower Snake River. Based on the analysis presented in this Environmental Impact Statement (EIS) and stakeholder and public comment, the Corps proposes to adopt and implement a Programmatic Sediment Management Plan (PSMP) for the long-term management of sediment within the lower Snake River system to meet authorized project purposes.

As a part of its Congressional authorization, the Corps operates and maintains the navigation system on the lower Snake River, which is part of an inland navigation system from Lewiston, Idaho to the Pacific Ocean and includes the Columbia River. Within this navigation system are four dams which were constructed by the Corps between 1961 and 1975 on the Snake River in Washington State (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite). These four dams and their associated locks and reservoirs, are referred to as the Corps' Lower Snake River Projects (LSRP).

The authorized purposes of the LSRP include commercial navigation, hydroelectric power generation, recreation, and fish and wildlife conservation. Sediment accumulation in the lower Snake River can interfere with these authorized project purposes and the Corps has historically dredged accumulated sediment that interfered with the authorized purposes of the LSRP. Dredged sediments were moved to and placed in areas where they would no longer interfere with the authorized purposes, either in-water within the reservoirs or on upland sites.

Purpose of and Need for the Proposed Action

The Corps proposed action is to adopt and implement a Programmatic Sediment Management Plan (PSMP) for managing sediment within the lower Snake River system to meet the authorized project purposes that are affected by sediment deposition. The Corps is preparing this EIS to evaluate a long-term plan for management of sediment accumulation that affects authorized purposes of the LSRP and an immediate need action, consistent with the plan, to reestablish the navigation channel.

The purpose of the proposed action is to establish a programmatic framework to evaluate and implement potential sediment management measures to address problem sediment accumulation. The PSMP must provide a long term plan to manage, and prevent if possible, the accumulation of sediment that interferes with authorized project purposes. The immediate need action to reestablish the navigation channel to the Congressionally-authorized dimensions will be consistent with the PSMP.

The need for the PSMP is to manage, reduce and prevent if possible, sediment accumulation in areas of the lower Snake River reservoirs that interfere with federally authorized purposes. Sediment accumulation interferes with the following authorized purposes of the LSRP:

- *Commercial navigation* by reducing the depth of the Federal navigation channel to less than the authorized depth (14 feet) when operating at minimum operating pool, or MOP, thereby impairing access to port berthing areas, access to navigation locks, and safe movement of tug and multibarge tows;
- *Recreation* by limiting water depth at boat basins to less than original design dimensions;
- *Fish and wildlife conservation* by sediment accumulation interfering with irrigation water intakes at Habitat Management Units (HMUs), juvenile ESA-listed fish barge access to loading facilities, and fish barge passage through the reservoirs and locks within the LSRP.

Sediment accumulation at the confluence of the Snake and Clearwater Rivers can interfere with the intended design and function of the Lower Granite Project levees to provide adequate flood risk protection at Lewiston-Clarkston. Continued sediment management at the confluence of the Snake and Clearwater Rivers may be needed in the long-term to ensure adequate flow conveyance through the Lewiston levee system to support Lower Granite project purposes and manage the risk of flooding consistent with applicable Corps policies. For the PSMP and EIS the need to manage sediment for flow conveyance is considered to be equivalent to an authorized project purpose.

Additionally, sediment deposition is currently interfering with the Corps' ability to comply with requirements of the Federal Columbia River Power System (FCRPS) 2008/2010 biological opinion (2008/2010 BiOp), which was prepared by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA). The 2008/2010 BiOp addresses operation of the Columbia River system projects including the LSRP. Reasonable and Prudent Alternative (RPA) Action 5 of the 2008/2010 BiOp states that the lower Snake River reservoirs will be operated within one foot of MOP from April through August each year to help move juvenile threatened and endangered salmon through the river system to the ocean. The Corps has been operating the Lower Granite Project above MOP (1 to 2 feet) for navigation purposes since 2010 in response to the accumulation of sediment at the confluence of the Snake and Clearwater Rivers.

