



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

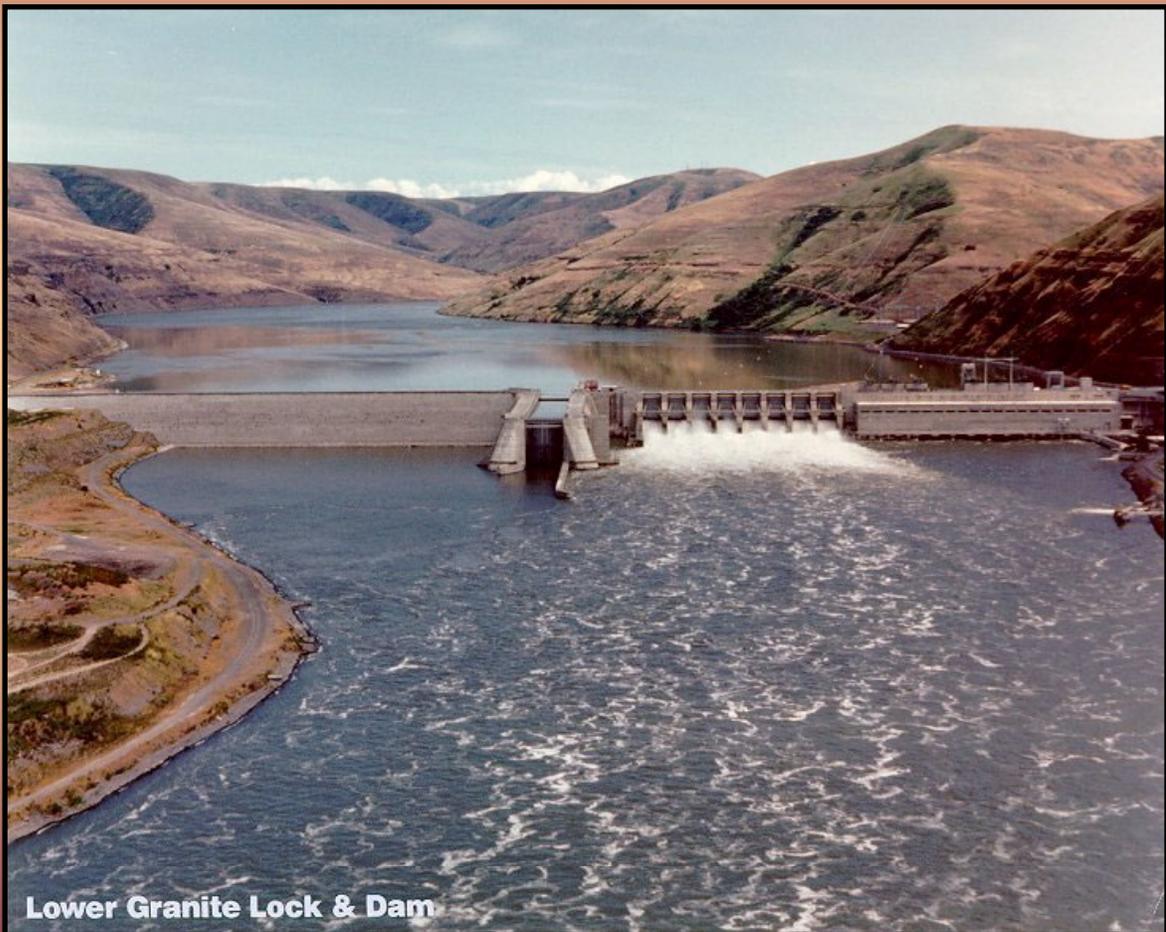


**United States
Environmental Protection Agency
Region 10**

DREDGED MATERIAL MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT

McNary Reservoir and Lower Snake River Reservoirs

EXECUTIVE SUMMARY



Lower Granite Lock & Dam

**FINAL
July 2002**

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EXECUTIVE SUMMARY

INTRODUCTION

The U.S. Army Corps of Engineers' Walla Walla District (Corps) is responsible for maintenance of the portion of the Columbia-Snake River inland navigation waterway that includes the Ice Harbor, Lower Monumental, Little Goose, and Lower Granite reservoirs on the Snake River, and McNary reservoir on the Columbia River. The Corps maintains a 14-foot- [4.3-meter (m)-] deep and 250-foot- (76.2-m) wide navigation channel through these reservoirs, which have historically required some level of dredging. These reservoirs are part of an inland navigation system that provides slackwater navigation from the mouth of the Columbia River near Astoria, Oregon, to port facilities on the Snake and Clearwater Rivers in Lewiston, Idaho, and Clarkston, Washington.

The Corps, in cooperation with the U.S. Environmental Protection Agency (EPA), is developing a long-range plan for the maintenance of the navigation channel from Lower Granite through McNary reservoirs (see plate 1). The Corps has completed a Draft Dredged Material Management Plan and Environmental Impact Statement (DMMP/EIS) for McNary reservoir and the lower Snake River reservoirs. The DMMP/EIS evaluates the likely environmental effects of the plan alternatives on a long-term, programmatic basis. Public comments on the plan and EIS will be considered by the Corps prior to the selection and implementation of a final plan. In addition, as specific proposals to implement the plan are developed and evaluated by the Corps over the 20-year term of the DMMP, the Corps will solicit public comments on these specific proposals. This Executive Summary presents the key components of the Corps' programmatic plan for:

- Maintenance of the authorized navigation channel in the lower Snake River reservoirs between Lewiston, Idaho, and Columbia River in the McNary reservoir for 20 years after the Record of Decision (ROD) is signed.
- Maintenance of limited public facilities within the reservoirs, such as recreational boat basins and irrigation intakes for the wildlife habitat management units (HMUs).
- Management of dredged material from these reservoirs.
- Maintenance of flow conveyance capacity at the most upstream extent of the Lower Granite reservoir for the remaining economic life of the project (to year 2074).

Plates 2 through 17 provide further information on area features and likely dredging and disposal areas. Based on current information, the plates depict the sites most likely to be dredged. Not every location shown will be dredged and not every location to be dredged is necessarily shown on the plates. The size and shape of the areas are approximate and will be further defined when the need to dredge is identified.

This Executive Summary presents a description of the DMMP planning process, including: the purpose and need; the plan alternatives; the anticipated environmental effects of the plan alternatives; and the Corps' preferred alternative.

AUTHORITY

The portion of the Columbia-Snake Rivers navigation system addressed in the DMMP was 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 include:

- McNary Lock and Dam (McNary) - Lake Wallula, Columbia and Snake Rivers, Oregon and Washington
- Ice Harbor Lock and Dam (Ice Harbor) - Lake Sacajawea, Snake River, Washington
- Lower Monumental Lock and Dam (Lower Monumental) - Lake Herbert G. West, Snake River, Washington
- Little Goose Lock and Dam (Little Goose) - Lake Bryan, Snake River, Washington
- Lower Granite Lock and Dam (Lower Granite) - Lower Granite Lake, Snake River, Washington and Idaho

Each of these projects is authorized to provide slackwater navigation, including locks and a 14-foot- (4.3-m-) deep channel. Additionally, although not part of the DMMP/EIS, each project is authorized to provide hydroelectric power generation, irrigation, recreation, and wildlife habitat.

The Corps study was initiated under guidance provided in Engineer Circular (EC) 1165-2-200, *Policy - Dredged Material Management Plans*, which directed the development of DMMP's for Federal navigation projects. It is the Corps' policy to manage dredged material associated with the construction or maintenance dredging of navigation projects in a manner that is the least costly, is consistent with sound engineering practice, and meets Federal environmental standards. Guidance for developing DMMP's has now been incorporated into the current revision of Engineer Regulation (ER) 1105-2-100, *Planning Guidance Notebook*. The ER 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 ER 1105-2-100 provides specific guidance on the maintenance of navigation projects and the preparation of DMMP's. A least-cost alternative that is compliant with environmental laws forms the "base plan," against which other plan alternatives can be compared. Through the DMMP planning process, the Corps has considered a range of management strategies (including approaches to reduce the need for dredging and to beneficially use dredged materials) and has incorporated these strategies into its alternatives development and evaluation process.

In addition, on May 4, 1995, the Corps Director of Civil Works provided guidance to the Commander, North Pacific Division, by memorandum entitled "Lower Granite Lock and Dam, Washington, Sedimentation Studies Related to the Level of Protection Provided to the City of Lewiston, Idaho." This memorandum discussed a study to evaluate restoring the performance of project levees constructed to protect Lewiston, Idaho, from inundation caused by the Lower

Granite project. It states, “The study should evaluate a range of alternative risk management plans, including modifications in the operation of the project and increased dredging.” In compliance with this memorandum, consideration of reestablishing the flow conveyance capacity at Lewiston, Idaho is included in the DMMP.

PURPOSE AND NEED

The purpose of the DMMP is threefold:

- 1) To develop and evaluate alternative programs to maintain the authorized navigation channel and certain publicly owned facilities in the lower Snake River and McNary reservoirs for the next 20 years;
- 2) To develop and evaluate alternative measures to maintain the flow conveyance of the Lower Granite reservoir for the remaining economic life of the project (through 2074);
- 3) To develop and evaluate alternative programs of managing dredged material in a cost-effective, environmentally acceptable, and, wherever possible, beneficial manner.

The Corps is authorized to maintain a navigation system on the lower Snake and Columbia Rivers and to manage the lock and dam/navigation projects (generally referred to as “projects” or “reservoirs” in this document) on the lower Snake River from Lewiston, Idaho, to the McNary Lock and Dam project at Umatilla, Oregon, on the Columbia River (which includes the confluence of the Columbia and Snake Rivers). The Corps also maintains publicly owned recreational areas (such as marinas and swimming beaches), irrigation intake facilities for wildlife HMUs and recreation areas, and port access channels within the lower Snake River and McNary reservoirs. Historically, the Corps has dredged accumulated sediments from the navigation channel and the other facilities noted above on these reservoirs in order to maintain their operational capacities. Maintenance dredging actions are in response to a variety of conditions including, but not limited to: emergency situations which would result in an unacceptable hazard to navigation; program periodic dredge maintenance of known persistent shoal areas which impede navigation; and removal of sediment that presents a hydraulic flow impediment.

In addition, sediment accumulation in the upstream reach of Lower Granite reservoir at the confluence of the Clearwater and Snake Rivers has reduced the flow conveyance capacity of the river channel. If allowed to continue, this sedimentation would reduce the flow capacity to a point that the Standard Project Flood [(SPF) an estimated or hypothetical flood that might be expected from the most severe combination of weather and flow conditions that are considered reasonably characteristic of the geographical area] could potentially overtop the levees in Lewiston, Idaho, before the end of the economic life of the project is reached in 2074. To date, dredging has been the method of choice for the removal of this sediment and restoration of the flow capacity.

LOCAL SEDIMENT MANAGEMENT GROUP

A Local Sediment Management Group (LSMG) has been formed, and has met on three occasions (July 2000, February 2001, and December 2001) to provide input and discussion in the development of the DMMP, as well as during the plan's implementation (i.e., the dredging and dredged material management activities). This group has been formed consistent with the inter-agency National Dredging Team's guidance. Roles within the LSMG will continue to develop in accordance with policies and procedures currently evolving for the Regional Dredging Team (RDT), as referred in the April 26, 2002 policy letter jointly signed by Brigadier General David A. Fastabend (Corps of Engineers Northwest Division Commander) and L. John Iani (EPA Region 10 Administrator).

The LSMG would 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 Clean Water Act. In the formulation of these management policies, the 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, the LSMG would assist the Corps in evaluating dredging and dredged material management activities and options consistent with an adaptive management approach.

The general objectives of the LSMG are to:

- Provide an interagency approach to dredged material management.
- Promote consistency in dredging and sediment management activities.
- Assist in development of monitoring plans and a sediment sampling and testing framework.
- Facilitate adaptive management and beneficial use of dredged materials.
- Promote consideration of all environmental laws and regulations.
- Consider necessary cultural resource protection.
- Discuss and evaluate possible strategies to reduce sediments entering the lower Snake River system.
- Involve other stakeholder groups and pursue consistency with their plans.

The Corps anticipates that the LSMG will convene regularly, either annually or semi-annually, depending on dredged material management activities. It is envisioned that the LSMG will consider proposed dredging within a given timeframe, suggest strategies to reduce dredging requirements, provide suggestions for promising beneficial uses of dredged materials, and comment on proposals for in-water habitat creation using dredged materials. The LSMG would

also serve as a forum for providing suggestions to the Corps on improving the implementation of the DMMP.

As situations develop which call for maintenance dredging, the LSMG would be informed. The situations expected to cause maintenance dredging could include, but would not be limited to:

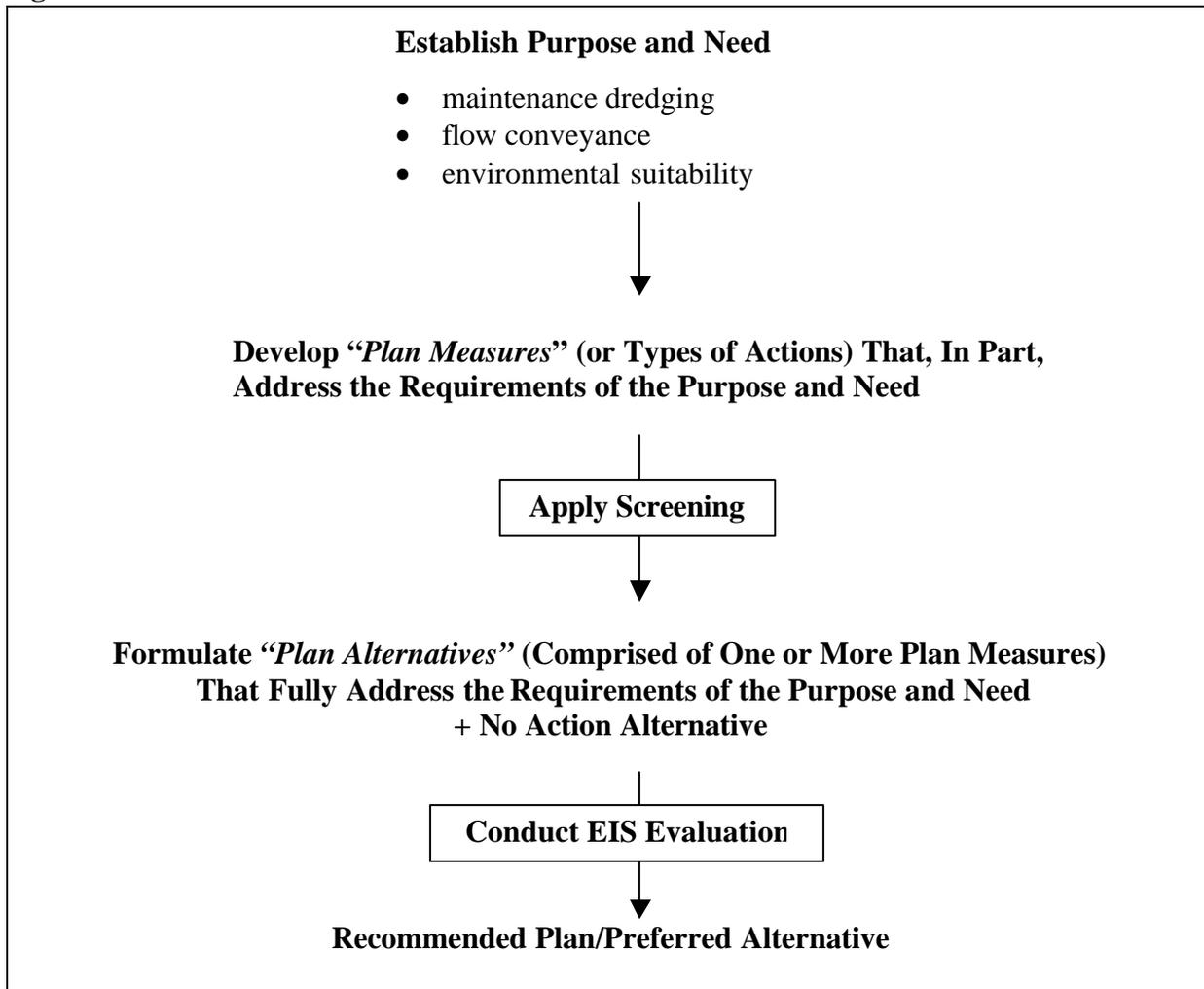
- Emergencies involving shoaled areas that pose a serious risk to navigation of commercial vessels as indicated by records of groundings, complaints by shippers, and/or condition surveys of the navigation channel.
- Programmed/periodic dredge maintenance activities based on well-established historical records of persistent shoaling in a navigation channel that could pose a serious risk to navigation of commercial vessels.
- Shoaled areas that pose a serious risk to navigation and moorage of recreational craft as indicated by comments of operators of recreational boat facilities and/or condition surveys.
- Sedimentation to irrigation intakes associated with Lower Snake River Habitat Management Units (HMU) which restricts the ability to deliver irrigation water to the HMU.
- Advanced maintenance, of a commercial navigation channel or berth which historically requires dredging to remove shoals that pose a serious risk to navigation, when an opportunity to meet a specific environmental restoration need for beach nourishment exists and/or when the dredging can be combined with other maintenance dredging to lower the cost and minimize the dredge related disturbance to transportation and local business activities.

Federal and state agencies with resource management and regulatory responsibilities applicable to the development and implementation of the DMMP, and affected Native American Tribes, have been asked to participate in the LSMG. Additionally, public ports within the study area have been invited to participate in the LSMG. Other local entities (e.g., counties, municipalities, environmental groups, and transportation and industrial interests) with an interest in management of the resources involved in dredging and disposal activities have been invited to participate.

The LSMG has been identified as a forum for discussion of possible measures to reduce sedimentation in the lower Snake River system and, as such, land management and conservation agencies like the U.S. Forest Service, the Natural Resources Conservation Service, and others that may have a role in sediment reduction strategies, will be asked to participated in the LSMG.

ALTERNATIVES

The Corps of Engineers' planning guidelines and the National Environmental Policy Act require the consideration and analysis of a broad range of alternatives in the development of the DMMP/EIS. A summary of the process the Corps employed to develop and evaluate plan alternatives is illustrated in figure ES-1.

Figure ES-1. DMMP/EIS Plan Formulation Process.

Plan Measures Development and Evaluation

Initially, a broad range of measures that either partially or completely fulfilled the purpose and need were considered in the development of plan alternatives. These measures included:

- Sediment deposition reduction.
- Dredging.
- Management of dredged materials.
- Raising levees in the Lewiston, Idaho, area.

In accordance with the requirements of the NEPA, a broad range of alternatives that could potentially meet the stated purpose and need was developed. The Corps conducted public scoping meetings, consulted with state and Federal environmental and resource agencies, and conducted technical studies to develop a range of conceptual alternatives that addressed the

plan's purpose and need. Multiple scenarios which included sediment deposition reduction, dredging, dredged material management, and/or levee raises were considered in the development of plan measures. A range of alternative strategies within each of the plan measures was developed and evaluated.

