US Army Corps of Engineers ®
Portland District

Salmon Recovery through John Day Reservoir

John Day Drawdown
Phase I Study

Biological/Environmental Technical Appendix
Wildlife Resources Section






September 2000

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Section 1. Executive Summary

This technical document identifies the results of a reconnaissance-level assessment of the potential consequences anticipated to occur to wildlife resources from four alternatives proposed to draw down the John Day Reservoir: Spillway Crest (elevation 213[1] feet) with and without flood control, and Natural River (elevation 165 feet) with and without flood control. The normal pool elevation behind the John Day Dam is currently 265 feet. The John Day Lock and Dam Project is situated on the Columbia River at River Mile 215.6, with John Day Reservoir extending 76 miles upstream. It is believed that lowering the reservoir may improve migrating and rearing conditions for juvenile salmonids, and restore spawning conditions for adults.

The study area currently includes 571 acres of riparian habitat and 2,283 acres of wetland habitat. Shallow-water habitats (including ponds, embayments, and tributary backwaters) that typically support submergent aquatic plants comprise 8,836 acres of the study area, while islands occupy approximately 1,755 acres. While the study area also includes steppe and shrub-steppe habitats, these habitats are not directly influenced by fluctuations in reservoir elevation, and consequently were not considered an area subject to impacts from the drawdown alternatives.

Regardless of the alternative, all 2,854 acres of wetland and riparian habitat would be de-watered and subsequently lost due to drawdown. Either alternative would also result in a loss of all the approximately 8,836 acres of shallow-water habitat. Each of the alternatives would increase the area of islands in this reach of the Columbia River. It is anticipated that the total area of islands would be 5,361 acres and 6,178 acres for the Spillway Crest and Natural River alternatives, respectively. Both alternatives would yield a barren, drawdown zone. For the Spillway Crest alternative, it would be 22,810 acres in size, while it would be 30,625 acres under the Natural River alternative.

The Umatilla National Wildlife Refuge, McCredie Island, Threemile Island, Whitcomb Island, Crow Butte Island backwater, Long Walk Island, McCormack Slough, Paterson Slough, the Willow Creek and Irrigon Wildlife Management Areas, the mouth of the John Day River, and agricultural lands are the most important habitats for waterfowl in the study area. All drawdown alternatives would result in a loss of nesting habitat (land bridging of islands), and loss of shallow water habitat used by wintering waterfowl. However, there would be an increase in available Canada goose brood rearing habitat as vegetation develops on islands. In the long term, suitable nesting habitat would become established, but similar shallow-water habitat would not be restored.

Threemile Island and Sand Dune Island are important nesting areas to a variety of heron, gull, and tern species, as well as to double-crested cormorants. While these nesting areas would be lost, Caspian terns, Forster's terns, and gulls may benefit from all four drawdown scenarios in the short term and long term due to the increase in island area for nesting activitites. There would be a long-term reduction in suitable foraging habitat for great blue heron and black-crowned night heron, but in the short term, stranded fish, amphibians, and

[1] All elevations referred to in this Phase I Study are referenced in feet to the National Geodetic Vertical Datum.

other prey would be abundant. Shorebirds such as killdeer, spotted sandpipers, American avocets, and black-necked stilts would be beneficially affected by the proposed drawdown in both the short term and long term, by the provision of favorable nesting and foraging habitat.

Riparian, emergent marsh, and shallow-water habitats are important to a variety of nongame species such as pied-billed grebe, yellow warblers, red-winged blackbirds, rails, shorebirds, flycatchers, chickadees, warblers, kinglets, orioles, grosbeaks, sparrows, wrens, and other neotropical migrants. Loss of these habitats due to drawdown would result in a short-term decline in local populations. Species such as northern flicker, on the other hand, would benefit from the creation of snags in what is currently forested riparian habitat. Upland game birds such as ring-neck pheasant, California quail, mourning dove, and chuckar would generally be unaffected by the proposed drawdown. Raptors such as osprey, Northern harrier, golden eagle, red-tailed hawk, American kestrel, Swainson's hawk, great horned owl, short-eared owl, western screech owl, and Cooper's hawk are likely to be subject to an increase in prey availability (e.g., small mammals, amphibians, reptiles), but suitable nest trees in riparian habitats would be lost.

Beaver may be adversely affected in the short term due to loss of denning and foraging habitat. This species may become a nuisance in the establishment of woody riparian vegetation along the new river channel. Loss of emergent wetland would result in short-term and potentially long-term reduction of muskrat and mink populations, while a decline in otter is anticipated due to the significant reduction of backwater habitat. Terrestrial furbearers such as raccoon and striped skunk may respond positively in the short term due to the increased vulnerability of small mammals, amphibians, reptiles, fish, ground-nesting birds, and other potential prey. No substantial reduction in population would likely occur. Coyote, badger, and bobcat, which rely primarily on upland habitat, are not likely to be directly affected by a drawdown. Big game species would be impacted to a limited extent by implementation of the proposed drawdown alternatives. The only species potentially affected would be mule deer. Impacts to this species would result from the anticipated loss of wetland and riparian habitats that are used for cover and foraging. Mule deer would also be subject to a loss of island habitat in the John Day Pool that is used currently for fawning. In the long term, some of these islands may provide adequate cover to serve as fawning habitat for mule deer however, this is unlikely in the short term.

Western painted turtles, which occur at the Irrigon Wildlife Management Area and McCormack Slough, Umatilla National Wildlife Refuge are expected to incur severe population reductions with implementation of any of the drawdown alternatives, as the ponds would permanently dry up. It is not known whether a viable population could be maintained following drawdown. There is no alternate suitable habitat for western painted turtles in the study area. Consequently, turtles would be subject to predation by coyote, fox, raccoon, and other species.

In the long term, widespread and abundant species, and those that are largely terrestrial, may be relatively unaffected. This would include species such as long-toed salamander, tree frog, and spadefoot toad. However, the significant loss of riparian, wetland, and shallow water habitats would adversely affect the most aquatic of the native amphibians in the study area, the northern leopard frog. Woodhouse's toad, which is usually found near permanent water throughout the year, may likewise be adversely affected in both the short term and long term.

The non-native bullfrog may be adversely affected, but a decline in the abundance and distribution of this species would benefit native species, upon which it preys.

The northern bald eagle is the only listed or proposed endangered and threatened species likely to occupy the John Day study area. There are no known active bald eagle nest sites in any county adjacent to the John Day Pool. However, wintering eagles are common along pool, relying heavily on the large concentrations of wintering waterfowl. The number of wintering bald eagles is not expected to substantially decline under the proposed alternative. While the number of wintering waterfowl (principal prey) may decline, alternate prey may be available. The loss of potential perch trees adjacent to the water would not substantially affect this species, as ground perching is a common practice.

Turbidity and sedimentation would result from erosion of areas exposed during drawdown, including scouring of the extensive deltas formed at the mouths of tributary streams, construction activities, and dredging actions. Elevated levels of suspended sediments and turbidity are likely during the time estimated to attain equilibrium (i.e., 2 to 15 years). Shallow waters and wetlands upstream of The Dalles Dam would be subject to considerable deposition of sediments. In addition, the redistribution of sediments may potentially result in the release of environmental contaminants bound to existing sediments.

Dredging would occur in the navigation channel, at the mouths of streams (to provide fish passage), as well as in the commercial ports and recreational marinas, producing at least 5,774,000 or 9,346,000 cubic yards (Spillway Crest and Natural River alternatives, respectively) of dredge material. At a placement depth of 15 feet, at least 274 or 519 acres for the Spillway Crest and Natural River alternatives, respectively would be needed to dispose of this material. Disposal areas for this material have not been identified at this time.

All drawdown areas (including islands) would be seeded to vegetate and stabilize barren ground and slopes. Native species would be preferred to seed the potential approximately 21,684 or 29,186 acres of barren land suitable for establishing upland habitat under the Spillway Crest or Natural River alternatives, respectively. A mix of native wetland plant seed would be applied to approximately 1,126 acres of suitable areas of the Spillway Crest. For the Natural River alternatives, approximately 1,439 acres of the drawdown zone may be suitable for wetland plants. Approximately 50 percent of this potential wetland and riparian zone would also be planted with native willow and other trees and shrubs. Upland, emergent marsh, and aquatic plant communities could establish within three to five years, however, forested riparian habitat would take at least 25 years to attain present stand conditions. Regardless of the alternative, approximately 48 miles of the estimated 152 miles of exterior shoreline of a new river channel would need to be armored with riprap to protect railroad and highway embankments. Riprap would substantially limit the ability for habitat to become established and develop, including riparian vegetation that could provide shade, structure, organic input, and other elements of a healthy aquatic ecosystem. Furthermore, there is a very high potential that invasive and other weeds would become established in the barren drawdown zone.

Section 2. Introduction

This technical appendix section documents the results of the wildlife evaluation for the John Day Drawdown Phase I Study. This Phase I Study is a reconnaissance-level evaluation of

the potential consequences and benefits of the proposed drawdown of the John Day Reservoir. This technical appendix section supplements the main report, which describes more fully the alternatives, purpose, scope, objectives, assumptions, and constraints of the study.

Section 3. Background of the Project

In 1991, the National Marine Fisheries Service (NMFS) proposed that Snake River wild sockeye, spring/summer chinook, and fall chinook salmon be granted "endangered" or "threatened" status under provisions of the Endangered Species Act. Natural resource agencies believe that the drawdown of the 76-mile John Day Reservoir may provide substantial improvements in migration and rearing conditions for juveniles by increasing river velocity, reducing water temperature and dissolved gas, and restoring riverine habitat. It is also speculated that drawdown may improve spawning conditions for adult fall chinook by restoring spawning habitat and the natural flow regimes needed for successful incubation and emergence.

As a result, the NMFS Reasonable and Prudent Alternative Action #5 of its' Biological Opinion on Operation of the Federal Columbia River Power System (FCRPS), and subsequent reports recommended that USACE investigate the feasibility of lowering John Day Reservoir. In compliance with appropriation conditions, only two alternatives were to be evaluated: reduction of the current water surface elevation 265 to the level of the spillway crest that would vary between elevations 217 and 230, or reduction to natural river level elevation 165. Both alternatives were proposed by NMFS. These two alternatives were then expanded to consider each alternative with 500,000 acre-feet of flood storage and without such storage. Flood storage and hydropower are the current approved authorizations for the John Day project.

Section 4. Description of the Study Area

The Columbia River originates in Canada and flows for 300 miles through eastern Washington to Oregon and continues west to the Pacific Ocean, as shown in Figure 1. The adjoining region is mostly open country, with widely scattered population centers. The climate of the region is semiarid. Agriculture, open space, and large farms are prevalent. Lands adjacent to the reservoir are used to grow grains and other crops. The reach of the Columbia River under consideration in this report extends from John Day Lock and Dam at river mile (RM) 215.6, to McNary Lock and Dam RM 291. The body of water impounded by John Day Dam, Lake Umatilla, is referred to as the John Day Reservoir throughout this report. The John Day is the second longest reservoir on the Columbia River, extending 76 miles upstream to McNary Dam.

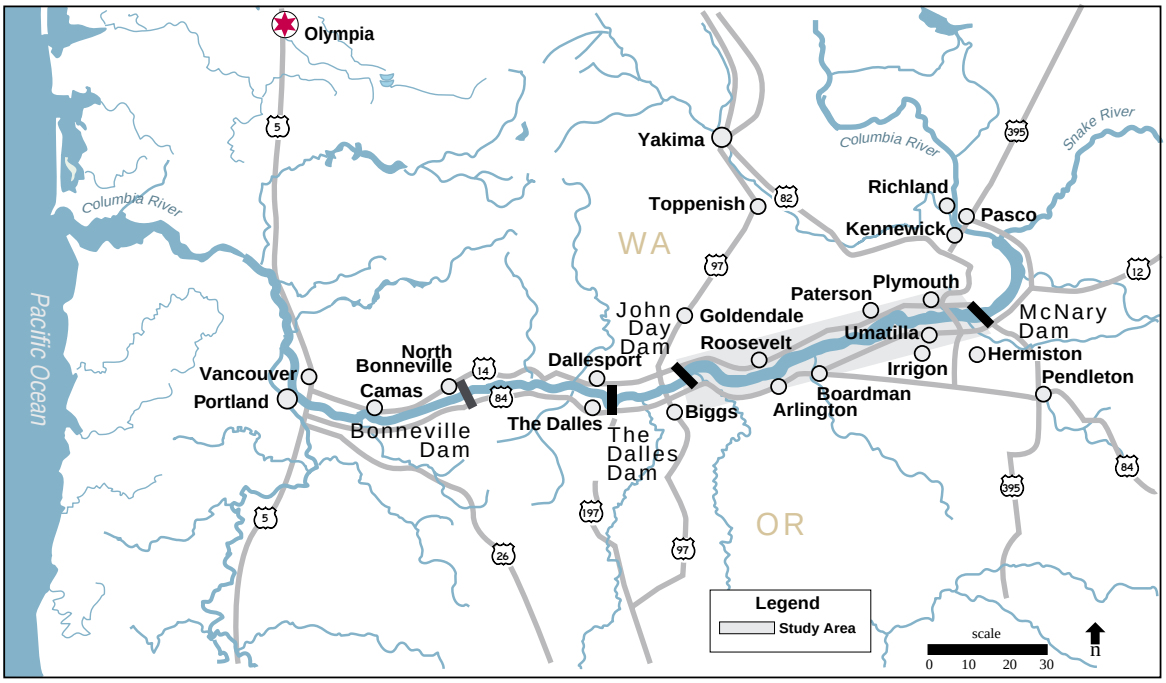
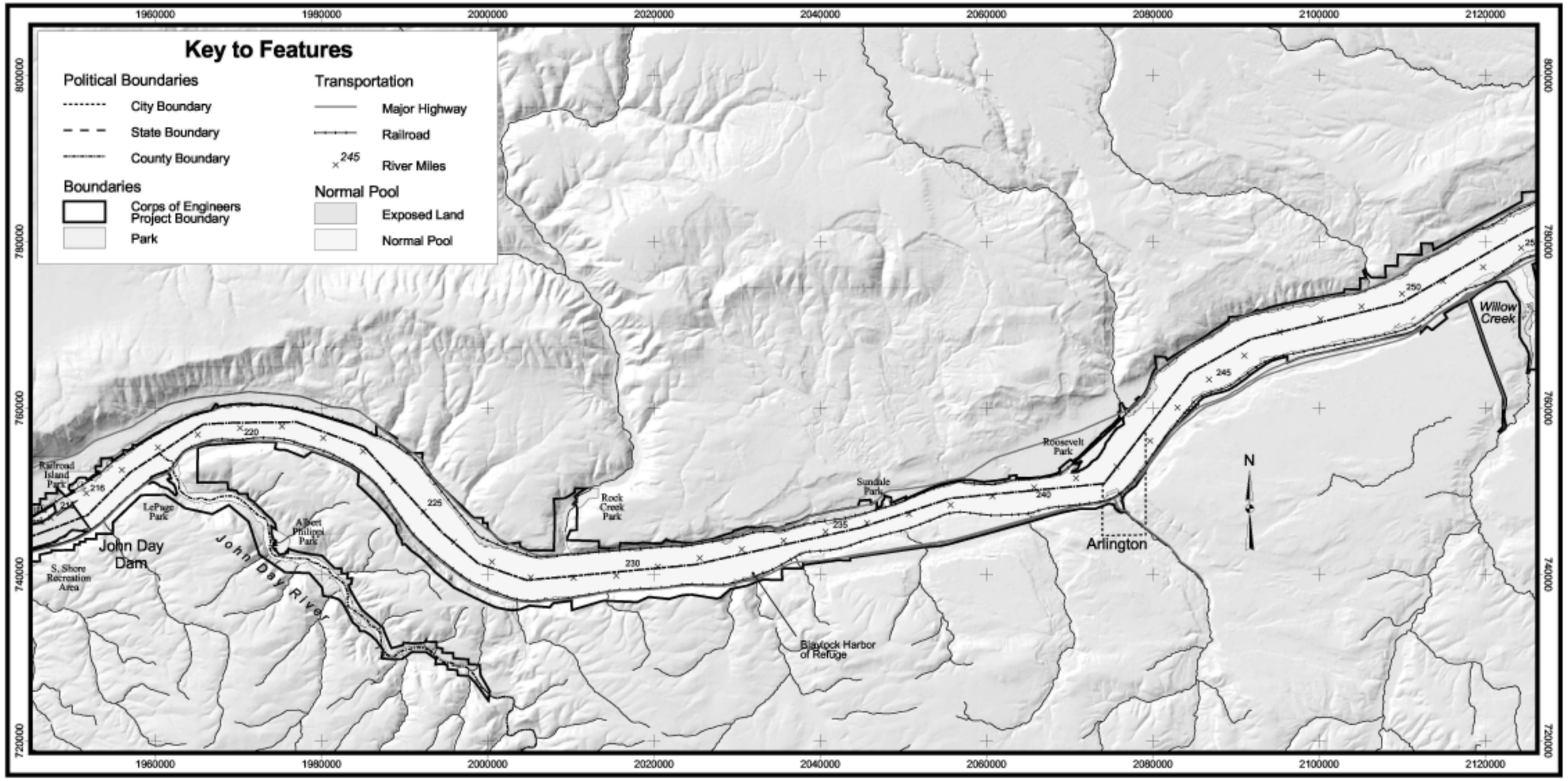


Figure 1. John Day Drawdown Phase 1 Study Area



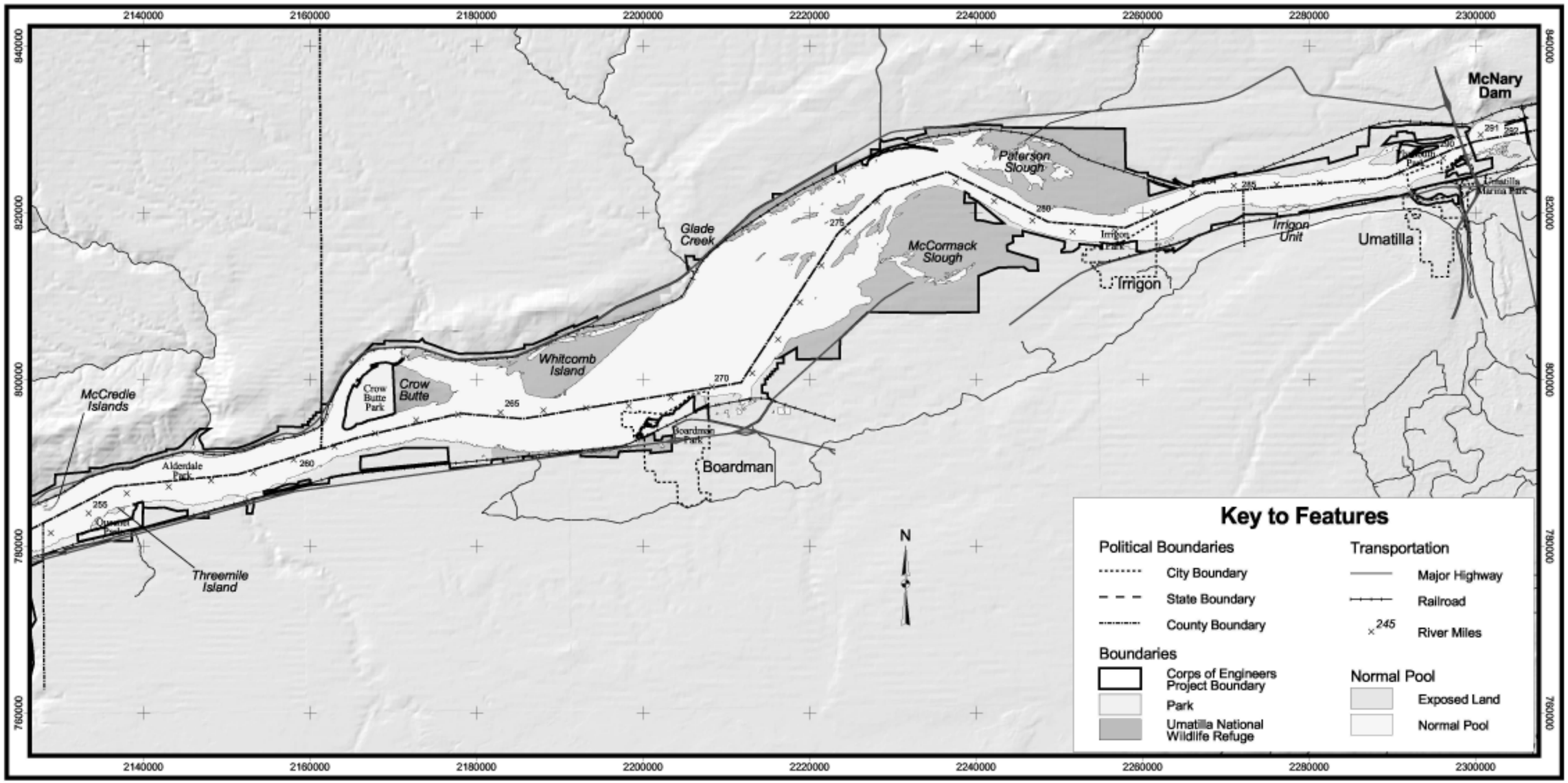
Projection: State Plane, Oregon North Zone, NAD 27
Depths based on Corps of Engineers Hydrosurveys, 1994
Produced by GIS, Survey and Mapping Section
US Army Corps of Engineers, Portland District

2 0 2 4 6 Miles

US Army Corps of Engineers
Portland District

JOHN DAY DRAWDOWN PHASE I STUDY
Columbia River - Oregon / Washington

Figure 2a
Study Area Overview



Projection: State Plane, Oregon North Zone, NAD 27
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US Army Corps of Engineers, Portland District

2 0 2 4 6 Miles

US Army Corps of Engineers
Portland District

JOHN DAY DRAWDOWN PHASE I STUDY
Columbia River - Oregon / Washington

Figure 2b
Study Area Overview

John Day Dam and Reservoir are part of the Columbia-Snake Inland Waterway. This shallow-draft navigation channel extends 465 miles from the Pacific Ocean at the mouth of the Columbia River to Lewiston, Idaho. The entire channel consists of three segments. The first is the 40-foot-deep water channel for ocean-going vessels that extends for 106 miles from the ocean to Vancouver, Washington. The second is a shallow-draft barge channel that extends from Vancouver to The Dalles, Oregon. Although this section is authorized for dredging to a depth of 27 feet, it is currently maintained at 17 feet. The third section of the channel is authorized and maintained at a depth of 14 feet and extends from The Dalles to Lewiston. In addition to the main navigation channel, channels are dredged to numerous ports and harbors along the river.

The middle Columbia River area is served by a well-developed regional transportation system consisting of highways, railroads, and navigation channels. Railroads and highways parallel the northern and southern shores of the reservoir. Interstate 84 (I-84), a divided multilane highway, runs parallel on the south shore with the Columbia River from Portland, Oregon, to points east. Washington State Route 14 (SR-14) also parallels the Columbia River from Vancouver to McNary Dam on the north shore. Umatilla Bridge at RM 290.5, downstream from McNary Dam, is the only highway bridge linking Oregon and Washington across the Columbia River in the John Day Reservoir.

The study area includes lands directly adjacent to the reservoir as well as those directly and indirectly influenced by the hydrology of the reservoir (e.g., irrigated lands). It includes the reservoir behind the John Day Dam, and adjoining backwaters, embayments, pools, and rivers.

Section 5. Alternatives

The Phase 1 Study includes a preliminary evaluation of the impacts of the drawdown scenarios relative to the "without project condition," which is defined as the condition that would prevail into the future in the absence of any new federal action at John Day. The four alternatives are summarized below. One of the most important constraints on the alternatives is the requirement to pass fish for river flows up to the 10-year flood flow of 515,000 cfs. Under the four alternatives, John Day Reservoir would be drawn down at a rate of one foot per day. For greater detail, please refer to the main report, *John Day Drawdown Phase 1 Study*, and *John Day Drawdown Phase 1 Study, Engineering Technical Appendix, Structural Alternatives Section.*

5.1. Spillway Drawdown without Flood Control (Alternative 1)

The first drawdown alternative is based on requirements for improved downstream fish passage conditions during both low and flood flow conditions on the Columbia River. The existing 20-bay spillway will be operated differently from current operations, but without any structural modifications. All project inflows will be directly passed through the dam spillway with the spillway gates fully opened in free overflow condition, resulting in a pool elevation that will vary from elevation 217 to 230. Impacts downstream from John Day Dam were not studied.

5.2. Spillway Drawdown with Flood Control (Alternative 2)

The second study alternative is based on requirements for improved downstream fish passage conditions during low flow periods, while maintaining authorized flood control for the John Day Project. The existing 20-bay spillway will be operated differently from current operations, but without any structural modifications. During low flow periods, project inflows will be directly passed through the dam spillway with the spillway gates set in fully open, free overflow condition. During a flood event, however, the spillway gates will be controlled to reduce downstream flood flows based on using 500,000 acre-feet of allocated project storage space. Ponding will occur upstream from the dam. Impacts downstream from John Day Dam were not studied.

5.3. Natural River Drawdown without Flood Control (Alternative 3)

The third study alternative is based on a natural river drawdown for fish passage "without flood control" condition. Natural river conditions pertain to an opening at the John Day Dam that permits acceptable upstream fish passage conditions. The size of the total dam opening must conform to two criteria based on an invert elevation at the dam of 135. The first criterion is that the opening must be sufficiently large to meet maximum allowable stream velocity criteria for sustained swim speed for the weakest salmon species, which is estimated to be 10 feet per second (fps). The second criterion is that fish passage for this opening must correspond to the 10-year annual flood peak (515,000 cfs). This alternative will require extensive modifications to John Day Dam even beyond modification of the 1,228-foot long spillway structure. Impacts downstream from John Day Dam were not studied.

5.4. Natural River Drawdown with Flood Control (Alternative 4)

This fourth study alternative is based on natural river conditions for fish passage and includes the "with flood control" condition. It requires natural fish passage conditions for both upstream and downstream directions at the dam and includes a requirement for full authorized flood control. The calculated width of the total dam opening will correspond to that previously calculated for natural river conditions without flood control (Alternative 3). Impacts downstream from John Day Dam were not studied.

Section 6. Methods

The evaluation of potential impacts to wildlife resources of the proposed drawdown of the John Day Dam relied exclusively on existing information, consultation with professional experts, literature reviews, and best professional judgement. It relied upon previous habitat assessments and evaluations in the area undertaken by USACE and others. In this feasibility study, the characterization of habitats in the John Day study area is based solely on previous works by EnviroScience, Inc. (1995), Rasmussen and Wright (1990), Tabor et al. (1981), and Tabor (1976). In these studies, photo interpretation was not conducted downstream of RM 257.8 because of generally unsuitable conditions for riparian habitat development.

USACE completed a draft technical report (USACE, 1994) in response to a request by the Northwest Power Planning Council (NPPC, 1994) request. This study, within a broader System Configuration Study, evaluated the consequences of operating the John Day Reservoir at minimum operating pool (elevation 257). The System Operation Review (SOR) and Final Environmental Impact Statement (FEIS), completed in 1995, analyzed future

operations of the system and river use issues (USACE, 1995a). The goal of that study was to achieve a coordinated system operation strategy for the Columbia River System. Appendix N (Wildlife) (USACE, 1995b) of the FEIS addresses the effects of alternative system operating strategies for managing the Columbia River system. This Phase 1 evaluation relies heavily upon the information from the SOR/FEIS.

USACE conducted an experimental drawdown in May 1992 to determine the potential consequences of lowering the pool elevation on a seasonal basis. The pool was drawn down to an elevation of 263 for 18 days. This elevation was not substantially below the lower elevation for normal pool operation (elevation 265 feet), and thus it provided only limited insight as to future impacts from a year-round drawdown of the pool.

The wildlife habitat evaluation of this Phase 1 study of four drawdown alternatives was based on hydrological data provided by West Consultants, Inc. (West, 1999). Hydrological data from 1982 were used to determine potential impacts to wildlife. This was the best available data from the hydrological study, and represented a five-year flood event (approximately 450,000 cubic feet per second). Average, maximum, and minimum monthly elevations were obtained for each of the four alternatives. These data were input into a Geographic Information System database. The aerial extent of habitats between existing and expected average water levels was calculated at sites of concern identified in previous investigations. These sites were Willow Creek Wildlife Management Area (WMA); McCredie Islands; Threemile Island; Crow Butte; Sand, Blalock, Coyote, Long Walk, and Straight Six Islands; McCormack Slough; Paterson Slough; and Irrigon WMA. The linear margin of the exposed areas was also computed. In addition, graphical depictions of sites of concern were generated (Plates 1-9).

Section 7. Assumptions and Constraints

This John Day Drawdown Phase 1 Study is based on numerous assumptions and constraints, specific to the technical disciplines analyzed. While summarized in the main report, these assumptions and constraints are detailed in the technical appendices that accompany the main report.

This wildlife evaluation was based on the following project assumptions and constraints:

- Under most alternatives, dredging of tributaries (i.e., Willow and Rock Creeks and John Day and Umatilla Rivers) would be necessary. The exception would be the John Day River under Alternatives 1 and 2 (i.e., Spillway Crest without Flood Control and Spillway Crest with Flood Control). The *Tributary Sedimentation Evaluation Section of Engineering Technical Appendix* provides the detailed assessment for the tributary dredging requirements.
- It would be necessary to place riprap in some areas of the drawdown zone to minimize erosion and undermining of railway lines, highways, and other infrastructure. This is anticipated to occur where such facilities currently lie adjacent to the John Day Pool.
- The anticipated impact to shallow water habitats is assumed to be the total estimated acreage between pool elevations 165 (Natural River) or 215 (Spillway Crest) and 268 feet.