In the past, the Corps has approached sediment management by identifying areas where sediment interfered with authorized LSRP purposes and then taking action to remove the sediment, usually by dredging. Development of the PSMP would establish a decision-making process to manage and, if possible, prevent sediment accumulation that interferes with authorized project purposes.

Historically, the Corps has routinely maintained the navigation channel at its authorized dimension through dredging actions, typically every 3 to 5 years. The Corps has not performed maintenance dredging in the channel since the winter of 2005-2006 when the Lower Monumental and Lower Granite downstream navigation lock approaches, the federal channel at the Snake and Clearwater Rivers confluence, and the berthing areas of the Ports of Lewiston and

Clarkston were dredged. Sediment has been accumulating in the navigation channel and over the past 2 to 3 years, and the accumulation has reached a level where channel dimensions at some locations are not at authorized dimensions, even when the reservoir is operated above MOP. Currently, sediment accumulation has reduced the navigation channel depth to as shallow as seven to nine feet at MOP and is impairing navigation. Therefore, immediate action is needed to reestablish the navigation channel to its authorized dimensions at the following locations:

- Ice Harbor Navigation Lock downstream approach
- Federal navigation channel at confluence of Snake and Clearwater Rivers
- Port of Clarkston berthing area
- Port of Lewiston berthing area

A Programmatic Approach

The PSMP EIS is, as its name states, a programmatic document.

A federal agency may enact a programmatic approach versus project-specific approach for a broad program of management activities under their authority (40 CFR 1502.4(b)). The purpose of programmatic management is to provide consistency in and a roadmap for future project-specific decision-making. The associated programmatic management plan developed by a federal agency requires preparation of a programmatic EIS. The PSMP programmatic EIS includes alternatives that define broad programs for managing sediments through implementation of future and immediate actions as they relate to maintaining the authorized project purposes of the LSRP. Actions taken to address the immediate need to reestablish the navigation channel are covered in this EIS. Future actions may require project-specific environmental reviews, including preparation of National Environmental Policy Act (NEPA) documents (Environmental Assessment [EA], EIS, or supplemental EIS) tiered off of this programmatic EIS.

The Corps used a watershed approach for this programmatic assessment. That is, the study sought to identify dominant sources of sediment and provide direction to continually evaluate potential sediment reduction measures within the watershed and sediment management measures within the LSRP through an adaptive management process. To accomplish these objectives, the Corps identified a study area that included the area that contributes sediment to the lower Snake River, which included the major tributaries draining to the Snake River reservoirs. The study area is large – more than 32,000 square miles – and diverse. Most of the area is owned and managed by the Federal government, and a sizeable portion (27 percent) is designated as wilderness. About 34 percent is privately owned.

The Corps and other agencies conducted extensive analysis of sediment loads and transport to support decision making on the management of sediment deposition that interferes with authorized purposes of the LSRP. This research and analysis represents the most comprehensive assessment of sediment sources, loading, transport, and deposition conducted for the Snake River system. It provides information to support decision making about long-term strategies for managing sediment deposition that interferes with authorized purposes of the lower Snake River.

Alternatives

Past sediment management efforts by the Corps have focused largely on site-specific actions within the reservoirs, particularly dredging, to remove sediment deposits that interfere with authorized purposes of the reservoirs. Through the PSMP EIS, the Corps identified dominant sediment sources within the watershed and evaluated the potential for reducing sediment input from upland sources rather than focusing solely on sediment management within the lower Snake River reservoirs. Therefore, in developing and evaluating alternatives, the Corps identified and evaluated methods of managing sediment through structures or reservoir operations in addition to dredging, as well as methods for reducing sediment entering the reservoirs from tributaries and upland sources. The programmatic alternatives can be thought of as variations on a "toolbox" that contains a group of techniques, or measures, for managing sediments.