Sediment deposition reduction strategies that were considered included: changes in upstream land uses to control sediments entering the system; pool draw-down; in-water sedimentation controls that would prevent sediments from being deposited within the navigation channel, including Bendway weirs and "bubble curtains" around the navigation channel; and construction of upstream sediment traps.

Dredging scenarios included maintenance dredging only on an as-needed basis, dredging 300,000 cubic yards (cy) [229 366.5 cubic meters (m³)] per year, dredging 1,000,000 cy (764 555 m³) per year, and dredging 2,000,000 cy (1 529 110 m³) per year. The three scenarios that included dredging beyond navigation maintenance requirements were intended to provide flow conveyance capacity in Lower Granite reservoir.

Similarly, several levee raise alternatives in the Lewiston, Idaho, area were considered. These included: 3-foot, 4-foot, 8-foot, and 12-foot (0.9-m, 1.2- m, 2.4- m, and 3.7- m) levee raise options.

Finally, a range of dredged material management options were developed and evaluated. These options included upland disposal of dredged material, in-water disposal of dredged material, and beneficial uses of dredged material. Several in-water disposal options were considered, such as beneficially using dredged sand and gravel to create shallow-water fish habitat.

The Corps may need to perform dredging on an emergency basis. Potential situations that could require emergency dredging include high flows depositing sediment that block the navigation channel or rock could be swept into the navigation lock approach posing an unacceptable navigation hazard. For an emergency dredging situation, the Corps would perform environmental coordination on an expedited basis as much as possible before initiating the emergency dredging.

An iterative screening process was developed that consisted of formulating alternatives from the most viable program measures above, evaluating each alternative and selecting alternatives for further detailed consideration. Preliminary evaluation criteria were then developed to determine the alternatives that were feasible, reasonable, and should be considered in detail. These criteria considered whether:

- The alternatives were cost-effective, while either providing environmental benefits or causing the least environmental damage.
- The alternatives provided a way to regain and/or maintain channel capacity to provide an acceptable level of flow conveyance capacity resulting in flood protection (based on the results of a risk-based analysis) in the Lewiston-Clarkston area.

- The alternatives have acceptable impacts on other project uses (such as shippers and recreational users).

Based on these preliminary screening criteria, measures that were incorporated into plan alternatives included combinations of dredging and levee raises, with consideration of upland disposal/beneficial use and in-water disposal/beneficial use of dredged materials.

A set of more detailed screening criteria were then developed to evaluate the relative impacts, costs, and/or benefits of a set of dredging and levee alternative combinations. Application of these criteria facilitated the identification of alternatives that were considered feasible, reasonable, and would be evaluated in detail. The identified alternatives are summarized in table ES-1 and presented in detail below:

Alternative 1 - No Action (No Change) - Maintenance Dredging With In-Water Disposal

Alternative 1 represents the continuation of historic maintenance of the authorized navigation channel in the study area. As such, this alternative includes those activities (specifically, mechanical dredging and in-water disposal) that have been performed in the recent past to maintain the authorized depths in the navigation channels of the lower Snake River and McNary reservoirs. The areas covered include Lake Wallula behind McNary Lock and Dam on the Columbia River and the reservoirs behind Ice Harbor, Lower Monumental, Little Goose, and Lower Granite on the lower Snake River (see plates 2 through 17). This navigation project provides for a 14-foot by 250-foot (4.3-m by 76.2-m) channel within each reservoir with at least a 15-foot (4.6-m) depth over the sills at each of the locks. This alternative would provide the authorized navigation clearance and provide some flow conveyance capacity in Lower Granite reservoir, based on maintenance dredging. Maintenance dredging would be done on an as-needed basis (possibly as often as every 2 to 3 years) and would generate up to 340,000 cy (259 948.7 m³) per dredging activity. Additionally, dredging could only occur during an in-water work "window" approved by the National Marine Fisheries Service (NMFS). This window represents the time of year when dredging and disposal activities would have minimal effects on salmonid species. The current in-water work window is December 15 through March 1 for the lower Snake River reservoirs and December 1 to March 31 for the Columbia River. The Corps also periodically conducts maintenance dredging around public recreation areas (such as swimming beaches and boat basins) and irrigation intakes for wildlife HMU's managed by the Corps (see plates 2 through 17).

Disposal of dredged materials under alternative 1 would be consistent with disposal methods utilized during recent dredging cycles: dredged materials would be loaded onto bottom-dump barges and transported to the disposal site. Dredged materials would be sampled for particle size and sediment quality prior to dredging. Historic testing for sediment quality has indicated that dredged sediments are suitable for in-water disposal. As such, fine-grained materials (i.e., silts) would be disposed in deep-water areas and sand, gravel, and cobbles would be used to create shallow-water fish habitat within the study area reservoirs (using techniques similar to those in alternative 2, described below).

Table ES-1. Comparison of Alternatives.

Alternative	Dredged Material Disposal	Levee Modification	Relocation/Acquisition Requirements
1 - No Action (No Change) - Maintenance Dredging With In-Water Disposal	In-water; silt in deep water; sand, gravel, and cobbles to create shallow water fish habitat	None	None
2 - Maintenance Dredging With In-Water Disposal to Create Fish Habitat and a 3-Foot (0.9-m) Levee Raise	Create shallow water fish habitat. Material unsuitable for in-water disposal to Joso or other upland site.	Raise levees up 3 feet (0.9 m) to maintain flow conveyance capacity.	Raising of two roadways.
3 - Maintenance Dredging With Upland Disposal and a 3-Foot (0.9-m) Levee Raise	Upland at Joso site in Lower Monumental reservoir.	Raise levees up 3 feet (0.9 m) to maintain flow conveyance capacity.	Raising of two roadways.
4 - Maintenance Dredging With Beneficial Use of Dredged Material and a 3-Foot (0.9-m) Levee Raise	Beneficial use, either upland or in water. Material unsuitable for in-water disposal to Joso or other upland site.	Raise levees up 3 feet (0.9 m) to maintain flow conveyance capacity.	Raising of two roadways.
Note: (1) Includes maintenance of the authorized navigation channels of the lower Snake River reservoirs and McNary reservoir; maintenance dredging of access channels to port and moorages on an as-needed basis, public recreation areas (swimming beaches and boat basins), irrigation intakes for wildlife HMU's managed by the Corps; and flow conveyance capacity of the Lower Granite reservoir.			

Alternative 2 - Maintenance Dredging With In-Water Disposal to Create Fish Habitat and a 3-Foot (0.9-m) Levee Raise

This alternative considers the same dredging activities with the same quantities and frequencies as alternative 1, but with changes in dredging methods, work window, and disposal location for silt. Mechanical dredging would still be the primary dredging method used, but hydraulic dredging would also be considered for off-channel areas on a case-by-case basis. The majority of the dredging would be done during the winter in-water work windows used in alternative 1, but a summer work window would be considered for off-channel areas on a case-by-case basis. Silt would no longer be disposed of in deep-water sites. Instead, all dredged materials would be placed in water to create shallow-water fish habitat that would be beneficial to salmonid species.

Disposal and creation of shallow-water habitat would be accomplished using bottom-dump barges to transport and deposit the dredged material. Finer sands and silts would be used in a base for creation of habitat and may be dumped in mid-depth water areas as part of this process. Coarser sands, gravels, and cobbles would be placed over the base or within shallow water. These materials provide a favorable substrate for juvenile salmonid rearing and resting. Finally, a drag beam or some other similar device would be used to re-contour the surface of the material dumped from the bottom-dump barges in order to provide a relatively smooth surface. Placement and contouring of sand and gravel would occur with each dredging cycle in order to maximize the amount of habitat created. Figures ES-2 and ES-3 illustrate this dredged material management process.

An upland containment area would be constructed for disposal of dredged materials that sediment testing indicates would be unsuitable for in-water disposal but suitable for upland disposal. These dredged materials would be transported by barge to the upland disposal site. Currently, the preferred site is the Joso HMU, located on land adjacent to the Lower Monumental reservoir at Snake River Mile 56.5 (see plate 11). Only material that meets all applicable environmental health and safety regulations and requirements would be disposed of at the upland site. Material that is not appropriate for disposal at the upland site would be transported to a licensed landfill facility.

Alternative 2 would employ an “adaptive management” approach to the overall implementation of the DMMP. The Local Sediment Management Group (LSMG) would provide input and feedback to the Corps with respect to dredging and dredged material management that would be implemented under this alternative, as well as Alternatives 3 and 4. The adaptive management approach would allow the Corps and the LSMG to regularly evaluate dredging and dredged material management activities and monitoring results, and make needed adjustments to the overall course of action.

This alternative includes raising the levee at Lewiston up to 3 feet (0.9-m) at critical locations to maintain flow conveyance. Plate 18 shows the location of proposed levee raises. Proposed levee raises would require modification of portions of two adjacent roadways. Three existing buildings would experience an increased risk of flooding.

Alternative 3 - Maintenance Dredging With Upland Disposal and a 3-Foot (0.9-m) Levee Raise

This alternative considers the same dredging activities in terms of locations, quantities, frequencies, and methods as alternatives 1 and 2, but with upland disposal of dredged material. The 3-foot (0.9-m) levee raise described as a part of alternative 2 would be included with this alternative.

Under this alternative, dredged materials would be transported by barge to the Joso upland disposal site (see plate 11). This site was selected through a process that identified and screened multiple candidate sites and selected the Joso site based on environmental and economic considerations. A large portion of the Joso site is a disturbed area that was previously used for gravel mining. An existing barge slip is located at the downstream end of the site, and this area would be used to establish an off-loading and staging area for the disposal facility. A containment berm would be constructed around the disposal area and a 600-foot (182.9-m) setback from the river would provide a buffer zone to minimize environmental impacts of disposal operations.

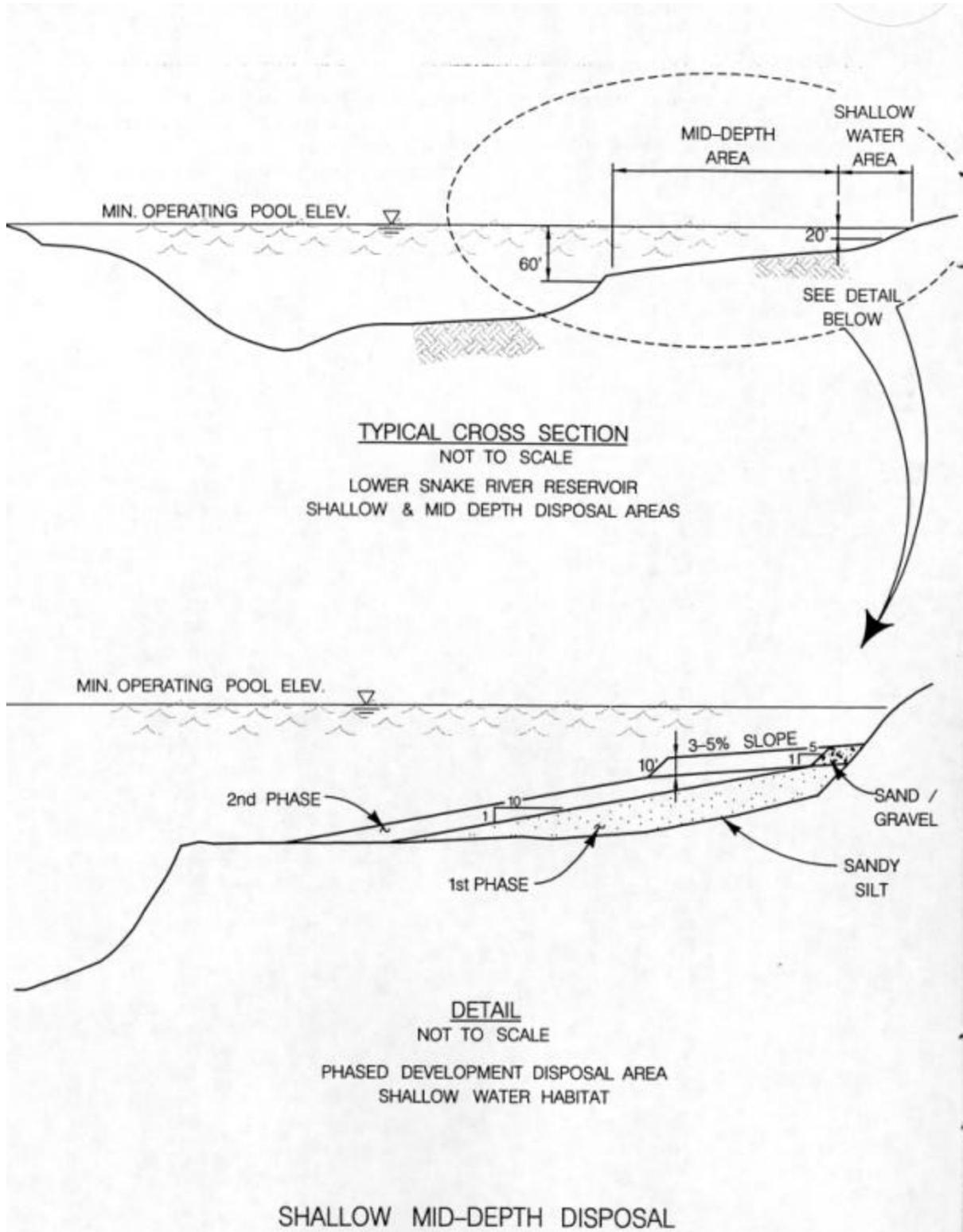


Figure ES-2. Cross Section of the Phased Development Disposal Technique for Creating Shallow Water Habitat.

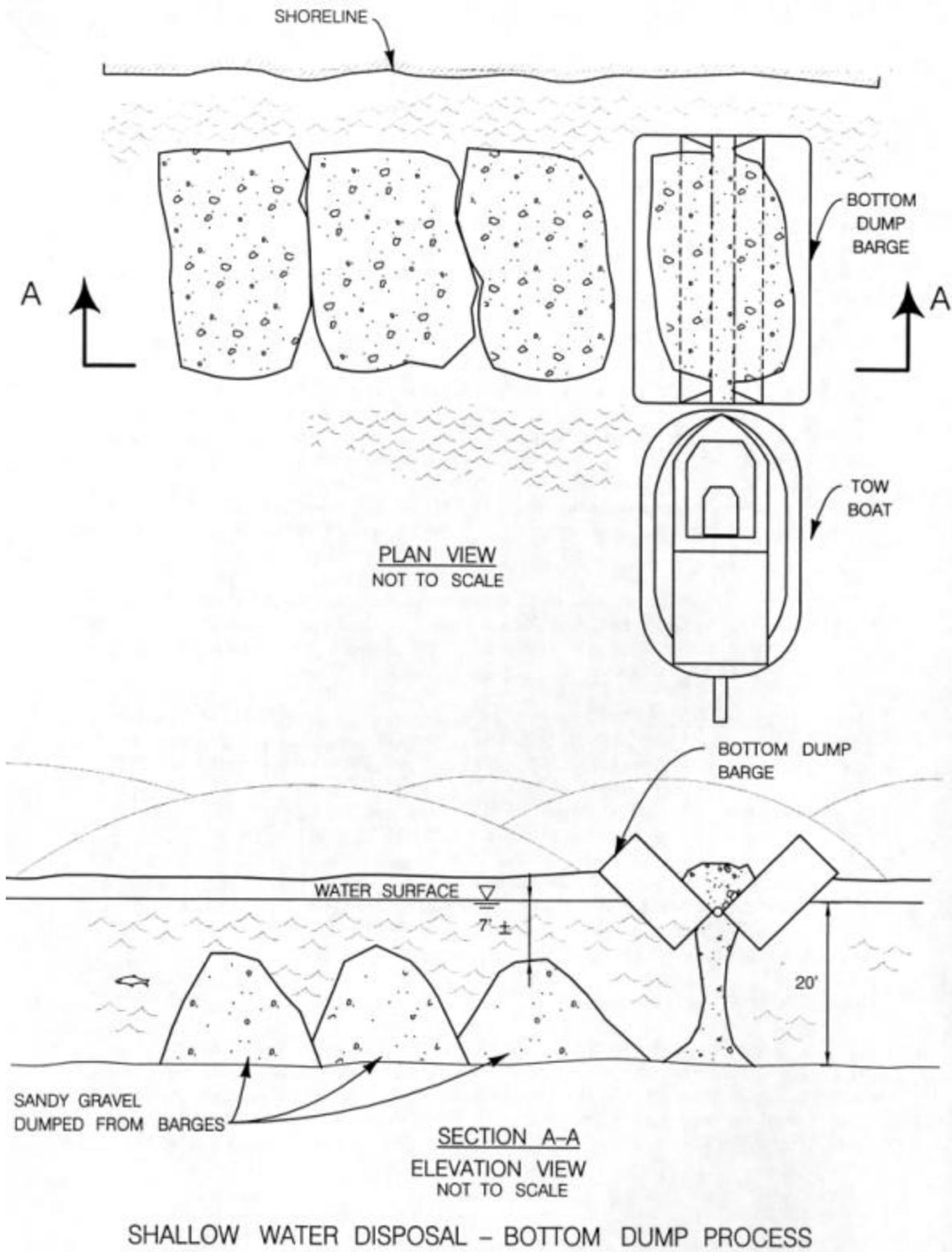


Figure ES-3. Shallow Water Sediment Placement Technique Using a Bottom Dump Barge.

Alternative 4 -Maintenance Dredging With Beneficial Use of Dredged Material and a 3-Foot (0.9-m) Levee Raise

This alternative considers the same dredging activities in terms of locations, quantities, frequencies, and methods as alternatives 1, 2, and 3. As with alternatives 2 and 3, this alternative includes raising the levee at Lewiston up to 3 feet (0.9 m) at critical locations to maintain the flow conveyance capacity of the upper reservoir behind Lower Granite Dam at the confluence of the Snake and Clearwater Rivers.

The distinguishing characteristic of alternative 4 is that the primary focus of the management strategy for dredged material under this alternative would be to incorporate beneficial uses. For each dredging activity, the Corps would identify potential beneficial uses and coordinate the uses with the Local Sediment Management Group prior to selecting a use. Beneficial uses, as defined by this process, may be achieved when a local sponsor is willing to contribute a share of the cost if the use would require cost sharing.

Potential beneficial uses that could be initially considered include:

- Fish habitat creation as described in alternative 2.
- Woody riparian habitat program.
- Hanford remediation and closure activities capping material.
- Potting soil.
- Riparian habitat restoration.
- Fill at Port of Wilma.
- Fill on non-Federal lands.
- Fill for roadway projects.

The Corps proposes to use dredged material to develop woody riparian area at Chief Timothy Habitat Management Unit in Lower Granite Reservoir as a beneficial use of dredged material that would result from the planned dredging in winter 2002-2003. This beneficial use would create shoreline habitat in line with the goals of the Lower Snake River Fish and Wildlife Compensation Plan.