- The wildlife impacts of the drawdown vary with the extent and pattern of the drawdown that occurs. The extent of habitat impacts is based on the operation of John Day Reservoir at elevations below those currently experienced during the period of May through the 31st of August. Further, it is assumed that the pool elevation will not be adjusted higher for mitigation for other concerns (e.g., irrigation withdrawal).
- The lake (pool) elevations referenced throughout this document are forebay readings at the John Day Dam (RM 216). Actual elevations of habitat upstream of RM 250 are slightly higher. The water surface elevation at RM 280 is 258 feet at 100,000 cfs discharge from John Day Dam and at Minimum Operating Pool (MOP) (257 feet) at that location. RM 280 is upstream of Umatilla National Wildlife Refuge (NWR) where the largest block of wildlife habitat occurs. Development of plant communities is assumed to be directly related to forebay elevations, thus those elevations are referenced in the text when analyzing habitat acreage and impacts of changes in elevation.
- Acreage for shallow-water, wetland, and riparian habitats were derived from hydrographic surveys of pool areas upstream of RM 257.8. The topography of lands downstream is typically steep and rocky, and therefore has minimal potential to support these types of habitats.
- Emergent marsh/riparian habitats are directly associated with the level of the John Day Pool. These habitats occur to elevations slightly above full pool and are also associated with ponds/wetlands above full pool elevation that are hydrologically linked to the pool. Emergent marsh and riparian habitat types are grouped together due to their intermingling and the difficulty in accurately delineating them using aerial photo interpretation. However, for analytical purposes it was assumed that 80 percent of the 2,854 total acres or emergent marsh/riparian habitat (i.e., 2,283 acres) is emergent marsh and the balance (i.e., 571 acres) is riparian habitat. Furthermore, an estimated 1,009 acres of emergent marsh/riparian habitat occurs between elevation 263 and 268 (i.e., within the pool), while 1,845 acres of this habitat occurs above 268 feet elevation.
- Currently, at least 143,000 acres of farmland in Oregon and Washington is irrigated from Columbia River water taken from the John Day Pool. A variety of wildlife species and populations (e.g., waterfowl, upland game birds, big game) are strongly associated with habitats provided by these lands. Retro-fitting irrigation pump stations or otherwise providing irrigation water to these lands should ensure that no impacts to wildlife arise from loss of irrigated agriculture. If this assumption is not met, then wildlife impacts associated with the drawdown of the John Day Pool would be substantially greater than that reported below for the alternatives considered. It is assumed, therefore, that irrigation water would continue to be provided, and no change in wildlife carrying capacity on irrigated farmland is anticipated.
- No significant change is anticipated to upland areas adjacent to the pool.
- The ability of soils long inundated to support vegetation is uncertain. However, for the purposes of this study, it is assumed that the soils that are currently submerged would retain the capacity to support vegetation after a drawdown of the reservoir.
- Most lands exposed by a drawdown would support shrub-steppe vegetation typical of this portion of the Columbia Basin. Because of the disturbed nature of the exposed barren

drawdown zone, noxious and other weeds would significantly compete with native species when establishing vegetative cover.

- Areas between maximum pool and a year's high water level will generally be captured in increased upland/riparian/wetland acreage. Exceptions may occur, however, particularly where steep, rocky slopes or cliffs are exposed.
- The drawdown zone will fall under the jurisdiction of USACE until otherwise authorized.
- Mitigation refers to replacement of existing facilities or elements within the John Day Reservoir. USACE planning guidance policy, as outlined in ER 1105-2-100, 28 Dec 90, would be used in determining mitigation requirements and for establishing the level of replacement for lost wildlife refuge area. Any replacement or mitigation would be limited to in-kind to the greatest extent practicable, with a focus on maximizing efforts onsite, using federal lands, rather than purchasing off-project lands.

Section 8. Existing Conditions

The John Day project is situated in the steppe and shrub-steppe zone of the Columbia Basin physiographic province as designated by Franklin and Dyrness (1973). Throughout most of the study area, shallow alluvial soils overlay Miocene Columbia River Basalt. Along the Washington shore, canyon walls rise abruptly to as much as 500 feet. The Oregon shore generally rises gradually along a lower terrace extending up to a mile, then abruptly to about 200 feet, forming a higher terrace. High winds have resulted in the deposition of sand and the creation of dunes along these terraces. This semi-arid environment receives less than 14 inches of rainfall annually, most of it occurring between October and March (State of Oregon, 1999). Temperatures fluctuate considerably, both daily and seasonally, with average temperatures ranging from 32^{o} F in January to 73^{o} F in July (State of Oregon, 1999).

8.1. Wildlife Habitats

USACE considered the following five habitat zones in its System Operation Review impact analysis (USACEb, 1995): Riparian, Emergent Wetland, Submergent Aquatic Plant, Islands, and Drawdown/Barren. These were selected because of their sensitivity to changes in reservoir elevations and operations, and because they affect a wide variety of wildlife. Each of these is characterized below as they reflect habitats within the John Day study area. A Submergent Aquatic Plant Zone, however, has not been delineated for the John Day Pool, therefore, a Shallow-Water Habitat will be used instead, and it will include embayments, ponds, and tributary backwaters of the John Day Pool.

The upland areas adjacent to John Day Reservoir exhibit a considerable variation in plant communities from west to east. They include steppe and shrub-steppe habitats as well as croplands (both irrigated and dryland). Upland habitats in this area are typically shrub steppe associations including big sagebrush (*Artemisis tridentata*)-bluebunch wheatgrass (*Agropyron spicatum*), big sagebrush-Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass-Idaho fescue, three-tip sagebrush (*Artemisis tripartita*)-Idaho fescue, and bitterbrush (*Purshia tridentata*)-Idaho fescue. However, very little habitat supports these native plant communities, as much of the area has been severely modified by human activity (e.g., agriculture, grazing, transportation development, and urban development). Native vegetation in these upland areas has typically been replaced by species such as cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola tragus*), and Jim Hill mustard (*Sisymbrium altissimum*).

Pool levels typically only influence a region immediately abutting the reservoir. This zone of influence includes riparian habitat but does not extend into the upland habitats. Thus, the upland zone is not considered an area subject to impacts from implementation of the proposed drawdown alternatives. Table 1 indicates the extent of the habitats in the study area.

Table 1. Existing Habitats In and Along the John Day Reservoir	
Habitat Zones	**Approximate Area (acres)**
Riparian	571
Emergent Wetland	2,283
Shallow-Water Habitats (ponds, embayments, and tributary backwaters)	[1]8,836
Islands[2]	1,755
Drawdown/Barren	-

[1] 8,135 acres are directly connected to the surface water of the Columbia River
[2] includes Crow Butte which alone totals 1,347 acres
- Indicates no significant amount of these habitats present

8.1.1. Riparian

Riparian plant communities depend on subirrigation for water. In the John Day Pool, these habitats are typically in immediate juxtaposition to a stream, as very dry condition and dryland plant communities occur at slight elevations above full pool. Much of this habitat occurs within the Umatilla NWR and the Irrigon Wildlife Management Area (described below). Riparian habitats determined by the U.S. Fish and Wildlife Service (USFWS) (Rasmussen and Wright, 1990) were broken into three sub-categories: hardwood, shrub, and herb. In the riparian hardwood community, black cottonwood (*Populus trichocarpa*) is the dominant tree species, with willow (*Salix* sp.), Russian olive (*Elaeognus angustifolia*), alder (*Alnus rubra*), and hackberry (*Celtis reticulata*) comprising a smaller component. Riparian shrub habitat is comprised of willows, young hardwoods, false indigo (*Amorpha* spp.), and other shrubby species. The riparian herb communities are typically found on sand, mud, or gravel bars. They are characterized by low-growing forbs and grasses, but are typically dominated by weeds such as mustard (Brassicaceae), dock (*Rumex* spp.), pigweed (*Chenopodium* spp.), and Russian thistle (*Salsola tragus*).

The John Day Pool currently supports an estimated 571 acres of riparian habitat based on 1994 aerial photo interpretation upstream of RM 257.8.

8.1.2. Emergent Wetland

Emergent wetlands appear to be characteristic, classic marshy areas typified by cattails and bulrushes. These habitats are inundated or saturated with water most of the year, although they may tolerate some drying. Some species spend their entire life in emergent wetlands, and could not exist elsewhere. Other species use these habitats for incidental activities.

The USFWS (Rasmussen and Wright, 1990) noted that emergent wetlands usually occupy sites where seepage from upslope or subirrigation maintains wetland plant species. They also noted that emergent vegetation communities are more prevalent in Paterson and McCormack Slough Units in 1989 than indicated by interpretation of 1979 aerial photography, and that numerous ponds appear to be undergoing natural succession from emergent wetlands to uplands. An estimated 2,283 acres of emergent wetlands are associated with the John Day

Pool, according to 1994 aerial photo interpretation. Wetlands depend on water depths and seasonal inundation patterns that are directly impacted by reservoir operations.

8.1.3. Shallow-Water Habitats

The location, extent, and species composition of shallow water aquatic habitats has not been formally documented. These habitats can be very productive for submergent, emergent, and aquatic vegetation, in addition to benthic invertebrate populations. Aquatic plants are important forage resources for many wildlife species. Aquatic plants such as *Potamogeton* spp. typically occur in open water habitats in the range of two to three-feet deep. However, the productivity of these habitats may be somewhat tempered in the John Day Pool by fluctuating pool levels (John Day Reservoir is normally operated between elevations 262 and 265 feet). Aquatic plant beds are evident in some locations, and the relatively gentle topography and extensive shallow areas in the upstream end of the pool suggest their presence may be substantial. Submergent plant communities are present in Paterson and McCormack Sloughs, Irrigon Wildlife Management Area, and other slack-water areas. Observations of foraging concentrations of American coot (*Fulica americana*) and American wigeon (*Anas americana*) at other embayments along these pools are strong indicators of the presence of submergent aquatic plant communities. The presence of submergent aquatic plant communities in open water habitat is suspected but not adequately documented. For the purposes of this evaluation, embayments, adjacent ponds, and tributary backwaters are used to represent shallow-water submergent plant habitats.

Embayments, sloughs, backwaters, and other shallow water habitats total approximately 8,836 acres of the study area. Approximately 701 acres of these are not directly linked to the surface water of the Columbia River. Embayments are relatively unique, and provide special wildlife values. They provide protected loafing and roosting areas for waterfowl and other waterbirds, in addition to food resources. Embayments are considered bodies of water cut off from the main river by highway or railroad causeways, or other features and are typically connected to the Columbia River via culverts or small channels. Associated tributaries reflect slack-water conditions that extend up tributaries. Adjacent ponds encompass bodies of water adjacent to the river; the source of the water in these sites may arise from sub-irrigation and/or drainage from adjoining lands (e.g., irrigated croplands). Seven of these embayments were the focus of the 1995 surveys by EnviroScience Inc. (1995).

There are approximately 17 embayments in the John Day study area. Paterson Slough, in the Umatilla NWR, is the largest embayment, with 1,043 acres. McCormack Slough represents another major embayment, with 494 acres. An embayment behind Crow Butte Island represents an additional 165 acres of the total embayment acreage. Other significant embayments occur at Threemile Island and Willow Creek. Adjacent ponds represent 212 acres. Ponds in the Paterson Unit of the Umatilla NWR, and others just downstream of McNary Dam constitute the bulk of the acreage. Slack-water areas of tributaries provide 1,391 acres of backwater habitat with the John Day River arm and Willow Creek encompassing 1,272 acres of the total.

8.1.4. Islands

Islands are bodies of land completely surrounded by water. Islands may contain one, several, or all of the habitats described above, and as a result, they tend to support an abundance and diversity of wildlife. Certain species exclusively use islands for nesting and reproduction,

while other species use islands opportunistically or preferentially. Islands are attractive to many species of wildlife because they provide security from mainland predators. Islands owe their existence to water elevations, and any changes in operations may directly affect their habitat profiles and their value to wildlife. There are currently 137 individual islands in the John Day Reservoir, averaging three acres in size, and ranging in size from less than one acre to 85 acres. In addition to these islands, Crow Butte Island occupies an area of 1,347 acres on the reservoir. It is connected to the mainland, however, by a bridge, and does not provide the isolation and protection from terrestrial predators offered by most other islands.

8.1.5. Barren/Drawdown

Typically, the substrate of the John Day Pool comprises rock, gravel, sand, and silt, with rocky shorelines predominating in many locations. Gravel shorelines are prevalent in the upper John Day Pool. Sand and silt deposits are most evident in backwaters, inlets, and embayments, and at the mouths of rivers. This habitat type currently occupies a very small portion of the study area.

8.2. Wildlife

The categories of wildlife identified in the System Operation Review (USACE, 1995b) impact analysis are mirrored in this Phase 1 study. These categories include waterfowl, colonial nesting birds, shorebirds, nongame birds, upland game birds, raptors, aquatic furbearers, terrestrial furbearers, big game, reptiles and amphibians, and endangered, threatened, and sensitive species. Existing conditions for each of these groups is described below. A list of wildlife species expected in the John Day Pool study area is included as Attachment B.

8.2.1. Waterfowl

The John Day Pool supports one of the most significant Northwest concentrations of wintering waterfowl, particularly Canada geese (*Branta canadensis*) and mallards (*Anas platyrhynchos*). Backwater areas on the John Day Pool provide protected areas for wintering waterfowl to escape storms, and to roost. Wintering waterfowl are strongly dependent on agricultural crops grown in the region, particularly field corn and winter wheat for forage. Between 1943 and 1950, the Columbia Basin supported a waterfowl population of 50,000 to 100,000 (USFWS, 1997). Since that time, agricultural production of cereal grains, as well as the increase in the extent of open water and wetland habitat have contributed to a significant increase in waterfowl numbers since that time, but numbers have fluctuated significantly over the years. The Columbia River and its islands currently provide protected, relatively undisturbed loafing, resting, and roosting habitat for waterfowl. At times, the area has supported in excess of 900,000 mallards. The USFWS documented a maximum of 131,000 ducks wintering on the John Day Pool upstream of RM 250 in winter 1994/1995 (USFWS, 1997). An estimated 20,500 to 58,400 Canada geese (average 33,550, USFWS surveys 1987-1992) also winter on this portion of the pool (USFWS, 1997). Greater than 14 species of ducks occur in the John Day Pool (Tabor, 1976, BPA, 1984). Approximately 20,000 northern pintails (*Anas acuta*) are included in this concentration (Bonneville Power Administration [BPA], 1984). Most of these birds occur in the vicinity of Umatilla NWR. Wintering Canada geese number approximately 100,000 in the basin.

Ducks begin arriving in the Umatilla NWR area of the John Day Pool in August. At that time, approximately 30,000 to 50,000 birds, primarily northern pintails and green-winged teal (*Anas crecca carolinensis*) are present (BPA, 1984). Mallards begin arriving in substantial numbers in September. A population of 100,000 ducks can be attained by the end of September. These early-arriving waterfowl appear to focus on aquatic, emergent, and moist-soil vegetation, rather than feeding in fields. Foraging in shallow backwaters, ponds, and wetlands is prevalent in late summer and early fall. Foraging on agricultural fields, however, is prevalent during winter.

Geese do not begin arriving in significant numbers until November. Most wintering geese occur in the vicinity of the Umatilla NWR, but significant numbers are found loafing and roosting on the Columbia River throughout the John Day Pool and backwaters of major tributaries such as the John Day River and Willow Creek. Protected bays and backwaters are important loafing and roosting areas for wintering birds during high winds and storm events.

Resident, breeding waterfowl numbers are generally low except for Canada geese (Great Basin Canada geese), and a variety of ducks around the Umatilla NWR. A substantial number of Canada geese nest along the John Day Pool. In 1991, 323 nests were identified, the majority (240) located on islands in the Umatilla NWR. However, McCredie and Threemile Islands also support a substantial number of nests. Most islands are well offshore and therefore protected from mammalian predation. McCredie and Threemile Islands, on the other hands, are relatively near shore, and are susceptible to land-bridging or to predators wading or swimming to the islands. The species of ducks breeding on the Umatilla NWR includes mallards, Northern pintail, blue-winged teal (Anas discors), green-winged teal (*Anas crecca carolinensis*), cinnamon teal (*Anas cyanoptera*), Northern shoveler (*Anas clypeata*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), and lesser scaup (*Aythya affinis*) (USFWS, 1994).

Canada goose brood rearing areas in the John Day Pool occur primarily on the Umatilla NWR, particularly at Whitcomb Island, Crow Butte Island backwater, Long Walk Island, McCormack Slough, and Paterson Slough (Tabor, 1976). The Oregon shoreline between RM 260 and RM 265, and the Willow Creek Wildlife Management Area, are other important foraging areas for Canada geese with broods. Foraging geese use gently sloping shorelines with grass-forb communities (Tabor, 1976). Low water levels increase the distance geese with broods have to travel to access shoreline forage from open water (Tabor, 1976). This increase in escape distance could have a significant positive bearing on predatory efficiency and a negative effect on percent brood survival.

Waterfowl nesting, other than Canada geese, is also centered on the Umatilla NWR. The Willow Creek and Irrigon Wildlife Management Areas, and McNary Wildlife Park also provide important nesting and brood rearing areas for ducks. Tabor (1976) considered that portions of the John Day Pool downstream of RM 250 were unproductive waterfowl habitat due to rocky, steep shorelines and the lack of islands. Upstream of RM 250, gently sloping shorelines with adjacent grass-forb communities are more prevalent and provide appropriate habitat conditions for waterfowl. Greater than 14 species of ducks occur in the John Day Pool (Tabor, 1976, BPA, 1984).

8.2.2. Colonial Nesting Birds

Species comprising this complex include herons, gulls, terns, and cormorants. The John Day Pool supports more colonial nesting birds than the downstream projects (i.e., The Dalles and Bonneville). These species are primarily dependent on fisheries resources associated with the Columbia River, however amphibians, reptiles, small mammals, and invertebrates may provide important forage resources at times. Scavenging and foraging on agricultural lands by gulls is also common. Threemile Island, at RM 256, supports black-crowned night herons (*Nycticorax nycticorax*), California gulls (*Larus californicus*), ring-billed gulls (*Larus delauarensis*), and Caspian terns (*Hydroprogne caspia*). Tabor (1976) reported Forester's terns as having nested at Threemile Island. As many as 35 black-crowned night heron nests have been estimated at this location. The breeding population of California and ring-billed gulls was estimated at 4,377 pairs (Roby et al., 1998). Roby et al. (1998) reported 184 pairs of Caspian terns were located at this site. Sand Dune Island (RM 274) supports approximately 50 nests each of black-crowned night herons and great blue herons.

Foraging by gulls occurs primarily in agricultural fields; use of freeway rest stops, and garbage dumps is also common. Gulls congregate below McNary Dam to capture fish that may have been injured or stunned passing through the dam; foraging may occur along the length of the pool. Foraging by herons primarily occurs along shorelines, in wetlands, and throughout shallow backwaters.

8.2.3. Shorebirds

Killdeer (*Charadrius vociferus*) and spotted sandpipers (*Actitis macularia*) are the primary shorebirds nesting in the John Day study area. They forage along the shoreline mudflats, and nest just upslope of the high pool line. No data are available on the abundance of nesting shorebirds in the John Day study area, but kildeer, sandpipers, and other shorebirds are common in the area. Black-necked stilts (*Himantopus mexicanus*) and American avocets (*Recurvirostra americana*) took advantage of the short-term drawdown in 1992.

8.2.4. Nongame Birds

Many species of nongame birds occur near the John Day Pool. Riparian and wetland habitats directly influenced by the Columbia River, as well as the ecotone to upland habitats, are important to many species. Typically, riparian/marsh/wetland habitats and the ecotones to upland habitats would support a higher density and diversity of bird life than the dryland shrub-steppe, talus, cliff, and/or grassland habitat that is prevalent along the Columbia River. Habitats associated with the river generally support trees or dense grass-forb cover offering more structural diversity and better forage resources than adjacent upland habitats.

Species that forage for insects in the airspace over the pool are present in substantial numbers. These species include cliff swallows (*Petrochelidon pyrrhonota*) and barn swallows (*Hirudo rustica*). Insect production in riparian, wetland, and embayment and backwater areas are important for these species, as well as for violet-green swallows (*Tachycineta thalassina*), common nighthawks (*Chordeiles minor*), and Vaux's swifts (*Chaetura vauzi*). Riparian forest also provides perch and roost sites for common nighthawks.

Riparian habitats provide important nesting and foraging elements for several species of woodpeckers, flycatchers, chickadees, warblers, kinglets, orioles, grosbeaks, and other

neotropical migrants. Marsh habitats are important to several species each of sparrows, warblers, rails, blackbirds, plus marsh wrens (*Telmatodytes palustris*) and common yellowthroats (*Geothlypis trichas*) in addition to other species. Many species of birds use the Columbia River or associated backwaters for a water source.

This group of nongame birds include many species of neotropical migratory birds. These are species that breed in the United States or Canada, and winter in Mexico, South or Central America, or the Caribbean. Waterfowl and shorebirds are typically not included in this group, even though they may follow this migration regime. The Migratory Bird Treaty Act protects all migratory birds and their parts (including eggs, nests, and feathers) identified under international conventions. Attachment B identified wildlife species known or expected to occur in the study area. It also identifies neotropical migratory bird species, and those bird species known to nest on the Umatilla NWR.

8.2.5. Upland Game Birds

Upland game birds are more abundant in the upper reaches of the John Day Pool than further downstream. The Umatilla NWR is particularly important to these species. Ring-neck pheasant (*Phasianus colchicus*), California quail (*Lophortyx californicus*), mourning dove (*Zenaida macroura*), and common snipe (*Capella gallinago*) are present. Chukar (*Alectoris graeca*) would be the most abundant species along the lower reaches of the John Day Pool. This species occurs mainly in upland grass habitats in steep areas associated with cliff and rimrock.

8.2.6. Raptors

Osprey (*Pandion haliaetus*) represent the most abundant nesting raptor whose foraging requirements are directly dependent upon the fisheries resources of the Columbia River. Most raptor use is associated with upland habitats, wherein their principal prey base would occur. Riparian forest habitats provide nesting opportunities for some species including red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), and Swainson's hawks (*Buteo swainsoni*). These species occur in riparian stands within the Umatilla NWR. Use of riparian habitats during migration is expected by sharp-shinned hawks (*Accipiter striatus*) and Cooper's hawks (*Accipiter cooperii*). Northern harriers (*Circus cyaneus*) nest and forage in grassland, marsh, and wetland communities. Golden eagles (*Aquila chrysaetos*) occur throughout the John Day study area, primarily associated with cliffs, shrub-steppe, and other upland habitats. Great horned owls (*Bubo virginianus*) and western screech owls (*Otus kennicottii*) represent the primary owl species in riparian habitats associated with the Study Area. Short-eared owls (*Asio flammeus*) may be present in wetland and marsh plant communities, primarily in winter and during migration. Barn owls (*Tyto alba*) are found in association with the abundant croplands along the John Day Pool. Peregrine falcon and bald eagle are discussed below in Section 8.2.11 Endangered, Threatened, and Sensitive Species.

8.2.7. Aquatic Furbearers

Aquatic furbearers that would occur in the John Day study area include muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), river otter (*Lutra canadensis*), and mink (*Mustela vison*). These species occur in low densities. The lack of riparian habitats between RM 216 and RM 263 contributes to the low abundance of these species. Most furbearers occur

upstream of RM 263, in more suitable habitat than in downstream locations (Tabor, 1976). Riparian forest, principally cottonwoods, is an important habitat feature for beaver. Muskrats are typically associated with cattail-bulrush marshes. Otter are common in the John Day Pool, with most observations upstream of RM 263 (Tabor, 1976).

8.2.8. Terrestrial Furbearers

Riparian habitats of the John Day study area support coyote (*Canis latrans*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), and raccoon (*Procyon lotor*) (Tabor, 1976). Coyotes are the most abundant, though they exhibit a preference for the sagebrush habitat. Raccoons are the next most abundant species, most prevalent in riparian habitats (Tabor, 1976). Other species present in the area include opossum (*Didelphis virgianiana*), red fox (*vulpes vulpes*), and bobcat (*Lynx rufus*).

8.2.9. Big Game

Mule deer (*Odocoileus hemionus hemionus*) are the only species of big game typically observed in habitats immediately adjacent to the John Day Pool study area (Tabor, 1976). Bitterbrush habitat appears as the most important habitat for muledeer, however it is believed that cottonwood/willow and marsh habitats are more important to deer than surveys indicate (Tabor, 1976). It is noted that islands in the John Day Pool, particularly those on the Umatilla NWR, appear to be important fawning areas for mule deer. The lack of predators on these islands is cited as a probable factor for the observed high use during the spring and summer. Bighorn sheep (*Ovis canadensis*), elk (*Cervus canadensis*), and pronghorn (*Antilocapra americana*) are present on uplands immediately south of Interstate 84 (I-84). These species do not appear to be dependent upon the John Day Pool.

8.2.10. Reptiles and Amphibians

Seven species of amphibians and reptiles are commonly found in association with cottonwood/willow riparian, and marsh habitats of the John Day Pool (Tabor, 1976). The western painted turtle (*Chrysemys picta belli*) is abundant in the Irrigon Wildlife Management Area, supported by the complex of emergent marsh and open water with abundant submerged aquatic plants, and associated sparsely vegetated uplands. The abundance and availability of potential prey species make the ecotone between marsh and upland habitats important to toads, lizards, and snakes, including Woodhouse's toad (*Bufo woodhousei*), Great Basin spadefoot toad (*Scaphiopus intermontanus*), sagebrush lizard (*Sceloporus graciosus*), western yellow-bellied racer (*Coluber constrictor*), gopher snake (*Pituophis melanoleucas*) (Tabor, 1976). The introduced bullfrog (*Rana catsbiana*) is also found in the study area.

Other lizards common in other habitats of the study area include Oregon alligator lizard (*Gerrhonotus multicarinatus*), western skink (*Eumices skiltonianus*), short-horned lizard (*Phrynosoma douglassi*), and side-blotched lizard (*Uta stansburiana*) (Tabor, 1976). Common snakes include striped whipsnake (*Masticophis taeniatus*), Oregon rattlesnake (*Crotulatus viridis oreganus*), wandering garter snake (*Thamnophis elegans vagrans*) (Tabor, 1976). Other amphibians likely to occur in the area include long-toed salamander (*Ambystoma macrodactylum*), Pacific treefrog (*Hyla regilla*), and leopard frog (*Rana pipiens*) (Tabor, 1976). The western painted turtle is identified as a sensitive (critical) species by the ODFW.

8.2.11. Federal Endangered, Threatened, and Sensitive Species

One listed threatened species occupies the John Day study area, the bald eagle (*Haliaeetus leucocephalus*). The peregrine falcon (*Falco peregrinus*) has recently been de-listed, and the bald eagle has recently been proposed to be de-listed. This list is not intended to be inclusive. The study area may be within the range of other species, e.g., Canada lynx (*Lynx canadensis*), but the area is not occupied, or does not provide potentially suitable habitat for these species.

There are no known active bald eagle nest sites in Gilliam, Morrow, and Umatilla Counties in Oregon or in Klickitat and Benton Counties in Washington (Isaacs and Anthony, 1998). However, wintering bald eagles are common along the John Day Pool study area. These wintering eagles rely heavily on the large concentrations of wintering waterfowl. Greater than 40 bald eagles may occur in the vicinity of the Umatilla NWR.

Peregrine falcons nest and winter along the lower reaches of the study area. There are two known nest sites in the cliffs in proximity to the John Day Pool study area (pers. obs., R. Leighty, Wildlife Biologist, USACE, Portland District). More nest sites are suspected, based on the abundance of suitable nesting habitat, but extensive surveys have not been performed. The peregrine falcons nesting along the Columbia River feed primarily on rock doves (*Columba livia*), gulls, and passerines.

8.3. Important Sites

Ten significant wildlife habitat and management areas have been identified within the John Day study area. Table 2 summarizes most of the key marsh/riparian and shallow water habitats provided by these areas. The most significant wildlife habitat areas that would be impacted by drawdown occur on the U.S. Fish and Wildlife Service Umatilla NWR and Oregon Department of Fish and Wildlife (ODFW) Willow Creek and Irrigon Wildlife Management Areas. These management areas are discussed below. Habitat outside the management areas is also treated in detail but the management areas are the units where habitat degradation/loss is expected to be the most noticeable and of most consequence to wildlife and wildlife habitat. Elsewhere on the pool, emergent marsh and riparian habitat generally occurs as small pockets or narrow fringes along the full pool boundary. Rocky, steep shorelines typify much of the project below RM 254.

Table 2.
Shallow Water and Emergent Marsh-Riparian Habitat at Significant Habitat Sites within the John Day Pool Study Area

Site (acreage)	Habitat Area (acres)	
	Emergent Marsh and Riparian	Shallow Water
Willow Creek Wildlife Mgmt. Area (ODFW) (646 acres)	119	243
Crow Butte	37	-
Whitcomb Island	215	-
Glade Creek	19	12
McCormack Slough (494 acres)	272	222
Paterson Slough (1043 acres)	353	690
Irrigon Wildlife Management Area (ODFW) (983 acres)	228	29.4 (ponds)
- Indicates no substantial amount of these habitats present		

8.3.1. Willow Creek Wildlife Management Area

Willow Creek Wildlife Management Area is an embayment located at RM 252 to 253 on the Oregon shore. ODFW manages this 646-acre embayment/upland complex, of which 404 acres are land and the remaining 242 acres are within the full pool line (Plate 1). Riparian and emergent wetlands are interspersed throughout the delta at the upper end of the Willow Creek embayment. This delta, comprising sediments deposited by Willow Creek, continues to build and fill the embayment. Extensive flats are exposed at lower pool elevations. Acreage estimates of flats derived from 1979 photography indicated 39 acres of flats. There now is substantially more flat acreage based upon comparison of recent field observations and 1992 aerial photography with mapped locations of flats in 1979. This accreted material, upon reaching an elevation of approximately 265 feet, supports emergent wetland communities. Riparian shrubs and trees become prevalent at or above the full pool level. The transition to arid uplands supporting sagebrush, bunchgrass, and annual grasses occurs with only a few feet change in elevation.

There are about 119 acres of emergent wetlands and riparian habitat in the Willow Creek embayment. The spring 1992 drawdown to elevation 263 feet de-watered the emergent marsh habitat and exposed mudflats beyond the causeway supporting the irrigation pumping station. Mudflats were exposed sufficiently long for a relatively dense stand of moist soil plants (i.e., smartweed, other forbs, and grasses) to establish. Subsurface water was at or very near the soil surface, which contributed significantly to the green-up observed during the spring 1992 partial drawdown. Substantial foraging by Canada geese and their broods, shorebirds (American avocet, black-necked stilt, long-billed curlew, killdeer), ducks, and gulls were noted on the exposed, vegetated flats.