The Corps used the following process to develop and evaluate the PSMP alternatives presented in this EIS:

1. Areas were identified where sediment accumulation has adversely affected or is likely to adversely affect navigation, water intakes, recreation, or flow conveyance.

2. A broad range of sediment management measures were developed that could potentially address identified problems in accordance with the purpose and need. Measures did not need to completely solve all sediment-related problems identified by the Corps, but they would have to reasonably contribute to resolving the problems. Measures considered were actions that could be taken by the Corps or by other agencies.

3. Technical, environmental, and economic criteria were developed to determine the feasibility and effectiveness of the measures.

4. Measures were screened during technical workshops for potential inclusion in the PSMP alternatives based on criteria noted above.

5. A range of PSMP alternatives was developed by assembling feasible and effective measures into groups that would meet the purpose and need and provide effective strategies for sediment management.

6. The PSMP alternatives were each evaluated to determine if implementation of the alternative would meet the project purpose and need, if the alternative comprehensively addressed identified problems, and if the alternative provided an effective means of

managing sediment over a long term period. Alternatives that did not meet these criteria were eliminated from detailed analysis, and the retained alternatives were evaluated in detail.

Measures

Through a collaborative process that included a series of workshops involving technical experts from the Corps and other agencies, and input from scoping and stakeholders, the Corps developed a broad range of management measures that could address identified sediment accumulation problems. Sediment management measures were grouped as follows:

Dredging and Dredged Material Management – Dredging involves physical removal of sediments from one location, and placement of the dredged material in another location. The dredging process typically consists of excavation, transport, and placement of dredged sediments. Excavation may be by mechanical means (i.e., physically scooping sediments with a clamshell or backhoe) or hydraulic dredging, which removes sediment by suction. Once dredged, sediments are transported to a disposal or placement area. Dredged material may be placed in-water or upland, and may be beneficially used for other purposes, such as habitat creation. Disposal options available to the Corps for dredged materials are indentified in accordance of Corps regulations (33 CFR 335-338). The "Federal standard" for disposal of dredged material is defined as "[T]he least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process. . . ." (33 CFR 335.7).

Structural Sediment Management Measures – Structural sediment management measures seek to control the location and rate at which sediment is deposited at a specific location, in order to reduce or eliminate the magnitude of the sediment interference with authorized purposes of the LSRP. Examples of structural management measures include weirs to prevent sediment from accumulating in certain areas, and sediment traps provide a place to collect sediment that may otherwise interfere with authorized purposes. Structural sediment management measures could be considered by the Corps subject to authority and funding.

System Management Measures – System management measures modify reservoir operations (such as pool depth) or facilities so that sediment deposition does not adversely affect authorized purposes. Examples of system operations measures include reconfiguring or relocating navigation facilities, managing reservoir water levels for navigation, and modifying flows to flush sediments from problem areas. These measures would occur within the lower Snake River. The Corps and public port authorities would be responsible for implementing system management measures for their respective facilities.

Upland Sediment Reduction Measures – Upland sediment reduction measures are land management actions intended to reduce the amount of sediment that enters into the lower Snake River systems. Upland sediment reduction measures include site-specific projects such as sediment traps or vegetation filter strips designed to reduce erosion of soil from land into area

waterways, and programs aimed at encouraging or requiring such projects. Upland sediment reduction measures are currently implemented throughout the watershed of the lower Snake River. For the purposes of this EIS, the expansion or increase of practices beyond current levels of implementation is assumed. Sediment reduction measures would be implemented on public and private lands in contributing drainage areas through programs and actions by agencies other than the Corps. In addition, the Corps also implements upland sediment reduction measures on land it manages adjacent to the LSRP.

Range of Alternatives

The Corps formulated a range of alternatives by assembling the feasible and effective measures into groupings based on how measures could be implemented and what agencies could implement them. In accordance with NEPA, the Corps included a No Action Alternative, defined here as no change in current practices. As noted previously, the alternatives are programmatic and describe broad categories of actions that could be implemented to meet the purpose and need.