Because opportunities to use dredged material beneficially become available over time and cannot always be anticipated, a process would be established whereby a notice would be sent to parties known to have an interest in the use of the dredged material and a public notice published prior to the proposed dredging/beneficial use activity. Impacts would be assessed on a case-by-case basis through this process. The Corps may prepare Biological Assessments (BA's) for each dredging activity or for up to 5 years of dredging activities, depending upon the outcome of the Endangered Species Act (ESA) consultation processes with the NMFS and U.S. Fish and

Wildlife Service (USFWS). The Corps may also prepare a Clean Water Act Section 404(b)(1) evaluation for each dredging activity or for 5 to 10 years of dredging, depending upon the outcome of coordination with the state water quality agencies and EPA.

ENVIRONMENTAL EFFECTS OF ALTERNATIVES

The following sections provide brief summaries of the anticipated environmental effects of the plan alternatives considered in the DMMP/EIS for each element and table ES-2 presents a summary of those effects. The anticipated effects are generally characterized with respect to their intensity and duration as:

- Direct, indirect, or cumulative;
- Minor, moderate, or major, and
- Short- or long-term.

Aquatic Resources

The dredging activity associated with all four alternatives would have the same indirect, minor, short-term effects on aquatic ecosystems by disturbing sediments and removing macroinvertebrate species (which are prey species for resident and migratory fish) from the dredging area. However, re-colonization of macroinvertebrates would occur relatively rapidly within both the dredging area and at the in-water shallow and mid-depth disposal areas. Long-term impacts would not occur. Fish could use the areas upstream and downstream of dredging and disposal activities, and dredging would not be a continuous activity confined to a single location. Fish could return to the area following completion of dredging and disposal activities.

Alternatives 1, 2, and 4 could have potential benefits by creation of in-water fish habitat, whereas alternative 3 (upland disposal) would provide no benefit to fish habitat. In addition to benefiting salmonid species, creation of in-water habitat could benefit white sturgeon and macroinvertebrate species. Initially, the proposed beneficial use would be creation of woody riparian habitat in shoreline areas of Chief Timothy HMU. The 3-foot (0.9-m) levee raise proposed in alternatives 2, 3, and 4 would have no impacts on aquatic resources.

Terrestrial Resources

The dredging and disposal actions within and adjacent to the river included in alternatives 1 through 4 would not prevent wildlife (primarily waterfowl and raptors) from obtaining food from, or otherwise using the areas adjacent to, dredging and disposal activities. Dredging and disposal activities would occur only within the approved in-water work window and, following dredging and disposal, wildlife would return to areas affected by these activities.

TABLE ES-2. Environmental Effects Summary Matrix.

Discipline	Alternative 1 No Action (No Change) - Maintenance Dredging with In-Water Disposal	Alternative 2 Maintenance Dredging with In-Water Disposal to Create Fish Habitat and a 3-Foot (0.9-m) Levee Raise	Alternative 3 Maintenance Dredging with Upland Disposal and a 3-Foot (0.9-m) Levee Raise	Alternative 4 Maintenance Dredging with Beneficial Use of Dredged Material and a 3-Foot (0.9-m) Levee Raise
Aquatic Resources	Direct and indirect, minor, short-term effects on food source for aquatic species. No long-term effects anticipated. Potential beneficial effects from creation of some in-water fish habitat.	Direct and indirect, minor, short-term effects on food source for aquatic species. No long-term negative effects anticipated. Potential beneficial effects (greater than Alternative 1) from creation of shallow water fish habitat.	Direct and indirect, minor, short-term effects on food source for aquatic species. No long-term negative effects anticipated. No creation of in-water fish habitat.	Direct and indirect, minor, short-term effects on food source for aquatic species; no long-term effects anticipated. Potential beneficial effects from creation of shallow water fish habitat, woody riparian habitat and/or beneficial use that may restore habitat.
Terrestrial Resources	Indirect, short-term minor effects on terrestrial wildlife and habitat	Similar effect as Alternative 1; Minor, short-term, indirect impacts on terrestrial species through disruption of habitat from levee raise and displacement during dredging.	Direct, moderate effects to terrestrial species from loss of habitat at upland disposal site and disruption of habitat from levee raise. Positive effects from habitat creation in old borrow area at disposal site.	Indirect, minor, short-term, negative effects through disruption of habitat from levee raise; potential long-term positive effects from beneficial use of dredged material to create upland habitat and woody riparian habitat.
Endangered Species	<ul style="list-style-type: none"> • <i>Fish</i> – “May affect and would likely adversely affect” salmonids but no jeopardy to listed species; “may affect, not likely to adversely affect” bull trout. • <i>Terrestrial Wildlife</i> – “May affect, not likely to adversely affect” bald eagle. • <i>Plants</i> – “May affect, not likely to adversely affect” Ute ladies’ tresses and water howelia; “no effect” on Spalding’s silene. 	Same effects as Alternative 1.	<ul style="list-style-type: none"> • Same effects as Alternative 1. 	<ul style="list-style-type: none"> • Same effects as Alternative 1.
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.	Minor, short-term, direct impact due to disruption of recreational facilities in Lewiston area due to levee raise, and minor short-term impact to recreational boating near dredging and disposal. Maintains ability to use recreational facilities.	Same effects as Alternative 2 except for dredged material disposal. Minor indirect effects to recreational users in the vicinity of the upland disposal site. Maintains ability to use recreational facilities.	Same effects as Alternative 2. Potential long-term, beneficial effect from beneficial use of dredged material if used to enhance recreation sites. Maintains ability to use recreational facilities.
Cultural Resources	Known submerged cultural properties would be avoided to the maximum extent practicable during dredged material disposal and management activities.	Same effects as Alternative 1.	Same effects as Alternative 1. Cultural properties in vicinity of upland disposal site would be avoided.	Same effects as Alternative 1. Potential effects of beneficial uses would be evaluated as proposals are developed.
Socioeconomics	Long-term, positive effect from maintaining navigation. Indirect, long-term, moderate negative effect from greater potential flood risk (no levee raise). Minor effects could occur. Low-income and minority populations not disproportionately affected.	Long-term, positive effect from maintaining navigation. Direct, short-term and long-term positive effect from levee raise due to added jobs and materials required by levee construction. Reduction of flood risk from levee raise. Low-income and minority populations not disproportionately affected.	Same effects as Alternative 2.	Same effects as Alternative 2.
Transportation	Maintains existing transportation systems.	Direct, short-term, minor effect on roadways and railroads from proposed levee/road raise construction activities.	Same effects as Alternative 2.	Same effects as Alternative 2. Potential positive effect if dredged material is used for transportation projects.
Geology and Soils	Local displacement of soils and alluvial material.	Potential short-term effect to soils in the vicinity of levee raise due to construction activities.	Potential short-term effect to soils in the vicinity of the levee raise. Long-term effect on soils at upland disposal site due to construction and disposal activities.	Potential short-term effect to soils from implementation of beneficial use due to construction activities.
Water Quality/ Water Resources	<ul style="list-style-type: none"> • <i>Water Quality</i> - Direct, minor, short-term effects due primarily to turbidity. • <i>Wetlands</i> - No effect. • <i>Flood Plains</i> – No impacts 	<ul style="list-style-type: none"> • <i>Water Quality</i> - Direct, minor, short-term effects due primarily to turbidity. • <i>Wetlands</i> - No direct effect. Minor indirect effects associated with levee raise. • <i>Flood Plains</i> – Minor, short-term impact at proposed upland containment site. 	<ul style="list-style-type: none"> • <i>Water Quality</i> - Direct, minor, short-term effects due primarily to turbidity. • <i>Wetlands</i> - No direct effect. Minor indirect effects associated with levee raise and upland disposal. • <i>Flood Plains</i> – Minor, short-term impact at upland disposal site. 	<ul style="list-style-type: none"> • <i>Water Quality</i> - Direct, minor, short-term effects due primarily to turbidity and placement of fill in shoreline areas for woody riparian habitat creation. • <i>Wetlands</i> - Minor direct effect from woody riparian habitat creation adjacent to wetland. Minor indirect effects associated with levee raise. • <i>Flood Plains</i> – No impact to floodplain from woody riparian development. Future beneficial uses may require assessment of floodplain impacts.
Hazardous, Toxic, and Radioactive Waste	No effects anticipated; sediments will be tested for contamination.	Same effects as Alternative 1.	Same effects as Alternative 1.	Same effects as Alternative 1.
Air Quality	Direct, minor, short-term effects to local air quality due to dredging and disposal equipment operation.	Direct, minor, short-term effects to local air quality due to dredging, disposal, and construction equipment operation.	Direct, minor, short-term effects to local air quality due to dredging, disposal, and construction equipment operation and upland disposal activities.	Direct, minor, short-term effects to local air quality due to dredging, disposal, and construction equipment operation, including implementation of beneficial use(s).
Noise	Direct, minor, short-term effects due to noise from dredging and disposal equipment operation.	Same effects as Alternative 1. Localized minor, short-term noise from construction levees.	Same effects as Alternative 1. Localized minor, short-term noise from construction levees.	Same effects as Alternative 1. Localized minor, short-term noise from construction levees.
Aesthetics	Direct, minor, short-term effect on aesthetics from dredging and disposal activities.	Direct, minor, short-term effects on aesthetics from dredging and disposal activities; long-term, minor impacts from levee raise.	Direct, minor, short-term effects from dredging. Long-term, minor impacts from levee raise. Direct, minor, long-term effects from upland disposal.	Direct, minor, short-term effects from dredging and disposal; long-term, minor impacts from levee raise; and long-term beneficial effect to shoreline area for woody riparian habitat creation.
Native American Tribal Communities	Potential positive effects on salmon fishing from creation of salmon rearing habitat and cultural resources to be avoided.	Potential positive effects (greater than Alternative 1) on salmon fishing from creation of salmon rearing habitat.	No effects anticipated.	Same effects on salmon fishing as for Alternative 2.
Cumulative Effects	Potential positive effects on salmonid fish from creation of shallow-water fish habitat. Other resources were evaluated regarding cumulative effects and nothing was determined to preclude the selection of this alternative.	Potential positive effects on salmonid fish (greater than Alternative 1) from creation of shallow-water fish habitat. Same effects on other resources as Alternative 1.	Potential positive effects to terrestrial species from filling old borrow area at disposal site and establishing vegetation. Same effects on other resources as Alternative 1.	Same effects as Alternative 2. Positive effects from proposed beneficial use of dredged material (e.g., woody riparian habitat development). Same effects on other resources as Alternative 1.

¹ “Impacts” and “effects” are used interchangeably. Unless otherwise noted as beneficial or positive, impacts described are negative.

There would be displacement of wildlife habitat for alternative 3, where the disposal of all dredged material would occur at the Joso upland site. Most disposal activities would occur on the disturbed portion of the site that was formerly used as a gravel pit. The area would be stabilized following each disposal cycle and would be re-contoured and restored with native plantings following completion of all dredging over the next 20 years. With completion of the disposal and revegetation, the site would provide wildlife habitat similar to the surrounding area, which would be a long-term benefit to wildlife habitat. Upland disposal at Joso is expected to have a direct, long-term, moderate impact on terrestrial wildlife. Material that is unsuitable for in-water disposal under alternatives 2 and 4 would be taken to an upland site (currently identified as the Joso site), which would have a minor, direct effect on terrestrial resources at the site.

The proposed 3-foot (0.9-m) levee raise for alternatives 2, 3, and 4 would similarly have minor, indirect, temporary impacts on terrestrial species. Construction could disturb wildlife; however, the areas proposed for the levee raise are in an urban setting and only those species accustomed to human activity would be present. The levee raise would be placed atop the existing levee. Revegetation would result in habitat similar to existing conditions.

Endangered Species

The Corps prepared a Biological Assessment for the proposed dredging and dredged material management activities and consulted with NMFS and USFWS. See Appendix F and G for further details. NMFS determined that the proposed actions would not cause jeopardy to anadromous fish species listed under the Endangered Species Act (ESA) and set forth Reasonable and Prudent Measures. USFWS provided concurrence with the findings of the Corps' Biological Assessment.

Anadromous salmon and steelhead stock from all of the Evolutionary Significant Units (ESU's) listed as Threatened or Endangered under the ESA pass through the McNary reservoir and lower Snake River. These species include Snake River spring/summer chinook salmon (*Oncorhynchus tshawytscha*), listed as Threatened in 1991; Snake River fall chinook salmon (*O. tshawytscha*), listed as Threatened in 1991; Snake River sockeye salmon (*O. nerka*), listed as Endangered in 1992; Snake River Basin steelhead (*O. mykiss*), listed as Threatened in 1998; Upper Columbia River spring run chinook salmon (*O. tshawytscha*), listed as Endangered in 1999; Middle Columbia River steelhead (*O. mykiss*), listed as Threatened in 1999; and Upper Columbia River steelhead, listed as Endangered in 1997. In addition, the resident Columbia Basin bull trout (*Salvelinus confluentus*) is listed as Threatened under the ESA.

Of the alternatives that involve in-water disposal, alternative 1 would provide the least benefit to increasing habitat for fall chinook salmon rearing in the McNary and lower Snake River reservoirs. The dredged material disposal methods of alternative 2 would provide the greater opportunity to develop shallow water salmonid habitat throughout the McNary and lower Snake River reservoirs. Upland disposal of dredged material proposed in alternative 3 would not provide for creation of salmonid habitat. Some of the beneficial uses proposed in alternative 4 could also create salmonid habitat.

Because dredging and disposal activities would only occur during authorized in-water work windows, impacts to salmonids would be minimized. For alternative 1, the work windows would be winter only. For alternatives 2, 3, and 4, these work windows would include winter main stem dredging and both winter and summer dredging of off-channel areas.

The likelihood of bull trout being in the project areas is remote, and they are not expected to be affected by the dredging and disposal activities. However, if bull trout were present in dredging and disposal areas, there would be short-term, indirect effects due to turbidity and disturbance from dredging activities, which would cause them to leave the area.

Beneficial use of dredged material proposed in alternative 4 is anticipated to have minor effects or potential benefits to endangered fish species.

The bald eagle (*Haliaeetus leucocephalus*) inhabits the project area and is listed as Threatened under the ESA. The dredging activities proposed for all four alternatives would not be a continuous activity confined to a single location. If impacts to bald eagles were to occur, they would be minor, short-term, and localized. Adjacent areas would be available for foraging, feeding, and perching.

The levee raise proposed in alternatives 2, 3, and 4 would not result in the loss of any trees or shoreline perch areas. Eagles' prey species would not be impacted. Thus, if any impacts were to occur, they would be related to disturbance during construction and would be minor, short-term, and localized.

Two plant species that may be found within the project area [Ute ladies' tresses (*Spiranthes diluvialis*) and water howelia (*Howellia aquatilis*)] are listed as Threatened under the ESA. Another plant, Spalding's silene, is proposed for listing under the ESA.

The proposed activity would not likely impact these plant species. There are no recorded observations of Ute ladies' tresses in the project vicinity, and they are not likely to occur due to lack of suitable habitat and the elevation of the project area. Therefore, no impacts to Ute ladies' tresses are expected to occur. Similarly, water howelia and Spalding's silene are not likely to occur at this low elevation or in this habitat.

As with endangered fish species, alternative 4 is not anticipated to impact endangered terrestrial species. However, because opportunities to use dredged material beneficially become available over time and cannot always be anticipated, a process has been established whereby a notice would be sent to parties known to have an interest in the use of the dredged material and a public notice published prior to the dredging activity. Impacts would be assessed on a case-by-case basis through this process. Plant surveys would be required to determine the presence of Ute ladies' tresses. Any sites found to support these plants would need to be avoided to preclude impacts to these plants. A BA may be prepared for each dredging activity, or for 5 years of dredging activities, depending upon the outcome of the ESA consultation with USFWS.

Recreation

Dredging activities proposed as part of all of the alternatives are expected to have a minor, short-term effect on those recreation activities and facilities located near proposed dredging and disposal locations. Dredging scenarios proposed may temporarily close boat ramps and boat basins and affect public recreation areas (e.g., swimming beaches) on a short-term basis during maintenance dredging. There would be short-term, minor impacts due to low levels of activities that occur during the winter months. Summer dredging of recreation sites would also have short-term impacts since the small areas would not take long to dredge. Construction of the levee raises proposed under alternatives 2, 3, and 4 are anticipated to have short-term, direct effects on the Lewiston levees park and the recreational activities that occur there. These effects would be minor because they impose a temporary disruption of activities at the Lewiston levees park, specifically multi-use paths and day-use facilities such as picnic tables on and adjacent to the levees could not be used during construction of the levee raise. Recreational facilities and activities would be restored following the interruption caused by the construction of the levee raise.

Upland disposal activities (barging and material handling) at the Joso site would have long-term, minor, indirect effects on river users, hunters, and the nearby Lyon's Ferry State Park and Lyon's Ferry Marina facilities. These effects are anticipated to be minor since the disposal area is set back at least 600 feet (182.9 m) from the river shoreline and is not directly visible from Lyon's Ferry State Park and Lyon's Ferry Marina, which are located on the opposite side of the Snake River.

To the extent that beneficial uses of dredged material would reduce the need to dispose of the material either upland or in-water, these uses are expected to have minor, direct impacts to recreational facilities and activities, depending on where the material is placed. Beneficial uses that would create or enhance wildlife habitat would have indirect beneficial effects on recreation if they enhanced hunting, fishing, or wildlife viewing opportunities.

Cultural Resources

Proposed dredging, disposal, and levee modification activities could affect cultural resources located within the project's area of potential effect as defined under the National Historic Preservation Act (NHPA). Dredging actions for all four alternatives would be limited to the removal of accumulated sediments and would not affect original riverbed or shoreline material, or cultural resources contained within that material. In-water disposal proposed in alternatives 1, 2, and 4 could affect identified underwater cultural resources in the lower Snake River and McNary reservoirs; however, known submerged cultural resource sites would be avoided to the maximum extent practicable during the placement of dredged material. Levee modification proposed in alternatives 2, 3, and 4 would not affect any cultural resources sites that have been identified.

Alternatives 2, 3, and 4 would use the Joso area for the upland disposal of some or all of the dredged material. Any cultural resources identified in the vicinity of the Joso upland disposal site would be avoided during construction and operation of the disposal site.

Beneficial uses of dredged material, as proposed in alternative 4, could potentially affect cultural resources, depending on the use. Prior to implementation of any beneficial use, the Corps would need to conduct research and field investigations to determine if cultural resources would potentially be affected.

The development, implementation, and monitoring of project actions would be conducted in conformance with the NHPA and the National Environmental Policy Act. Prior to the finalization and implementation of any plan, the Corps would complete the required cultural resource consultation. The Corps would continue to consult with appropriate State and Tribal Historic Preservation Officer(s) as well as other affected consulting parties throughout the life of the 20-year plan.

If human remains were inadvertently discovered during dredging or dredged material handling operations, all work in the immediate area would stop and the Corps archaeologist will take the appropriate steps to address the discovery. The Corps will notify all appropriate tribes, agencies, and local coroner's offices depending on the status of the human remains.