8.3.2. McCredie Islands

The McCredie Islands are a series of small, rocky islands, just offshore from the Washington mainland at RM 254 (Plate 2).

8.3.3. Threemile Island

Threemile Island is located approximately 500 to 1,000 feet off the Oregon shoreline at Quesnel Park, RM 256. A shallow embayment separates the island from the Oregon mainland (see Plate 2). The island supports a large colony of nesting ring-billed and California gulls, some Forster's terns (*Sterna forsteri*), Caspian terns, and approximately 35 black-crowned night heron nests. In 1977, approximately 4380 breeding adult ring-billed gulls and an equal number of breeding adult California gulls were estimated on the island; in 1996 approximately 8828 breeding pairs of gulls were estimated (USFWS, 1997). An average of 51 Canada goose nests occurred at this island from 1985 to 1991.

Tabor et al. (1981) observed that more than half the gull nests hatched between May 15 and May 31. Great blue heron egg laying and incubation occurred from late February to early March with fledgling beginning in late May (Tabor et al., 1981). Black-crowned herons initiated egg laying and incubation in early April with fledgling beginning in June (Tabor et al., 1981).

8.3.4. Crow Butte

Emergent wetland and open water habitats are found on both sides of the access road from Washington State Route (SR) 14 to Crow Butte Island (Plate 3). Emergent marsh (37 acres) has formed on the delta at the mouth of the drainage at this location.

8.3.5. Whitcomb Island

Riparian and emergent marsh habitat at Whitcomb Island occurs along the backwater between Whitcomb Island and the Washington mainland and along the Columbia River shore (Plate 4). A dike occurs at the upstream end of the backwater. Two causeways in the center further break up the backwater. The downstream end of the backwater has direct water exchange with the Columbia River only at higher pool levels. Habitat present includes shallow water, and approximately 215 acres of emergent marsh and riparian shrub.

8.3.6. Glade Creek

Glade Creek contains approximately 19 acres of emergent wetland habitat and 12 acres of open water habitat if shallow water areas river-ward of the railroad causeway are included (Plate 5). Glade Creek, in combination with backwaters of the John Day Pool, provides water to this wetland.

8.3.7. Sand, Blalock, Coyote, Long Walk, and Straight Six Islands

Several islands are scattered along the Oregon shore of the Columbia River. In 1989, these islands totaled approximately 165 acres (Plate 6). The vegetation on these islands is typically upland scrub/shrub or barren sand. These islands are important nesting areas for a variety of birds including black-crowned night herons.

8.3.8. McCormack Slough

The McCormack Slough unit (RM 275) of the Umatilla NWR is a 494 acre area comprised of 272 acres of emergent wetland and riparian forest and 222 acres of open water (Plate 7).

8.3.9. Paterson Slough

Paterson Slough, in the Umatilla NWR, is a 1,043-acre backwater area with associated ponds and small lakes on the Washington shore between RM 278 and 280; 353 acres of this total consists of emergent marsh and riparian vegetation (Plate 8). Submergent aquatic plants occur in open water areas of Paterson Slough.

8.3.10. Irrigon Wildlife Management Area

The Irrigon Wildlife Management Area is a 983-acre tract of habitat adjacent to the Columbia River between Umatilla and Irrigon, Oregon (Plate 9). The area is typified by numerous, relatively linear depressions roughly parallel to the Columbia River. Ponding occurs where surface elevation of these depressions falls below elevation 268 feet (full pool). These ponds are typically ringed by emergent marsh vegetation transitioning into riparian tree and shrub vegetation. Aquatic plants are prevalent in open water areas of these wetlands. Open water habitat represents only 29.4 acres in the Irrigon Wildlife Management Area. Emergent marsh and riparian habitat comprise 228 acres of habitat within the management area. Water elevation in wetlands at Irrigon is directly related to pool elevation. Irrigation runoff from upslope agricultural lands also contributes to water availability in these pocket wetlands. Open water areas typically support aquatic plant communities. This interspersion of habitats supports many species of breeding birds, furbearers, and a large population of painted turtles.

Section 9. Historical Consequences of the John Day Dam Project

In 1989, a study was undertaken to evaluate pre- and post-construction habitat conditions in Oregon and Washington of the John Day Lock and Dam Project (Rasmussen and Wright, 1990). The assessment was based on interpretation of aerial photography from 1979 and from 1966, before the dam was completed. A Habitat Evaluation Procedures (HEP) assessment was used to determine the value of habitats pre- and post-project. That study provides an indication of the types of habitats that historically bordered the Columbia River in the study area, those that were subject to inundation by project construction, and those that may be restored over time.

It was determined that the project directly impacted 27,566 acres of wildlife habitat. The majority of these impacts (46 percent) were to shrub/steppe/grass habitats. A further 26 percent of the total impacts were to habitats described as Sand Dunes/Blowouts and Sand/Gravel/Cobble/Mud. Impacts to riparian and wetland habitats combined to total 14 percent (3,860 acres) of the impacts from the John Day Dam Project. The overall project impacts are detailed in Table 3.

Table 3.
Habitats Modified by Construction of the John Day Dam Project
(from Rasmussen and Wright, 1990)

Habitat Type	Areas Inundated or Lost (acres)		
	Mainland	Island	Total
Agriculture	2,012	50	2,062
Shrub/Steppe/Grass	10,175	2,472	12,647
Riparian Hardwoods	960	126	1,086
Riparian Shrub	833	252	1,085
Riparian Herb	476	702	1,178
Emergent Wetland	511	0	511
Sand Dunes/Blowouts	1,966	1,459	3,425
Sand/Gravel/Cobble/Mud	2,439	1,544	3,983
Talus/Rock	830	64	894
Disturbed/Bare/Riprap	392	0	392
Open Water/Lakes/Ponds	182	10	192
Residential/Urban/Industrial	82	29	111
Totals	**20,858**	**6,708**	**27,566**

Construction of the John Day Project resulted in the creation of a 47,993-acre reservoir with associated backwater areas. A total of 6,708 acres of islands were inundated (an 80 percent reduction from pre-dam conditions). The project, however, did result in the creation of more than 8,100 acres of shallow-water habitat (i.e., less than 10 feet deep) suitable for waterfowl. Further, it resulted in the creation of approximately 2,854 acres of wetland and riparian habitats.

Section 10. Impacts of Drawdown Alternatives

The anticipated impacts of the evaluated drawdown alternatives can be distinguished as short term or long term. These categories are highly subjective and variable depending upon an individual's or a species life span, or a species ability to adapt to habitat modifications. However, for the purposes of this evaluation, "short term" would be recognized as a period of less than 20 years of an event. "Long term" would be considered to be greater than 20 years.

The drawdown of John Day Reservoir below the existing normal operation level would result in a significant loss of wetland, riparian, and shallow-water habitats. Those habitat loses pose substantial concerns for wildlife populations of the area. Lowering the pool elevation from existing levels would lower ground water levels in areas adjacent to the river (to a level commensurate with the pool elevation) resulting in withdrawal of water from established marsh and riparian habitats, and exposure of presently shallow water habitat. These effects would be exacerbated by climate, terrain, and soil permeability. The terrain in the upper

portion of the pool adjacent to the river is relatively flat with numerous shallow depressions that hold water during normal pool operation (i.e., elevation 265 to 268 feet). The soil in the study area is highly permeable. Tests conducted for the Portland District on the Umatilla NWR indicated rates ranging from four to 29 inches of water per hour. The average permeability rate was 15.9 inches per hour. These high soil permeability rates would result in a very rapid loss of standing and near-surface water in emergent marsh, open water, and riparian habitats upon drawdown. Further, the dry, hot climate would preclude survival of the plant species comprising these habitats.

Depending on the alternative, water levels would be significantly modified from existing conditions. Stage hydrographs were derived for 1982 flow data, representing a typical 5-year event. These stage hydrographs (included in Attachment A) illustrate anticipated surface water elevations by month for each of the four alternatives. The actual 1982 conditions are also shown. For all alternatives, peak elevations would be experienced in June and July, while the lowest surface water elevations would occur from August through October, inclusive. Table 4 provides the computed maximum water surface elevations for the forebay of the John Day Dam (RM 216) and at selected locations along the Columbia River, including RM 280 near the Umatilla NWR. This table also presents the difference between these levels and existing.

It is anticipated that the 500,000 acre-feet of flood control storage for Alternatives 2 and 4 would result in substantial seasonal inundation in the lower reach of the John Day Pool, but not in the upper end of the pool. For example, at the mouth of Willow Creek (RM 253), Alternative 2 (Spillway Crest with flood control) would yield a peak elevation approximately 13 to 17 feet higher than Alternative 1 (Spillway Crest without flood control). Alternative 4 (Natural River with flood control) would yield a peak surface water elevation approximately 11 to 15 feet higher than Alternative 3 (Natural River without flood control).

Table 4.
Existing and Predicted Maximum Water Surface Elevations for the John Day Pool.

River Mile and Location	Elevation (feet)			
	Spillway Crest (213 feet)		Natural River (165 feet)	
	Without Flood Control	With Flood Control	Without Flood Control	With Flood Control
216 (John Day forebay)	236.85	252.52	168.93	226.33
218 (John Day River)	236.88	252.54	171.36	226.37
252.5 (Willow Creek)	238.67	253.21	215.85	228.96
264.5 (Crow Butte and Whitcomb Island)	240.90	253.89	228.61	232.87
276.5 (McCormack Slough and Paterson Slough)	247.42	255.42	245.55	245.66
280 (Umatilla NWR)	251.44	256.89	250.41	250.46
289 (Umatilla River)	264.28	264.88	264.18	264.18

(Source: West, 1999)

Further upstream at approximate RM 276.5, Alternative 2 (Spillway Crest with flood control) would yield a peak elevation approximately 7 to 11 feet higher than Alternative 1 (Spillway Crest without flood control). Alternative 4 (Natural River with flood control), on the other hand, would yield a peak surface water elevation only approximately one to two feet higher than Alternative 3 (Natural River without flood control).

Alternative 2 (Spillway Crest with flood control) would result in a peak elevation approximately 1.3 feet greater than Alternative 1 (Spillway Crest without flood control) the Umatilla River (RM 289). There would be no difference between Alternative 3 (Natural River without flood control) and Alternative 4 (Natural River with flood control) downstream. Attachment A includes stage hydrographs for six locations along the John Day Pool.

The Spillway Crest alternative would initially result in a 22,810-acre barren drawdown zone, while under the Natural River alternative this zone would be 30,625 acres. These values represent the difference between the existing pool elevation (265 feet) and projected October pool elevations. October elevations represent the worst-case estimate for acreage exposed in the drawdown zone. Once pool elevations reach 260 feet or below, however, existing wildlife habitat associated and within the pool would be effectively lost.

As previously mentioned, pool levels typically only influence a region immediately abutting the reservoir. This zone of influence includes riparian habitat but does not extend into the upland habitats. Thus, the upland zone is not considered an area subject to significant impacts from implementation of the proposed drawdown alternatives. The steppe and shrub-steppe habitats would remain largely unaffected by the proposed action. However, some disturbance to upland habitats is expected to result from activities necessary for removal and modification of the lock and dam facilities, for the protection of shoreline (i.e., bank stabilization with riprap and/or vegetation), and for the protection and modification of infrastructure (i.e., roads, irrigation, railway lines, bridges, etc.). Compared with the anticipated impacts to wetland, riparian, and shallow-water habitats (see below), the impacts to upland habitats would be minimal. The actual extent of impact to these habitats cannot be estimated at this time due to a lack of design detail. This detail would be developed in a Phase 2 evaluation.

10.1. Wildlife Habitats

Overall, hydrological conditions in the upper end of the John Day Pool would not substantially vary between the four alternatives. Modification of river levels to 213 (Spillway Crest) or 165 (Natural River) would result in the loss of emergent marsh and riparian habitat currently associated with the pool, as well as extensive areas of shallow water habitats. Table 5 presents the anticipated habitat modifications that would result from the drawdown alternatives. As previously mentioned, it is assumed that riparian habitats currently comprise approximately 20 percent of the total acres of emergent marsh/riparian habitat, while emergent marsh comprises 80 percent. Over time, new habitats would develop in the barren/drawdown zone. This post-drawdown habitat development is discussed later. The impacts discussed here pertain to those that would occur within the area directly influenced by the pool hydrology.

Table 5.
Expected Initial Habitat Changes From the Proposed Drawdown of the John Day Dam.

Habitat Types	Approximate Change from Existing (acres)	
	Spillway Crest	Natural River
Riparian	-571	-571
Emergent Wetland	-2,283	-2,283
Shallow-Water Habitats (ponds, embayments, and tributary backwaters)	-8,836	-8,836
Islands	+4,953	+5,770
Barren/Drawdown	+22,810	+30,625

10.1.1. Riparian and Wetland Habitats

Poplar seedlings are intolerant of drought (Rood and Mahoney, 1990), however saplings more than two years old are more drought-tolerant as they have larger root systems (Pezeshki and Hinckley, 1988, in Rood and Mahoney, 1990). Large trees with well-established root systems might survive in some areas; poplars on the Umatilla NWR are greater than 25 years old. However, drought stress also influences mortality rates for mature poplars. Albertson and Weaver (1945, ref. in Rood and Mahoney, 1990) identified increasing susceptibility to drought in poplars greater than 30 years old, noting extensive mortality in western poplars during the 1930s drought. Albertson and Weaver (1945 ref. in Rood and Mahoney, 1990) observed mortality in riparian trees within a few months where rapid declines in the water table occurred. Also, McNatt et al. (1980) reported 60 to 84 percent mortality in cottonwood trees in an area influenced by a reduction of ground water levels up to 10 feet or more due to withdrawal by the City of Phoenix, Arizona.

During the 1992 short-term drawdown to minimum operating pool (elevation 257), loss of water from emergent plant communities (i.e., cattail and bulrush) was noted at several locations. Subirrigation maintained moist soils in the stands and plants seemed to survive. However, some apparent loss of turgor pressure and sunburn of stem tips of marsh plants was observed in wetlands situated near the upper limit of normal full pool elevation. A reduction in normal wildlife use and species composition for wetland plant communities was also apparent. The potential effects of a permanent drawdown by an additional 44 to 92 feet greater would result in permanent loss of these habitats and associated wildlife species.

Regardless of the alternative, an estimated 2,854 acres of riparian and wetland habitats would be lost, and the area of greatest habitat impacts would be on the Umatilla NWR. Substantial loss of riparian and emergent marsh habitat would also occur on the Irrigon and Willow Creek Wildlife Management Areas which encompass lands licensed to the Oregon Department of Fish and Wildlife by Portland District USACE.

Seasonal inundation due to flood control would result in a "bathtub ring" around the project, and would be particularly evident on the downstream end of this reach of the river. The fluctuation zone may initially be revegetated by annual forbs (i.e. smartweed), noxious weeds, and grasses, with the extent of cover determined by seed source and/or availability,

soil moisture levels, soil type, and elevation. Vegetation may not establish permanently in the "bathtub ring," however, is a function of flooding followed by extremely dry conditions.

10.1.2. Shallow Water Habitats

Existing shallow-water and backwater habitats are limited to the upstream end of the John Day Pool (above RM 252), and are primarily found in the areas of Willow Creek, Paterson Slough, Whitcomb Island, McCormack Slough, and Crow Butte. The Irrigon Wildlife Management Area includes numerous ponds and shallow water habitats. The existing submergent aquatic plant communities would be lost regardless of the selected alternative. Additional loss of shallow water habitats would result from dredging at the mouths of the Umatilla River, Rock Creek, Willow Creek, and the John Day River. This was determined to be necessary based on an analysis of depth and velocity necessary for passage of anadromous salmonids (Tributary Sedimentation Evaluation Section of Engineering Technical Appendix). All drawdown alternatives would expose present shallow water areas of the pool, including those areas supporting submerged aquatic plant communities. A preliminary estimate of shallow water habitat loss is 8,836 acres. This includes 701 acres of shallow water habitats that are not directly connected to the Columbia River (i.e., they do not rely on a direct surface water connection to the river for their existence). The anticipated potential effects of this loss to wildlife species are discussed below.

10.1.3. Islands

All drawdown alternatives would significantly increase the number and area of islands in this reach of the Columbia River. It is estimated that 214 islands ranging in size from less than one acre to 4,038 acres would be apparent following drawdown to Spillway Crest elevation (213 feet), an increase of 77 islands. The Natural River (165 feet) alternative would result in 221 islands ranging in size from less than one acre to as large as 4,581 acres, an increase of 84 islands. For both alternatives, the largest island would be Blalock Island. The total area of island habitat is estimated at 5,361 and 6,178 acres, for the Spillway Crest and Natural River alternatives, respectively. It is very likely that the new islands would compensate for those existing islands that would be bridged with the mainland under the drawdown alternatives. However, for those species requiring forested or shrub vegetation for nesting habitat, these islands would not be suitable habitat for a considerable period of time (i.e., 10 to 25 years or more). The establishment of herbaceous vegetation will make some of these islands suitable for waterfowl nesting and rearing (e.g., Canada goose) within a couple of years. Others may be too close to the shore, however, to be free from terrestrial predators. Regardless of the alternative, the number of individual islands and total area of islands would be significantly greater than existing conditions. There would be an increase of 4,953 acres under the Spillway Crest alternative or an increase of 5,770 acres under the Natural River alternatives. These values are based on 1994 bathymetric data. Erosion of these islands would begin upon drawdown so these values represent an optimistic estimate of the potential area of island habitat. Wind and water erosion would continue to reduce island size post-drawdown.

10.1.4. Barren/Drawdown

Immediately following drawdown under the Spillway Crest alternative, there would be approximately 22,810 acres of mudflat or other barren land. Under the Natural River alternative, approximately 30,625 acres of mudflat or other barren land would be exposed.

Upland and wetland seed will be applied to this drawdown zone, where practicable, and some areas would be planted to establish riparian forest and shrub/scrub vegetation.

10.2. Site-Specific Impacts

The anticipated effects of the drawdown alternatives are described in further detail below for each of the areas identified as important for wildlife.

10.2.1. Willow Creek Wildlife Management Area

There are currently approximately 119 acres of emergent wetlands and riparian habitat in the Willow Creek embayment. The drawdown of the John Day Pool would result in a total withdrawal of water from the Willow Creek embayment and loss of these 119 acres of habitat. This loss of open water acreage is partially a function of the significant levels of sediment that have accumulated since the John Day Dam impoundment. Dredging would be necessary at the mouth of Willow Creek to maintain the potential for fish passage during drawdown. Following project implementation, sedimentation would continue to be deposited at the mouth of the creek. The anticipated loss of habitat at Willow Creek is illustrated in Plate 10 and 11.

The loss of riparian and emergent marsh habitat would occur under all alternatives. Flows in Willow Creek and subsurface water depths are expected to be insufficient to maintain the present acreage of these plant communities and the wildlife species that use them.

Under the Spillway Crest alternative (without flood control), the surface water elevation of the Columbia River near the mouth of Willow Creek could vary as much as 5 feet between April and June. The annual variation could be as much as 15.5 feet. With flood control, the Spillway Crest alternative could result in a seasonal (April - June) fluctuation of surface water elevation of approximately 9 feet, and an annual fluctuation of as much as 19.6 feet. These fluctuations contrast with the current, relatively stable water levels that vary by less than two feet.

Under the Natural River alternative (without flood control), the surface water elevation of the Columbia River near the mouth of Willow Creek between April and June could vary as much as 3.7 feet. Throughout the year, an average range of 12.3 feet is anticipated. With flood control, the seasonal (April - June) surface water elevations would range on average 6.5 feet. The annual fluctuation of the Natural River alternative with flood control would average 15 feet.

In the long term, upland vegetation is anticipated to establish on areas currently occupied by wetland and riparian vegetation. Based on the prevalence of weedy species on lands adjacent to the pool, it may be difficult to achieve a dominance of native plants in the drawdown zone, even though native grasses such as bluebunch wheatgrass would be planted in the drawdown zone.

It is estimated that approximately 468,382 cubic yards of material would be dredged from Willow Creek for the Spillway Crest Alternative. The volume for the Natural River Alternative is estimated at 1,051,755 cubic yards. No disposal locations are identified at this time, but at a depth of 15 feet, the dredged material would occupy an area of 29 or 65 acres for the Spillway Crest and Natural River alternatives, respectively. Annual maintenance dredging would yield 70,000 or 106,000 cubic yards for the Spillway Crest and Natural River

alternatives, respectively. These volumes would occupy 4.3 or 6.6 acres per year to a depth of 15 feet. The *Tributary Sedimentation Evaluation* Section *of Engineering Technical Appendix* details these dredging needs.

10.2.2. McCredie Islands

Regardless of the alternative, the proposed drawdown is expected to result in the formation of a land-bridge between McCredie Island and the Washington shore. This is anticipated to result in depredation on nesting Canada geese, and their abandonment of the site. The anticipated impacts of drawdown are shown in Plate 12 and 13.

The John Day Pool annually fluctuates less than two feet near McCredie Island. Under the flood control alternatives, surface water levels between April and June would rise approximately 9 feet under the Spillway Crest alternative and 5.7 feet under the Natural River alternative. Without flood control, seasonal (April - June) surface water elevations are expected to vary by 5.1 and 3.8 feet for the Spillway Crest and Natural River alternatives respectively.

Annual surface water elevations are estimated to vary approximately 19.8 to 28.3 feet for flood control options of the Spillway Crest and Natural River alternatives, respectively. Without flood control, these elevations are expected to vary approximately 15.9 and 12.3 feet for these alternatives, respectively.

10.2.3. Threemile Island

The island supports a large colony of nesting ring-billed and California gulls (4,377 pairs), some Forster's terns, Caspian terns, and approximately 35 black-crowned night heron nests. It is expected that Threemile Island would no longer exist should drawdown occur (regardless of the alternative). The area would become part of the Oregon mainland (see Plates 12 and 13), and would permit access by mammalian predators (e.g., coyote) to the island. This is likely to result in desertion of colonial nesting birds and abandonment of the site.

Gulls constitute the bulk of nesting species on Threemile Island, more than half the nests hatching between May 15 and May 31 (Tabor et al. (1981). Great blue heron egg laying and incubation occurred from late February to early March with fledgling beginning in late May (Tabor et al., 1981). Black-crowned herons initiated egg laying and incubation in early April with fledgling beginning in June (Tabor et al., 1981). Terns initiate egg laying and incubation in early May. Based on typical nesting chronology, young terns would fledge within 30 to 40 days (i.e., by approximately mid-June).

Surface water levels in this area of the Columbia River, under the flood control alternatives, would rise approximately 9 feet under the Spillway Crest alternative and 5.7 feet under the Natural River alternative between April and June. Seasonal (April - June) surface water elevations are expected to vary by 5.1 and 3.8 feet for the Spillway Crest and Natural River alternatives without flood control.

Annual surface water elevations are estimated to vary approximately 19.8 to 28.3 feet for flood control options of the Spillway Crest and Natural River alternatives, respectively. Without flood control, these elevations are expected to vary approximately 15.9 and 12.3 feet for these alternatives, respectively.

10.2.4. Crow Butte

Drawdown of the John Day Pool would result in perching of the adjacent wetland habitat at Crow Butte. It is unlikely that flows from the upslope drainage into the delta would support any significant portion of the wetland plant community, including that along the drainage channel. Plates 14 and 15 illustrate the expected extent of habitat modification from the drawdown alternatives. Long-term seasonal (April - June) water level fluctuations would create a bathtub ring under the flood control alternatives as fluctuations would be approximately nine feet and five feet under the Spillway Crest and Natural River alternatives, respectively. Without flood control, seasonal (April - June) fluctuations would be approximately 5.2 feet or 3.9 feet for these alternatives, respectively. Annual fluctuation of surface water elevations would be approximately 20 feet and 13.3 feet under the flood control options for the Spillway Crest and Natural River alternatives respectively. Without flood control, these variations would be 16.3 feet or 12.3 feet for the Spillway Crest and Natural River alternatives, respectively. Water levels in the Crow Butte area currently varies by less than two feet annually.

10.2.5. Whitcomb Island

The shallow water, emergent marsh and riparian shrub habitats at Whitcomb Island would be completely de-watered with drawdown to elevation 213 or 165 feet. Riparian and marsh habitat along the Columbia River shore would be eliminated. Whitcomb Island would be completely connected to the Washington mainland. Plates 16 and 17 present the expected extent of habitat modification for the drawdown alternatives. The seasonal and annual surface water elevations for this site along the Columbia River would be the same as that described for the near by Crow Butte area.

10.2.6. Glade Creek

The relatively small wetland, open water, and island habitats at Glade Creek would be substantially de-watered by all project alternatives and wetlands would be lost (Plates 18 and 19). The extent of de-watering is difficult to determine given the influence of Glade Creek flows and the railroad and highway causeways through the area. The seasonal and annual surface water elevations for this site along the Columbia River would be the same as that described for the near by Crow Butte area.

10.2.7. Sand, Blalock, Coyote, Long Walk, and Straight Six Islands

The number and size of islands in the area of Sand, Blalock, Coyote, Long Walk, and Straight Six Island would be significantly modified under the proposed drawdown alternatives. Historically (i.e., prior to inundation), many of these islands were just a single island, “Blalock Island.” Longwalk and Coyote Islands were part of the Oregon mainland. Under the Spillway Crest alternative, a single island would emerge that may total approximately 4,038 acres, while Longwalk and Coyote Islands would be joined with the mainland. Under the Natural River alternative, this island may be as large as 4,581 acres (Plates 20 and 21). The seasonal and annual surface water elevations for this site along the river would be similar to that described for the Crow Butte area.

10.2.8. McCormack Slough

Existing riparian and emergent marsh habitat plus submergent aquatic plant communities in open water habitat would be lost upon drawdown to Spillway Crest (213 feet) or Natural

River (165 feet), further compromising wildlife habitat values of the unit. The approximate 272 acres of emergent wetland and riparian forest would be eliminated upon all drawdown alternatives (Plates 22 and 23). Soil permeability rates measured for this unit were 4, 21, 16, 15, and 29 inches per hour. There are two existing dikes in McCormack Slough; one abuts the Columbia River while the other is approximately mid-way up the slough. These structures appear to lessen the loss rate of water from the slough during periods when the pool is operated below elevations 265 through 268 feet. However, water level in McCormack Slough does fluctuate commensurate with the level of the John Day Pool. Given soil permeability rates, the slough would be lost subsequent to a drawdown to elevation 213 or 165 feet. Runoff from upslope irrigation can influence McCormack Slough water levels although more efficient irrigation systems appear to have lessened the influence of runoff on slough levels. Thus, it is unlikely that irrigation runoff would sustain the wetlands at McCormack Slough. Water withdrawal from wells on the refuge for hatchery water supply also appears to influence water levels in McCormack Slough. Water supply from these hatchery wells would be adversely affected by drawdown. If the hatchery were to remain open, it would require the establishment of an alternative water supply.

The mainstem Columbia River adjacent to McCormack Slough, under the flood control alternatives, would incur long term seasonal (April - June) water level fluctuations which would create a bathtub ring. Fluctuations would be approximately 6.2 feet and 3.5 feet under the Spillway Crest and Natural River alternatives, respectively. Without flood control, seasonal (April - June) fluctuations would be approximately 4 feet or 3.3 feet for these alternatives, respectively. Annual fluctuation of surface water elevations would be approximately 14.6 feet and 11 feet under the flood control options for the Spillway Crest and Natural River alternatives respectively. Without flood control, these variations would be 12.3 feet or 10.9 feet for the Spillway Crest and Natural River alternatives, respectively.

10.2.9. Paterson Slough

Drawdown to elevation 213 feet (Spillway Crest) or 165 (Natural River) would completely de-water this unit of the Umatilla NWR (Plates 24 and 25). Soil permeability rates were five inches per hour at the southwest end and 21 inches per hour at the northeast end of Paterson Slough. Consequently, no retention of water in the unit is anticipated. Thus, all emergent marshes and riparian habitat (353 acres) plus most of the 690 acres of submergent aquatic plant communities in Paterson Slough would be eliminated. Water surface elevations, both annually and seasonally would be the same as McCormack Slough.

10.2.10. Irrigon Wildlife Management Area

Water levels in the wetlands and ponds (shallow water habitats) at Irrigon WMA are directly related to pool elevation. Irrigation runoff from upslope agricultural lands also contributes to water availability in these pocket wetlands. The high porosity of the soil within this unit would significantly affect loss of water from these wetlands during drawdown; soils present have a percolation rate of 6 to 20 inches of water per hour. It is expected that drawdown to Spillway Crest (213 feet) or Natural River (165 feet) would de-water and eliminate all wetlands and ponds within the Irrigon WMA (Plates 26 and 27), and result in subsequent adverse impacts to wildlife use and occurrence in the area.

Surface water elevations would not significantly vary between alternatives. Under the Spillway Crest alternative with flood control, seasonal (April - June) elevations would vary

by approximately 3.5 feet, while annual fluctuations would vary by approximately 10.6 feet. All other alternatives (i.e., Spillway Crest without flood control, Natural River with flood control, and Natural River without flood control) would result in a seasonal variation of approximately 3.2 feet and an annual variation of approximately 10.3 feet.

10.3. Wildlife

As previously mentioned, regardless of the alternative, drawdown of the John Day Dam would result in a loss of approximately 2,854 acres of wetland and riparian habitat and approximately 8,836 acres of shallow water habitat (i.e., embayments, ponds, backwater sloughs, etc.). Drawdown of the river to Spillway Crest (213 feet) would initially result in the exposure of approximately 22,180 acres of barren, exposed earth. The Natural River (165 feet) alternative would result in approximately 30,625 acres of barren exposed earth. Both would also result in increased distance to subsurface water at current shoreline habitats than under present conditions. The amount of time necessary to establish vegetation on the exposed areas is not known but would vary by location within the pool, depth of soil, proximity to water, aspect, slope, and other factors. The establishment of weedy species such as cheatgrass, knapweed, and Russian thistle, is expected to be substantial.

The nature and extent of drawdown effects would not substantially differ between the four alternatives. That is, once below 257 feet, loss of existing wildlife habitat would occur. The anticipated effects are, therefore, discussed together for all alternatives. However, where effects would be unique to a specific alternative, they are identified in the discussions below.