Each alternative represents a plan that the Corps (or potentially other agencies) would implement over time, and thus contains both action to address the immediate need to reestablish the authorized navigation channel and a framework for decision-making on future actions. For any alternative, the Corps would monitor sediment accumulation in the LSRP and assess conditions with respect to sediment accumulation that would affect authorized purposes. Those conditions are:

- Immediate need:
  - Federal navigation channel (including channel, lock approaches, and port berthing areas) is less than authorized dimensions at MOP.
- Future needs:
  - Sediment accumulation that interferes with an authorized purpose recurs at the same location more frequently than every five years.
  - Sediment accumulation that interferes with an authorized purpose is anticipated at a particular location (or locations) in less than five years.

When any of those conditions exist, the Corps (or others) would initiate actions to address them. For the immediate need, the Corps would initiate action to reestablish the authorized dimensions of the navigation channel; for future needs, the Corps (or others) would initiate planning and evaluation of applicable measures, consistent with the framework of the adopted plan. Currently, the immediate need exists at several locations within the LSRP. In addition, several sites within the LSRP have recurring sediment accumulation conditions that represent future needs.

Table ES-1 presents the alternatives considered. Several alternatives were removed from further consideration because they did not meet the criteria noted above. The alternatives considered in detail are described below.

Table ES -1: Range of Alternatives Screening

Alternative	Does the alternative			Retain for further evaluation in EIS?
	Provide long-term solution(s) to sediment that interferes with authorized purposes of LSRP?	Reestablish the navigation channel to authorized dimensions at MOP?	Provides the ability to address flood risk in future?	
1 – No Action	No	No	No	Yes
2 - Increased Implementation Sediment Reduction Measures	No	No	No	No
3 - System Management	Partial	No	Partial	No
4 - Non-Dredging Sediment Management Measures	Partial	No	Partial	No
5 - Dredging-Based Sediment Management	Yes	Yes	Yes	Yes
6 - System Management and Non-Dredging Sediment Management	Partial	No	Partial	No
7 - Comprehensive (Full System and Sediment Management Measures)	Yes	Yes	Yes	Yes

Alternative 1: No Action (Continue Current Practices)

The No Action Alternative represents a continuation of the Corps' current operational practices of managing the LSRP, and sediment reduction measures implemented in the Snake River watershed by other agencies and land managers.

The Corps would continue its current operation of monitoring sediments that affect the authorized purposes of the LSRP. The Corps operation of the dams and reservoirs would comply with the terms and conditions of the 2008/2010 Federal Columbia River Power System Biological Opinion (2008/2010 Bi Op), or subsequent ESA consultation, and other applicable requirements. The Corps would continue to operate the Lower Granite reservoir (and other LSRP reservoirs if necessary) above minimum operating pool (MOP) if needed to provide for safe navigation (this practice is referred to as "navigation objective reservoir operations").

The Corps' ongoing monitoring of sediment accumulation and evaluation of sediment transport in Lower Granite Reservoir shows that sediment accumulation in the upper part of the reservoir has slowed over time and that some segments of the channel have not changed much in recent years. The depth and shape of the river near the confluence is adjusting to balance deposition of the incoming sediment load in some locations (inside of river bends) with scouring of sediment

in other places (outside of river bends) through operation of the reservoir, resulting in no net increase in the amount of sediment deposited. The long-term risk of flooding at Lewiston, while not eliminated, is reduced from earlier projections because the flow conveyance of the levee system can be maintained by normal reservoir operation for a longer period of time.

Sand and coarse silt sediment entering at the confluence of the Snake and Clearwater Rivers cannot escape Lower Granite reservoir. Therefore, other segments of Lower Granite Reservoir have achieved the same condition as the confluence and will therefore continue to accumulate sediment. It is not possible to predict with certainty how the reservoir will adjust to future sediment loads. As such, the Corps would continue to monitor sediment accumulation and periodically reevaluate flow conveyance in the reservoir levee system and the need for sediment management.