Socioeconomics

Dredging to maintain the navigation channel, access channels to ports and moorages, public recreation areas, irrigation intakes for HMUs, and flow conveyance capacity of the Lower Granite reservoir proposed under all four alternatives, and disposal of dredged material in-water proposed in alternatives 1, 2, and 4 represent no change in the management of the navigation projects and associated facilities. Therefore, with respect to navigation and economic use of waterways, these alternatives would have no effects on regional population, employment, or income. All alternatives considered would have minor, short-term, positive economic effects due to added employment for dredging-related activities.

Since alternative 1 does not include a levee raise in Lewiston, allowing continued loss of levee freeboard and increased risk associated with flooding, it would be expected (in comparison to the other alternatives being considered) to have an indirect, long-term, moderate negative effect on the local economy of the Lewiston area since reduction in annualized flood damages would not be realized. Proposed levee modifications for alternatives 2, 3, and 4 are anticipated to have a direct, short-term, positive effect on the local economy of the Lewiston area due to the added jobs and materials required for construction of the levee modifications.

Upland disposal proposed under alternative 3 would be expected to have a direct, minor, short-term positive impact due to jobs created for construction and initial operation of the disposal facility at the Joso site. The economic effects would remain positive, but lessen over time, for the continued use of the upland disposal facility.

Beneficial use of dredged material would be expected to have a direct, minor, short-term positive economic effect due to construction activities associated with implementation of the beneficial use. Also, beneficial uses that create or enhance wildlife habitat or recreational resources would potentially have minor, indirect, long-term beneficial effects attributable to enhancement of recreational resources and opportunities.

The Corps reviewed demographic data to identify areas where there are potential environmental justice populations, and considered the alternatives' environmental effects with respect to these areas.

Transportation

River Navigation

Maintenance dredging for all four alternatives would have a long-term beneficial impact on river navigation by ensuring adequate depths in the navigation channels, access channels to ports and moorages, and public recreation areas. In-water disposal activities would be away from areas of commercial navigation. Dredging in the navigation channels would occur on a 2-year cycle on average, causing some disruption during the authorized in-water work period from December 15 to March 1 in the Snake River and December 1 and March 31 in the Columbia River. No disruption to recreational boating would be expected in the main river channels; only short-term disruption may occur during maintenance dredging of boat basins.

Upland disposal of all material proposed in alternative 3 would increase the number of lockages (barges passing through lock and dam facilities) during the dredging period by as much as 150 lockages every 2 years (up to 113 barges with an average of four lockages of three barge tows). These lockages would occur during a time of year when they would cause very little impact to other commercial or recreational traffic.

Alternative 4 could have different effects in the disposal area depending on the disposal location and method employed to develop the beneficial use. For the beneficial uses being considered, the adverse impacts to other river navigation would be short-term and minor. In some cases beneficial uses could have positive impacts to river navigation by providing added terminal and port areas.

Railroads

Continued maintenance of the navigation channels, access channels to ports and moorages, public recreation areas, irrigation intakes, and flow conveyance capacity proposed in all four alternatives would have no adverse effect on the railroads in the area and would continue to support the multi-modal flow of commerce to and from the study area.

The nominal 3-foot (0.9-m) levee raise, proposed in alternatives 2, 3, and 4 includes construction to the west levee below the south abutment of the Camas Prairie Railroad Bridge over the Clearwater River at Lewiston and would have minor, short-term impacts during construction.

Disposal of all dredged material at Joso proposed in alternative 3 would cause minor, long-term, direct impacts to the Union Pacific Railroad resulting from the developments of the Joso disposal site and increases in crossings of the Union Pacific Railroad right-of-way during construction.

The beneficial use of the dredged material proposed in alternative 4 would be determined on a case-by-case basis and may affect the railroads due to minor disruptions that could potentially

involve the railroad to transport dredged material to a final destination point. The potential impacts to railroads from this alternative are expected to be minor.

Highways/Roadways

Modification of roads (associated with the levee raise) proposed in alternatives 2, 3, and 4 would create short-term, direct impacts to Highway 129 and the Snake River Road. The roadways would be raised to avoid inundation with water during high-flow events. Effects would occur during reconstruction of the affected portions of roadway.

One concept for beneficial use of dredged material, proposed in alternative 4, would use the material to form a roadway connection on the north shore of the Lower Granite pool linking State Route (SR) 193 at Wawawai to SR 194, a distance of 3 miles [4.8 kilometers (km)]. This would create a potential positive effect with respect to roadway construction.

Geology and Soils

Maintenance dredging proposed in all four alternatives is not anticipated to significantly affect the geology and soils in areas surrounding the lower Snake River and McNary reservoirs. Dredging would cause local soil and rock disturbance and relocation of some alluvial material.

Modifications to the levee system in Lewiston proposed in alternatives 2, 3, and 4 are expected to result in direct effects on the geology and soils of the levees and surrounding areas. Minor, short-term effects to soils and topography, resulting from earthmoving and construction activities, are expected during construction of the levee modifications.

Upland disposal as proposed under alternative 3 is anticipated to have a direct, long-term effect on the soils and topography of the Joso site. Erosion and compaction would occur from construction and dredged material disposal activities. Site restoration would include stabilizing and seeding of the dredged material after it has been disposed of on site. Disposal material would be contained within a bermed area and drainage would be controlled to minimize erosion. In addition, a 600-foot (182.9-m) setback from the river would help minimize shoreline erosion.

Alternative 4 would use some or all of the dredged material for beneficial uses. Beneficial uses, such as woody riparian habitat creation, other habitat creation/enhancement, landfill cover, or other activities, would be expected to have direct, short-term impacts to the soils in the areas where the uses would be implemented.

Water Quality/Water Resources

All alternatives considered in the DMMP/EIS are expected to have a temporary, direct negative effect on water quality in the Columbia, Snake, and Clearwater Rivers, mostly because of turbidity plumes caused by the dredging and, where proposed, in-water disposal. However, it is anticipated that elevated turbidity levels would be confined and will stay within the “mixing zones” (established under Clean Water Act Section 401 water quality certification) allowed for this activity, and allowable turbidity downstream of the mixing zone would not be exceeded.

Historically, the Corps has sampled and tested dredged materials for sediment size and quality, including contaminants, to determine suitability for in-water disposal. To date, sediment contaminant levels have been at low levels that allow in-water disposal. Based on historic sediment testing data, contaminant levels that would preclude in-water disposal in the future are not anticipated. Nonetheless, the Corps will continue its sediment sampling protocols to ensure sediment quality is adequately assessed.

Construction of the levees at Lewiston proposed in alternatives 2, 3, and 4 could result in short-term, minor water quality impacts due to runoff and erosion. These concerns would be minimized with the implementation of a site-specific Erosion/Sedimentation Control (ESC) Plan and construction best management practices (BMP's). The levees would be stabilized by hydroseeding immediately after construction.

Direct, temporary, minor impacts due to erosion may occur as a result of construction and disposal operations at the Joso site as proposed in alternative 3. A containment berm would be constructed on the perimeter of the permanent disposal area and would minimize water quality impacts associated with runoff and erosion. An ESC plan would be developed and BMP's used during site development. The site would also be regularly stabilized in a phased manner during disposal, and measures will be taken to minimize sedimentation from dredged material transfer activities.

Impacts from beneficial use of the dredged material proposed in alternative 4 could vary depending on the use and would be the responsibility of the local sponsor. As with other dredged material management methods, beneficial uses involving placement of dredged materials would be subject to ESC measures and BMP's.

Wetlands

Minor, short-term, indirect impact to wetlands adjacent to the levees or roadway could occur during construction of the nominal 3-foot (0.9-m) levees as proposed in alternatives 2, 3, and 4. Long-term impacts are not expected as a result of the levee raise.

Two small wetland areas have been identified in the vicinity of the Joso upland disposal site proposed in alternative 3. The proposed disposal facility has been sited to avoid directly or indirectly affecting these wetland areas.

Beneficial uses proposed in alternative 4 would be expected to generally affect wetland resources positively if dredged material were used for enhancement or creation of aquatic and wildlife habitat. Beneficial uses could potentially improve wetland size, function, and quality. Specific wetlands in the vicinity of a proposed beneficial use would require identification prior to commitment for the beneficial use project. A wetland area approximately one acre (0.4 hectare) in area is adjacent to the area where woody riparian habitat development is proposed. This wetland area would be minimally impacted by the proposed habitat development. The wetland is a low area where ponding occurs; it holds water only at extremely high pool elevations, and dries out during most years. Under the proposed beneficial use, an inlet channel to the pond would be constructed, which should increase flows into the pond at lower reservoir elevations. It will also

have an exit (outlet) constructed so there will be some flow through, thus improving the water quality.

Floodplains

There would be no foreseeable significant negative floodplain impacts as a result of the maintenance dredging proposed in all four alternatives or the levee raise at Lewiston proposed in alternatives 2, 3, and 4.

The permanent upland disposal site at Joso would not be located in the 100-year floodplain and would not affect the floodplain. Approximately 360,000 square feet (33 445.1 square meters) of the unloading and temporary storage area for dredged material would encroach on the 100-year floodplain, causing minor short-term impacts to the floodplain during the time that the material is stored. However, the fill is not expected to change the water surface elevation and would not pose long-term effects on the 100-year floodplain.

Beneficial uses are not anticipated to present significant impacts to floodplain areas. The proposed woody riparian habitat creation would involve placement of fill in shoreline areas at Chief Timothy HMU, including some areas within the 100-year floodplain. This fill would not change the water surface elevation, nor have impact on the 100-year floodplain. Specific areas considered for placement of dredged material under beneficial use would require analysis of floodplain issues.

Hazardous, Toxic, and Radioactive Waste

Based on Phase I environmental site assessments conducted for the Joso site, there is a very low potential for land-based hazardous, toxic, and/or radioactive waste concerns to be associated with the Joso upland disposal site.

Based upon existing sediment quality data, it is not anticipated that the handling and disposal of dredged materials as hazardous or solid waste (as defined by applicable environmental health and safety regulations and requirements) would be required.

The proposed woody riparian habitat creation area at Chief Timothy HMU does not pose any known HTRW concerns. Beneficial use of dredged materials could have minor positive effects on hazardous waste if dredged material was used for cover or fill at the Hanford Reservation, which is a beneficial use option considered in alternative 4. In general, beneficial uses that involve upland handling of dredged materials would not be expected to have hazardous waste effects, given the quality of the sediments. See the Water Quality/Water Resources section for information on sediment contaminant levels.

Because of the location of the Hanford Nuclear Reservation at the upstream end of McNary reservoir, there is speculation of radioactive materials being present in the reservoir sediments. Dredging activities under any of the four alternatives should not extend deep enough into the sediment layer to reach existing (if any) radioactive material. However, the Corps plans to

evaluate each dredging activity in the McNary reservoir and determine if and what type of further pre-dredging sediment testing and analysis may be necessary.

Air Quality

All alternatives would cause direct, minor, short-term effects to local air quality due to dredging equipment operation. Dredged material would be wet, and is not anticipated to be subject to dust generation. Construction activities associated with raising the Lewiston levee could generate dust, as could the upland disposal at Joso proposed in alternative 3 and the upland contingency disposal at Joso in alternatives 2 and 4. The BMP's would be used to prevent material from becoming airborne during transport, offloading, and upland placement.

No additional impacts associated with implementation of alternative 4 are anticipated.

Noise

Minor, direct, short-term noise impacts are anticipated to result from dredging, transport, and disposal activities of all alternatives considered. Levee construction would occur primarily during daytime hours and would cause minor, short-term impacts from construction activities. Upland disposal of dredged material would occur primarily during daytime hours and would have minor, direct, short-term effects during site work and disposal activities.

Aesthetics

It is anticipated that all four alternatives will have a direct impact on aesthetics in the area where dredging activities are taking place and, for alternatives 1, 2, and 4, where in-water disposal is anticipated. Impacts due to levee modification as proposed in alternatives 2, 3, and 4 are expected to be both short-term (due to construction activities) and long-term (due to raising of the levees). Levee modifications would affect the riverfront park facilities and would present moderate impacts to both visual quality and viewing patterns.

Under alternative 3, dredged material from all reservoirs disposed of at the Joso site in the Lower Monumental reservoir would have a direct, long-term effect on the aesthetics of the disposal site and the areas immediately surrounding the site from which the site can be viewed. While the proposed disposal operations would directly impact the aesthetic quality of the Joso site, the effects would be minor due to the fact that the site is not highly visible to viewers and would be restored upon completion of disposal operations. Beneficial use of dredged material, proposed in alternative 4, would potentially have a long-term positive effect on aesthetic resources if used for wetlands or habitat restoration. Proposed woody riparian habitat creation at Chief Timothy HMU in Lower Granite Reservoir would have a long term, beneficial effect on the aesthetics of the shoreline area.

Native American Tribes and Communities

Impacts from DMMP activities that are of concern to tribes would involve potential effects to aquatic species and their habitats, water quality, and cultural resources. Although DMMP

actions would occur in the five study area reservoirs over its 20-year life, most dredging activities and the majority of any in-water disposal would occur in the Lower Granite reservoir.

Dredging as proposed for alternatives 1, 2, 3, and 4, and in-water disposal of dredged materials as proposed for alternatives 1, 2, and 4, could result in habitat changes that are beneficial, neutral, or even detrimental to different aquatic species depending on given species responses and needs. Constructing more shallow-water habitat could change water quality factors. Shallow-water temperatures, currently below optimum for the growing season of resident game fish, would be increased and possibly enhance resident game fish habitat conditions and population numbers.

Water quality impacts from DMMP activities under any of the alternatives are expected to be temporary, but would result in direct negative effects due to turbidity plumes caused by dredging and in-water disposal. Greater sediment plumes are expected from dredging operations.

Concerns over potential impacts to cultural resources would be focused on damage to cultural sites from dredging actions or covering sites with too much sediment as a result of disposal activities. As now planned, dredging under all four alternatives would be limited to existing navigation channels and/or would not go below accumulated sediments into original riverbed. Likewise, disposal activities either upland or in-water would avoid known sites. (However, sediment drift from in-water disposal could result in the eventual covering of sites with additional material.) Such actions would help to reduce the chances of impacting cultural sites.

Cumulative Effects

The National Environmental Policy Act and the Council on Environmental Quality's regulations require Federal agencies to consider the cumulative impacts of their actions on the natural and human environment. Cumulative effects are those environmental consequences that result from the incremental impact of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of the agencies or individuals that may undertake them.

Other past, present, and reasonably foreseeable projects or actions that could, when added to the proposed plan alternatives, result in cumulative impacts include:

- Construction of the five Corps dams.
- Land uses in the study area.
- Past and present dredging and disposal activities undertaken by the Corps for navigation maintenance or flow conveyance, as well as dredging for ports and/or boat basins within the study area.
- Levee construction and modification.
- Re-licensing of dams within the Columbia/Snake River system.
- The Lower Snake River Juvenile Salmon Migration Feasibility Study.
- Columbia River Channel Improvement Project.

The Corps has conducted a series of studies to evaluate appropriate in-water and upland disposal sites for dredged material and the effectiveness of habitat creation with dredged material deposited in water in shallow and mid-depth areas. In addition, the Corps reviewed and considered major projects and plans from throughout the study area, both within and outside of their jurisdiction.

Plan alternatives considered in combination with past and present dredging and disposal activities and other reasonably foreseeable plans and projects are not anticipated to cumulatively adversely affect the resources analyzed in the DMMP/EIS. The in-water disposal to create juvenile salmonid rearing habitat, when coupled with other measures being taken by the region to improve fish passage, may have a positive effect on juvenile salmonid survival.

RECOMMENDED PLAN/PREFERRED ALTERNATIVE

The Corps' preferred alternative, or Recommended Plan, for long-term management of dredging is "Alternative 4 - Maintenance Dredging With Beneficial Use of Dredged Material and a 3-Foot (0.9-m) Levee Raise." Alternative 4 most completely and efficiently meets the project purpose and need at the least cost, while presenting potential environmental impacts that are no greater, and often less, than other alternatives considered.

The recommended plan also represents the greatest beneficial use of dredged material that can be implemented on a programmatic basis at this time. Furthermore, the plan incorporates an adaptive management approach that provides for on-going evaluation of proposed dredging and dredged material management activities and opportunities to adapt and adjust actions based on these evaluations. Alternative 4 provides the most flexibility for identifying, evaluating, and potentially implementing beneficial uses of dredged material. The plan becomes the basis for cost sharing of other beneficial uses of dredged material that may be identified in the future as each separate dredging activity is planned and executed. Beneficial uses of dredged material may be adopted on a case-by-case basis under this plan as opportunities become available and, if necessary, when local sponsors agree to fulfill sponsorship requirements. To continue to optimize the use of dredged material, the Corps will coordinate potential beneficial uses for each dredging activity with the LSMG prior to the start of dredging. Figure ES-4 displays the decision tree that the Corps would use to determine the type of dredging and the disposal plan for each activity.