10.3.1. Waterfowl

The anticipated loss of habitat would significantly impact resident and migratory wildlife resources of the Columbia Basin. Forage and cover values of habitat for breeding and wintering waterfowl along backwaters and ponds would be severely compromised. Desiccation of marsh and shallow open water habitat would result in the loss of aquatic plant and benthic and other invertebrate populations which provide food resources for waterfowl and many species of waterbirds and shorebirds.

Wintering waterfowl are dependent upon agricultural crops for their food supply. The Columbia River is used for loafing and night roosting. The reduced surface elevation of John Day Pool would potentially reduce the ability of the Umatilla NWR to support wintering waterfowl. During the period of 1984 through 1988, the average number of waterfowl use days on the Umatilla NWR was 34,416,934 (ducks) and 2,672,838 (geese). Wintering waterfowl will continue to use the Columbia River for loafing and night roosting although the distribution may be more widespread or dispersed with drawdown. A reduction in wintering waterfowl use is anticipated due to decreased carrying capacity. This would result from the significant loss of shallow water habitat (8,836 acres). While at most 5,539 or 8,412 acres of the future river would be less than 10 feet deep (for Spillway Crest and Natural River alternatives, respectively), the velocity in most of this area would be too swift for substantial use by waterfowl.

Canada goose nesting efforts would initially be detrimentally affected by the proposed drawdown of the John Day Dam. Islands currently used for nesting would no longer exist (e.g., McCredie Island, Threemile Island) or would be accessible, resulting in potential

depredation by terrestrial predators (e.g. coyote). It is estimated that cover on new islands would be established in a few years and that Canada geese would use these sites.

Brood rearing by Canada geese would be compromised in the short term by implementation of all alternatives. Brood rearing areas in the John Day Pool primarily occur on the Umatilla NWR, particularly at Whitcomb Island, Crow Butte Island backwater, Long Walk Slough, McCormack Slough, and Paterson Slough. The Oregon shoreline between RM 260 and 265 and Willow Creek Wildlife Management Area are other important foraging areas for Canada geese with broods. All of these areas would be lost under all the proposed drawdown alternatives.

Foraging geese use gently sloping shorelines with grass-forb communities. In the short term, all drawdown alternatives would increase the distance that geese with broods would have to travel from water to access forage. This increase in escape distance could have a significant negative effect on brood survival, and a positive bearing on predator efficiency. Vegetation development in the drawdown zone may provide additional forage resources for geese and their broods. Distance to forage and predation success will be site-dependent.

Most young Canada geese would have hatched by the first of May. Few nests would still be incubating when high water levels peak in June. In the upper end of the pool (i.e., upstream of Crow Butte), under the flood control options, seasonal (April - June) surface water elevations could be nine feet or five feet higher for Spillway Crest and Natural River, respectively. The fluctuations for the alternatives without flood control would vary by five feet or by four feet for the Spillway Crest and Natural River. The fluctuations with flood control, however, would mimic more natural seasonal fluctuations.

The dewatering of habitats currently used for brood rearing, combined with anticipated increased predation, would initially reduce recruitment of Canada geese. A net reduction in the nesting population of Canada geese initially may result, but over the long term, recovery of the population would probably occur.

Wintering Canada geese, excluding the resident population, would also be affected by the proposed drawdown. While the proposed action would not change the extent of irrigated and other cropland in the study area, there would be an elimination of shallow-water habitat suitable for roosting and loafing by wintering geese, with a loss of over 2.5 million goose use days..

Ducks nesting in the John Day study area would be subject to a significant short-term and long-term loss of nesting habitat, particularly for those species that nest over water in emergent marsh vegetation. The loss of emergent wetland habitats would result in adverse conditions for many duck species, particularly diving ducks. Typically, emergent marsh habitat is associated with shallow backwater areas, which provide foraging, nesting, loafing, and roosting habitat for ducks. All of this existing backwater habitat would be lost under implementation of either alternative. In the short term, some emergent wetland marsh habitats may become established along the new river channel. The extent of the development of these habitats would be substantially less than existing, and would influence the number of nesting ducks that would occur in the future. Upland habitat development on the islands should provide future nesting habitat for mallards and other puddle ducks.

Brood rearing habitat for ducks is also contingent upon the extent and nature of backwater and other shallow water habitats that may develop following any drawdown alternative. There would be an initial, substantial detrimental impact to brood rearing habitat, with some habitat establishment in the short term following implementation of a drawdown scenario. A net loss in brood rearing capability for ducks is anticipated even after all on-site habitat establishment or mitigation has occurred, as the nature and extent of backwaters would be greatly diminished, relative to the current extent of suitable shallow water habitats.

The most apparent potential impact of the drawdown alternatives would the loss of backwater habitats and subsequent effects to wintering waterfowl, particularly mallards. The four most important areas for wintering waterfowl are Paterson Slough, Long Walk and McCormack Slough embayments, and the islands between RM 270 and 276. Regardless of the drawdown alternative, Paterson Slough and Long Walk embayment would be lost altogether. The anticipated water level fluctuations would affect the ability for backwater habitats to develop post-drawdown. The annual fluctuations anticipated with the flood control alternatives would be approximately 14.6 and 11 feet for Spillway Crest and Natural River, respectively. These substantial fluctuations may preclude or minimize the extent of development of backwater habitats. Without flood control, however, the anticipated fluctuations of 4 or 3.3 feet for Spillway Crest and Natural River would permit the establishment of backwater habitats.

There may be a substantial increase in the acreage of island habitats along this reach of the river. The potential for island habitats to be maintained in this area is uncertain, as they are subject to severe accelerated erosion because they are comprised principally of sand. While some 5,361 or 6,178 acres of island may be present upon drawdown (Spillway Crest and Natural River alternatives, respectively). Blalock Island would be extremely large (i.e., 4,038 or 4,581 acres for Spillway Crest and Natural River alternatives), and may function as a mainland site. The overall area of island habitat would probably be subjected to some erosion and continue to decrease over time following drawdown. Consequently, the net long-term effect to waterfowl is not known.

Some forage for wintering waterfowl would be maintained under a drawdown scenario, as it is assumed that, regardless of alternative, irrigation water would continue to be provided to agricultural lands in the area. Wintering diving duck populations however would incur loss of foraging resources because of the loss of shallow water habitats. The establishment of a benthic invertebrate community would not occur immediately in new shallow water areas. Furthermore, winter duck populations would never achieve current levels due to the long-term loss of shallow water habitat and the magnitude of river level fluctuation predicted for these alternatives. These fluctuations would preclude development of substantial benthic invertebrate populations.

10.3.2. Colonial Nesting Birds

The long-term sustainability of great blue heron and black-crowned night heron populations in this reach of the Columbia River is uncertain. At the time of drawdown, the extent of suitable foraging habitat for great blue herons would be reduced under all drawdown alternatives, but stranded fish, amphibians, and other prey would be abundant. However, there would be an overall, long-term reduction in shallow water habitat that would support prey for this species. These species currently nest at Sand Dune Island within the Umatilla

NWR. In the short term, the incorporation into the large Blalock Island may potentially jeopardize the nesting success of the herons, depending upon the season in which drawdown occurs. Mortality of willow and other riparian trees currently used for nesting by these species is anticipated regardless of the alternative. Because all wetland and riparian habitats would be lost along this reach of the Columbia River, optimal alternative nesting habitat would be unavailable in this area for a very long time (i.e., greater than 20 years). However, while herons and cormorants prefer trees for nesting, they may nest on the ground or in shrubby vegetation. Some birds may move to Cold Springs NWR to the southeast.

Colonial nesting birds at Threemile Island would also be affected by implementation of a drawdown scenario. This island would be bridged to the mainland, thereby permitting access to mammalian predators. Other islands are expected to emerge during drawdown, provided they do not substantially erode.

Caspian terns, Forster's terns, and gulls may benefit from all drawdown scenarios in the short term and long term. Islands that would be exposed upon drawdown would provide optimal nesting habitat for these species. It is unlikely that vegetation will establish on all islands, therefore, suitable nesting habitat would be available in the long term.

The effect of water level fluctuations on the establishment of backwater and shallow water habitats would influence the abundance and availability of prey resources for many species of colonial nesting birds. The alternatives with flood control may preclude or minimize the extent of development of these habitats due to the anticipated 14.6-foot or 11-foot annual fluctuation for the Spillway Crest and Natural River alternatives, respectively.

10.3.3. Shorebirds

Some wildlife species would benefit from the proposed drawdown of the John Day Reservoir. In May 1992, the John Day Pool was operated at an elevation of approximately 263 feet for 18 days. The drawdown exposed flats in formerly shallow water areas at several locations. These flats were attractive to black-necked stilts, American avocets, and killdeers that nested on the exposed areas and foraged in the shallow water areas or their margins adjacent to the exposed flats. Black-necked stilts and American avocets would probably take advantage of barren areas exposed during implementation of a drawdown scenario. These areas would provide favorable nesting habitat for these species in the short term.

10.3.4. Nongame Birds

Nongame birds associated with riparian and emergent marsh habitat would decline with the loss of these habitats. Species such as pied-billed grebe, red-winged blackbirds, and rails, which are dependent upon shallow, protected waters and associated emergent marsh habitat for foraging and nesting habitat, would also decline. Red-winged blackbirds and other species dependent on emergent marsh habitat would be subject to significant loss of nesting and foraging habitat (approximately 2,854 acres, regardless of the alternative). Riparian habitats of the Umatilla NWR, particularly those dominated by native species, are very important to songbirds for migratory stopovers (USFWS, 1997). Many neotropical migrants would lose important foraging, nesting, cover, and migratory stopover habitat. The drawdown alternatives would not only result in a net reduction in the local population, but would substantially reduce the availability of migration stopover habitat for numerous species of neotropical migratory birds.

While trees lost in the existing riparian and wetland habitats would provide suitable foraging habitat (i.e., snags) for species such as hairy woodpecker and northern flicker, these areas may not provide cover and other habitat elements necessary to support these species. For other forest-dependent species, however, suitable habitat would not establish for a long time, i.e., at least 20 years. It is likely that emergent marsh may become established along the margins of the new river channel following implementation of a drawdown scenario. However, the extent of this habitat type would not match nor even approach the extent of wetland and riparian habitat that would be lost. It is anticipated that there is a potential for at most, 1,126 or 1,439 acres of wetland and riparian habitat to develop in the study area, under the Spillway Crest and Natural River alternatives without flood control. The annual water level fluctuations of 14.6 or 11 feet for flood control alternatives (i.e., Spillway Crest and Natural River, respectively), however, would limit the extent to which these habitats would establish along the new river.

10.3.5. Upland Game Birds

The loss of riparian habitat would eliminate nesting habitat for mourning dove. Ring-necked pheasant and California quail use riparian and emergent habitat for escape cover and protection during severe winter weather. Overall, however, chukar, quail, pheasant, and mourning dove, would generally be unaffected by the proposed alternative, as these species use upland and other habitats as well.

10.3.6. Raptors

The anticipated loss of 571 acres of riparian habitat along the John Day Pool would result in the loss of suitable nesting habitat for great-horned owl, Swainson's hawk, American kestrel, red-tailed hawks, western screech owls, and other raptors that require trees for nesting sites. The availability of prey species may increase in the short term as small mammals, amphibians, reptiles, and other prey lose cover, foraging, and/or denning habitat and are increasingly vulnerable to predation. Insects and rodents would gradually occupy the drawdown zone as vegetation becomes established. American kestrels, red-tailed hawks, great-horned owls, and other raptors may increase in abundance in response to increased prey abundance. While nesting habitat for some of these species may take 20 years or more to establish, some species may occupy suitable nesting habitat on cliffs exposed by drawdown.

The loss of 2,283 acres of emergent marsh wetland would decrease the abundance of foraging habitat for northern harriers, but the effect would not be substantial based on the ability of this species to use alternate habitats (i.e., grasslands). Because no change in cropland irrigation is anticipated to result from the proposed drawdown alternatives, no effects are anticipated to barn owls. Adverse effects may occur to osprey, due to a change in the abundance and availability of fish that is anticipated to result from the loss of as much as 8,836 acres of suitable foraging habitat (i.e., backwater and other shallow water habitats).

10.3.7. Aquatic Furbearers

Beaver would incur substantial adverse impacts under implementation of a drawdown alternative, due to loss of denning and foraging habitat. Any existing dens would be dewatered, and trees in riparian forests would die. Beaver would likely be subject to increased predation because of the distance between the existing shoreline and a new shoreline. Riparian forest along a new river channel would take a long time to establish (at

least 20 years). Beaver may become a nuisance in the establishment of woody riparian vegetation along the new river channel.

The existing river otter population is small and would be subject to decline under each of the proposed alternatives. River otter, mink, and muskrat populations would incur substantial adverse impacts due to loss of denning and foraging habitat, and of prey. There would be a decrease of as much as 8,836 acres of backwater habitat suitable for this species, regardless of the alternative. This would result in a decrease in fish and benthic prey species. It is estimated that at most 1,832 or 2,633 acres of new shallow water habitat (Spillway Crest and Natural River alternatives, respectively) may be created along the margins of the new river channel, and may support these species of aquatic furbearers. The period of time necessary for these habitats to support sufficient prey for these species is not known.

10.3.8. Terrestrial Furbearers

The proposed drawdown of the John Day Reservoir would not likely adversely affect most terrestrial furbearers in the study area. In the short term, coyote, raccoon, and striped skunk, may respond positively, rather than negatively, to drawdown of the John Day Reservoir. The expected loss of habitat (cover, foraging, and breeding) for small mammals, amphibians, reptiles, fish, ground-nesting birds, and other potential prey species, would make them more vulnerable to predation by these terrestrial furbearers. An increase in abundance of these species may result in response to increased rodent and other prey species. Bobcat, which rely primarily on upland habitat, are not likely to be directly affected by the proposed action.

10.3.9. Big Game

Big game species would be impacted to a limited extent by implementation of the proposed drawdown alternatives. The species most affected would be mule deer. The loss of 2,854 acres of riparian and wetland habitat used by mule deer for cover and forage may adversely affect this species in the short term. Impacts to this species would also include the loss of island habitat in the John Day Pool that is used currently for fawning. At least 5,361 or 6,178 acres of other islands may be exposed by drawdown (Spillway Crest and Natural River alternatives, respectively). In the long term, some of these islands may provide adequate cover to serve as fawning habitat for mule deer, however, this is unlikely in the short term.

10.3.10. Reptiles and Amphibians

Western painted turtles, which occur at the Irrigon WMA and McCormack Slough, Umatilla NWR are expected to incur severe population reductions with implementation of the proposed drawdown alternatives. The western painted turtle is identified as a sensitive (critical) species by the ODFW. It is not known whether a viable population could be maintained following drawdown of the John Day Reservoir, regardless of the alternative. The ponds inhabited by turtles at Irrigon WMA and McCormack Slough would permanently dry up. The ponds within the management area would dry up during the drawdown period, which would be 50 days for the Spillway Crest alternative, or 100 days for the Natural River alternative. While some turtles could successfully traverse the 3,000 to 4,000 feet to the river, habitat conditions along the new river channel would be unsuitable (i.e., there would be no suitable or comparable foraging and escape cover). There is no alternate suitable habitat for western painted turtles in the study area. Consequently, turtles would be subject to predation by coyote, fox, raccoon, and other species. Attrition of adults would probably be

substantial under the drawdown alternatives. Neonate survival and thus recruitment into the population would be entirely compromised by loss of these backwater areas and their emergent and submergent plant communities, on which neonates are dependent for forage and cover.

The loss of 2,854 acres of wetland and riparian habitat, and loss of as much as 8,836 acres of shallow water habitat (regardless of the alternative) may result in substantial adverse consequences to native amphibian populations in the study area. The magnitude of potential effects would depend upon the season of drawdown and the natural history of the particular species. Recruitment of any of the amphibian species present could be significantly jeopardized, particularly if drawdown occurred before young metamorphose.

In the long term, widespread and abundant species such as long-toed salamander and tree frog may be unaffected. Species such as spadefoot toad that are largely terrestrial may also be relatively unaffected in the long term. However, the northern leopard frog may be the most adversely affected amphibian due to the significant anticipated loss of riparian, wetland, and shallow water habitats. This species has a limited distribution, and depends on marshes, shallow water habitats, and dense cover. It is the most aquatic of the native amphibians in the study area. It spends its winters hibernating on the bottom of ponds and sluggish streams, and breeds in shallow vegetated margins of ponds and other slow-moving waters. Woodhouse's toad may likewise be adversely affected in both the short term and long term. This species is usually found near permanent water throughout the year.

The non-native bullfrog may be adversely affected by the loss of ponds and other slow-moving waters, but a decline in the abundance and distribution of this species would benefit native amphibian, reptiles, small mammals, and other wildlife, upon which bullfrogs prey.

10.3.11. Federal Endangered, Threatened, and Sensitive Species

The number of wintering bald eagles along the John Day Pool is not expected to substantially decline under the proposed alternative. While the number of wintering waterfowl (principal prey) may decline, alternate prey may be available. The loss of potential perch trees adjacent to the water would not substantially affect this species, as ground perching is a common practice among some populations of bald eagles (e.g., treeless areas of Alaska). Peregrine falcons would not be affected by the proposed alternatives in the short term or long term. Peregrine falcons may forage within an area of as much as 40 square miles around their nest site, and take a variety of prey species (e.g., shorebirds, passerines, gulls, rock doves, etc.). This flexibility makes it unlikely that the reduction in riparian and wetland habitat would result in a decreased availability of avian prey for peregrine falcons. The drawdown would expose steep cliffs in the lower end of this reach of the river. This may offer potential nesting habitat for peregrine falcons in the long term.

10.4. Miscellaneous Impacts

Each of the proposed drawdown alternatives would result in increased turbidity and suspended solids in the John Day and downstream reservoirs. The magnitude of these effects would be greater under the Natural River alternative than the Spillway Crest alternative. Turbidity and sedimentation would result from erosion of areas exposed during drawdown, including scouring of the extensive deltas formed at the mouths of tributary streams including the Umatilla River, Willow Creek, Rock Creek, and the John Day River. A

substantial volume of sediment has likely accumulated in John Day Reservoir that would be released upon alteration or removal of the John Day Dam. Construction activities, including the installation and removal of coffer dams, installation of riprap, and the dredging of sediments, will also increase turbidity and sedimentation. It is estimated that it would take from two to 15 years for the John Day Pool reach of the Columbia River to attain equilibrium following drawdown (see *Water Quality Section of Engineering Technical Appendix*). During this time, elevated levels of suspended sediments and turbidity are likely. Lake Celilo, the pool upstream of The Dalles Dam, would be subject to considerable deposition of sediments upon reaching the slack water of the pool. Shallow waters and wetlands would be subject to much of this deposition. Wetland and riparian habitat may result from this deposition depending upon location and initial water depth.

The redistribution of sediments may potentially result in the release of environmental contaminants bound to existing sediments. Some compounds such as organochlorines and dioxins, which can be found bound to sediments, are known to be to toxic or have a detrimental effect upon fish and wildlife. The potential release of such compounds into solution during movement of sediments is not known at this time, but would be evaluated during Phase 2 (feasibility and National Environmental Policy Act (NEPA) evaluations).

Regardless of the alternative, approximately 50 miles of the estimated 152 miles of exterior shoreline of a new river channel would need to be armored with riprap to protect railroad and highway embankments. Seeding would stabilize the remaining shoreline area, including islands. Including islands, the total shoreline area would be 599 miles for the Spillway Crest alternative, and 618 miles for Natural River alternative. Some areas would also be planted with trees and shrubs (see Section 11. Mitigation Opportunities, below). However, the riprap would substantially limit the ability for habitat to reestablish in this reach of the Columbia River, and may inhibit the ability to establish riparian vegetation that could provide shade, structure, organic input, and other elements of a healthy aquatic ecosystem.

There is a very high potential that invasive and other weeds would become established in the barren drawdown zone. Species such as cheatgrass, knapweed, thistles, and other undesirable plants are likely to become established. Without a concerted vegetation management effort, some of these species could potentially prevent the successful establishment of native vegetation or beneficial species (e.g., species used to stabilize and protect embankments). This issue would require considerable attention as part of Phase 2.

It is not known at this time where dredged material from the project would be disposed. Dredging would occur in the navigation channel, at the mouths of streams (to provide fish passage), as well as in the commercial ports. The total quantity of dredge material is currently estimated to be approximately 5,774,000 cubic yards for Spillway Crest or 9,346,000 cubic yards for Natural River alternative. At a depth of 15 feet, at least 274 or 519 acres for the Spillway Crest and Natural River alternatives, respectively would be needed to dispose of this material. A more accurate estimation of the amount would be determined during a Phase 2 study. It is also unknown where riprap would be obtained. Additional impacts to habitats and wildlife are anticipated to arise, as engineering, mitigation, and other detail is developed during a Phase 2 feasibility and NEPA assessment.

Section 11. Mitigation Opportunities

USACE planning guidance policy, as outlined in ER 1105-2-100, 28 Dec 90, would be used in determining mitigation requirements and for establishing the level of replacement for lost wildlife refuge areas. This issue would be resolved during a Phase 2 evaluation, however, for the purposes of this reconnaissance assessment, it is assumed that present conditions would be the goal of any mitigation efforts. Any potential replacement would be evaluated from both economic and practicable standpoints. Any replacement or mitigation would be initially directed to in-kind (of the same type of habitat and species) with a focus on maximizing efforts on on-site federal lands, rather than purchasing of off-project lands. Out-of-kind replacement (managed for different habitats and species) would be considered, as appropriate, and would be coordinated with resource agencies. In all cases, mitigation refers to replacement of existing facilities or elements within the John Day Pool, John Day Reservoir. Mitigation opportunities are described in this section.

Wildlife habitat management opportunities could include avoiding impacts, minimizing the magnitude or extent of impacts, restorating habitat, or creating habitat. Several measures would be undertaken on site during drawdown of the pool. Other measures are recommended to further minimize and/or mitigate for adverse impacts anticipated from the alternatives and/or restore or create wildlife habitat.

As previously mentioned, portions of the total drawdown zone would be riprapped to protect infrastructure (i.e., rail and road embankments). However, all drawdown areas (including islands) would be seeded to vegetate and stabilize barren slopes to the greatest extent practicable. For this reconnaissance evaluation, it is assumed that wetland and riparian habitats may potentially establish within an elevation range of one foot above to two feet below average spring (March) water surface elevations. The drawdown zone above this area would be planted with a mix of upland grass seed. For the Spillway Crest alternative, this would be approximately 21,684 acres. Approximately 29,186 acres of the Natural River drawdown zone would likewise be seeded. Native species would be preferred, and would include bluebunch wheatgrass, Idaho fescue, Indian ricegrass (*Orzyopsis hymenoides*), and needle and thread grass (*Stipa comata*).

Based on predicted March surface water levels, it was determined that approximately 1,126 acres of the Spillway Crest drawdown zone may be suitable for establishing wetland or riparian vegetation to replace the areas lost due to drawdown. For the Natural River alternatives, approximately 1,439 acres of the drawdown zone may be suitable (Table 6). Therefore, approximately 1,126 acres along the new shoreline of the Spillway Crest alternative would be seeded with a mix of native wetland plants, including hardstem bulrush (*Scirpus acutus*), softstem bulrush (*Scirpus tabernaemontani*), Columbia sedge (*Carex aperta*), Baltic rush (*Juncus balticus*), and common cattail (*Typha latifolia*). For the Natural River alternative, the area seeded for wetland vegetation would be approximately 1,439 acres. Approximately 50 percent of this potential wetland and riparian zone would also be planted with native willow and other trees and shrubs to facilitate the development of habitats other than herbaceous. This proportion is similar to the proportion of forest and shrub riparian habitats compared to emergent riparian and wetland habitats that were lost when the John Day Pool was first inundated. Establishing upland, emergent marsh, and aquatic plant communities could occur within three to five years. Riparian habitat, however, would take at

least 25 years to attain present conditions. Fertilizer and herbicides would be applied only where appropriate to aid in the establishment of these new habitats along the Columbia River. Such efforts would improve the establishment of desirable vegetation and permit control of invasive weeds.

Table 6.
Potential Habitat Development Opportunities, by Drawdown Alternative

Potential Habitat Types	Approximate Area (acres)	
	Spillway Crest	Natural River
Upland	21,684	29,186
Wetland or Riparian	1,126	1,439
Shallow-Water Habitats (ponds, embayments, and tributary backwaters)	5,539*	8,412*
Islands**	5,361	6,178

* Velocity would not be suitable for waterfowl in most of this area

** Includes upland and wetland or riparian habitat types

Table 7 compares the habitats that may potentially become established following implementation of a drawdown scenario, with present conditions, and with those habitats estimated to have been present before the dam was constructed. It is important to note, however, that due to sedimentation and other factors, it is highly unlikely that habitats that existed prior to inundation behind the John Day Dam could be achieved following drawdown.

Table 7.
Comparison of Habitat Development Potential, by Alternative, with Current and Pre-dam Conditions

		Habitat Types (acres)				
		Riparian	Wetland	Wetland/Riparian Total	Shallow Water	Island
Pre Dam Condition		2,171	1,689	3,860	192	8,385
Present Condition		571	2,283	2,854	8,836	1,755
Balance		**-1,600**	**+594**	**-1,006**	**+8,644**	**-6,630**
Drawdown Alternatives with Estimated Acreage for Wetland/Riparian Habitat Development						
Spillway Crest Alternative		563	563	1,126	5,539	5,361
Balance	**Relative to Pre-Dam**	**-1,608**	**-1,126**	**-2,734**	**+5,347**	**-3,024**
	Relative to Present	**-8**	**-1,720**	**-1,728**	**-3,297**	**+3,606**
Natural River Alternative		720	720	1,439	8,412	6,178
Balance	**Relative to Pre-Dam**	**-1,451**	**-969**	**-2,421**	**+8,220**	**-2,207**
	Relative to Present	**+149**	**-1,563**	**-1,415**	**-424**	**+4,423**

In addition to the on-site seeding and planting opportunities described above, other opportunities to avoid and minimize adverse impacts to wildlife resources may be possible

during project development and implementation. However, the identification of specific mitigation needs and appropriate and suitable lands would require in-depth evaluations that are not possible in this reconnaissance-level investigation.

Consideration should be given to establishing large, woody debris and other structural elements along the new river shoreline. Such structure would provide habitat for a wide variety of wildlife species (e.g., basking sites for painted turtles). However, the feasibility of debris placement may be compromised by pool fluctuations.

Future studies should identify potential suitable shallow-water locations (i.e., slow-moving backwater areas) for submergent vegetation such as potamogeton, and should consider establishing appropriate submergent vegetation to expedite the reestablishment of such habitats.

The population of western painted turtles at the Irrigon WMA should be studied to identify the population status and demographics. Consideration should be made to temporarily relocating or foster-caring as many individual turtles as possible.

Consideration should be given to the use of bioengineering and other methods of bank stabilization methods, in order to minimize the extent of riprap. This may increase the potential establishment of riparian vegetation along the new river channel. As an alternative, vertical sheet piling or retaining walls could be considered in selected areas to minimize the extent of riprap.

Native seed and cuttings should be collected where possible from existing riparian and wetland habitats in the study area. Consideration should be given to collecting seed and/or cuttings from sites within McCormack Slough and Paterson Slough.

A number of on-site opportunities were evaluated during earlier consideration of drawdown of the John Day Reservoir to elevation 257 feet (Minimum Operating Pool). In this previous assessment, pumping, irrigation, diking, and other means of maintaining water to existing wetland and riparian habitats were proposed. However, for the Spillway Crest alternative (213 feet) and Natural River alternative (165 feet), a significant change in hydrology would occur. March surface water levels would drop from 20 to 27 feet. Coupled with high soil permeability (4 - 29 inches per hour) and lack of water rights, it is likely to be impractical to implement such options for the alternatives considered in this reconnaissance evaluation. However, these options would be further investigated in any Phase 2 study.

Any off-site mitigation would be significantly more costly than on-site mitigation based on the need for land acquisition, and the potential need for extensive vegetation modification and land management. Off-site mitigation would require the identification and acquisition of lands where development of wildlife habitats and/or populations are comparable to those lost by project implementation, i.e., wetland, riparian, and shallow water habitats.

With the loss of the Umatilla NWR, it may be feasible to enlarge or improve habitat quality in existing refuges elsewhere in the region. Examples include carp eradication, water quality improvement, aquatic weed control, which have been demonstrated at both Malheur and Umatilla NWRs to improve the occurrence and production of waterfowl and other aquatic-associated species.

11.1. U.S. Fish and Wildlife Service Recommendations

A Planning Aid Letter from the USFWS includes recommended mitigation for the alternatives, and a recommended course of action. This Planning Aid Letter is included as Attachment C. Should this project proposed action proceed to Phase 2 and the development of an Environmental Impact Statement (EIS) for NEPA compliance, specific mitigation measures would be developed in coordination with the resource agencies, and detailed in the NEPA documents. In addition, the USFWS would submit a Coordination Act Report detailing specific mitigation recommendations.