The Corps assumes agencies and land owners responsible for land management in the basins that drain into the LSRP (including federal and state agencies, tribes, and conservation districts) would continue to implement existing land management programs and practices related to erosion control, consistent with their current authorizations and funding. The Corps would continue implementing erosion and sediment control on its lands adjacent to the LSRP.

Measures

- Navigation objective reservoir management
- Continued upland sediment reduction measures by the Corps, other land managers/owners (at current levels of implementation)

Implementation

Alternative 1 would address immediate and future needs in the same way. The Corps would continue to manage the LSRP through operating reservoirs at or as close to MOP as possible during juvenile salmonid outmigration and above MOP (consistent with 2008/2010 Bi Op, or other applicable biological opinion) to provide sufficient water depth for safe navigation. As such, this alternative would address the immediate need only to the extent that raising pool levels to maximum operating pool would reestablish the authorized channel dimensions and would not, by itself, reestablish the navigation channel to its authorized dimensions. It would not address future needs once reservoir(s) have been raised to maximum operating pool and sediment would continue to accumulate in areas where it interferes with authorized purposes.

Alternative 5 – Dredging-Based Sediment Management

Alternative 5 represents a continuation of the Corps historical practices of using dredging as the primary tool for managing sediment that interferes with authorized uses of the LSRP. The Corps would continue its current program of monitoring sediments that affect the authorized purposes of the LSRP. Sediment management would consist of dredging and dredged material management. Sediment management activities would be undertaken in response to or anticipation of sediment accumulation problems.

Agencies and land owners responsible for land management in the basins that drain into the LSRP (including federal and state agencies, tribes, and conservation districts) would continue to implement existing land management programs and practices related to erosion control, consistent with their current authorizations and funding. The Corps would continue implementing erosion and sediment control on lands adjacent to the LSRP.

Measures

- Navigation objective reservoir operation (on temporary basis until dredging is implemented)
- Navigation and other dredging
- Dredging to improve flow conveyance capacity
- Beneficial use of dredged material
- In-water disposal of dredged material
- Upland disposal of dredged material
- Continued upland sediment reduction measures by the Corps, other land managers/owners (at current levels of implementation)

Implementation

Over the long term, the Corps would monitor sediment in the LSRP and would dredge accumulated sediment that interferes with the authorized purposes of the LSRP. Based on Corps regulations, the Corps would evaluate disposal options to identify the least costly, engineeringly feasible, environmentally acceptable option (Federal standard). It is also the Corps' policy to always consider potential beneficial use of dredged material. "Beneficial use" refers to utilizing dredged sediments as resource materials in productive ways. Potential beneficial use of dredged materials would include creating submerged fish habitat, establishing woody riparian habitat consistent with the Lower Snake River Fish and Wildlife Compensation Plan, or using the material as fill for future development. Dredged material could also be disposed of in upland areas or in-water.

If monitoring and evaluation of the Snake and Clearwater confluence area indicate conditions are changing and the flood risk is increasing above acceptable levels, the Corps would dredge to address the need to increase flow conveyance capacity and reduce flood risk.