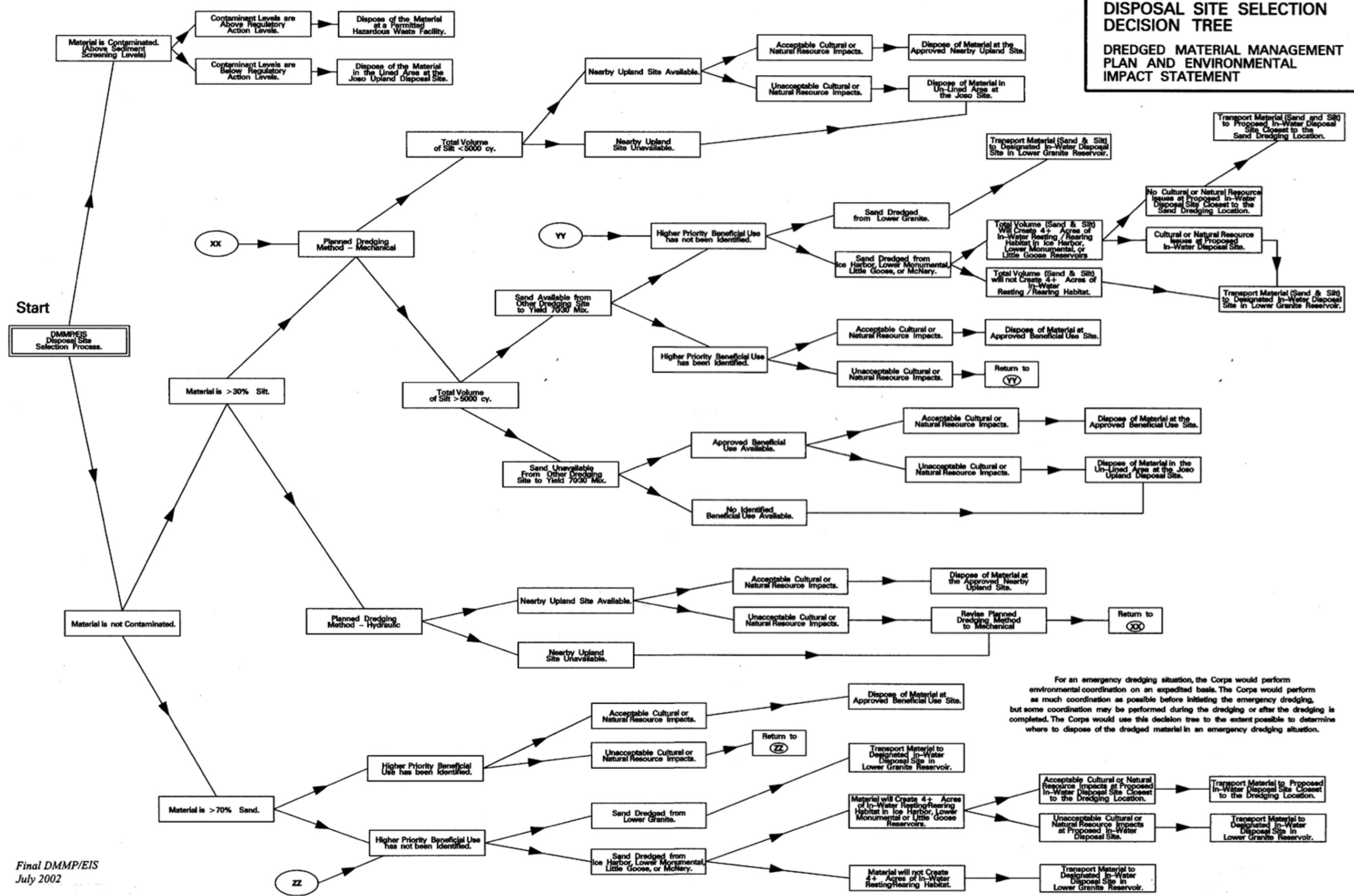
The 3-foot (0.9-m) levee raise feature is the preferred plan for maintaining the flow conveyance capacity in the Snake and Clearwater Rivers confluence area of Lower Granite reservoir because it meets the purpose and need and produces maximum net benefits in excess of costs. Raising the levee was found to reduce the need for dredging in the confluence area of Lower Granite reservoir and, therefore, is considered as a part of this DMMP. Selection of the levee raise as the preferred flow conveyance restoration method was based on the maximization of net benefits determined from a risk-based flood damage assessment and annual costs amortized over the remaining 74 years of the project life. Levee construction would not start until after 2005 and after any necessary appropriation and authorization is obtained.

Dredging projects implemented under this DMMP can be initiated in response to a variety of conditions described in the discussion of the Local Sediment Management Group above.

The Corps has identified the first dredging activity that would be conducted under the DMMP. This dredging is currently proposed for winter 2002-2003 and includes dredging the navigation channel at the confluence of the Snake and Clearwater rivers, several port facilities in the Lewiston-Clarkston area, several recreation facilities in Lower Granite and Little Goose reservoirs, navigation lock approaches to Lower Granite and Lower Monumental Dams, and several other potential areas. The Corps is currently proposing using dredged material to develop woody riparian habitat at the Chief Timothy Habitat Management Unit and/or using in-water disposal to create fish habitat in Lower Granite reservoir as the beneficial use of the dredged material. Appendix N provides a detailed description of the proposed dredging areas, the disposal plan, the sediment contaminant analysis, and the environmental impacts specific to this dredging activity.

DISPOSAL SITE SELECTION DECISION TREE

DREDGED MATERIAL MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT

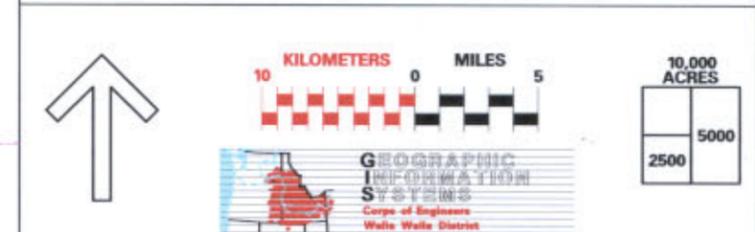
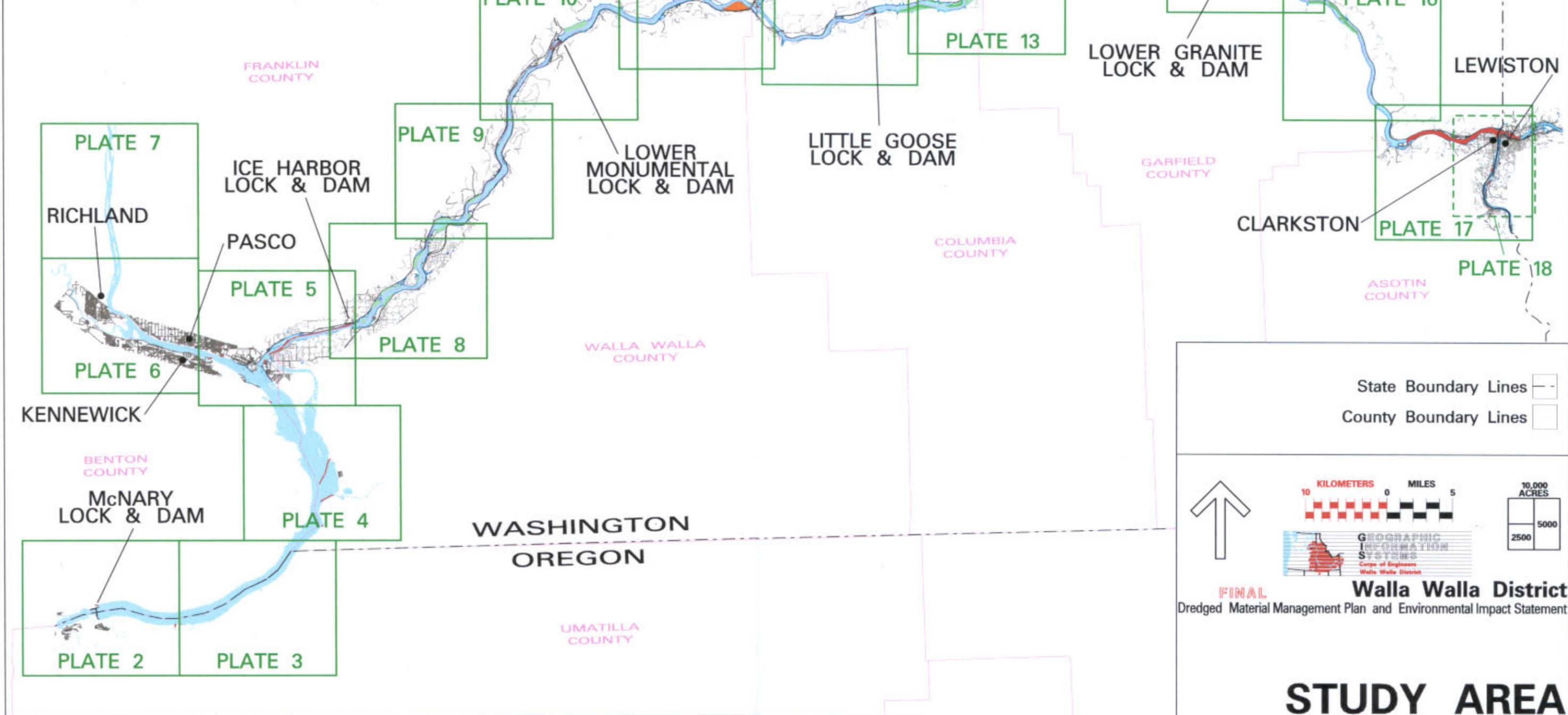
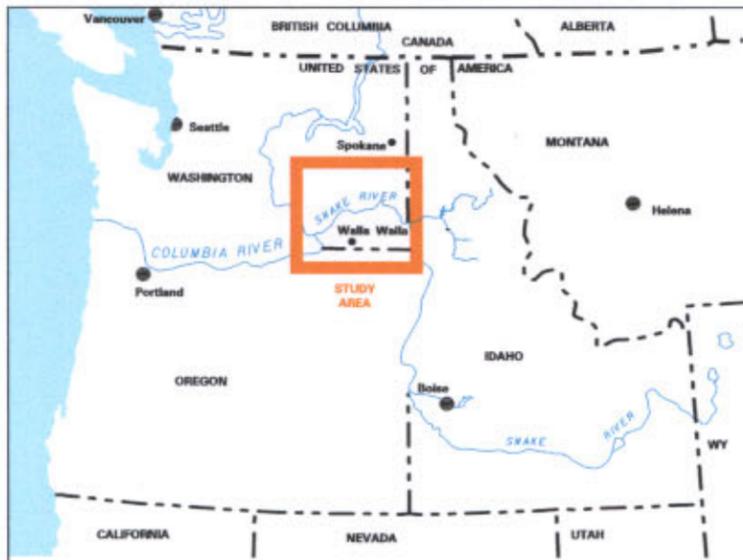


For an emergency dredging situation, the Corps would perform environmental coordination on an expedited basis. The Corps would perform as much coordination as possible before initiating the emergency dredging, but some coordination may be performed during the dredging or after the dredging is completed. The Corps would use this decision tree to the extent possible to determine where to dispose of the dredged material in an emergency dredging situation.

LIST OF PLATES

Plate

- 1 Study Area
- 2 McNary Dam and Reservoir: RM 289 - 298
- 3 McNary Reservoir: RM 299 - 310
- 4 McNary Reservoir: RM 310 - 321
- 5 McNary Reservoir: RM 322 - 329
- 6 McNary Reservoir: RM 330 - 341
- 7 McNary Reservoir: RM 342 - 352
- 8 Ice Harbor Dam and Reservoir: RM 9 - 22
- 9 Ice Harbor Reservoir: R 21 - 35
- 10 Lower Monumental Dam and Reservoir: RM 34 - 49
- 11 Lower Monumental Reservoir: RM 48 - 61
- 12 Little Goose Dam and Reservoir: RM 60 - 74
- 13 Little Goose Reservoir: RM 73 - 87
- 14 Little Goose Reservoir: RM 84 - 99
- 15 Lower Granite Dam and Reservoir: RM 99 - 116
- 16 Lower Granite Reservoir: RM 114 - 128
- 17 Lower Granite Reservoir: RM 127 - 147
- 18 3-Foot Levee Raise



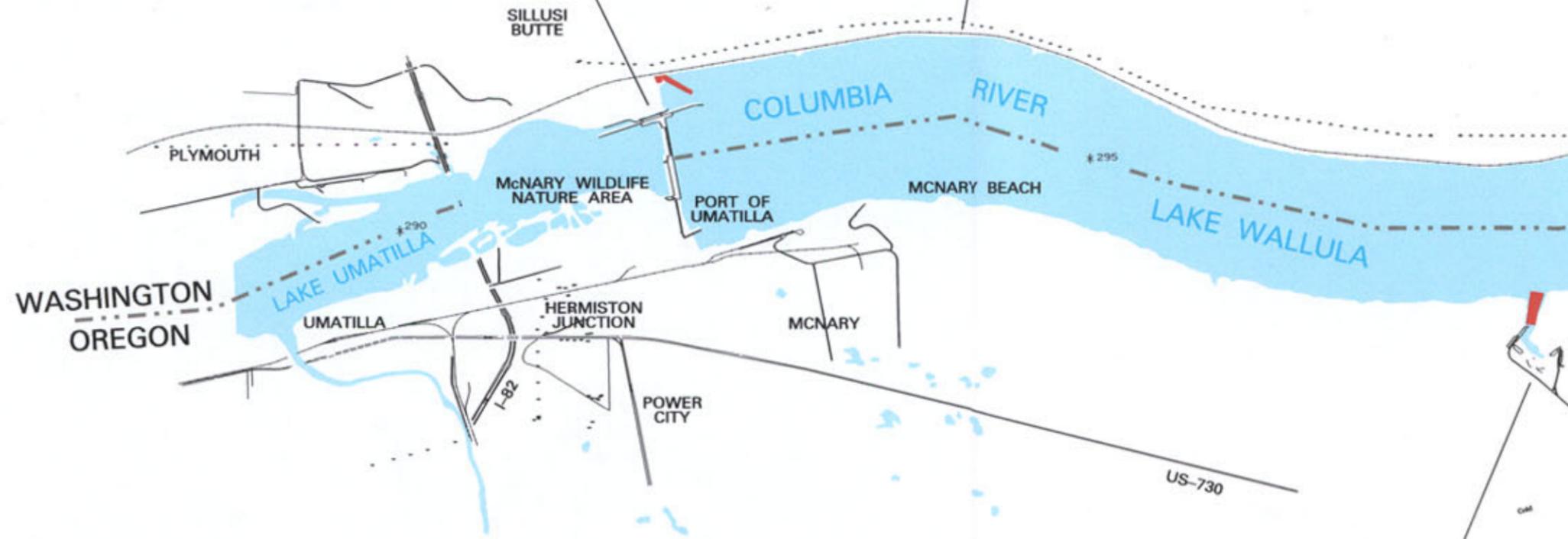
FINAL
 Dredged Material Management Plan and Environmental Impact Statement

STUDY AREA

BENTON COUNTY

HORSE HEAVEN
HMU

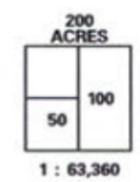
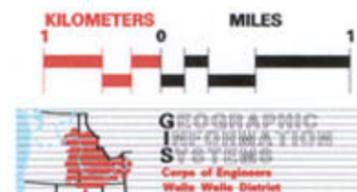
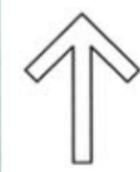
MCNARY
LOCK AND DAM



UMATILLA COUNTY



- Conservation Pool ■
- Portential Dredging Location ■
- Location Boundaries Not To Scale
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

McNary Dam and Reservoir: RM 289 - 298
DREDGING AND DISPOSAL SITES

BENTON COUNTY

WASHINGTON
OREGON

STATE LINE
HMU

LAKE WALLULA
COLUMBIA RIVER

REFUGE ISLAND

US-730

JUNIPER CANYON
HMU

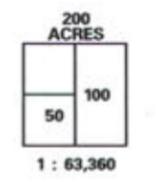
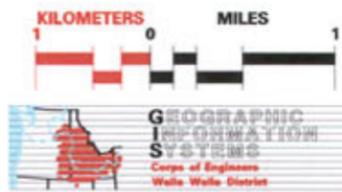
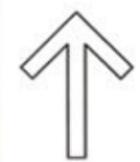
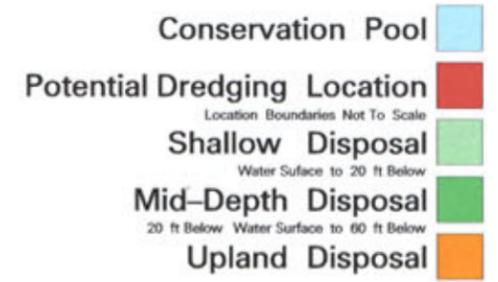
STATE LINE
HMU

SAND
STATION

WAREHOUSE
BEACH
RECREATION
AREA

WAREHOUSE
BEACH
HMU

UMATILLA COUNTY

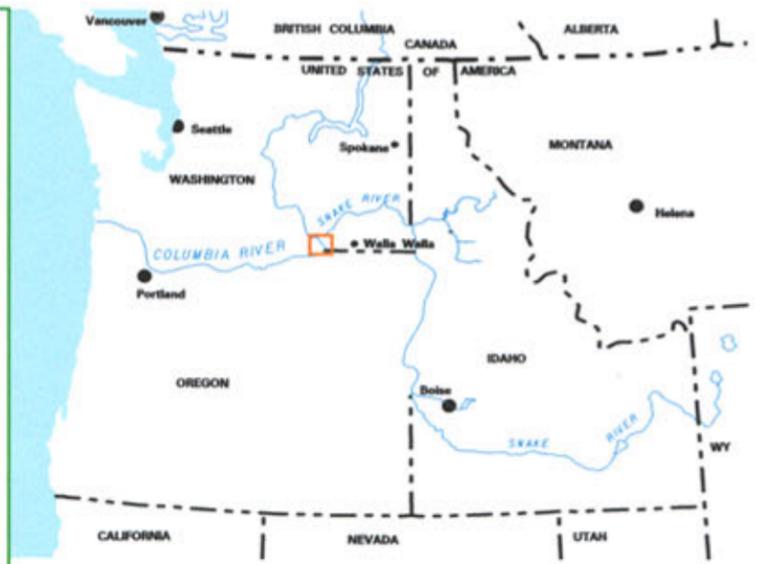
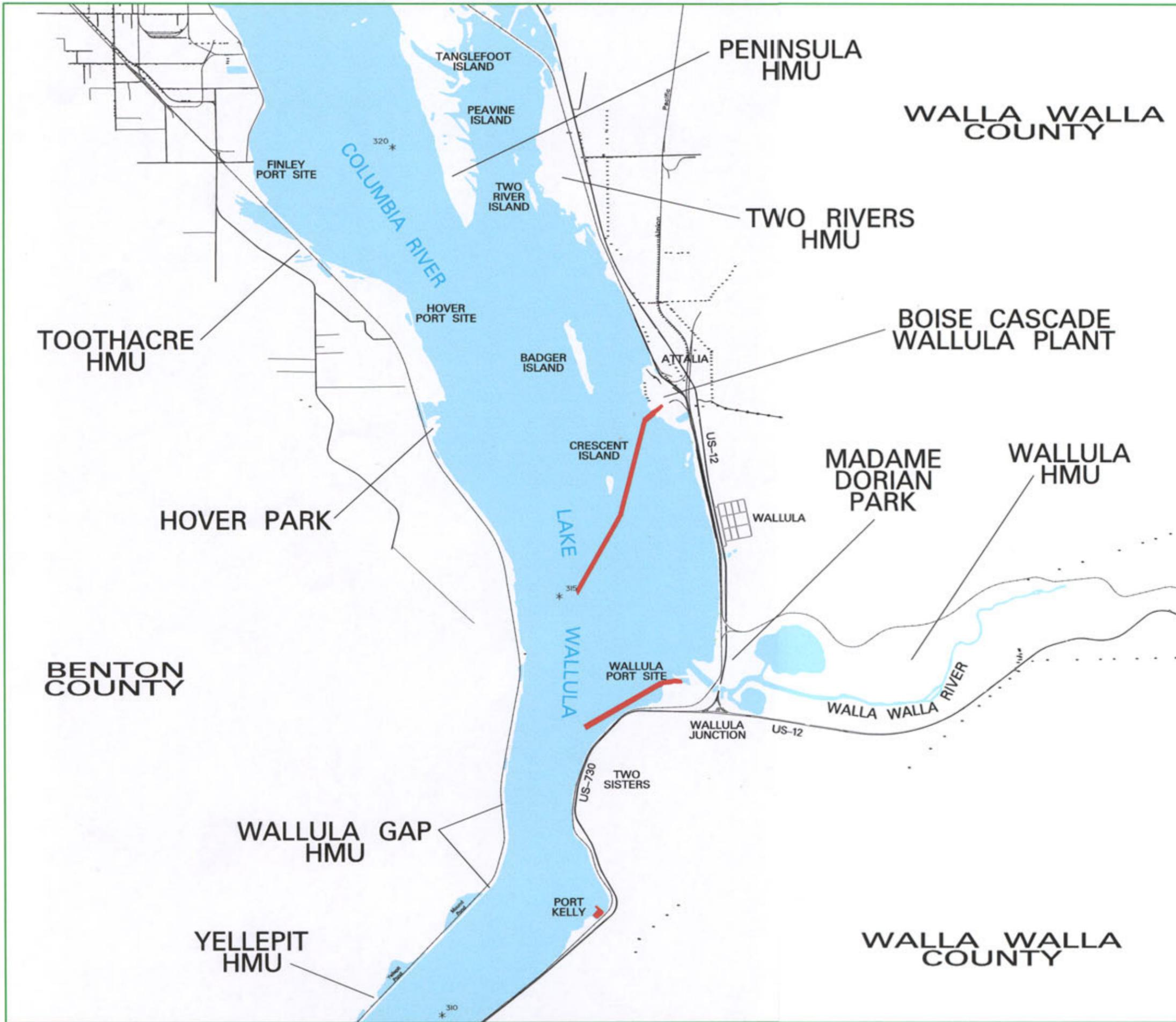


FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

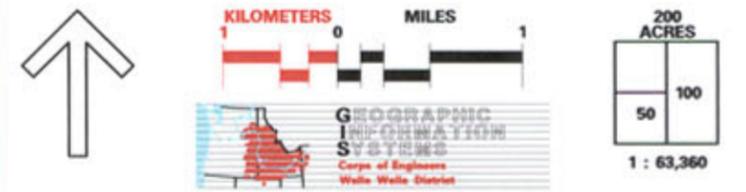
McNary Reservoir: RM 299 - 310
DREDGING AND DISPOSAL SITES

2002

PLATE 3



- Conservation Pool ■
- Potential Dredging Location ■
Location Boundaries Not To Scale
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

McNary Reservoir: RM 310 - 321

DREDGING AND DISPOSAL SITES

2002 PLATE 4

FRANKLIN COUNTY

ICE HARBOR
LOCK AND DAM



PASCO
POND

PASCO
BOAT
BASIN

BURBANK
PORT
SITE

MARTINDALE

Snake River

STRAWBERRY
ISLAND

BURBANK
HEIGHTS
HMU

HOOD
PARK

WALLA WALLA
COUNTY

SR-124

CLOVER
ISLAND

PORT OF
PASCO

INDIAN
ISLAND

CARGILL
POND

BURBANK

DREDGE
SPOIL
ISLANDS

McNARY
NATIONAL
WILDLIFE
REFUGE
(McNARY DIVISION)

(Refuge also
includes
Hood and
Strawberry
Islands.)