Section 12. References

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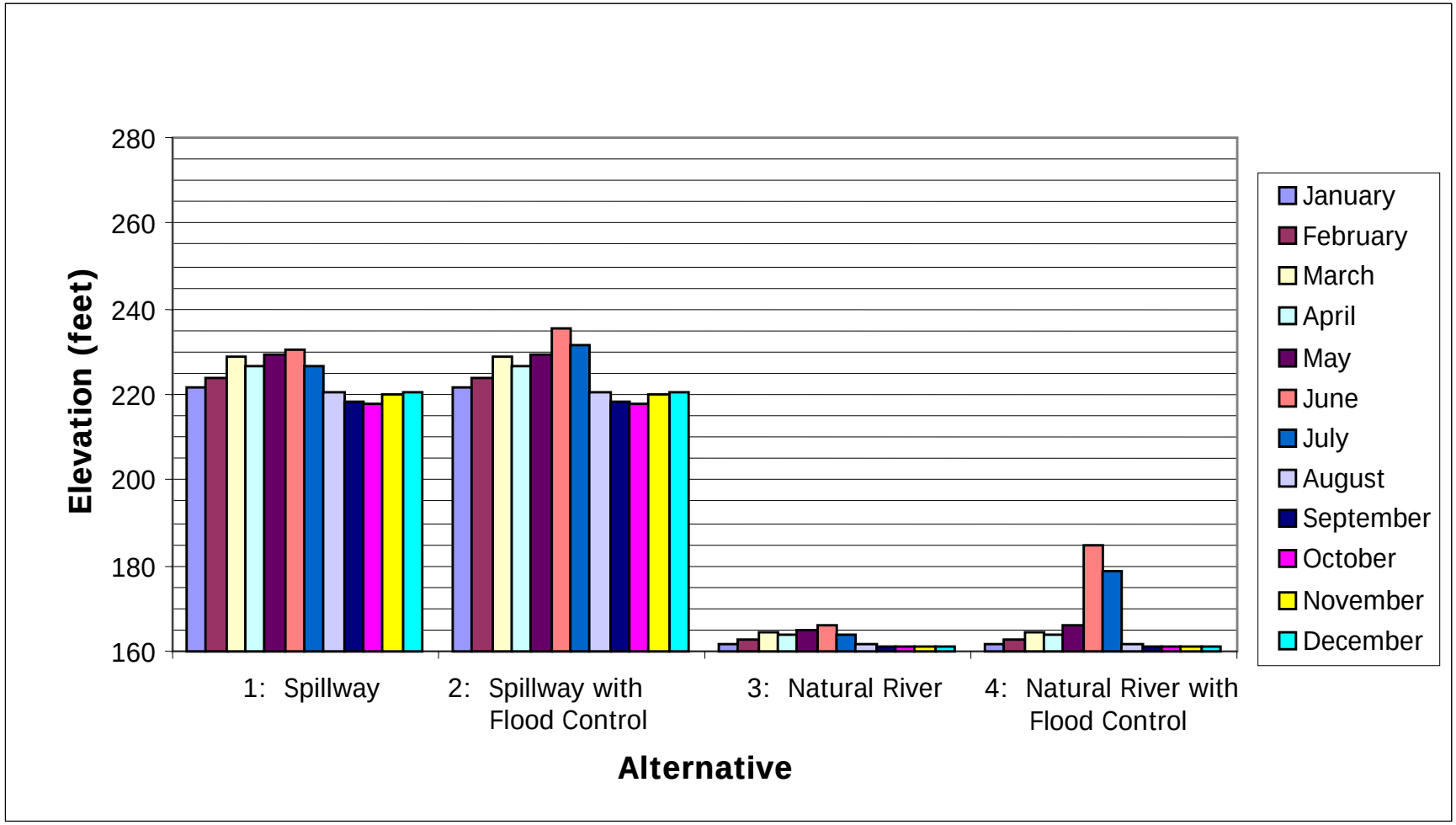
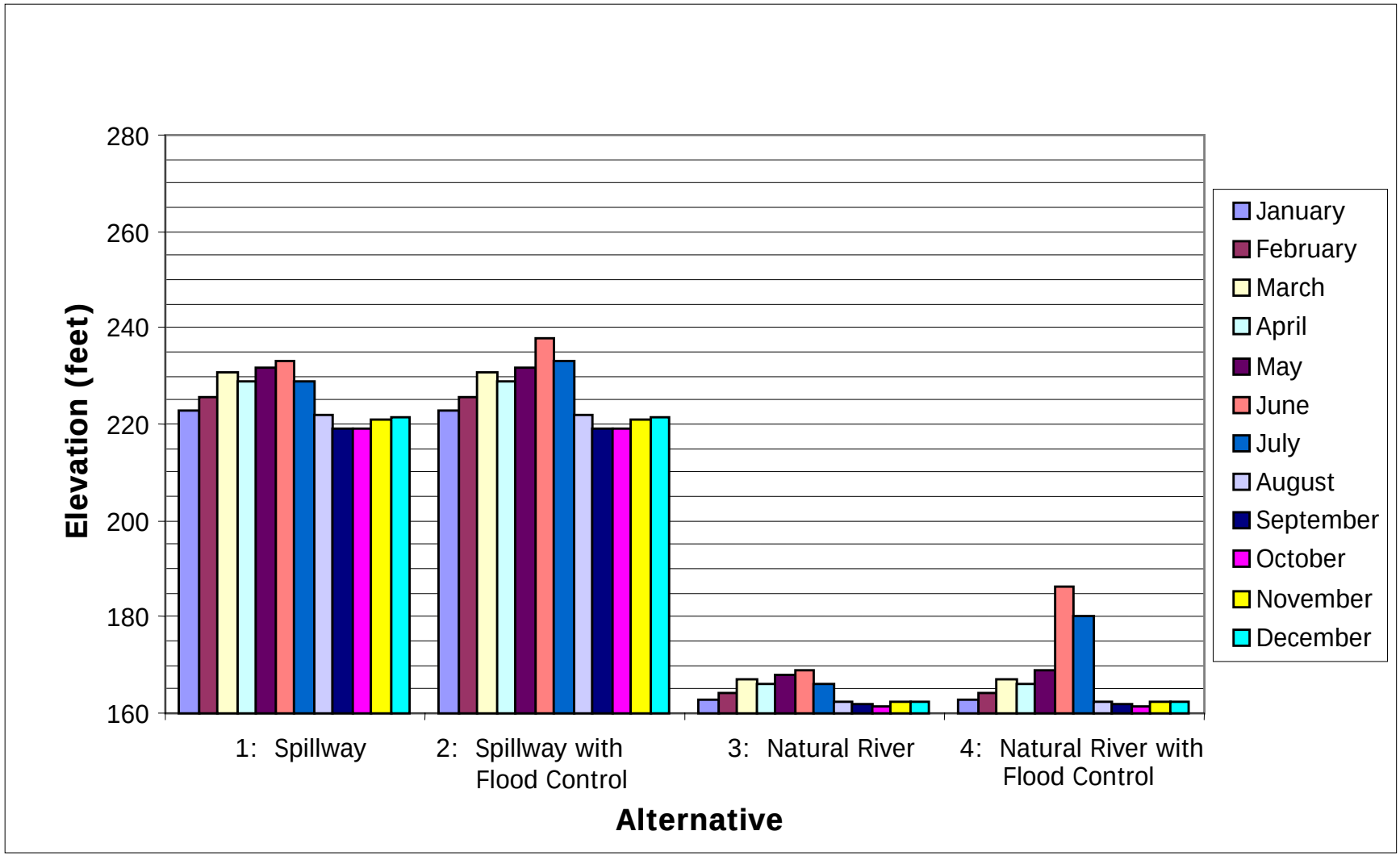
Attachment A. Hydrological Data from the John Day Drawdown Study

(from West Consultants, Inc. 1999)

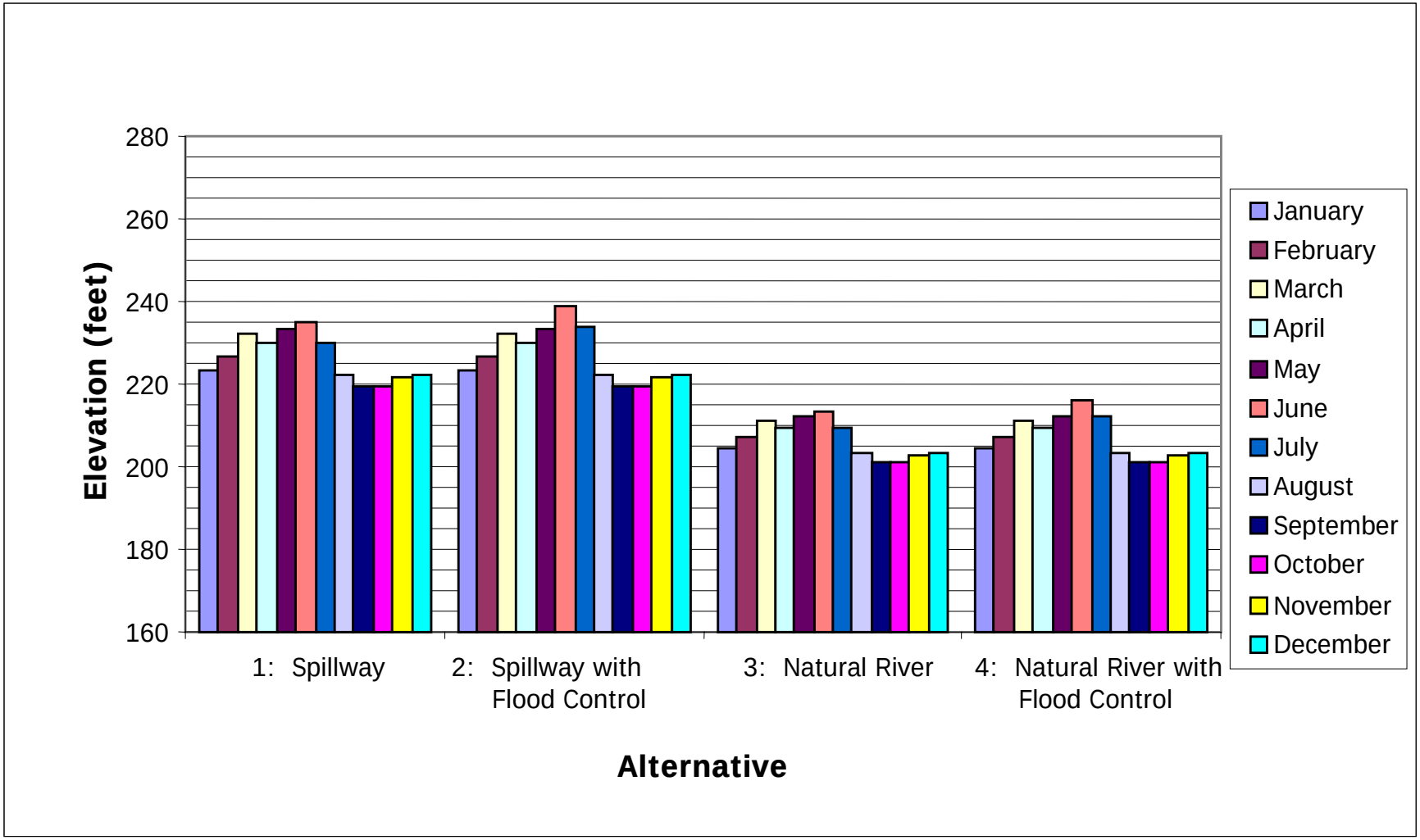
Monthly Mean Stage (RM 215.63 John Day Forebay)



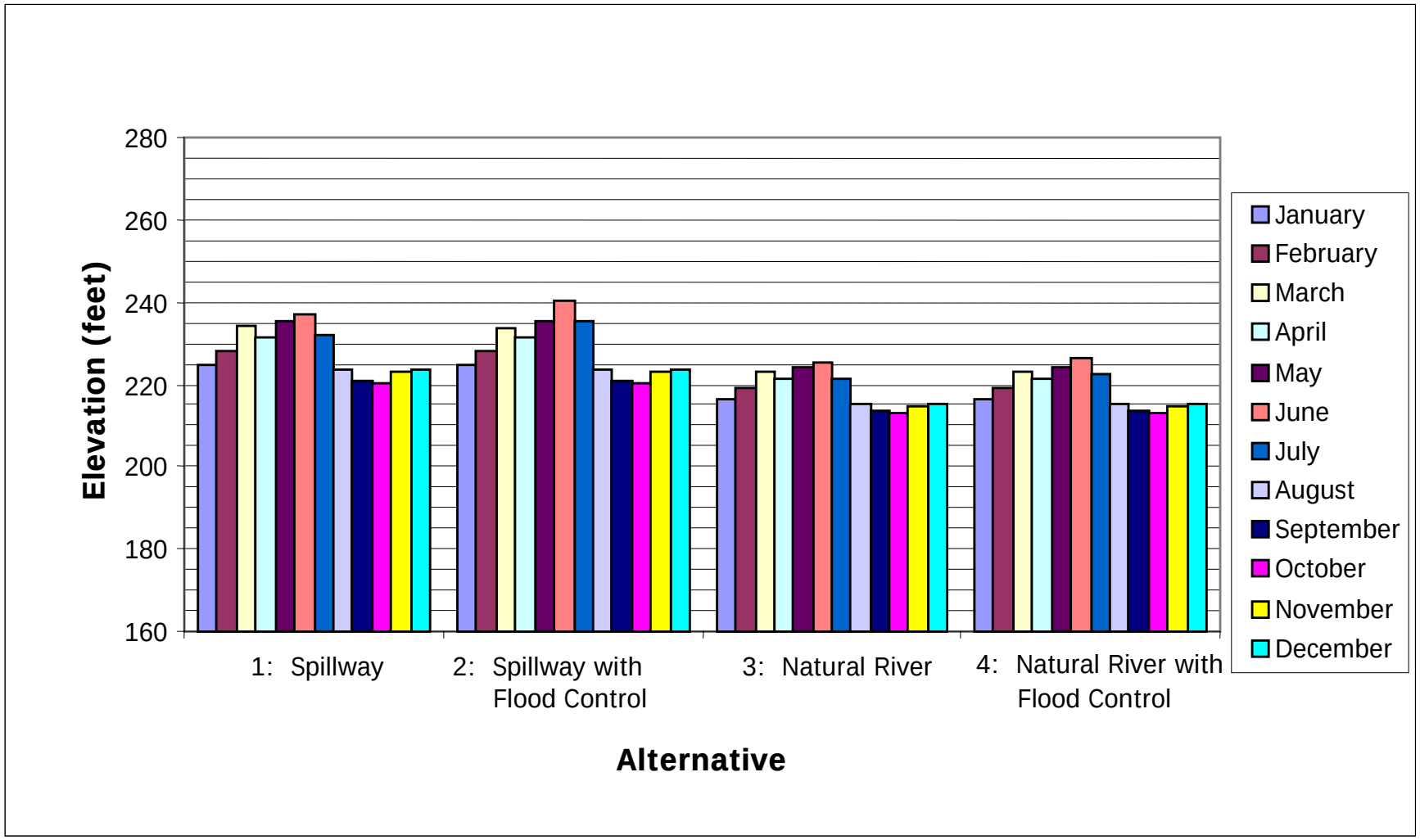
Monthly Mean Stage (RM 218.26 John Day River)



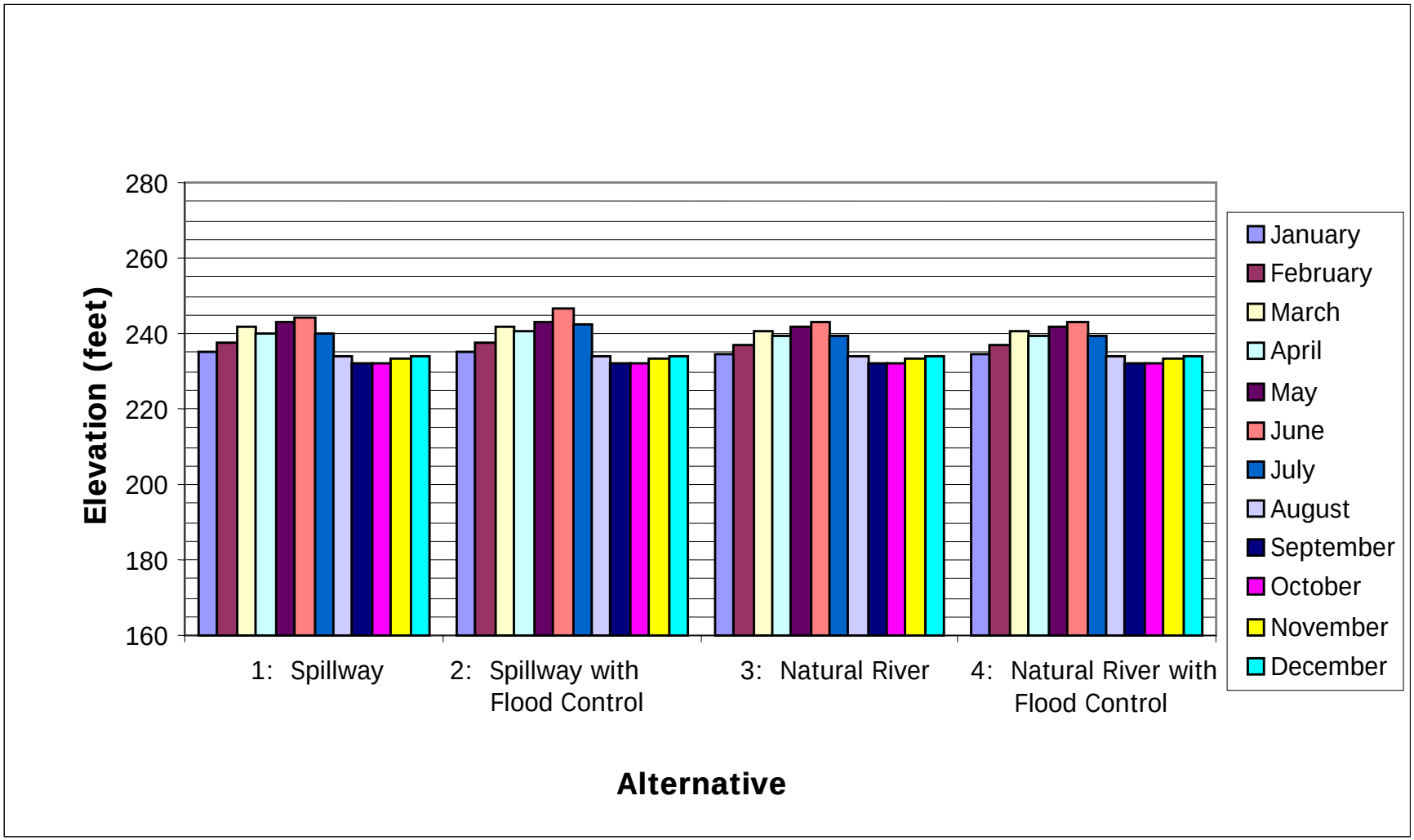
Monthly Mean Stage (RM 252.77 Willow Creek)



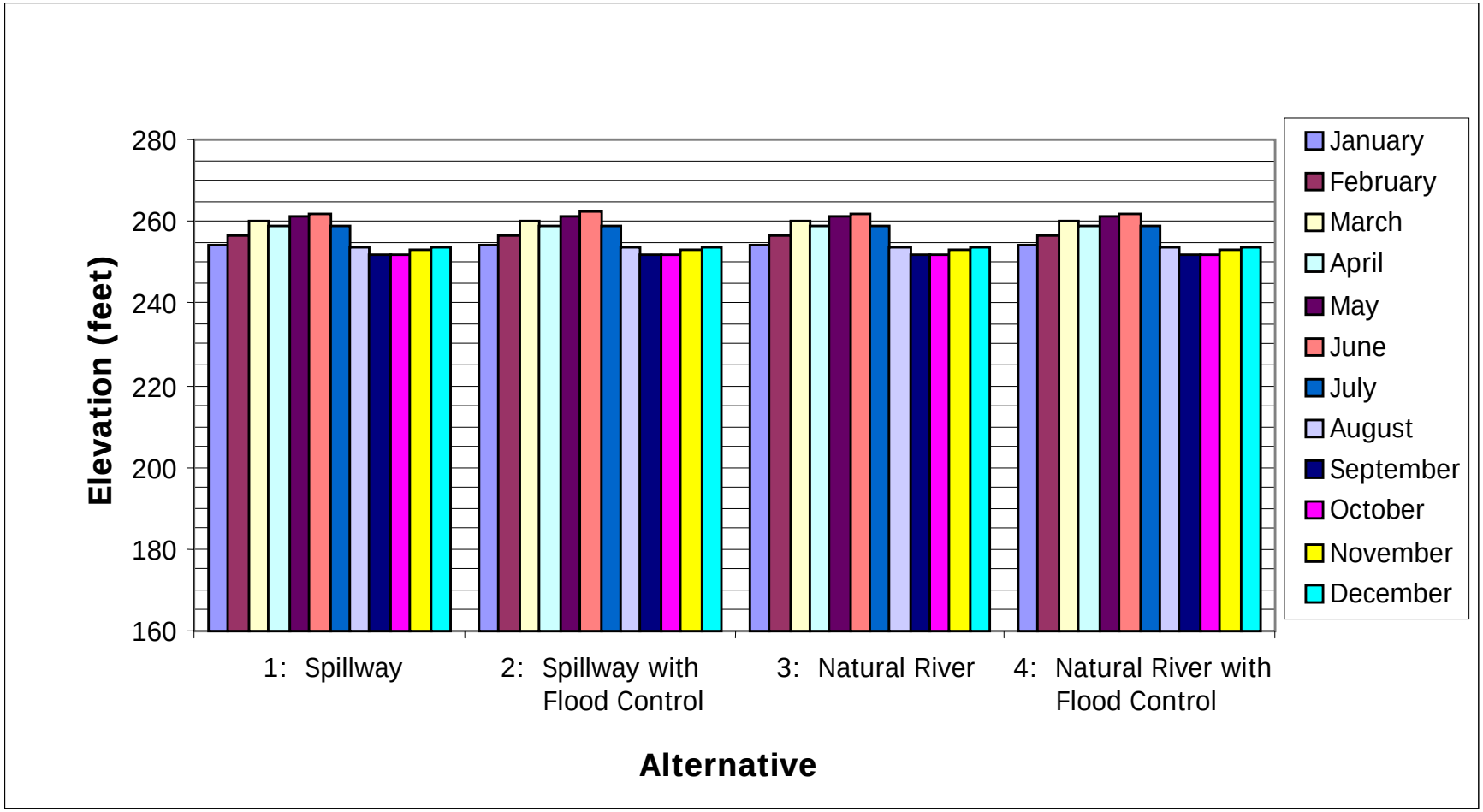
Monthly Mean Stage (RM 264.45 Crow Butte/Whitcomb Island)



Monthly Mean Stage (RM 276.41 McCormack Slough/Paterson Slough)



Monthly Mean Stage (RM 289.21 Umatilla River)



Predicted Monthly Mean Surface Water Elevations, by Alternative, based on 1982 flow data
(from West Consultants, Inc.)

RM 215.63 John Day Forebay

Month	1: Spillway	2: Spillway with Flood Control	3: Natural River	4: Natural River with Flood Control
January	221.62	221.62	161.63	161.63
February	224.00	224.00	162.61	162.61
March	228.53	228.53	164.49	164.49
April	226.78	226.78	163.64	163.64
May	229.39	229.50	165.03	166.15
June	230.67	235.67	165.78	184.80
July	226.86	231.40	163.78	178.54
August	220.73	220.73	161.45	161.45
September	218.31	218.31	160.91	160.92
October	217.96	217.96	160.87	160.87
November	220.14	220.14	161.22	161.22
December	220.38	220.38	161.31	161.31

RM 218.26 John Day River

Month	1: Spillway	2: Spillway with Flood Control	3: Natural River	4: Natural River with Flood Control
January	222.83	222.83	162.87	162.87
February	225.55	225.54	164.36	164.36
March	230.74	230.74	167.15	167.15
April	228.72	228.71	165.94	165.94
May	231.75	231.84	167.86	168.79
June	233.28	237.70	168.86	186.44
July	228.84	233.05	166.07	180.00
August	221.86	221.86	162.55	162.55
September	219.23	219.23	161.64	161.65
October	218.86	218.86	161.57	161.57
November	221.16	221.16	162.19	162.19
December	221.44	221.44	162.33	162.32

RM 252.77 Willow Creek

Month	1: Spillway	2: Spillway with Flood Control	3: Natural River	4: Natural River with Flood Control
January	223.52	223.52	204.39	204.39
February	226.46	226.46	206.98	206.98
March	232.03	232.03	211.20	211.20
April	229.85	229.85	209.59	209.59
May	233.14	233.22	212.09	212.10
June	234.79	238.91	213.30	216.06
July	229.97	233.99	209.48	212.26
August	222.49	222.49	203.49	203.49
September	219.70	219.70	201.21	201.21
October	219.32	219.32	201.03	201.03
November	221.73	221.73	202.82	202.82
December	222.03	222.03	203.12	203.12

RM 264.45 Crow Butte / Whitcomb Island

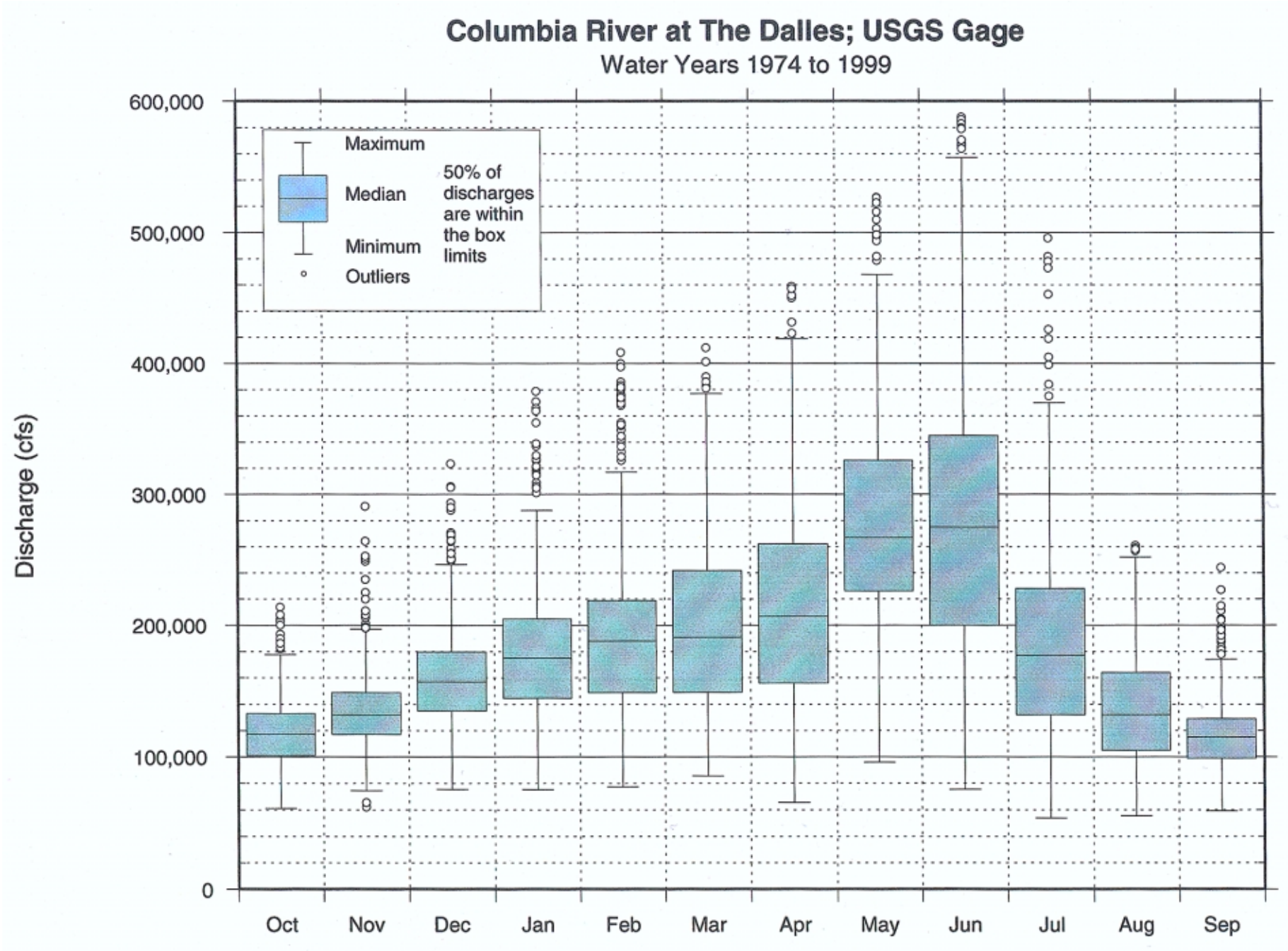
Month	1: Spillway	2: Spillway with Flood Control	3: Natural River	4: Natural River with Flood Control
January	224.97	224.96	216.41	216.42
February	228.14	228.13	219.01	219.01
March	233.96	233.95	223.30	223.30
April	231.68	231.67	221.60	221.60
May	235.13	235.19	224.25	224.25
June	236.85	240.54	225.53	226.49
July	231.75	235.41	221.49	222.53
August	223.86	223.86	215.53	215.53
September	220.91	220.90	213.35	213.35
October	220.54	220.54	213.21	213.21
November	223.05	223.04	214.94	214.94
December	223.38	223.38	215.21	215.21

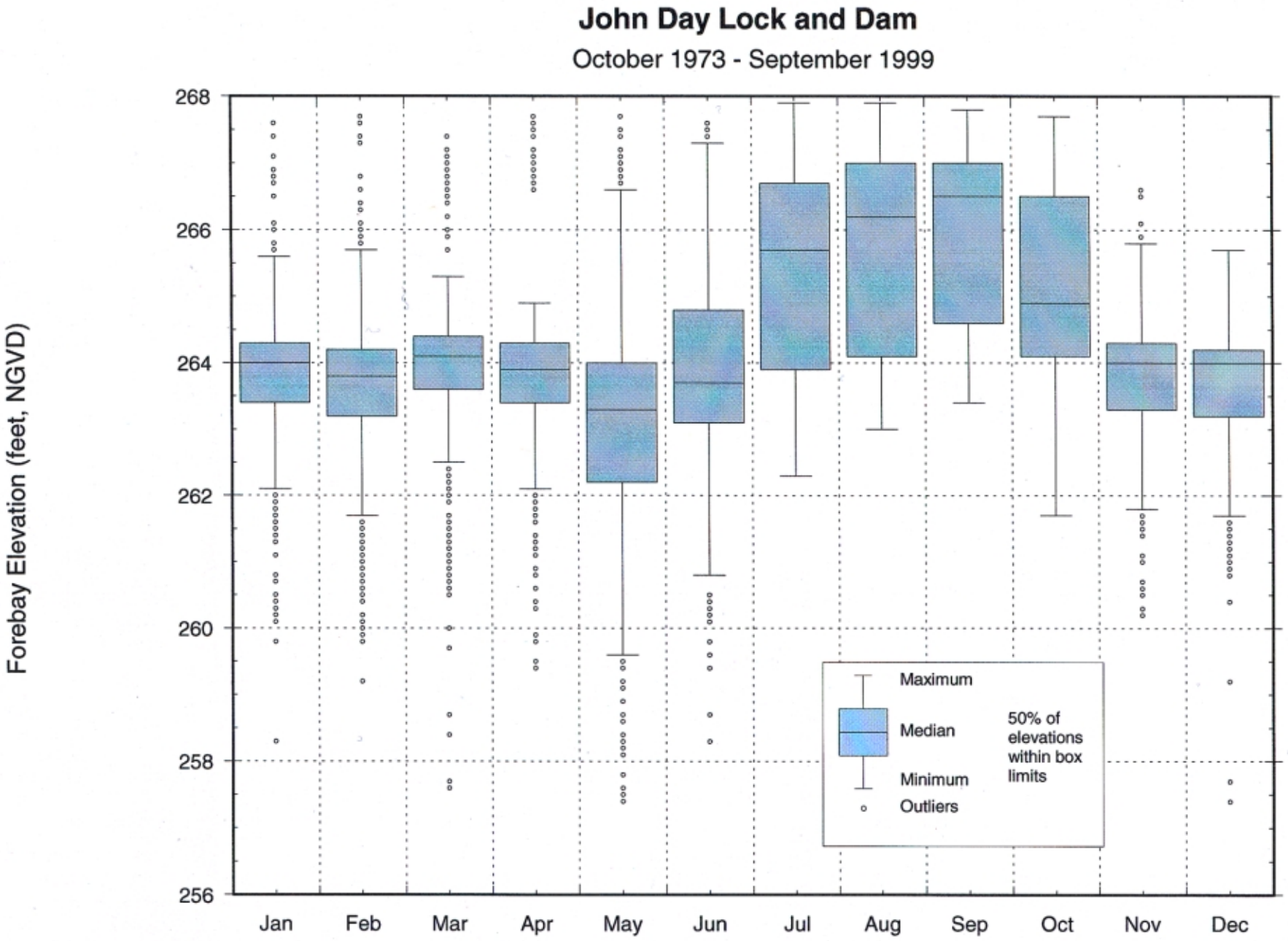
RM 276.41 McCormack Slough / Paterson Slough