To address the immediate need, the Corps would dredge areas of accumulated sediment that interfere with commercial navigation. Based on current conditions, the Corps would perform maintenance dredging at four locations in the lower Snake and Clearwater Rivers. One site is the downstream navigation lock approach for Ice Harbor Dam, and the other three sites are located at the confluence of the Snake and Clearwater Rivers in Lower Granite reservoir. The three sites in Lower Granite Reservoir are the Federal channel and the berthing areas for the Port of Lewiston and Port of Clarkston. The Corps proposes to undertake the dredging during the first available in-water work period (December 15 – March 1) following the approval of the Record of Decision for this PSMP EIS. The Corps currently estimates that it would dredge approximately 421,675 cubic yards of sediment from the four locations (1,950 cubic yards from Ice Harbor lock approach, 407,000 cubic yards from the Federal channel, 3,000 cubic yards from the Port of Lewiston, and 10,225 cubic yards from the Port of Clarkston). The Corps identified a location in the Lower Granite reservoir, Snake River Mile 116 just upstream of Knoxway Canyon, for in-water disposal of the dredged materials as a beneficial use for the immediate need. The Corps proposes to use the dredged material to create additional shallow water habitat for juvenile salmonids. The Corps would continue monitoring sediment in the LSRP, as well as the effectiveness of habitat created by placement of dredged material.

Alternative 7 – Comprehensive (Full System and Sediment Management Measures)

Alternative 7 provides all available dredging, system and structural measures for the Corps to manage sediments that interfere with the authorized uses of the LSRP. The alternative includes dredging and dredged material management along with other sediment and system management measures, and provides the Corps with a complete toolbox for addressing sediment that interferes with the authorized purposes of the LSRP.

Measures

- Navigation objective reservoir operation (on temporary basis until other action is implemented)
- Navigation and other dredging
- Dredging to improve flow conveyance capacity
- Beneficial use of dredged material
- In-water disposal of dredged material
- Upland disposal of dredged material
- Modify flows to flush sediments (drawdown)
- Reconfigure affected facilities
- Relocate affected facilities
- Raise Lewiston levees to manage flood risk

- Bendway weirs
- Dikes and dike fields
- Agitation to resuspend sediments
- Trapping upstream sediment (in reservoir)
- Continued upland sediment reduction measures by the Corps, other land managers/owners (at current levels of implementation)

Implementation

Over the long-term, the Corps would monitor sediment in the LSRP. When conditions meet criteria for action, the Corps would initiate review of site-specific conditions, screening of alternative measures (including consideration cost, engineering, and environmental factors), and determine which measure (or measures) to implement to address sediment accumulation.

Agencies responsible for land management in the basins that drain into the LSRP would continue to implement existing sediment reduction measures, consistent with their current authorizations and funding.

If monitoring and evaluation of the Snake and Clearwater confluence area indicate conditions are changing and the flood risk is increasing above acceptable levels, the Corps would implement dredging or raise the levees to address the need to increase flow conveyance capacity and reduce flood risk.

To address immediate needs the Corps would dredge areas of accumulated sediment to reestablish the navigation channel and port berthing areas at the authorized dimensions, as described for Alternative 5. Dredged material would be placed in-water in Lower Granite Reservoir (near Snake RM 116) as a beneficial use to create fish habitat. The Corps would continue monitoring sediment in the LSRP, as well as the effectiveness of habitat created by placement of dredged material.

Environmental Effects of Alternatives

Table ES-2 presents a summary of the effects of the plan alternatives on environmental resources.