KENNEWICK

COLUMBIA
RIVER

325 *

HEDGES
PORT SITE

ADY SITE

US-12

FOUNDATION
ISLAND

CASEY
POND

TWO RIVERS
PARK

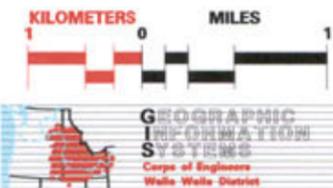
Conservation Pool

Potential Dredging Location

Shallow Disposal

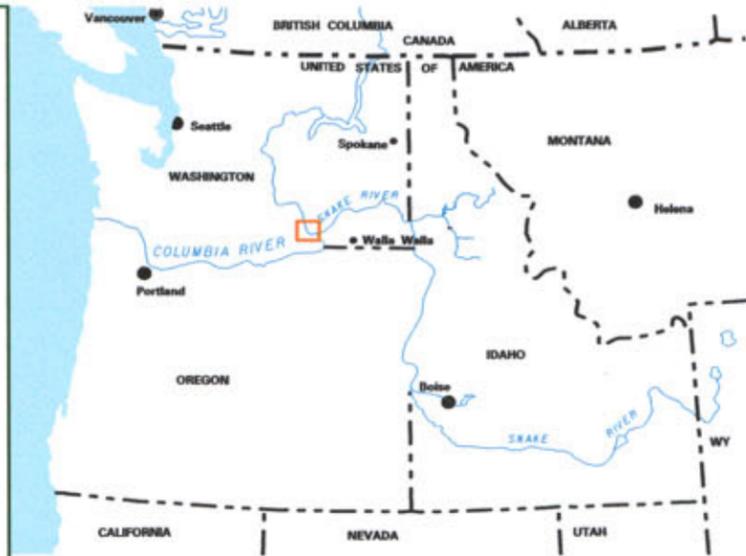
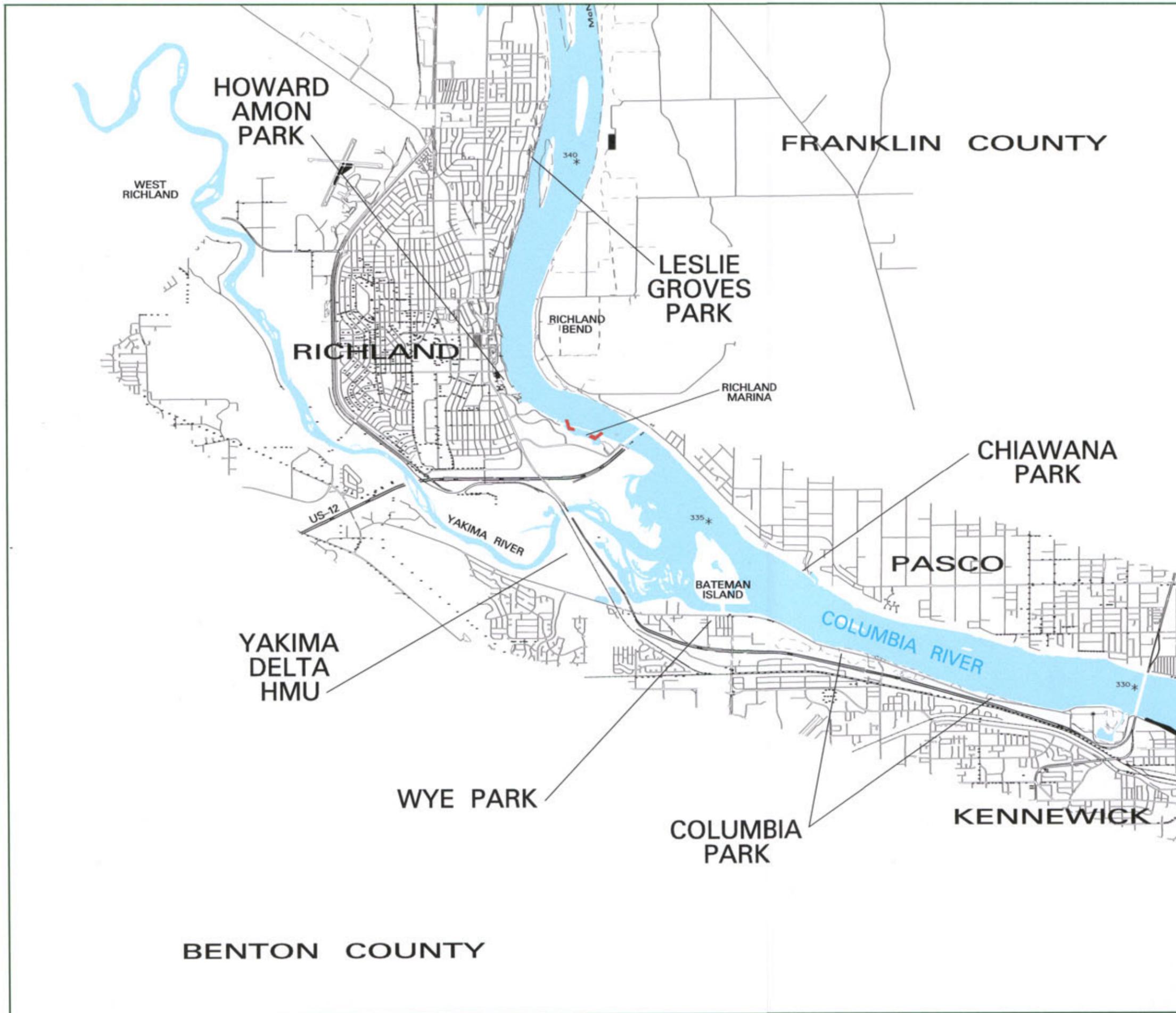
Mid-Depth Disposal

Upland Disposal

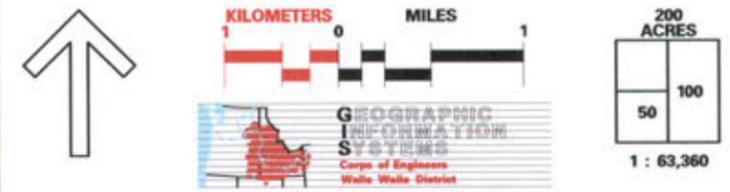


FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

McNary Reservoir: RM 322 - 329
**DREDGING AND
DISPOSAL SITES**

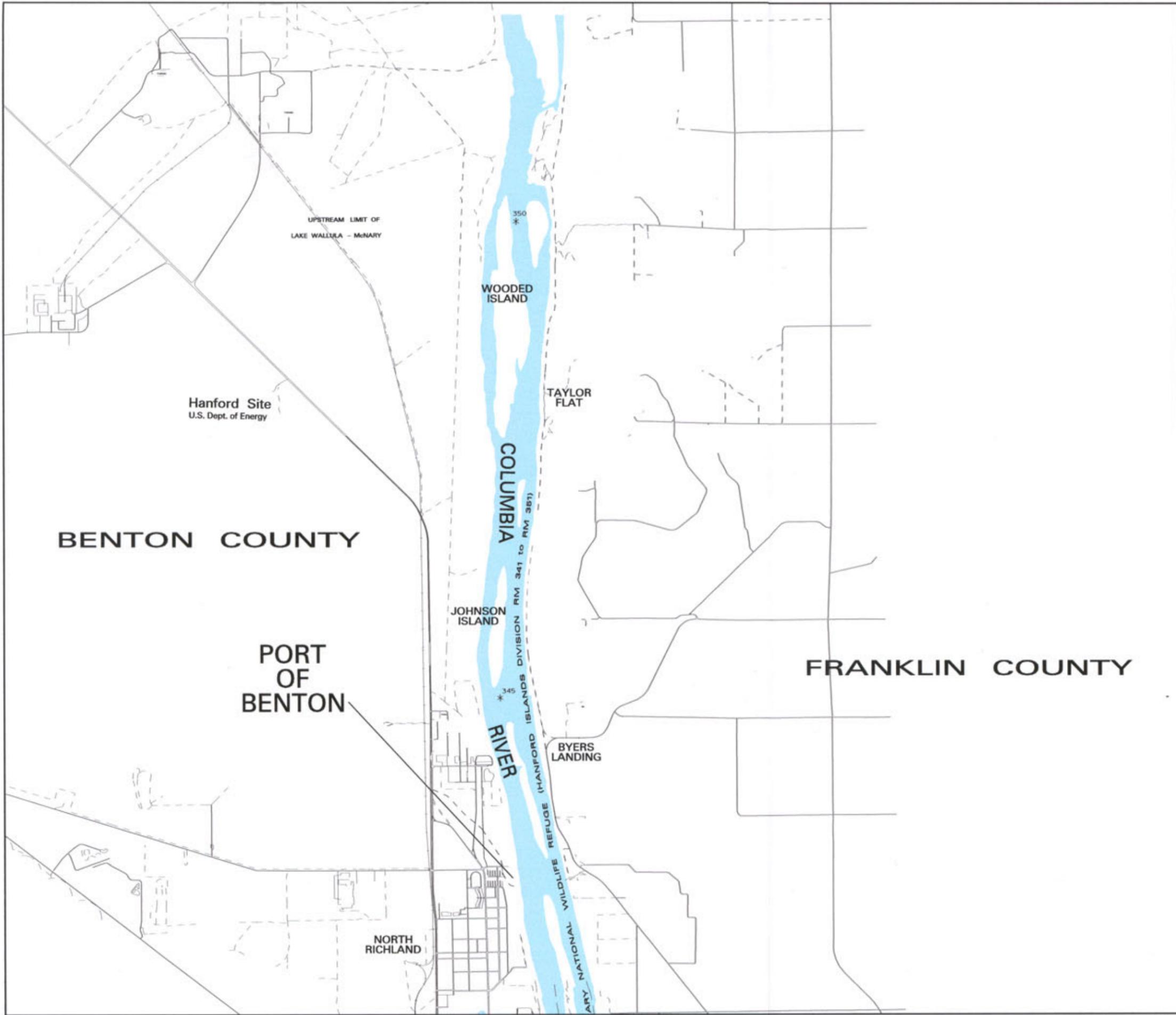


- Conservation Pool ■
- Potential Dredging Location ■
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■

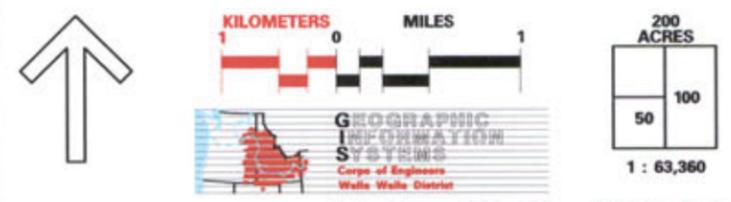


FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

McNary Reservoir: RM 330 - 341
DREDGING AND DISPOSAL SITES

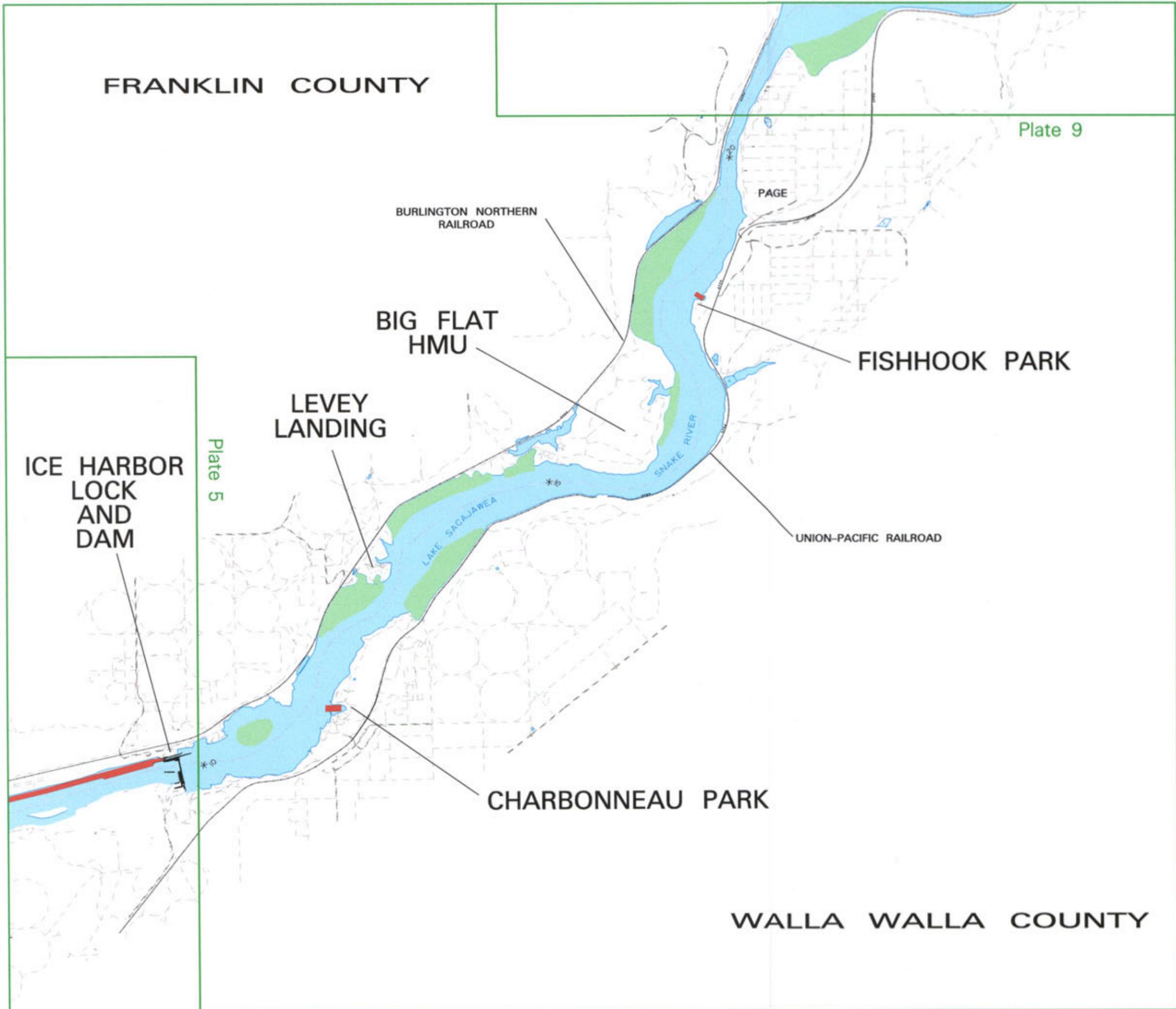


- Conservation Pool ■
- Potential Dredging Location ■
Location Boundaries Not To Scale
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■