Month	1: Spillway	2: Spillway with Flood Control	3: Natural River	4: Natural River with Flood Control
January	234.89	235.08	234.79	234.79
February	237.48	237.71	237.16	237.16
March	241.78	242.07	240.90	240.90
April	240.11	240.37	239.47	239.46
May	242.74	243.07	241.70	241.70
June	244.06	246.52	242.78	242.85
July	240.01	242.45	239.28	239.36
August	234.04	234.22	233.95	233.95
September	231.95	232.08	231.95	231.95
October	231.83	231.95	231.84	231.85
November	233.45	233.61	233.41	233.41
December	233.71	233.88	233.67	233.66

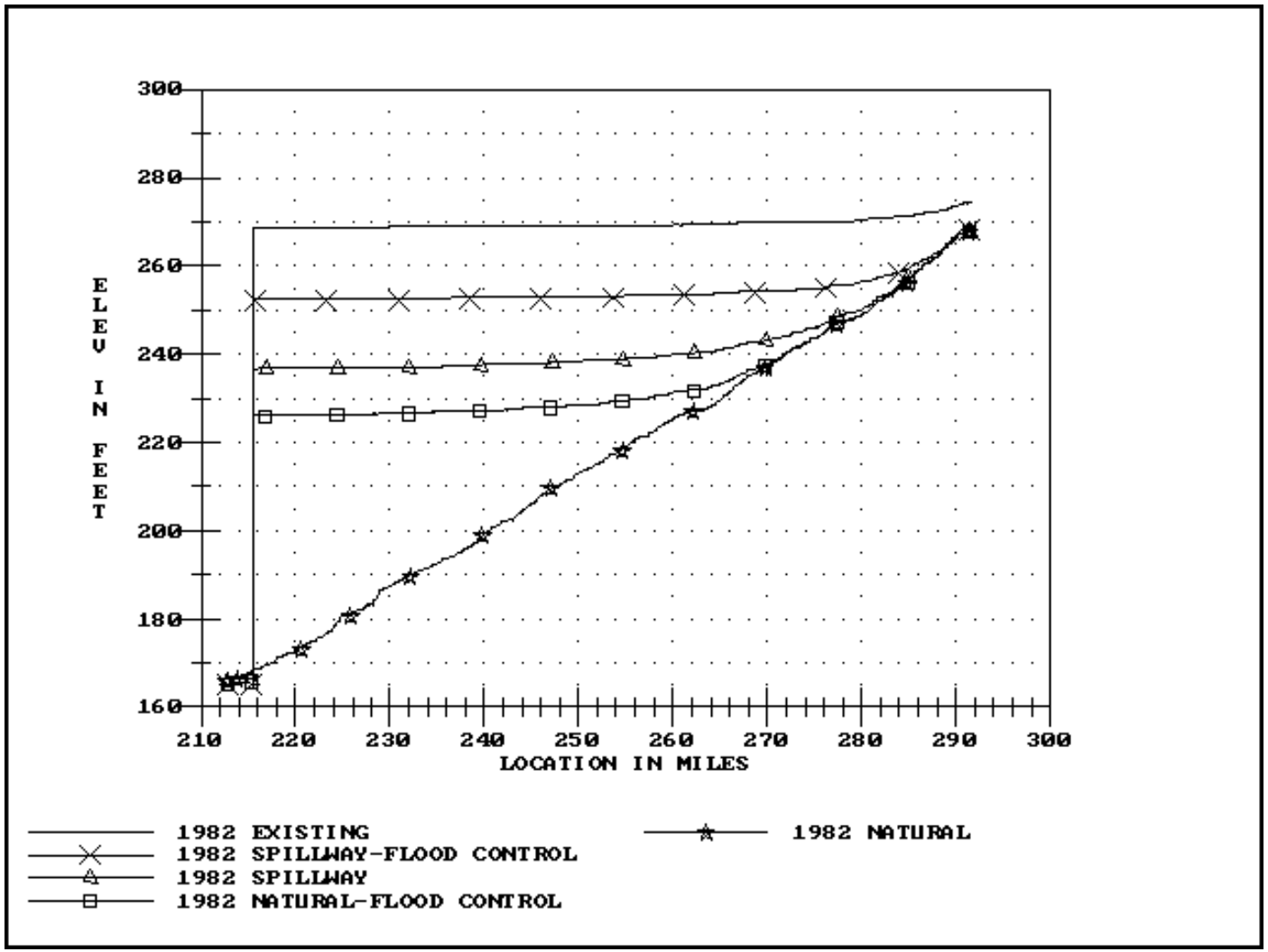
RM 289.21 Umatilla River

Month	1: Spillway	2: Spillway w/FC	3: Natural River	4: Natural River w/FC
January	254.53	254.53	254.53	254.53
February	256.78	256.78	256.78	256.78
March	260.23	260.24	260.21	260.21
April	258.93	258.93	258.91	258.91
May	261.03	261.04	261.00	261.00
June	262.12	262.38	262.06	262.07
July	258.78	259.04	258.76	258.76
August	253.76	253.76	253.76	253.76
September	251.88	251.88	251.88	251.88
October	251.81	251.81	251.81	251.81
November	253.21	253.21	253.21	253.21
December	253.46	253.46	253.46	253.46

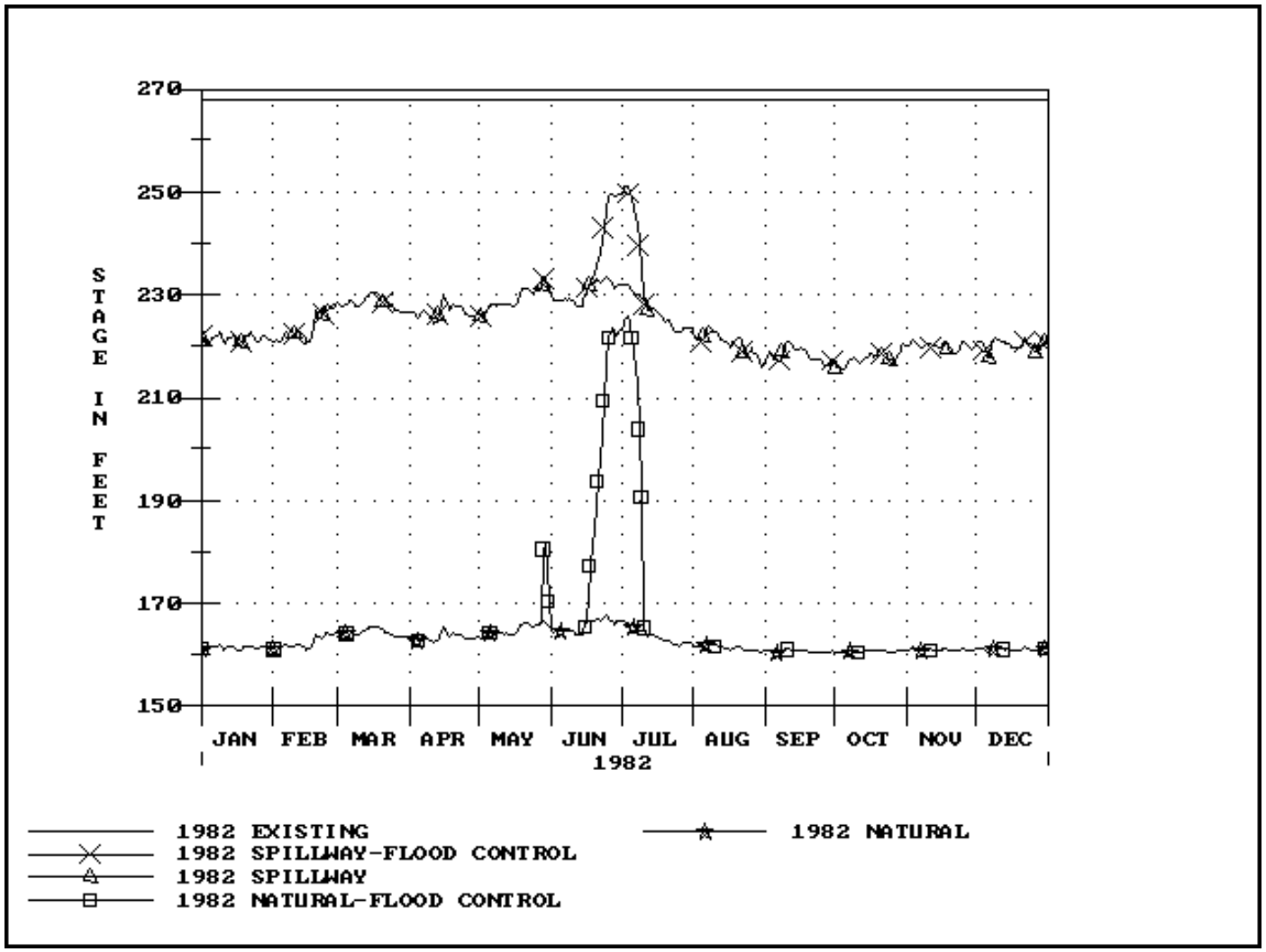

Columbia River at The Dalles; USGS Gage
Water Years 1974 to 1999
Discharge (cfs)
600,000
500,000
400,000
300,000
200,000
100,000
0
Maximum
Median
Minimum
Outliers
50% of discharges are within the box limits
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep


John Day Lock and Dam
October 1973 - September 1999
Forebay Elevation (feet, NGVD)
268
266
264
262
260
258
256
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Maximum
Median
Minimum
Outliers
50% of elevations within box limits

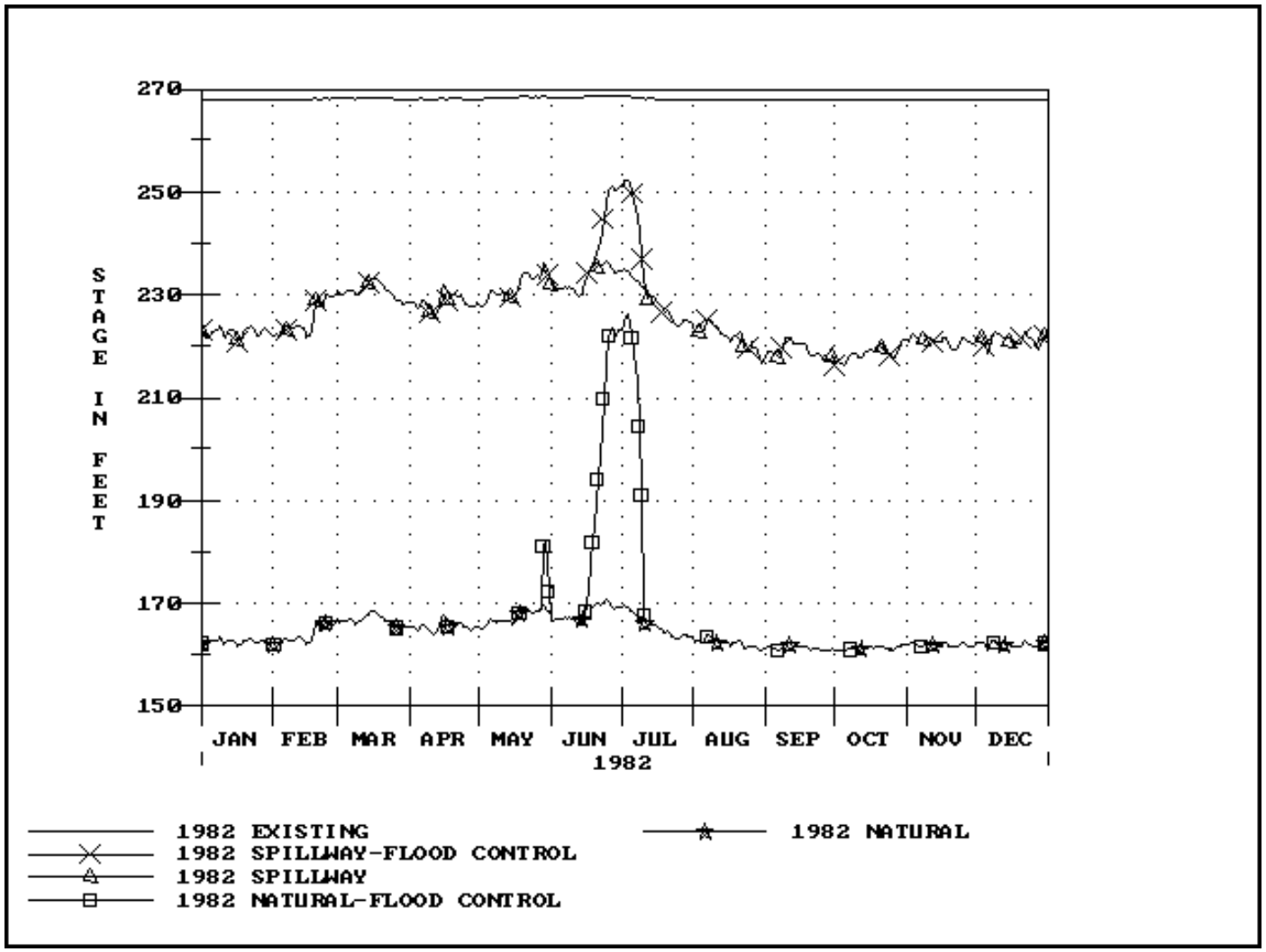
1982 Maximum Water Surface Profiles



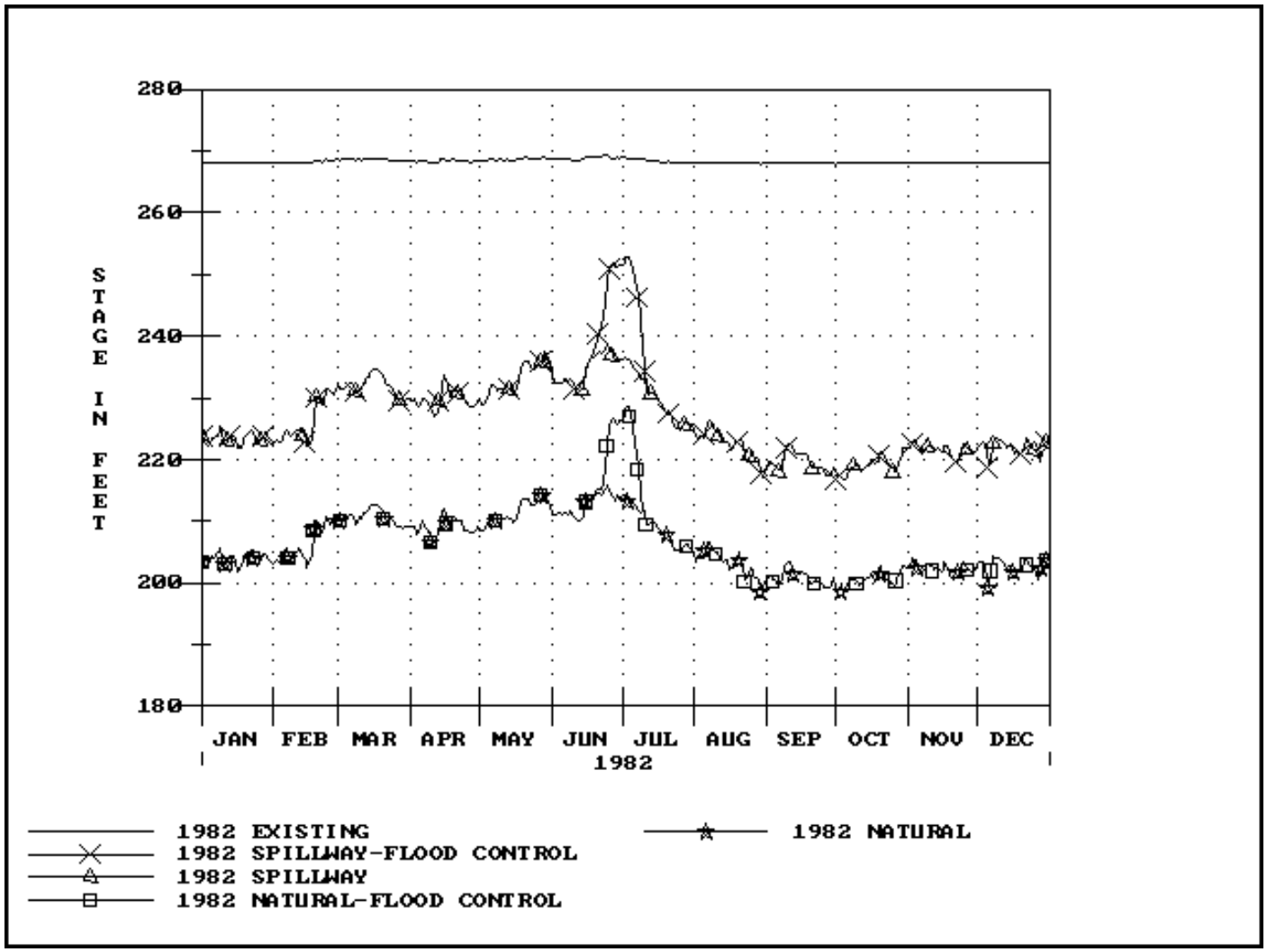
1982 Stage Hydrographs at John Day Forebay (River Mile 215.63)



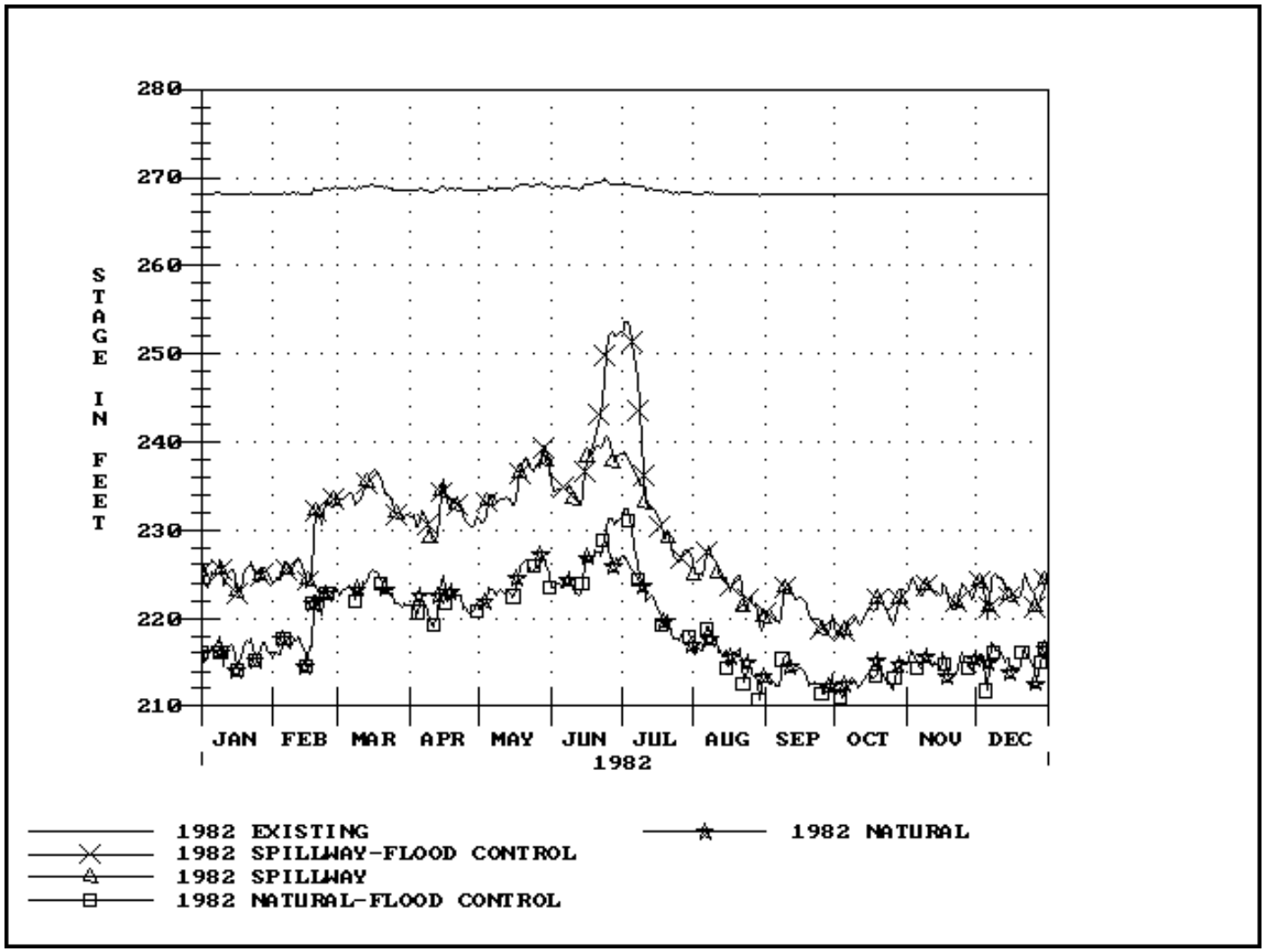
1982 Stage Hydrographs at John Day River Confluence (River Mile 218.23)



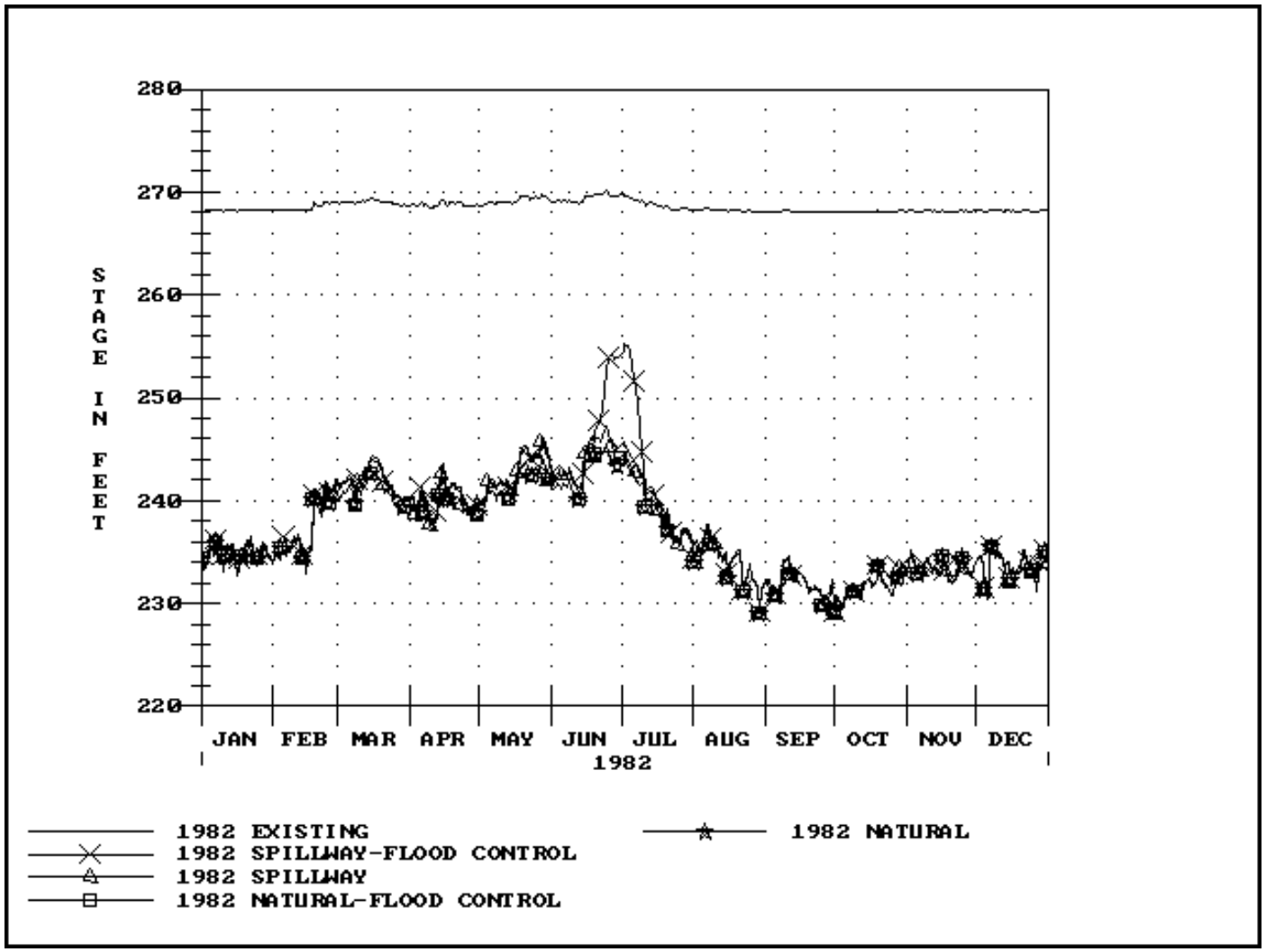
1982 Stage Hydrographs at Willow Creek Confluence (River Mile 252.81)



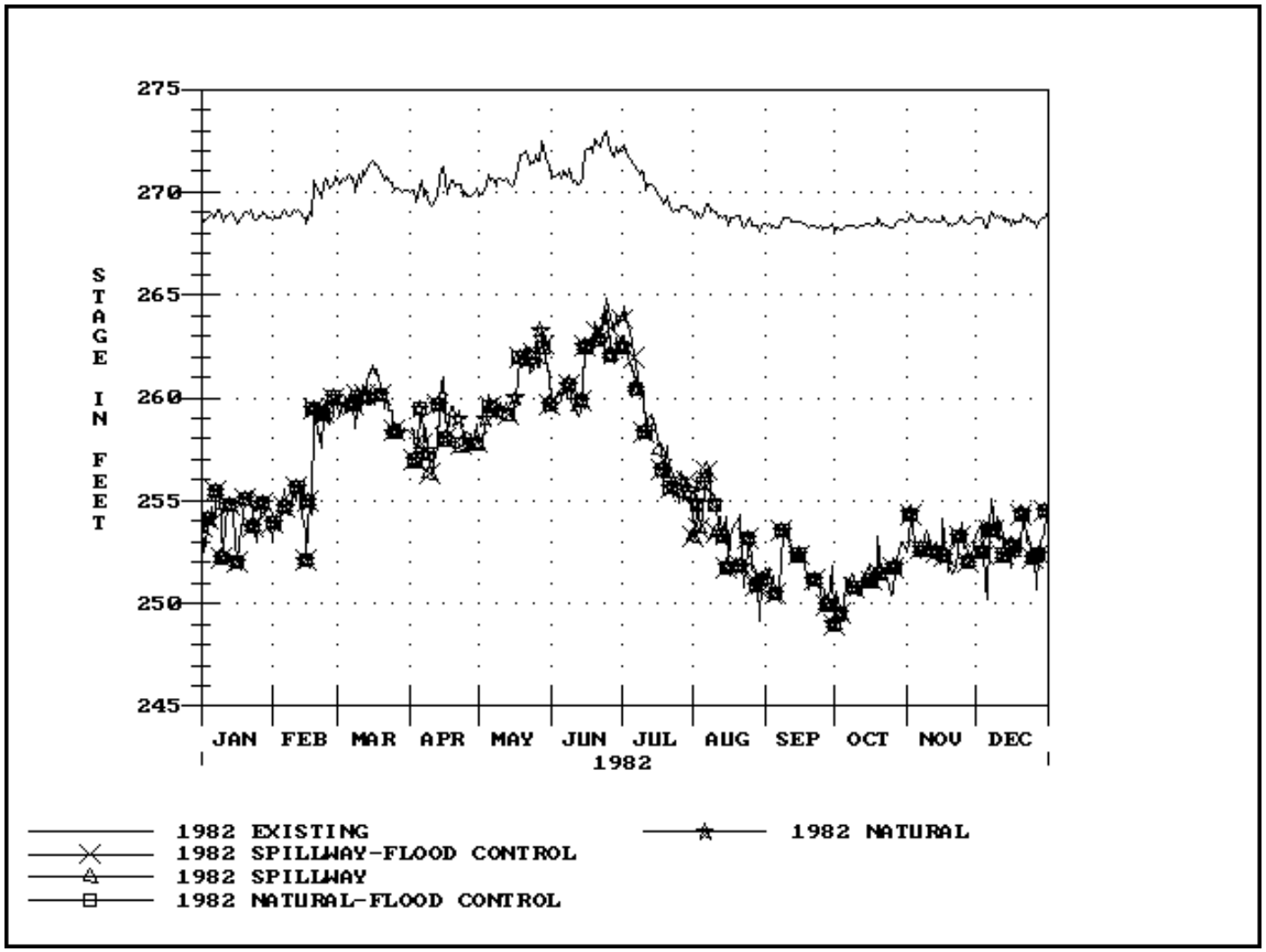
1982 Stage Hydrographs at River Mile 264.45