Table ES -2. Environmental Effects Summary Table

Discipline	Alternative 1: No Action (Continue Current Practices)	Alternative 5: Dredging-Based Sediment Management)[1]	Alternative 7: Comprehensive (Full System and Sediment Management Measures)[1]
Aquatic Resources	Temporary adverse effects on listed salmonid species during implementation of Navigation Objective Reservoir Operation.	Temporary adverse effects on aquatic resources during implementation of dredging-based sediment management activities. Long-term beneficial effects from beneficial use of dredged material.	Some temporary and longer-term adverse effects on aquatic resources during implementation of various measures. Long-term beneficial effects through beneficial use of dredged material. Potential adverse effects from weirs and dike fields that may provide habitat for predators on juvenile salmonids.
Terrestrial Resources	Minor adverse effects on plant/wetlands at the margins of reservoirs due to fluctuating reservoir levels of navigation objective reservoir operations.	Minor temporary adverse effects on wildlife during implementation of dredging-based sediment management. Upland beneficial use could have long-term benefits through habitat creation.	Minor temporary adverse effects on wildlife during construction activities associated with implementation of measures. Relocated or reconfigured facilities and upland disposal could have long-term adverse effects from loss of habitat; upland disposal could also have long-term benefits to wildlife from habitat creation.
Recreation	Beneficial effects on recreational boating.	Minor temporary adverse effects on boating/fishing during dredging and dredged material placement.	Minor temporary adverse effects on boating/fishing during measure implementation. Potential temporary adverse effects to recreation on Lewiston levee system during measure implementation.
Cultural Resources	Potential adverse effect on shoreline archaeological sites due to potentially prolonged exposure to water..	Potential adverse effects to cultural resources from implementation of dredging-based sediment management measures.	Potential adverse effects to cultural resources from construction activities associated with implementation of sediment and system management measures.
Socioeconomics	Benefit to commercial navigation by providing for safe navigation. Duration of benefit is limited to the point where pool levels can no longer be raised.	Temporary benefits to employment and income during dredging related activities. Long-term economic benefit by providing for safe commercial navigation and recreation opportunities.	Temporary benefits to employment and income during construction activities. Long-term economic benefit by providing for safe commercial navigation and recreation opportunities.

Table ES -2. Environmental Effects Summary Table

Discipline	Alternative 1: No Action (Continue Current Practices)	Alternative 5: Dredging-Based Sediment Management)[1]	Alternative 7: Comprehensive (Full System and Sediment Management Measures)[1]
Water Quality and Sediment Quality	No effect on water quality or sediment quality.	Temporary adverse effects on water quality during dredging activities. No long-term effect on water quality or sediment quality.	Temporary adverse effects on water quality during construction activities associated with measure implementation. Drawdown to flush sediments would adversely affect water quality temporarily by increasing turbidity and suspended sediments.
Hydrology and Sediment	No effect on sediment loading or transport dynamics of the Lower Snake River.	No effect on sediment loading or transport dynamics of the Lower Snake River.	No effect on sediment loading in the Lower Snake River. Beneficial localized effect of creating conditions to avoid or minimize long-term accumulation of sediment in specific problem areas.
Hazardous, Toxic, and Radioactive Waste (HTRW)	No effect from HTRW.	Minor temporary adverse effect if hazardous substances are released during dredging and dredged material management.	Minor temporary adverse effect if potentially hazardous substances are released during implementation of sediment or system management measures.
Air Quality	No effect on air quality..	Minor temporary adverse effect during dredging and dredged material placement.	Minor temporary adverse effect during sediment and system management measures implementation.

[1] *Alternatives 5 and 7 both include the navigation objective reservoir operation as a measure for future actions. As such, both alternatives would have environmental effects associated with that measure as documented for Alternative 1*

The Corps' Preferred Alternative

In comparing the best available information with regard to each alternative, the Corps determined that Alternative 7 - Comprehensive (system and sediment management measures), best satisfies the project purposes of managing sediments that interfere with the authorized purposes of the LSRP and reestablishing the authorized navigation channel at MOP. Therefore, the Corps identified Alternative 7 as the preferred alternative. In addition to fully addressing immediate needs, the alternative provides for proactive monitoring and planning for addressing potential sediment accumulation rather than reacting to accumulation once it becomes an identified problem. It also provides a broad array of measures the Corps could implement to address sediment accumulation within the LSRP. The proposed future and immediate actions and associated measures comprise the framework of the PSMP.

Any sediment and system management measures associated with Alternative 7 would be implemented by the Corps subject to authority and funding. The Corps assumes sediment reduction measures would continue to be implemented by other land use agencies and authorities at current levels.

Because Alternative 7 provides nondredging options for the Corps to evaluate when planning sediment management actions, and provides measures for the immediate need action that uses dredged material to create fish habitat, the Corps also determined it was the environmentally preferred alternative.

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