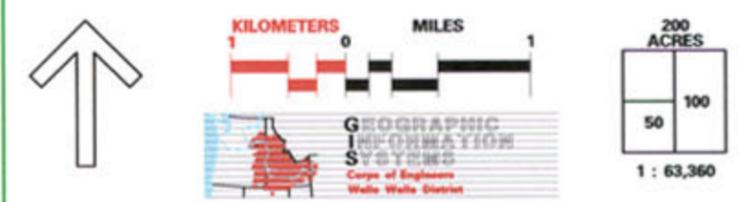


FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

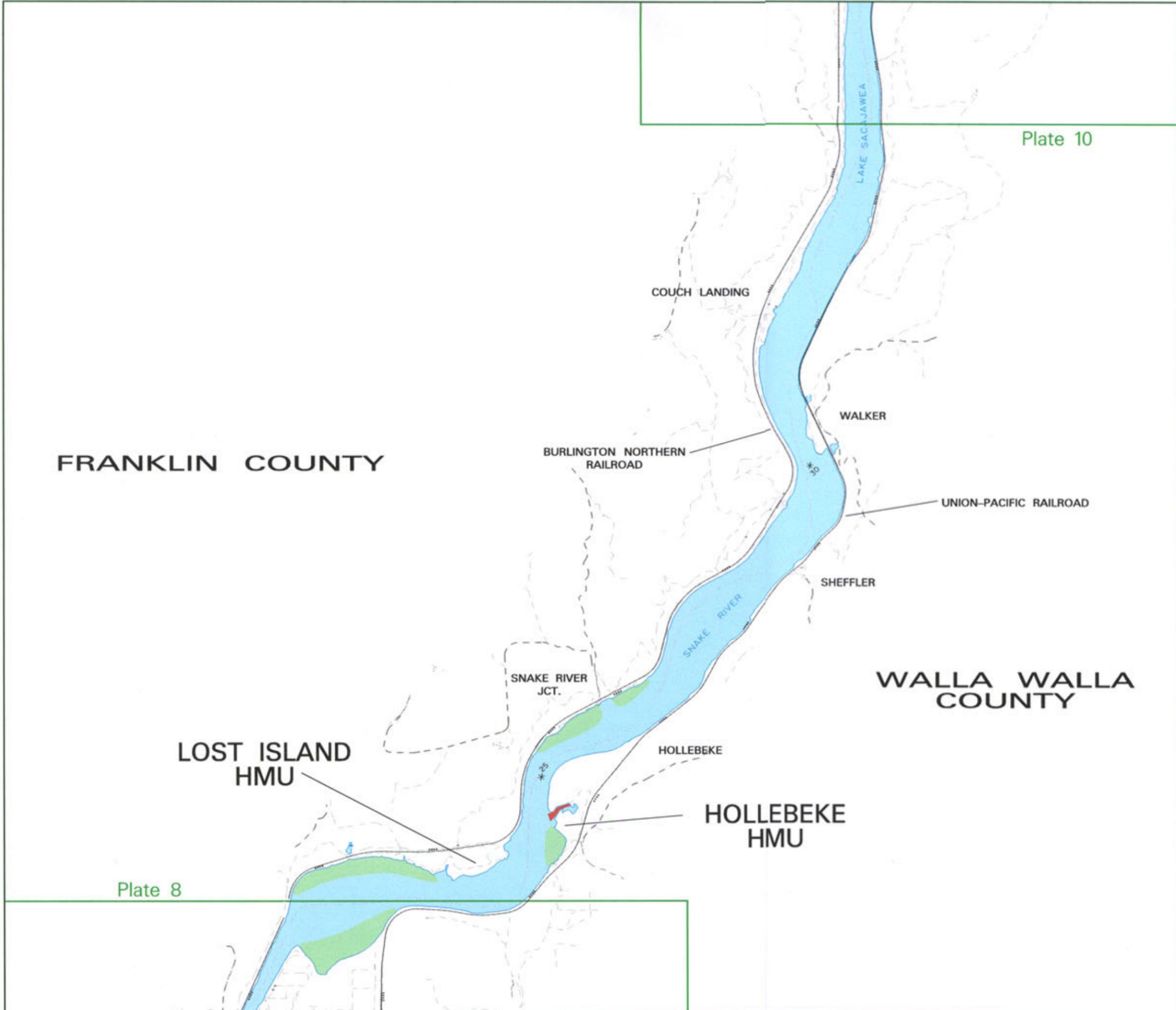
McNary Reservoir: RM 342 - 352
DREDGING AND DISPOSAL SITES



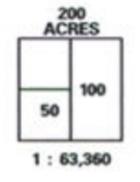
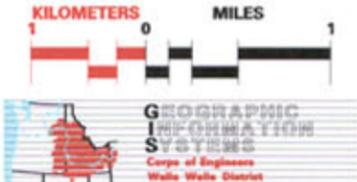
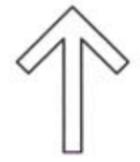
- Conservation Pool ■
- Potential Dredging Location ■
Location Boundaries Not To Scale
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement
Ice Harbor Dam and Reservoir: RM 9 - 22
DREDGING AND DISPOSAL SITES
2002
PLATE 8



- Conservation Pool ■
- Potential Dredging Location ■
Location Boundaries Not To Scale
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

Ice Harbor Reservoir: RM 21 - 35
DREDGING AND DISPOSAL SITES

FRANKLIN COUNTY

LOWER MONUMENTAL LOCK AND DAM

WINDUST PARK

FARRINGTON

WINDUST

BURLINGTON NORTHERN RAILROAD

BURR CANYON

SCOTT

DEVIL'S BENCH RECREATION AREA

MATTHEWS

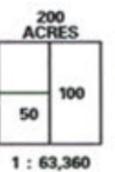
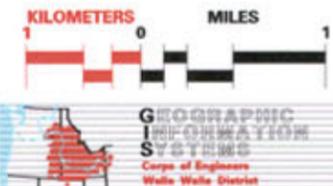
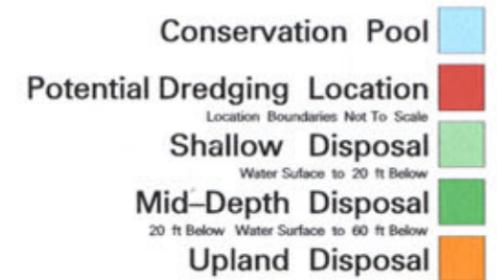
MATTHEWS PARK

UNION-PACIFIC RAILROAD

WALLA WALLA COUNTY

Plate 11

Plate 9

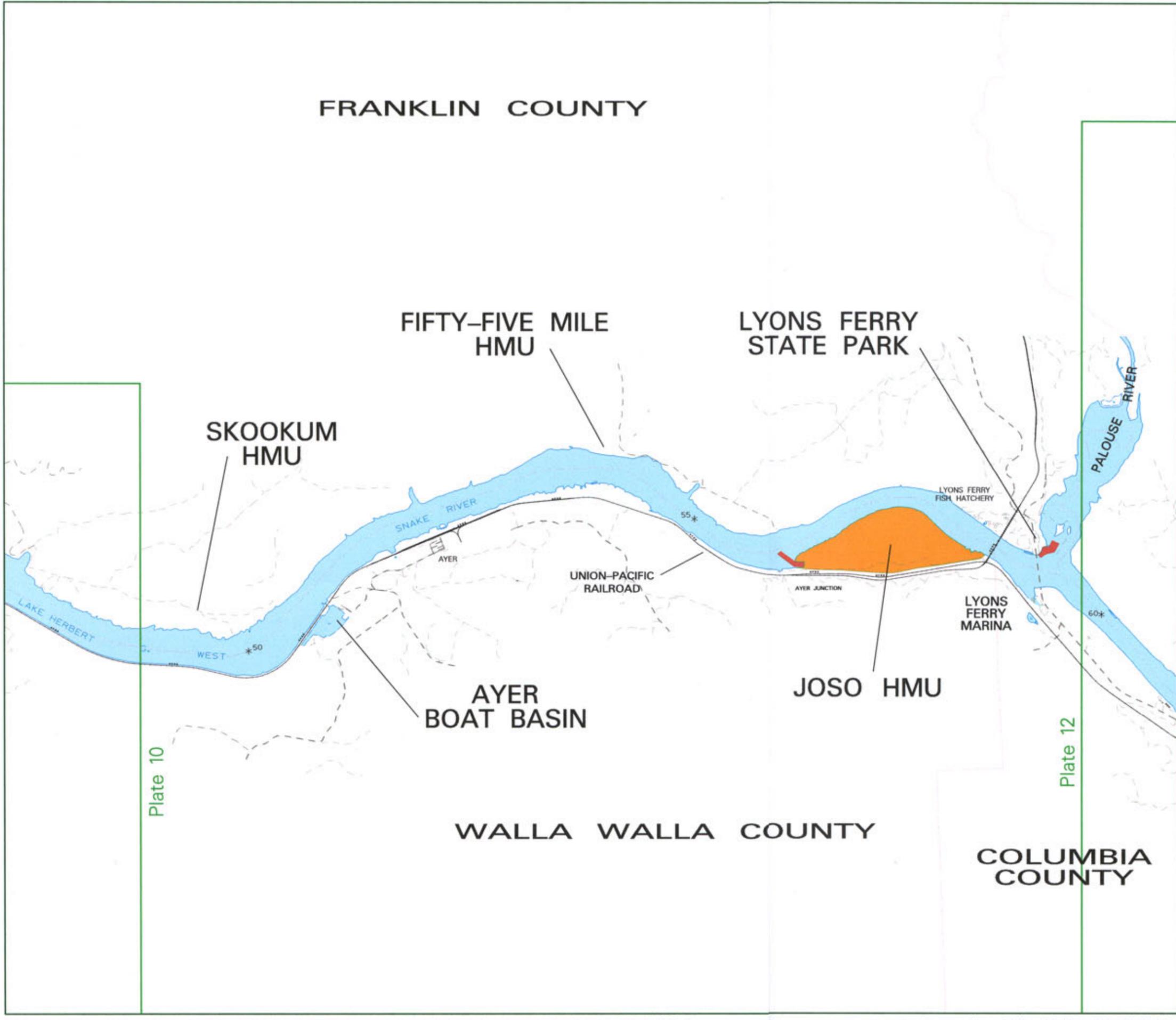


FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

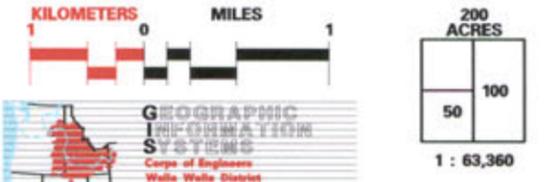
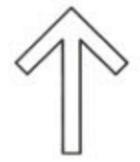
Lower Monumental Dam and Reservoir: RM RM 34 - 49

DREDGING AND DISPOSAL SITES

FRANKLIN COUNTY



- Conservation Pool
- Potential Dredging Location
Location Boundaries Not To Scale
- Shallow Disposal
Water Surface to 20 ft Below
- Mid-Depth Disposal
20 ft Below Water Surface to 60 ft Below
- Upland Disposal



FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

Lower Monumental Reservoir: RM 48 - 61

DREDGING AND DISPOSAL SITES

WHITMAN COUNTY

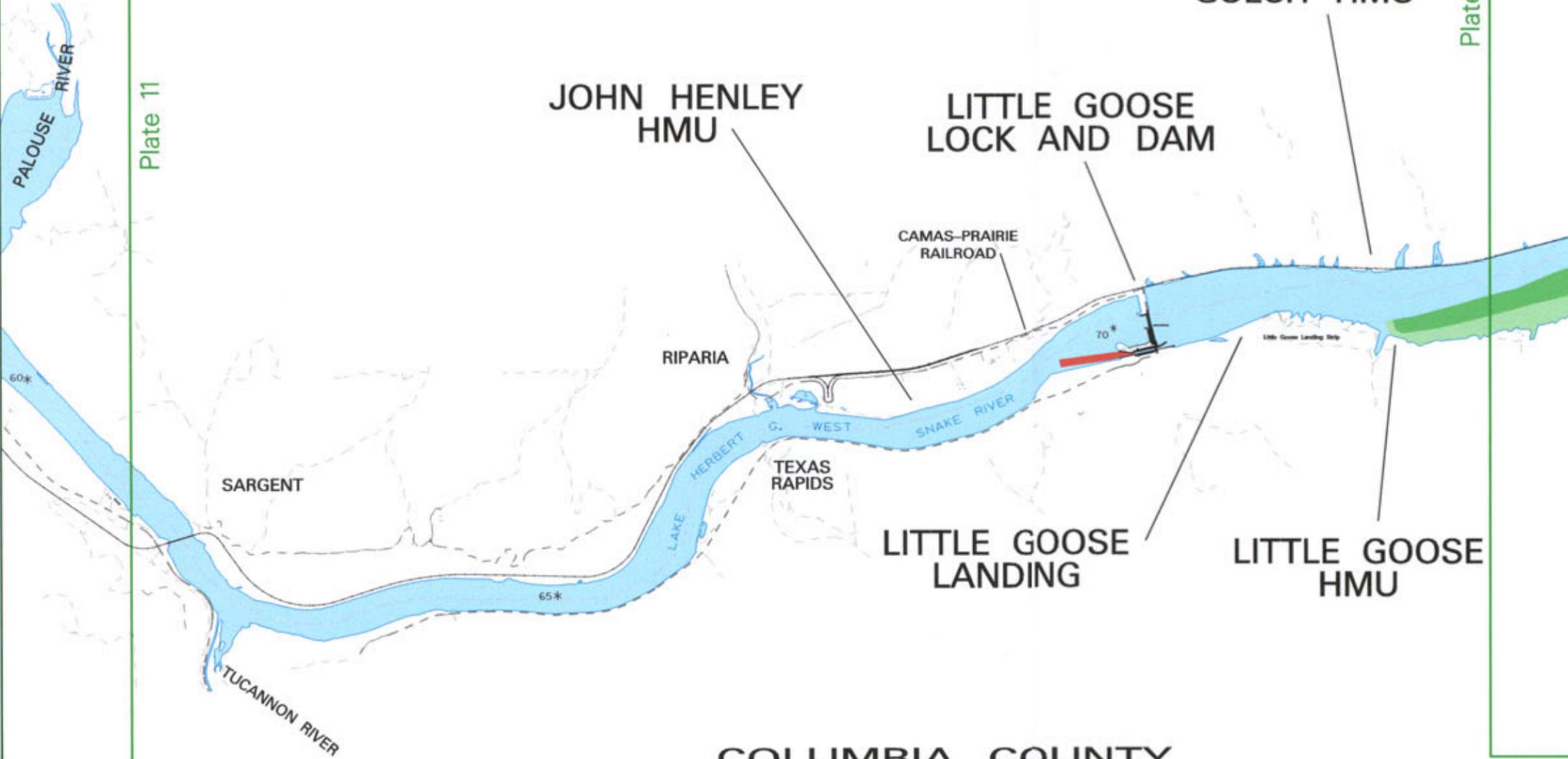


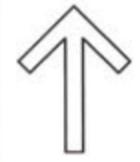
Plate 11

Plate 13

COLUMBIA COUNTY



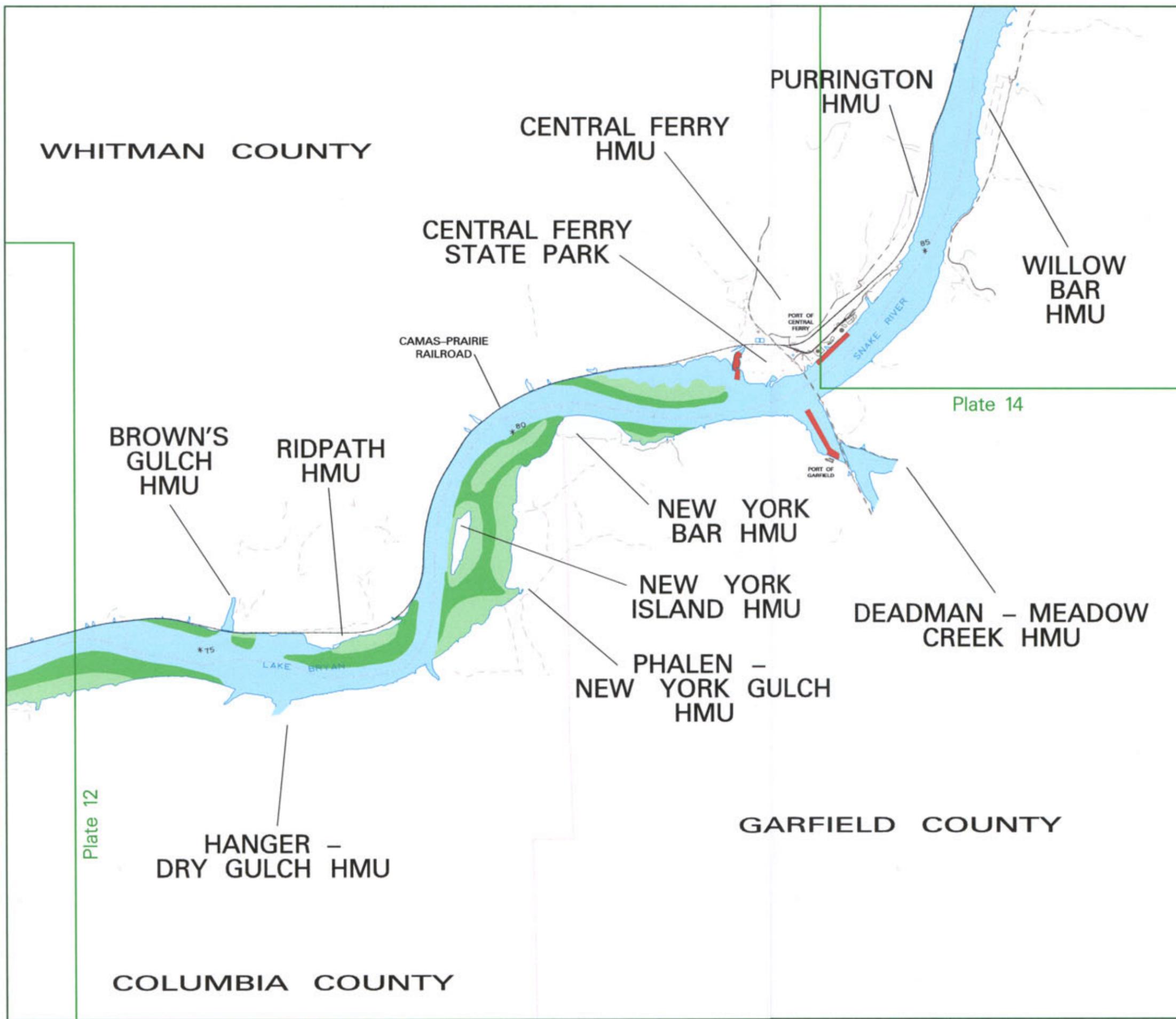
- Conservation Pool ■
- Potential Dredging Location ■
Location Boundaries Not To Scale
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



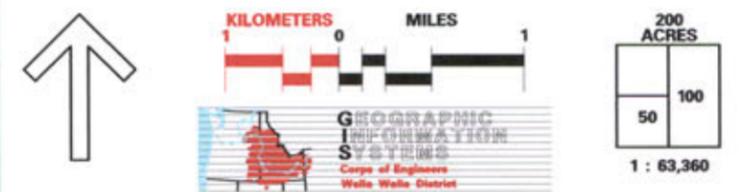
FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