1982 Stage Hydrographs at River Mile 276.41



1982 Stage Hydrographs at Umatilla River Confluence (River Mile 289.23)



Attachment B. Wildlife Species Expected in John Day Pool Study Area

(Compiled from Rasmussen and Wright, 1990; USFWS, 1994; and USACE, 1995)

Attachment B. Wildlife of the John Day Study Area

(Compiled from Rasmussen and Wright 1990, USFWS 1994, and USACE 1995)

Common Name	Scientific Name
Birds	
Common loon	*Gavia immer*
Pied-billed grebe [b]	*Podilymbus podiceps*
Horned grebe	*Podiceps auritus*
Eared grebe	*Podiceps nigricollis*
Western grebe	*Aechmophorus occidentalis*
Clark's grebe	*Aechmorphorus clarkii*
American white pelican	*Pelecanus erythrorhynchus*
Double-crested cormorant [b]	*Phalacrocorax auritus*
American bittern	*Botaurus lentiginosus*
Great blue heron [b]	*Ardea herodias*
Great egret	*Casmerodius albus*
Black-crowned night heron [b]	*Nycticorax nycticorax*
Turkey vulture [n]	*Cathartes aura*
White-fronted goose	*Anser albifrons*
Snow goose	*Chen caerulescens*
Canada goose [b]	*Branta canadensis*
Trumpeter swan	*Cygnus buddinator*
Tundra swan	*Cygnus columbianus*
Wood duck [b]	*Aix sponsa*
Gadwall [b]	*Anas strepera*
American wigeon [b]	*Anas americana*
Mallard [b]	*Anas platyrhynchos*
Blue-winged teal [b]	*Anas discors*
Cinnamon teal [b]	*Anas cyanoptera*
Northern shoveler [b]	*Anas clypeata*
Northern pintail [b]	*Anas acuta*
Green-winged teal [b]	*Anas crecca carolinensis*
Canvasback	*Aythya valisineria*
Redhead [b]	*Aythya americana*
Ring-necked duck [b]	*Aythya collaris*

[b] bird species that breed on the Umatilla National Wildlife Refuge

[n] neotropical migratory bird species

Common Name	Scientific Name
Greater scaup	*Aythya marila*
Lesser scaup [b]	*Aythya affinis*
Bufflehead	*Bucephala albeola*
Common goldeneye	*Bucephala clangula*
Barrow's goldeneye	*Bucephala islandica*
Hooded merganser [b]	*Lophodytes cucullatus*
Common merganser	*Mergus merganser*
Ruddy duck	*Oxyura jamiacensis*
Osprey [b n]	*Pandion haliaetus*
Bald eagle	*Haliaeetus leucocephalus*
Northern harrier [n]	*Circus cyaneus*
Sharp-shinned hawk [n]	*Accipiter striatus*
Cooper's hawk [n]	*Accipiter cooperii*
Northern goshawk [n]	*Accipiter gentilis*
Swainson's hawk [b n]	*Buteo swainsoni*
Red-tailed hawk [b n]	*Buteo jamaicensis*
Ferruginous hawk [n]	*Buto regalis*
Rough-legged hawk	*Buteo lagopus*
Golden eagle [n]	*Aquila chrysaetos*
American kestrel [b n]	*Falco sparverius*
Peregrine falcon [n]	*Falco peregrinus anatum*
Prairie falcon [n]	*Falco mexicanus*
Chukar [b]	*Alectoris chukar*
Gray partridge	*Perdix perdix*
Ring-necked pheasant [b]	*Phasianus colchicus*
California quail [b]	*Callipepla californica*
Virginia rail	*Rallus limicola*
Sora	*Porzana carolina*
American coot	*Fulica americana*
Sandhill crane	*Grus canadensis*
Black-bellied plover	*Pluvialis squatarola*
Semi-palmated plover	*Charadrius semipalmatus*
Killdeer [b n]	*Charadrius vociferus*
American avocet [b n]	*Recurnirostra americana*

[b] bird species that breed on the Umatilla National Wildlife Refuge

[n] neotropical migratory bird species

Common Name	Scientific Name
Greater yellowlegs	*Tringa melanoleuca*
Lesser yellowlegs	*Tringa flavipes*
Spotted sandpiper [b]	*Actitis macularia*
Long-billed curlew [b n]	*Numenius americanus*
Sanderling	*Calidris alba*
Western sandpiper	*Ereunetes mauri*
Least sandpiper	*Erolia minutilla*
Baird's sandpiper	*Calidris bairdii*
Pectoral sandpiper	*Calidris melanotos*
Dunlin	*Erolia alpina*
Long-billed dowitcher	*Limnodromus scalopaceus*
Common snipe	*Gallinago gallinago*
Wilson's phalarope [b n]	*Sreganopus tricolor*
Red-necked phalarope	*Phalaropus lobatus*
Franklin's gull	*Larus pipixcan*
Bonaparte's gull	*Larus philadelphia*
Ring-billed gull [b n]	*Larus delawarensis*
California gull [b n]	*Larus californicus*
Herring gull	*Larus argentatus*
Glaucous-winged gull	*Larus glaucensiens*
Caspian tern [b]	*Sterna caspia*
Forster's tern [b n]	*Sterna forsteri*
Rock dove [b]	*Columba livia*
Mourning dove [b n]	*Zenaida macroura*
Barn owl [b]	*Tyto alba*
Screech owl [b]	*Otus kennicottii*
Great horned owl [b]	*Bubo virginianus*
Burrowing owl [b n]	*Athene canicularia*
Long-eared owl [b n]	*Asio otus*
Short eared owl [b n]	*Asio flammeus*
Northern saw-whet owl	*Aegolius acadicus*
Common nighthawk [b n]	*Chordeiles minor*
White-throated swift [n]	*Aeronautes saxatalis*
Rufous hummingbird [b n]	*Selasphorus rufus*

[b] bird species that breed on the Umatilla National Wildlife Refuge

[n] neotropical migratory bird species

Common Name	Scientific Name
Belted kingfisher [b n]	*Ceryle alcyon*
Downy woodpecker [b]	*Picoides pubescens*
Hairy woodpecker	*Picoides villosus*
Northern flicker [b n]	*Colaptes auratus*
Western wood pewee [n]	*Contopus sordidulus*
Willow flycatcher [n]	*Empidonax traillii*
Hammond's flycatcher [n]	*Empidonax hammondii*
Dusky flycatcher [n]	*Empidonax oberholseri*
Western flycatcher [n]	*Empidonax difficilis*
Western kingbird [b n]	*Tyrannus verticalis*
Eastern kingbird [b n]	*Tyrannus tyrannus*
Loggerhead shrike [n]	*Lanius ludovicianus*
Northern shrike	*Lanius excubitor*
Warbling vireo [n]	*Vireo gilvus*
Solitary vireo [b n]	*Vireo solitarius*
Red-eyed vireo [n]	*Vireo olivaceus*
Black-billed magpie [b]	*Pica pica*
Common crow [b]	*Corvus brachyrhynchos*
Common raven	*Corvus corax*
Horned lark [b n]	*Eremophila alpestris*
Tree swallow [n]	*Tachycineta bicolor*
Northern rough-winged swallow [n]	*Stelgidopteryx serripennis*
Bank swallow [b n]	*Riparia riparia*
Cliff swallow [b n]	*Hirundo pyrrhonota*
Barn swallow [b n]	*Hirundo rustica*
Black-capped chickadee [b]	*Parus atricapillus*
bushtit	*Psaltriparus minimus*
Red-breasted nuthatch	*Sitta canadensis*
White-breasted nuthatch	*Sitta carolinensis*
Brown creeper	*Certhia familiaris*
Rock wren [b n]	*Salpnetes obsoletus*
Canyon wren	*Catherpes mexicanus*
Bewick's wren [b]	*Thryomanes bewickii*
Winter wren	*Troglodytes troglodytes*

[b] bird species that breed on the Umatilla National Wildlife Refuge

[n] neotropical migratory bird species

Common Name	Scientific Name
House wren	*Troglodytes aedon*
Marsh wren [b n]	*Cistothorus palustris*
Golden-crowned kinglet [n]	*Regulus satrapa*
Ruby-crowned kinglet [b n]	*Regulus calendula*
Townsend's solitaire [n]	*Myadestes townsendi*
American robin [b n]	*Turdus migratorius*
Swainson's thrush [n]	*Catharus ustulatus*
Hermit thrush [n]	*Catharus guttatus*
Varied thrush	*Ixoreus naevius*
American pipit [n]	*Anthus rubescens*
European starling [b]	*Sturnus vulgaris*
Bohemian waxwing	*Bombycilla garrulus*
Cedar waxwing [n]	*Bombycilla cedrorum*
Orange-crowned warbler [n]	*Vermivora celata*
Nashville Warbler [n]	*Vermivora ruficapilla*
Yellow warbler [b n]	*Dendroica petechia*
Yellow-rumped warbler [n]	*Dendroica coronata*
Black-throated gray warbler [n]	*Dendroica nigrenscens*
Townsend's warbler [n]	*Dendroica townsendi*
Common yellowthroat [n]	*Geothlypis trichas*
Wilson's warbler [n]	*Wilsonia pusilla*
Yellow-breasted chat	*Icteria virens*
Western tanager [n]	*Piranga ludoviciana*
Spotted towhee [n]	*Pipilo erythrophthalmus*
Chipping sparrow [n]	*Spizella passerina*
Brewer's sparrow	*Spizella breweri*
Vesper's sparrow	*Pooecetes gramineus*
Lark sparrow	*Chondestes grammacus*
Sage sparrow	*Amphispiza belli*
Savannah sparrow [b n]	*Passerculus sandwichensis*
Fox sparrow [b n]	*Passerella iliaca*
Song sparrow [b]	*Melospiza Melodia*
Lincoln sparrow	*Melospiza lincolnii*
White-crowned sparrow [n]	*Zonotrichia leucophrys*

[b] bird species that breed on the Umatilla National Wildlife Refuge

[n] neotropical migratory bird species

Common Name	Scientific Name
Golden-crowned sparrow	*Zonotrichia atricapilla*
Dark-eyed junco [n]	*Junco hyemalis*
Black-headed grosbeak [n]	*Pheucticus melanocephalus*
Lazuli bunting [b n]	*Passerina amoena*
Red-winged blackbird [b n]	*Agelaius phoeniceus*
Western meadowlark [b n]	*Sturnella neglecta*
Yellow-headed blackbird [b n]	*Xanthocephalus xanthocephalus*
Brewer's blackbird [b n]	*Euphagus cyanocephalus*
Brown-headed cowbird [n]	*Molothrus ater*
Northern oriole [b n]	*Icterus galbula*
Purple finch	*Carpodacus purpureus*
House finch [b]	*Carpodacus mexicanus*
Pine siskin	*Carduelis pinus*
American goldfinch [n]	*Spinus tristis*
Evening grosbeak	*Coccothrausyes vespertinus*
House sparrow [b]	*Passer domesticus*
Mammals	
Common Name	**Scientific Name**
Badger	*Taxidea taxus*
Beaver	*Castor canadensis*
Belding's ground squirrel	*Spermophilis bendingi*
Big brown bat	*Eptesicus fuscus*
Black-tailed jackrabbit	*Lepus californicus*
Bobcat	*Lynx rufus*
California ground squirrel	*Spermophilus beecheyi*
California myotis	*Myotis californicus*
Coyote	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Fringed myotis	*Myotis thysanoides*
Great Basin pocket mouse	*Perognathus parvus*
House mouse	*Mus musculus*
Little brown myotis	*Myotis lucifugus*
Long-eared myotis	*Myotis evotis*
Long-legged myotis	*Myotis volans*

[b] bird species that breed on the Umatilla National Wildlife Refuge

[n] neotropical migratory bird species

Long-tailed vole	*Mictotus longicaudus*
Long-tailed weasel	*Mustela frenata*
Lynx	*Lynx canadensis*
Merriam's shrew	*Sorex merriami*
Mink	*Mustela vison*
Montane vole	*Microtus montanus*
Mule deer	*Odocoileus hemionus*
Muskrat	*Ondatra zibethica*
Northern grasshopper mouse	*Onychomys leucogaster*
Northern pocket gopher	*Thomomys talpoides*
Norway rat	*Rattus norvegicus*
Nuttall's cottontail	*Sylvilagus nuttallii*
Opossum	*Didelphis virginiana*
Ord kangaroo rat	*Dipodomys ordii*
Pacific fisher	*Martes pennanti pacifica*
Pallid bat	*Antrozous pallidus*
Porcupine	*Erithizon dorsatum*
Preble's shrew	*Sorex preblei*
Pygmy rabbit	*Brachylagus idahoensis*
Raccoon	*Procyon lotor*
River otter	*Lutra canadensis*
Sagebrush vole	*Lagurus curtatus*
Short-tailed weasel (ermine)	*Mustela erminea*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis	*Myotis subulatus*
Snowshoe hare	*Lepus americanus*
Spotted skunk	*Spilogale gracilis*
Striped skunk	*Mephitis mephitis*
Thompson's big-eared bat	*Corynorhinus townsendii*
Townsend's ground squirrel	*Spermophilus townsendii*
Washington ground squirrel	*Spermophilis washingtoni*
Western harvest mouse	*Reithrodontomys megalotis*
Western jumping mouse	*Zapus princeps*
Western pipistrelle	*Pipistrellus hesperus*
White-tailed deer	*Odocoileus virginianus*
White-tailed jackrabbit	*Lepus townsendii*

Yellow-bellied marmot	*Marmota flaviventris*
Yellow pine chipmunk	*Eutamias amoenus*
Yuma myotis	*Myotis yumanensis*
Reptiles	
Common Name	**Scientific Name**
Gopher snake	*Pituophis melanoleucus*
Oregon alligator lizard	*Gerrhontus multicarinatus*
Oregon rattlesnake	*Crotalus viridis oreganus*
Sagebrush lizard	*Sceloporus graciosus*
Short-horned lizard	*Phrynosoma douglassi*
Side-blotched lizard	*Uta stanburiana*
Striped whipsnake	*Masticophis taeniatus*
Western fence lizard	*Sceloporus occidentalis*
Western painted turtle	*Chrysemys picta belli*
Wandering garter snake	*Thamnophis elegans vagrans*
Western skink	*Eumices skiltonianus*
Western yellow-bellied racer	*Coluber constrictor*
Amphibians	
Common Name	**Scientific Name**
Bullfrog	*Rana catsbiana*
Great Basin spadefoot toad	*Scaphiopus intermontanus*
Long-toed salamander	*Ambystoma macrodactylum*
Pacific treefrog	*Hyla regilla*
Western toad	*Bufo boreas*
Woodhouse’s toad	*Bufo woodhouseii*
Leopard frog	*Rana pipiens*

Attachment C. Planning Aid Letter

(United States Department of the Interior-Fish and Wildlife Service)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon State Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

November 16, 1999

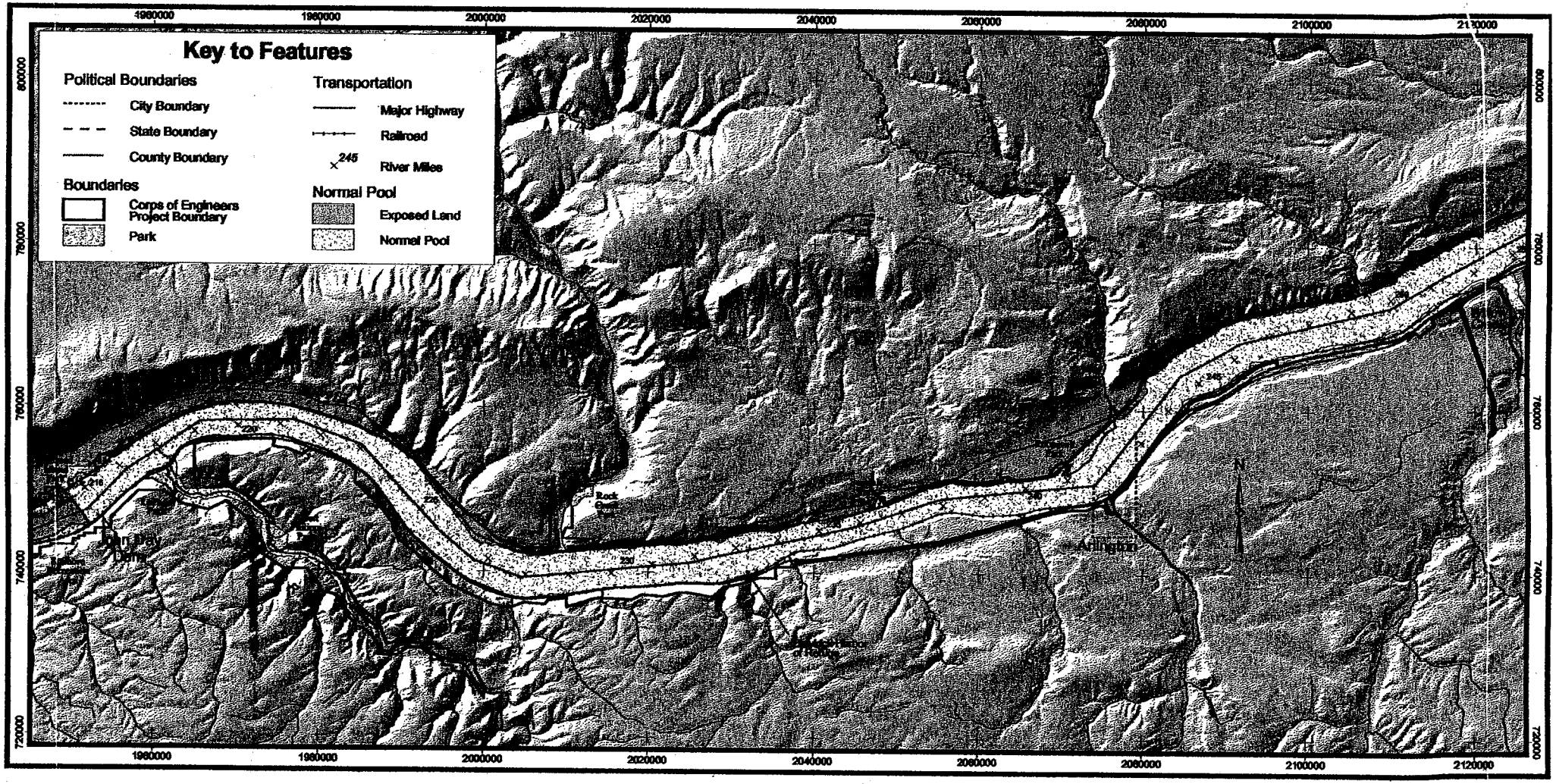
Reply To: 7365.002
File Name: John Day Drawdown-Phase 1

Colonel Randall J. Butler, District Engineer
Portland District, Corps of Engineers
P.O. Box 2946
Portland, Oregon 97208-2946

Dear Colonel Butler:

This is our Planning Aid Letter (PAL) describing the impacts to fish and wildlife resources from proposed drawdown of the Columbia River John Day Reservoir. Information in this letter is based upon existing information and general project data provided by the Portland District, Corps of Engineers (Corps) prior to October 1, 1999. The PAL is preliminary in nature, providing reconnaissance level information consistent with the Corps' Phase I study for the proposed project. This PAL does not indicate preferences for the drawdown alternatives described below and it provides only a preliminary outlook regarding mitigation for impacts to fish and wildlife. More detailed recommendations would be developed in a Coordination Act Report should the project proceed to Phase II.

This PAL has been prepared with input from the Oregon Department of Fish and Wildlife (ODFW), Washington Department of Fish and Wildlife (WDFW), National Marine Fisheries Service (NMFS), Columbia River Inter-Tribal Fish Commission (CRITFC), and Confederated Tribes of the Umatilla Indian Reservation (CTUIR). These agencies also received a draft of this PAL and provided informal comments. The scope of this letter is general in nature and does not constitute the formal report on the project within the meaning of Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401 as amended; 16 U.S.C. 661 et seq.).



Projection: State Plane, Oregon North Zone, NAD 27
Depths based on Corps of Engineers Hydrosurveys, 1994
Produced by GIS, Survey and Mapping Section
US Army Corps of Engineers, Portland District

2 0 2 4 8 Miles

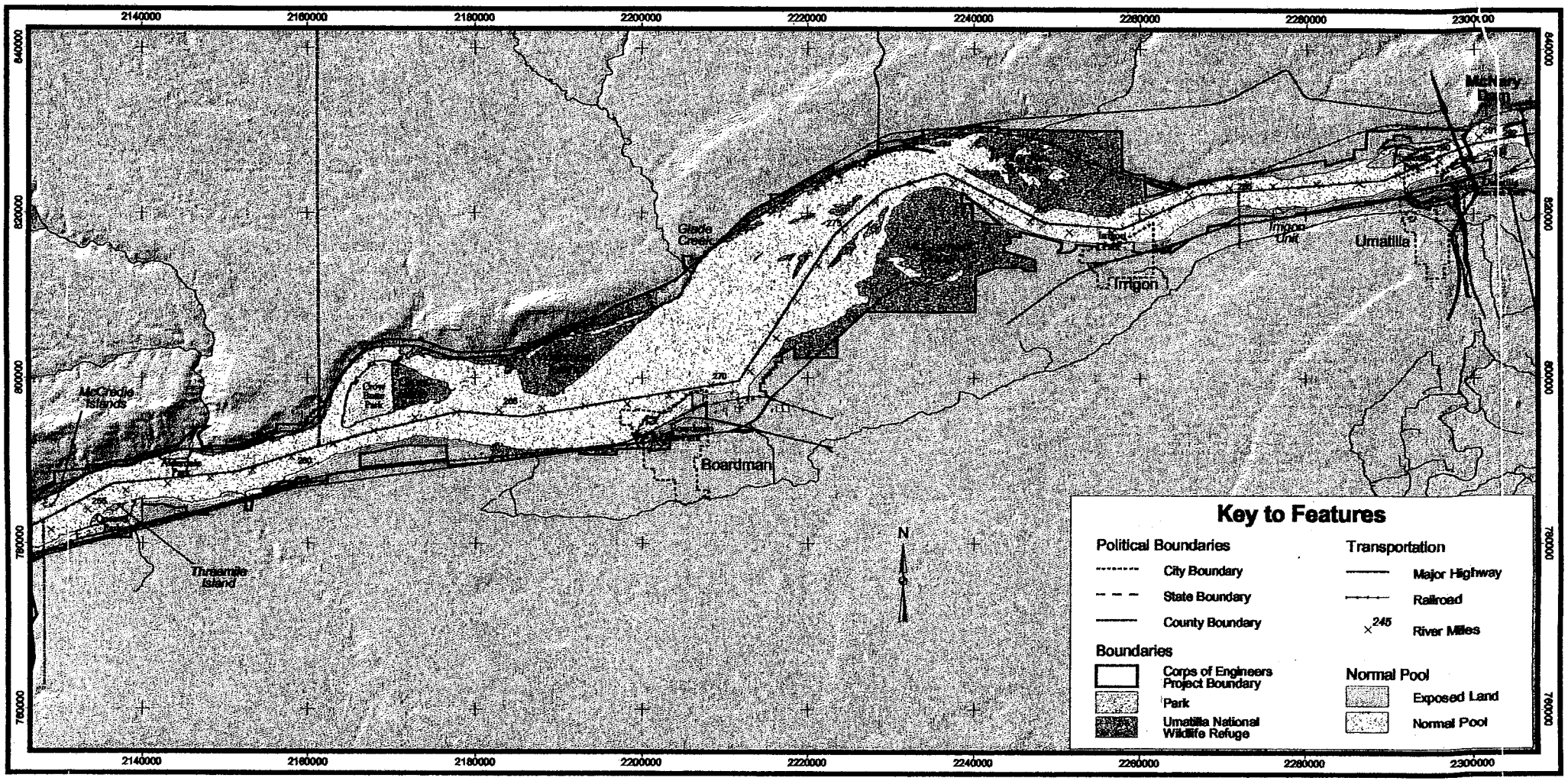
DRAFT
16 September 1999

US Army Corps of Engineers
Portland District

JOHN DAY DRAWDOWN PHASE I STUDY
Columbia River - Oregon / Washington

Study Area Overview Map

Figure 1 (a)



Projection: State Plane, Oregon North Zone, NAD 27
Depths based on Corps of Engineers Hydrosurveys, 1994
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2 0 2 4 6 Miles

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JOHN DAY DRAWDOWN PHASE I STUDY
Columbia River - Oregon / Washington

Study Area Overview Map

Figure 1 (b)

DESCRIPTION OF THE PROJECT

Under the existing operation, John Day Reservoir ranges from an average low elevation (measured at the dam) of 262 feet in May to a high of 267 feet* in August (West Consultants 1999).

The proposed project would involve a reduction in the current reservoir elevations in the John Day Reservoir. Two major scenarios are being evaluated: 1) drawdown to spillway crest and (2) drawdown to natural river level. Under each of these two scenarios, a flood control and a no flood control operation is being evaluated. This results in four alternatives for evaluation.

Alternative 1. Drawdown to spillway crest without flood control. In this alternative, the spillway gates would be opened and the river would flow uncontrolled over the existing spillway. The powerhouse would continue to operate. Reservoir elevations measured at the dam in a normal (average) year similar to 1982 would range from a low of about 218.0 in October to a high of 230.7 in June (West Consultants 1999). Although some flow would occur over the spillway year-round, most spill would occur from April 1 through July 31 (CH2MHill 1999). Table 1 provides a summary of reservoir elevation data, measured at several sites, for each alternative.

Alternative 2. Drawdown to spillway crest with flood control. In this alternative, the gates would normally be raised and the river would flow uncontrolled over the existing spillway. However, approximately once every two to five years, the gates would be lowered to control floods. This would provide up to 500,000 acre-feet of flood storage space. In an average year, reservoir elevations measured at the dam would range from a low of approximately 218.0 in October to a high of 235.7 in June (West Consultants 1999). Highest spillway flows would occur in April, May, June, and July (CH2MHill 1999). The powerhouse would continue to operate.

Alternative 3. Drawdown to natural river without flood control. This alternative would involve breaching the dam and allowing the reservoir to be drawn down to the level of the natural river bed. The natural river level at the dam would range in elevation from a low of about 160.9 in October to a high of 165.8 in June. The powerhouse would be abandoned.

Alternative 4. Drawdown to natural river with flood control. In this alternative, the dam would be breached; however, piers and gates would be constructed in the center of the dam to provide capability for 500,000 acre-feet of flood control space. During flood control operations, closing the gates would raise the river about 50 feet at the dam. Power production would be discontinued. River elevations measured at the dam would range from a low of about 160.9 in October to a high of 184.8 in June.

About 30 irrigation pumping stations along the Oregon and Washington shorelines would be adversely impacted by the lower reservoir elevations. Most of the pump intakes now submerged in the river would be dewatered as the reservoir level recedes. To provide water to irrigators, project plans include the construction of two irrigation distribution canals. One canal would be constructed on the Oregon side of the Columbia River and one would be on the Washington side (Figures 2 and 3). The canal in Washington would be designed to carry about 1,640 cubic feet per

* All reservoir elevations are in feet, Nataional Geodetic Vertical Datum at John Day Dam

Table 1. Reservoir elevations by alternative at three sites on the John Day Reservoir.