Little Goose Dam and Reservoir: RM 60 - 74

DREDGING AND DISPOSAL SITES



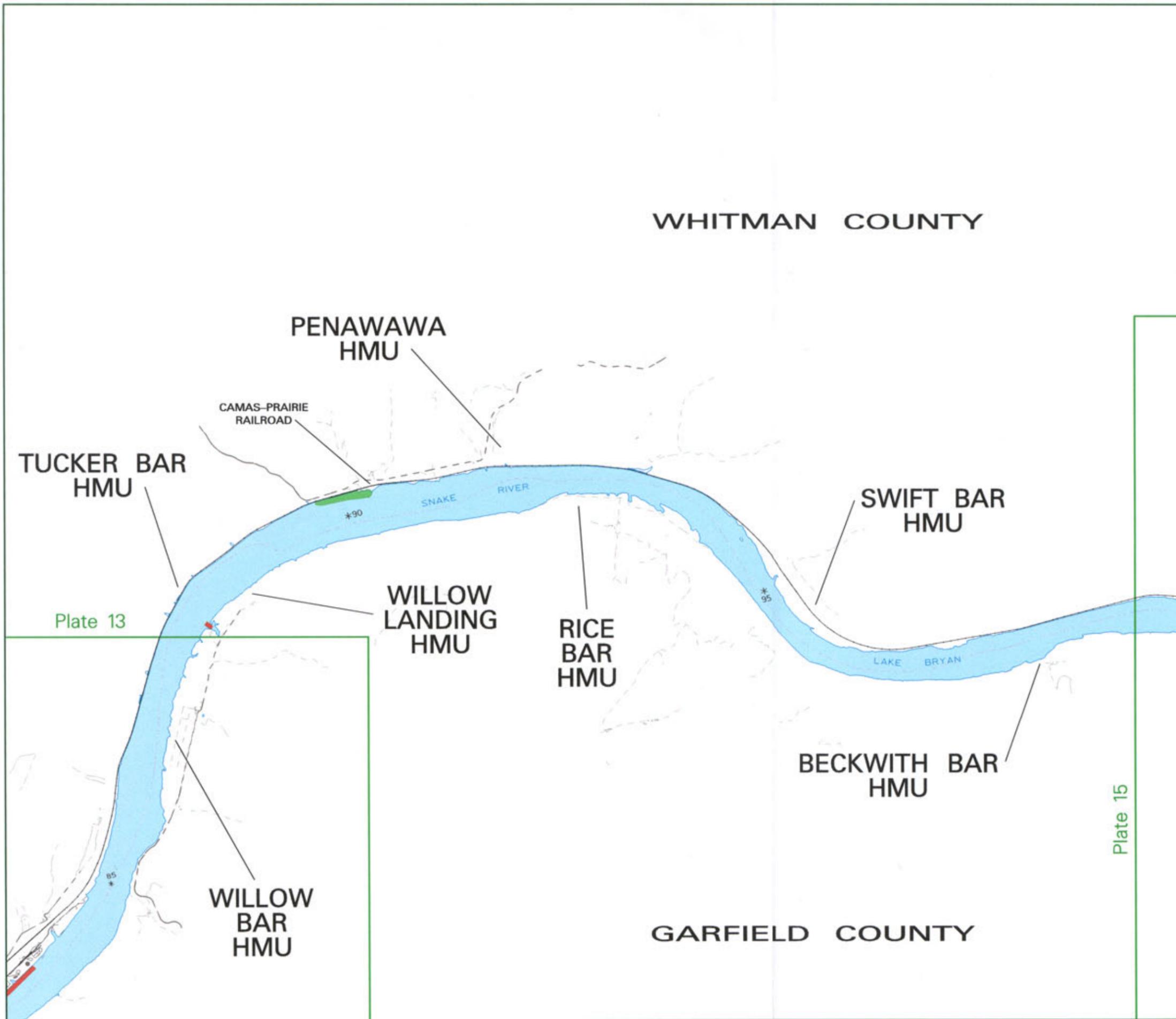
- Conservation Pool ■
- Potential Dredging Location ■
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



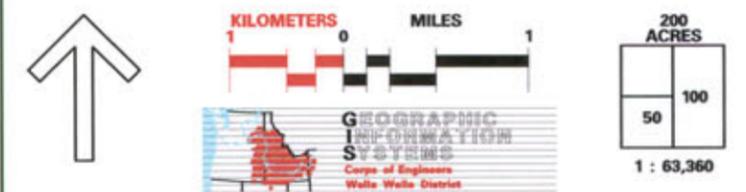
FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

Little Goose Reservoir: RM 73 - 87

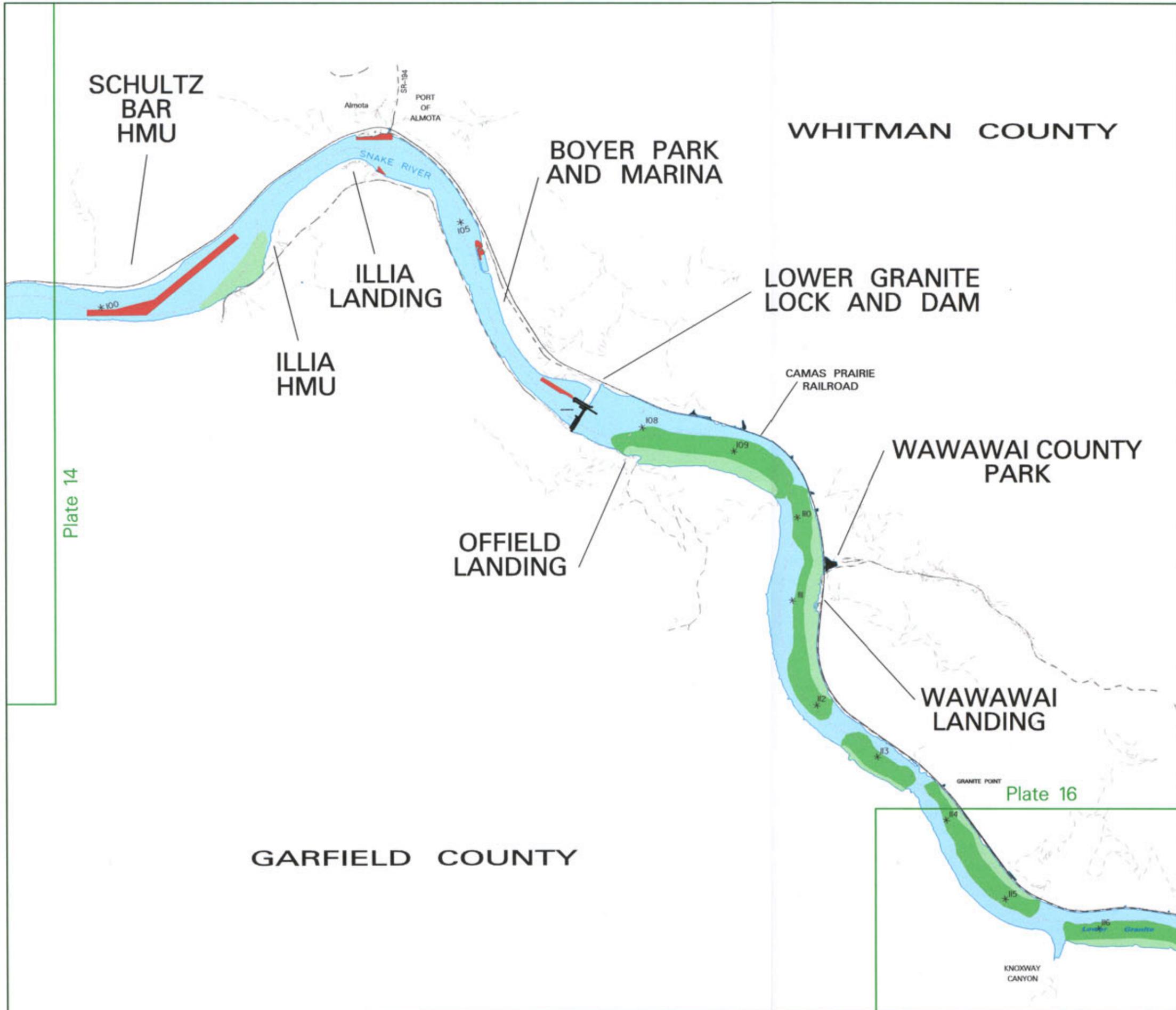
DREDGING AND DISPOSAL SITES



- Conservation Pool ■
- Potential Dredging Location ■
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■



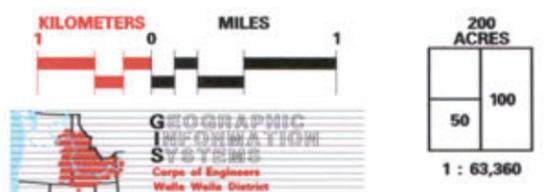
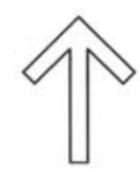
FINAL Walla Walla District
 Dredged Material Management Plan and Environmental Impact Statement
 Little Goose Reservoir: RM 84 - 99
DREDGING AND DISPOSAL SITES



- Conservation Pool ■
- Potential Dredging Location ■
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■

Plate 14

Plate 16



FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

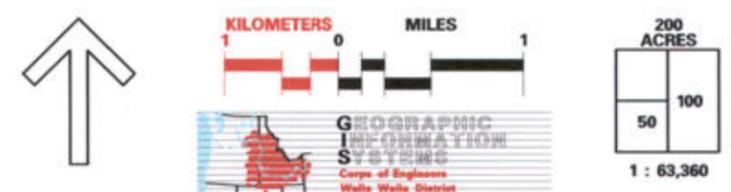
Lower Granite Dam and Reservoir: RM 99 - 116

DREDGING AND DISPOSAL SITES

2002 **PLATE 15**

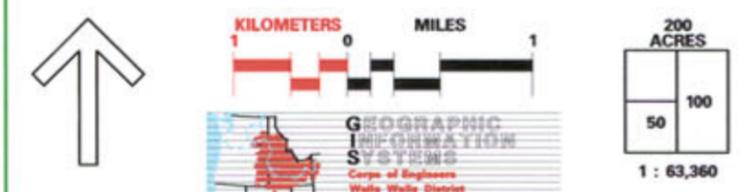
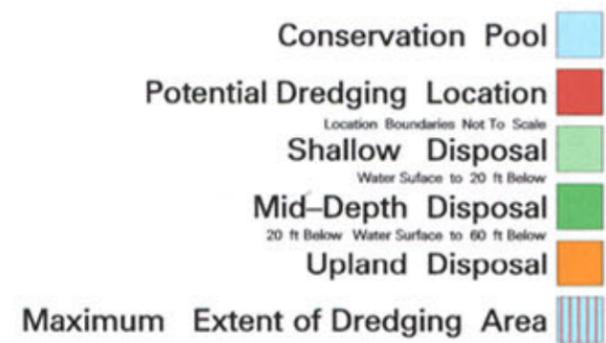
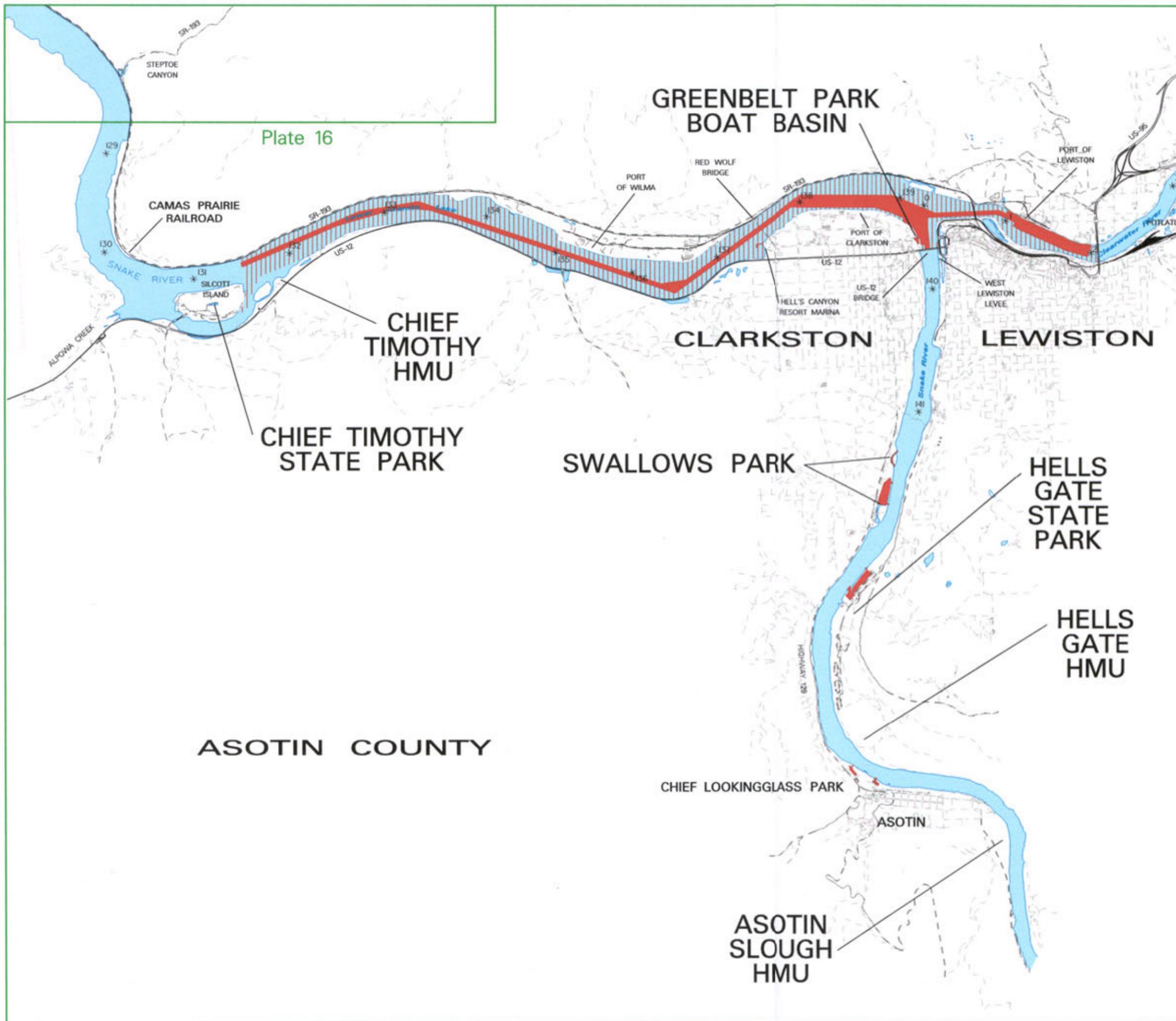


- Conservation Pool ■
- Potential Dredging Location ■
- Shallow Disposal ■
Water Surface to 20 ft Below
- Mid-Depth Disposal ■
20 ft Below Water Surface to 60 ft Below
- Upland Disposal ■

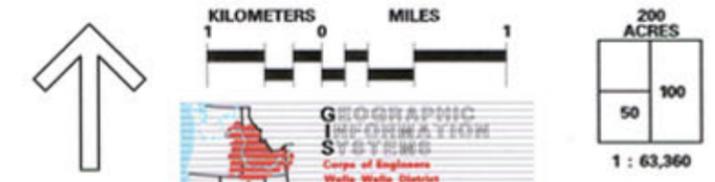
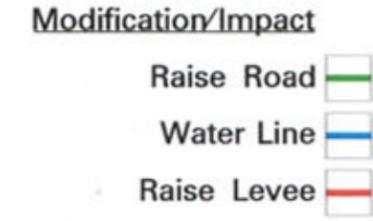
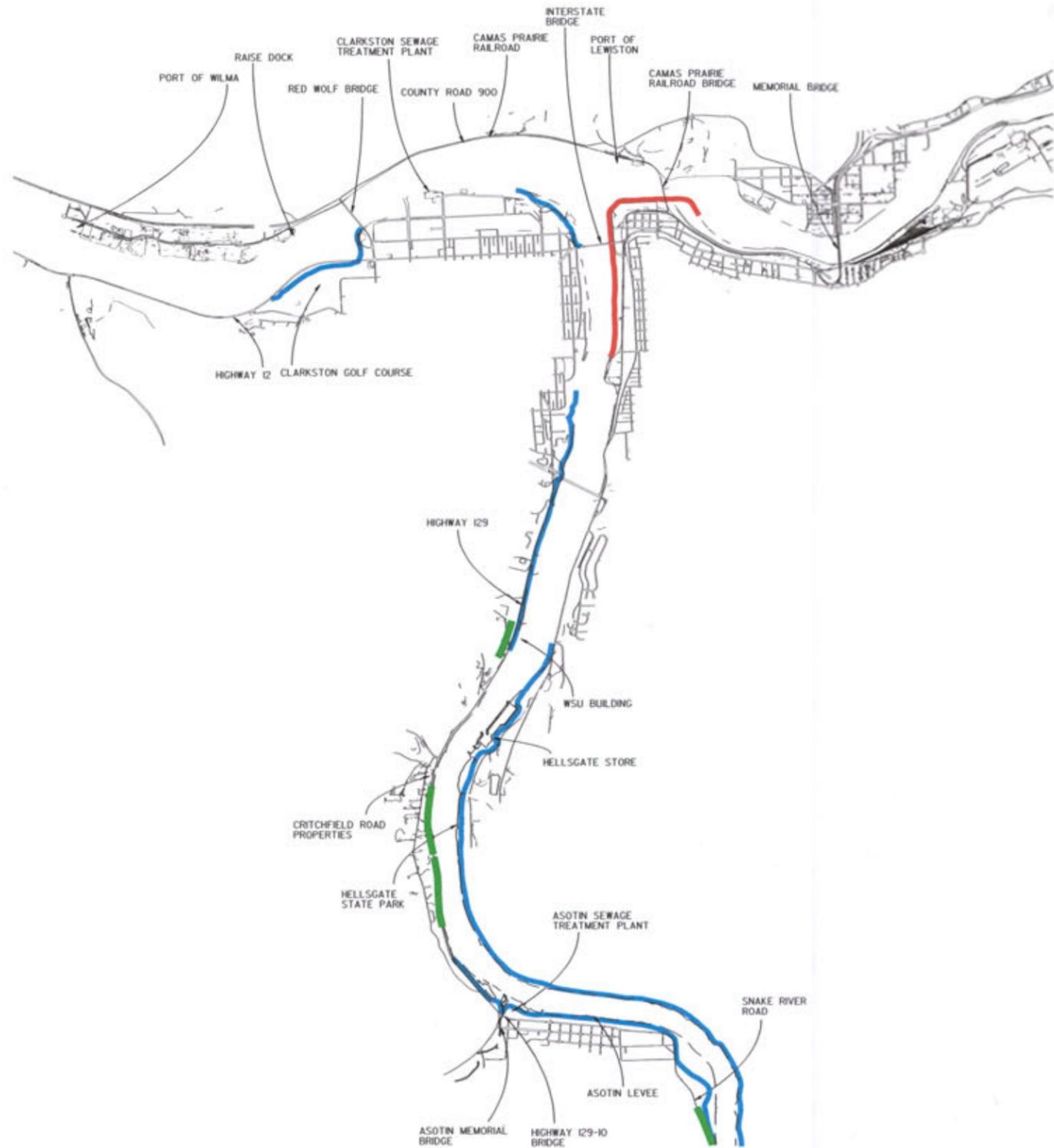


FINAL Walla Walla District
Dredged Material Management Plan and Environmental Impact Statement

Lower Granite Reservoir: RM 114 - 128
DREDGING AND DISPOSAL SITES



FINAL Walla Walla District
 Dredged Material Management Plan and Environmental Impact Statement
 Lower Granite Reservoir: RM 127 - 147
DREDGING AND DISPOSAL SITES
 2002
 PLATE 17



FINAL
 Walla Walla District
 Dredged Material Management Plan and Environmental Impact Statement

3-FOOT LEVEE RAISE
 2002
 PLATE 18