RM 215.63 John Day Forebay

Month	1: Spillway	2: Spillway w/FC	3: Natural River	4: Natural River w/FC
January	221.62	221.62	161.63	161.63
February	224.00	224.00	162.61	162.61
March	228.53	228.53	164.49	164.49
April	226.78	226.78	163.64	163.64
May	229.39	229.50	165.03	166.15
June	230.67	235.67	165.78	184.80
July	226.86	231.40	163.78	178.54
August	220.73	220.73	161.45	161.45
September	218.31	218.31	160.91	160.92
October	217.96	217.96	160.87	160.87
November	220.14	220.14	161.22	161.22
December	220.38	220.38	161.31	161.31

RM 276.41 McCormack Slough/Paterson Slough

Month	1: Spillway	2: Spillway w/FC	3: Natural River	4: Natural River w/FC
January	234.89	235.08	234.79	234.79
February	237.48	237.71	237.16	237.16
March	241.78	242.07	240.90	240.90
April	240.11	240.37	239.47	239.46
May	242.74	243.07	241.70	241.70
June	244.06	246.52	242.78	242.85
July	240.01	242.45	239.28	239.36
August	234.04	234.22	233.95	233.95
September	231.95	232.08	231.95	231.95
October	231.83	231.95	231.84	231.85
November	233.45	233.61	233.41	233.41
December	233.71	233.88	233.67	233.66

RM 289.21 Umatilla River

Month	1: Spillway	2: Spillway w/FC	3: Natural River	4: Natural River w/FC
January	254.53	254.53	254.53	254.53
February	256.78	256.78	256.78	256.78
March	260.23	260.24	260.21	260.21
April	258.93	258.93	258.91	258.91
May	261.03	261.04	261.00	261.00
June	262.12	262.38	262.06	262.07
July	258.78	259.04	258.76	258.76
August	253.76	253.76	253.76	253.76
September	251.88	251.88	251.88	251.88
October	251.81	251.81	251.81	251.81
November	253.21	253.21	253.21	253.21
December	253.46	253.46	253.46	253.46

FIGURE 2.
OREGON CANAL ROUTE

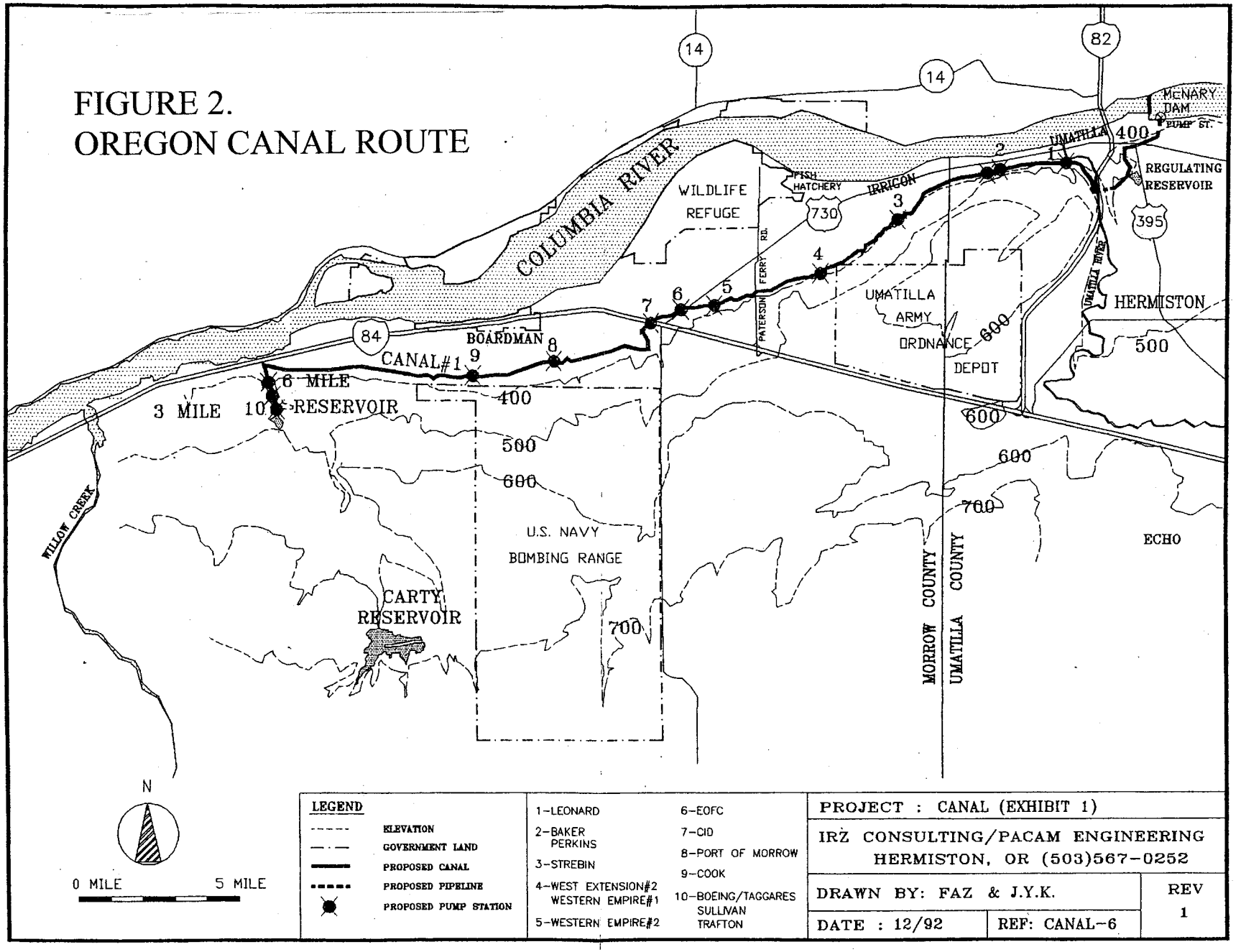
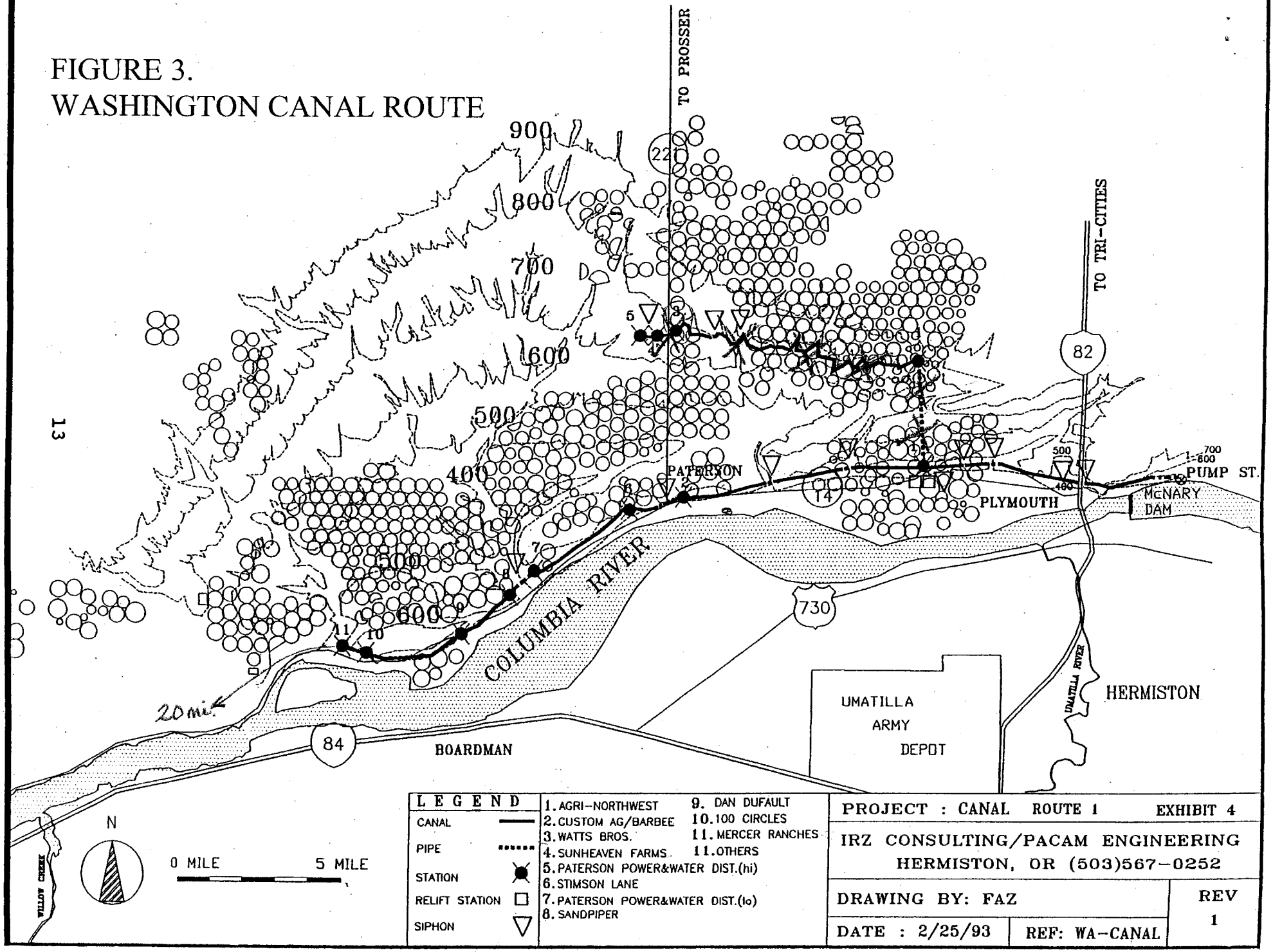


FIGURE 3.
WASHINGTON CANAL ROUTE



second (cfs). This canal would begin at a pump station in the Columbia River just upstream from McNary Dam and would terminate about 60 miles downstream. Another pump station would also be necessary on the Washington side of The Dalles pool to deliver water in a 1½ mile-long canal to Goldendale Aluminum. The canal in Oregon would be designed to carry about 1,990 cfs and would begin just upstream from McNary Dam and terminate about 5 miles west of Boardman. Total length of the canal would be about 37 miles.

Water for the canals would be provided by two pump stations located on the Columbia River, i.e., one approximately 1/2 mile upstream from McNary Dam and one immediately downstream from the Dalles Dam. The screens would be designed to meet NMFS fish screening criteria.

Corps project plans also include re-seeding the barren shoreline area of the drawdown zone. In addition, to protect existing railway lines, highways and other infrastructure from erosion and undermining, project plans include placing riprap on up to 48 miles of the new shoreline area.

FISH RESOURCES

WITHOUT THE PROJECT

The Columbia River System provides habitat for anadromous species such as chinook, coho, and sockeye salmon; steelhead trout; white sturgeon; American shad; and Pacific lamprey. While harvest yields have been drastically reduced from historic levels, some of these fish still contribute to commercial, sport, and Indian treaty fisheries. There are several treaty fishing access sites on the John Day Reservoir (Lake Umatilla) which have been developed or will be developed by the Corps of Engineers for tribal use. The treaty fishing access sites considered for development are North Shore, LePage Park, Goodnoe, Pasture Point, Rock Creek, Sundale, Roosevelt, Moonay, Pine Creek, Three Mile Canyon, Alderdale, Alder Creek, Crow Butte, and Faler Road near Boardman Park. Boat ramps, docks, and/or groins will be constructed at North Shore, LePage Park, Pasture Point, Sundale, Roosevelt, Pine Creek, Threemile Canyon (Quesnel), and Crow Butte.

The river in the project area is vital for passage of adult and juvenile salmonids. Adults migrate upstream to spawning and rearing waters in the upper Columbia and Snake River systems and each year, primarily from April through July, millions of juvenile salmonids migrate downstream through the project area to the ocean. Within the project vicinity the river and its backwater areas also provide habitat for salmonid rearing and, in the tailrace area, possibly spawning. For the 1988 to 1998 period, annual adult salmon runs passing over McNary Dam have averaged 123,000 chinook, 40,000 sockeye, and 2,300 coho. Steelhead counts for the same period have averaged 131,000. These numbers represent fish that have escaped sport, commercial, and Indian fisheries downstream.

Columbia River sockeye salmon runs have decreased dramatically. Sockeye runs past McNary Dam have decreased from over 100,000 fish in the mid-1950s to as few as 9,000 in 1998. The Snake River sockeye run has almost vanished; the number of adult sockeye returning to the Snake River (counted over Ice Harbor Dam) were one, fifteen, and three for 1996, 1997, and 1998 respectively. For this reason, the Snake River sockeye has been listed as an endangered species

and is protected under the Endangered Species Act (56FR 58611; Nov. 20, 1991). Snake River spring/summer and fall chinook salmon populations are also in a critical situation. Their runs have declined from about 123,000 in the 1950s to 26,000 in 1998. As a result of these diminishing returns, the Snake River spring/summer and fall chinook salmon have been listed as threatened species (57FR 14653; April 22, 1992).

The decline in salmon and steelhead runs can be attributed to many factors including habitat destruction, ocean conditions, harvest issues, and passage problems at dams and other man-made structures. Part of the passage problem occurs in the series of dams and pools on the Columbia and Snake Rivers that juvenile downstream migrants must negotiate on their journey to the ocean. Because of the slow moving water in these reservoirs, travel time for upper-Columbia River system smolts migrating in river to the ocean has increased significantly from historic conditions. One of the largest pools on the Columbia River that must be negotiated by downstream migrants is the 76-mile-long John Day Reservoir.

As travel time increases for smolts migrating down the Columbia River it reduces their chances for survival. There are several reasons that increased smolt travel time can be detrimental. The physiological condition of smolts changes as they migrate, preparing them for the transition to salt water. Increased travel time subjects the smolts to the possibility of missing their "biological window" for arriving in salt water. Additional migration time also increases the migrant's exposure to disease and predators within the Columbia River reservoirs. Predators such as the northern pikeminnow (formerly, squawfish) consume large numbers of juvenile salmon in the Columbia River each year. Some salmonid smolts, particularly steelhead trout, do not migrate but become "resident" fish. Extending their migration times may increase this rate of residualism.

The John Day and Umatilla Rivers, which enter the John Day Reservoir, both have runs of salmon and steelhead trout. The John Day River maintains runs of spring chinook salmon and summer steelhead. A popular troll fishery for steelhead begins each August in the John Day River arm. The Umatilla River supports runs of reintroduced spring and fall chinook and coho salmon as well as native summer steelhead. Spring chinook counts in the Umatilla River have ranged between 409 and 2,194 fish over the last three years. Fall chinook numbers have declined from 646 in 1996 to 286 in 1998. The coho run was 618, 670, and 3,081 fish for 1996, 1997, and 1998, respectively. Over the last four years, steelhead returns have averaged about 2,000 fish annually.

Both the Irrigon and Umatilla Fish Hatcheries are located in the project area adjacent to the Columbia River near Irrigon. The hatcheries, operated by the ODFW in cooperation with the Confederated Tribes of the Umatilla Indian Reservation (at the Irrigon Hatchery), produce a total of about 5 million salmon and steelhead smolts annually. The water supply for rearing these fish is provided by wells and the wells are extremely dependent upon the level of John Day Reservoir. Severe water supply problems now exist at the hatcheries when the reservoir drops to elevation 261.0

The run of Pacific lamprey over John Day Dam has decreased significantly in the past several decades (Jackson, personal communication). Presently, there is no longer a tribal fishery for lamprey in the Umatilla River and lamprey are now only caught incidentally as part of the spring chinook fishery in Granite Creek, a tributary to the John Day River. Both these rivers historically supported important commercial tribal fisheries.

The American shad run in the Columbia River continues to increase. Counting stations at McNary Dam noted 1,147 shad in 1968 while 393,000 were counted in 1998.

Principal resident game fish found in the vicinity of McNary Dam are rainbow trout and whitefish and channel catfish, bullhead, black and white crappie, largemouth and smallmouth bass, yellow perch, bluegill, pumpkinseed and walleye.

The Columbia River in the project area supports a significant sport fishery for warmwater game fish. A popular walleye fishery exists on the main river from McNary Dam down to the Boardman area. Numerous bass or walleye tournaments have taken place on the John Day Reservoir over the past several years. However, about 50 percent of the angling for resident game fish occurs in the many protected backwater areas of the reservoir. The John Day River backwater, for example, supports a popular smallmouth and channel catfish fishery.

These shallow backwater areas are of significant importance to warmwater game fish for spawning and rearing. Studies in the area have shown that bass migrate up to 40 miles in the Columbia River to spawn in the sloughs (Montgomery and Fickeisen 1975). Major backwater areas include Paterson Slough (494 acres) , Glade Creek (30 acres), Willow Creek, and the John Day River. Other areas important to resident fish include Plymouth Park, McCormack Slough, Whitcomb Island, and Crow Butte.

Nongame fish populations in the project area include northern pikeminnow, redside shiner, dace, peamouth, chiselmouth, sculpin, stickleback, sand roller, sucker, carp, and goldfish. Of special significance is the sand roller which is being considered for sensitive species status by ODFW. Large numbers of carp often occupy the shallow waters of the reservoir and eliminate much of the aquatic vegetation. This has resulted in lower game fish populations and reduced food for waterfowl.

WITH THE PROJECT

Drawdown to Spillway Crest

Under this alternative, the river would flow uncontrolled over the existing spillway, except under the flood control option where the spillway gates would be lowered about once every two to five years to provide 500,000 acre-feet of storage. Powerhouse operation would continue. During an average water year, reservoir elevations would range from 218.0 to 230.7 without flood control and from about 218.0 to 235.7 with flood control (Table 1).

Compared to existing conditions, water particle travel time through the reservoir would range from 1.7 to 4.8 days less with flows between 200,000 cfs and 500,000 cfs. For example, at a flow of 300,000 cfs (average May flow) water particle travel time under the existing operation would be 3.8 days compared to 1.9 days with the spillway crest alternative. This is a reduction of 1.9 days travel time. Average flows are usually 300,000 cfs in May, peak around 500,000 cfs in June, and drop off to 200,000 cfs in August. Table 2 shows water particle travel time for three reservoir operation scenarios at several flows.

Table 2. Water Particle Travel Time (in days) Through John Day Reservoir

Flow (1,000 cfs)	Existing Operation	Spillway Crest	Natural River
200	5.7	2.5	0.9
300	3.8	1.9	0.8
500	2.4	1.4	0.7

The decrease in water particle travel time is expected to result in potential decreased travel time for actively migrating yearling and sub-yearling anadromous fish moving downstream through John Day Reservoir. Decreased travel time through the reservoir means the smolts may suffer less mortality and arrive at the estuary sooner. This could result in increased numbers of returning adult salmon and steelhead in the Columbia Basin.

Adult salmon and steelhead trout would also realize long term benefits from the proposed drawdown. Over a period of several years, the upper one fourth of the reservoir (approximately 20 miles) would return to a free flowing river with a sand/gravel/cobble substrate. Historically, this part of the Columbia River provided significant mainstem spawning for anadromous fish. Drawdown to spillway crest should restore some of this habitat and provide suitable spawning areas for anadromous fish, particularly fall chinook. An estimated 31,000 fall chinook would be expected to spawn in this area (USGS 1999). New fish ladders would be constructed on both the north and south shores. If the ladders are properly designed, adult fish passage conditions should not change significantly.

Although there would be benefits to adult and juvenile salmonids, there are also a number of adverse impacts which are anticipated as a result of the reservoir drawdown. These impacts could cause direct losses to migrating juvenile salmonids and could reduce available rearing habitat. For example, the lower pool level will result in a smaller size reservoir which will concentrate both smolts and the population of fish which prey on smolts. Initially, this could result in increased predation on downstream migrants, primarily in the slower moving water. However, as predator populations reach equilibrium in the smaller, faster moving reservoir, the overall predation mortality should be lower than existing levels. A lower water level in the upper John Day Reservoir (tailwater of McNary Dam) will cause decreased submergence of the turbines at McNary Dam. This condition causes subatmospheric pressures which could increase mortalities to downstream migrants. This increased mortality could be in the range of one percent. When little or no water is going over the John Day spillway (during flood storage), all downstream migrants will be forced to negotiate the turbine screens and bypasses. This will result in continued losses and injuries to downstream migrants. New juvenile fish collection facilities will be built into the dam in an effort to keep these losses at a reduced level.

An almost total loss of fish habitat would occur in backwater areas such as Paterson Slough, McCormack Slough, Willow Creek, Glade Creek, the Plymouth Park area, the area between

Whitcomb Island and the mainland, the area behind Crow Butte, Mesner Pond, and in those areas between the railroad and highway fills along the Columbia River. The 50-foot drawdown at the mouth of the John Day River would also eliminate most of that backwater area. An estimated 8,836 acres of backwater fish habitat would be dewatered with this alternative.

The shallow water shoreline and backwater areas provide important foods and nutrients to the Columbia River ecosystem. Large numbers of aquatic invertebrates are produced in these areas. Juvenile salmonid smolts, including large numbers of fall chinook fry, utilize these areas for feeding during their downstream migration. Dewatering the sloughs and backwaters would eliminate this important food source for migrating juvenile salmonids. The loss of the backwater areas would also eliminate their contribution to the food chain and nutrient supply in the Columbia River. It is expected, however, that some shallow water zones would be reestablished along the new shoreline and would eventually contribute as food production areas.

Sediment deposition within the tributary channels due to backwater from the John Day Pool has significantly changed the geometry on several of the tributary streams. To insure the continuous passage of migrating adult fish in these tributaries following drawdown, modifications to the current channel geometry may be required. The modifications could include dredging in Willow Creek, Umatilla River, Rock Creek, and Wood Gulch to open the channel to adult fish passage under the proposed drawdown conditions. Dredging would not likely be required on the John Day River due to upstream bedrock control on the stream. For two of the four major tributaries to the John Day Pool, annual maintenance dredging may also be required to maintain fish passage. The dredged channels for Willow Creek and Rock Creek would be designed to transport the incoming sediment load. However, the dredged channels would be highly entrenched within the existing sediments. These sediments would be subject to erosion rates the first several years after drawdown occurs. Neither the John Day nor the Umatilla Rivers are expected to require maintenance dredging. The sediment transport capacity of the Umatilla River under spillway freeflow and natural drawdown conditions is in excess of the incoming sediment load. This would maintain the dredge channel or possibly cause additional degradation. Dredging at the mouths of these tributaries is expected to produce about 5,774,000 cubic yards of sediment. Potential passage problems could also occur upstream near Chinaman's Hole where channel modifications were recently made to facilitate fish passage.

Reservoir drawdown is expected to cause severe impacts to the Umatilla and Irrigon Hatcheries. The well water supply for both hatcheries is directly dependent upon the level of the Columbia River and hatchery operation is severely impacted when the John Day Reservoir drops as low as elevation 261.0. With the proposed drawdown, these hatcheries could no longer operate with the present water supply systems. This would mean an annual production loss of about 5 million salmon and steelhead smolts. If satisfactory replacement water sources were provided, these losses could be reduced.

Significant spawning and rearing habitat losses for warmwater game fish would occur with the reservoir drawdown. Dewatering shallow backwater areas would result in spawning habitat losses to species such as smallmouth bass, which travel many miles in the Columbia River to reach sloughs and backwaters to spawn. Beneficial effects would result if spawning areas of undesirable species (such as carp and northern pikeminnow) were dewatered or became unsuitable. Increased water velocities in the river could adversely affect walleye spawning success which is best when

the river is high and slow. As the reservoir level drops, all fish species will be subject to stranding in isolated pools that remain in the backwater areas. The loss of the aquatic invertebrate population associated with the shallow waters would cause additional losses to warmwater game fish which depend on invertebrates for a significant part of their food supply.

Depending on which alternative is selected, there would be varying impacts on the treaty fishing access sites in the John Day Reservoir. Several of the sites do not have inwater facilities associated with them and would probably not be affected by drawdowns. However, for those sites with existing or planned construction of boat ramps, docks, groins, and/or breakwater structures, there would be adverse impacts on the use and operation of these facilities. Treaty fishing access sites which would be impacted by drawdown include North Shore, LePage Park, Pasture Point, Sundale, Roosevelt, Pine Creek, Threemile Canyon, Alderdale, and Crow Butte. Under the spillway crest drawdown scenario, all of these sites would become unuseable for some period of time. The Corps plans to replace these access sites in-kind, but until reconstruction occurs, tribal fishing opportunities would remain limited.

Angling opportunities and success would be significantly reduced. Popular angling areas in the backwaters would be eliminated and fishermen would then have to fish along the new barren shoreline created as the river receded. Angling in areas such as the John Day River arm, which supports a significant smallmouth bass and channel catfish fishery, would be mostly eliminated.

Boat ramps now used by anglers will be unusable when the river level drops. Some of the more popular ramps which would be affected are at Sundale, Threemile Island, Paterson Ferry Road, Plymouth, and the Umatilla River. Other more primitive boat launch sites around the reservoir would also be affected. Boat marinas on the John Day River arm (LePage and Phillipi Parks) would be left dry as the reservoir would be from 35 to 50 feet lower than existing conditions. The drawdown would also eliminate marina operations at Boardman, Arlington, Crow Butte State Park, Irrigon, and Umatilla. As with the tribal fishing access sites, angling opportunities would remain limited or non-existent until in-kind replacement of these facilities is accomplished.

The pump stations to be installed for supplying irrigation water to the proposed canals would be designed in accordance with fish screening criteria acceptable to State and Federal fishery agencies. Therefore, impacts to juvenile fish from these facilities are not expected. Although the specific alignments of the canals are not yet known, they are not expected to significantly impact fish resources.

Drawdown to Natural River

With this alternative, John Day Dam would be breached. The powerhouse would be abandoned. Piers and gates would be constructed if the flood control option were implemented. In an average water year similar to 1982, reservoir elevations with this alternative would range from 160.9 to 165.8 without flood control and from 160.9 to 184.8 with flood control structures (Table 1).

Overall, the long-term effects of the natural river drawdown alternatives would be beneficial to anadromous fish stocks which migrate above John Day Dam. While the following beneficial effects on anadromous fish are anticipated, they have not been quantitatively assessed at this stage. Quantitative biological benefit estimates would be refined if a Phase II study was implemented.

Existing passage delays to juvenile salmonids caused by the dam and reservoir would be eliminated. Downstream migration rates of juvenile salmonids should be similar to that of passage through free flowing sections of river. Without the dam, water particle travel time through the reservoir would range from 1.7 to 4.8 days less than existing conditions (at flows between 200,000 cfs and 500,000 cfs). For example, at a flow of 300,000 cfs (average May flow), water particle travel time would be 3.8 days under existing conditions, compared to 0.8 days with the natural river drawdown. This a reduction of 3.0 days travel time. Average flows are usually 300,000 cfs in May, peak around 500,000 cfs in June, and drop off to 200,000 cfs in August. Table 2 shows water particle travel time for three reservoir operation scenarios at several flows.

The decrease in water particle travel time is expected to result in decreased travel time for smolts moving through John Day Reservoir. Decreased travel time through the reservoir means the smolts suffer less mortality and arrive at the estuary sooner. This could result in increased numbers of returning adult salmon and steelhead in the Columbia Basin.

Breaching the dam would also eliminate juvenile losses now caused by turbines, bypass systems, and spillways. Each of these factors contributes significantly to the mortality rate of downstream migrants. Juvenile losses now caused by supersaturated gas below John Day Dam would be reduced. The "without flood control" option would essentially eliminate the supersaturated gas now created by John Day Dam. The spillway constructed for the "with flood control" option would still add some supersaturated gas to the river.

Long term benefits are also anticipated for returning adult salmon and steelhead. Without the flood control option, this alternative would eventually change an existing 76-mile-long reservoir into a free flowing river environment more closely resembling historical river conditions. Historically, this reach of the Columbia River provided significant mainstem spawning for anadromous fish. Breaching the dam should restore many miles of this habitat and again provide extensive suitable spawning areas for anadromous fish, particularly fall chinook. This restored habitat would support an estimated spawner capacity of 55,000 fall chinook (USGS 1999). If salmon spawning is restored in this section of the river, it could reduce the current fish mitigation levels at Spring Creek, Ringold, Little White Salmon, and Bonneville Hatcheries. The potential for this effect exists because some of the production at these hatcheries is linked to mitigation of fish losses caused by John Day Dam.

The rate of upstream passage of adult fish is not expected to change significantly. Adult fish passage through the natural river channel would probably be slower than passage through the existing reservoir. However, migration delays that may now occur at the dam would be eliminated. Water velocities through the breach in the dam could reach 10 fps during a 10-year flood event. Therefore, some delay could occur when fish attempt to move upstream during such a flood event. Passage would also improve for adult and juvenile lamprey, i.e., adults would experience fewer passage delays in the ladders at the dam and juveniles would be subject to fewer bypass delays and reduced predation in the reservoir.

A number of adverse fishery impacts are anticipated as a result of the reservoir drawdown, including potential losses of rearing habitat and predation impacts on migrating juvenile salmonids. For example, the lower river level may concentrate both smolts and the population of Quantitative biological benefit estimates would be refined if a Phase II study was implemented.

migrants, primarily in isolated areas of slower moving water. As predator populations reach equilibrium in the faster moving river, however, the overall predation mortality should be lower than existing levels. Without the upper John Day Reservoir (tailwater of McNary Dam), there would be decreased submergence of the turbines at McNary Dam. This condition could cause increased exposure of fish to subatmospheric pressures resulting in increased mortalities to downstream migrants. This increased mortality could be in the range of one percent.

There would be a total loss of all existing backwater fish habitat including Paterson Slough, McCormack Slough, Willow Creek, the John Day River arm, Glade Creek, Plymouth Park area, the area between Whitcomb Island and the mainland, the area behind Crow Butte, Mesner Pond, and those areas between the railroad and highway fills along the Columbia River. An estimated 8,836 acres of backwater fish habitat would be dewatered with this alternative. Approximately 6,968 acres of shallow waters along the main river shoreline would also be dewatered. Associated with this loss would be a net increase of 81 linear miles of shoreline that would occur with the proposed project, primarily due to increased island habitat. These shallow water shoreline and backwater areas provide important foods and nutrients to the Columbia River ecosystem. Large numbers of aquatic invertebrates are produced in these areas. Juvenile salmonid smolts, including large numbers of fall chinook fry, utilize these areas for feeding during their downstream migration (Zimmerman and Rasmussen 1981). Dewatering the sloughs and backwaters would eliminate this important food source for migrating juvenile salmonids. The loss of the backwater areas would also eliminate their contribution to the food chain and nutrient supply in the Columbia River. It is estimated that 8,412 acres of new shallow water zones would be created along the shoreline of the river after removal of the dam and, once established, they could develop into valuable aquatic food production areas.

Breaching John Day Dam is expected to expose large mud flats at the mouths of the tributaries of the Columbia River such as the Umatilla River, John Day River, Willow Creek, Glade Creek, and Rock Creek. Some of these tributaries carry a heavy silt load into the Columbia River. This silt has been settling out where the tributaries meet the Columbia River backwater since John Day Dam was completed in 1968. The proposed natural river will be lower than the existing level of the river mouths where the sediments have accumulated. This will likely result in the tributary rivers cutting a channel into the sediment deposit down to the new river level. The removed sediment will be redeposited in the immediate river area and carried and distributed downstream. There is concern regarding the potential impact of this channel cutting realignment on tributary anadromous fish. If the river mouth should spread out into many small channels, fish passage could be restricted. Plans are in place to, if necessary, dredge Willow Creek, the Umatilla River, Rock Creek, and Wood Gulch to maintain a well defined channel in these streams and allow for upstream passage of anadromous fish. Additional passage problems are possible in the Umatilla River near Chinaman's Hole where channel modifications were recently made to facilitate fish passage. If passage problems should occur at any of the tributaries, additional channel modifications would be required to enable fish passage. Dredging at the tributary mouths could produce an estimated 9,346,000 cubic yards of sediment material.

Eliminating John Day Reservoir would cause severe impacts to the Umatilla and Irrigon Hatcheries. The well water supply for both hatcheries is directly dependent upon the level of the Columbia River. Hatchery operation is severely impacted when the John Day Reservoir drops as low as elevation 261. With the proposed breaching of the dam, these hatcheries could no longer

operate which would mean an annual production loss of about 5 million salmon and steelhead smolts. If a new water supply system were supplied that was not dependent on river water elevations, these losses could be mitigated.

Major losses of spawning and rearing habitat for warmwater game fish would occur with the dam breaching. Dewatering 8,836 acres of shallow backwater areas described above would result in spawning habitat losses to species such as smallmouth bass, which travel many miles in the Columbia River to reach sloughs and backwaters to spawn. Beneficial effects could result if spawning areas of undesirable species (such as carp and northern pikeminnow) were dewatered or became unsuitable. Increased water velocities in the riverine system could adversely affect walleye spawning success which is best when the river is high and slow. During the initial drawdown period, all fish species will be subject to stranding in isolated pools that remain in the backwater areas. The loss of shallow water habitat and associated aquatic invertebrates is expected to cause additional losses to warmwater game fish which depend on the invertebrates for a significant part of their food supply. Over a period of time, however, new populations of aquatic invertebrates would become established in the Columbia River.

Drawdown to natural river levels would permanently eliminate use of the inwater facilities at the tribal fishing access sites. This would have a severe negative impact on tribal fishing in the John Day Reservoir, amounting to an average loss to the commercial fishery of about 12,000 chinook salmon and steelhead (based on 1994 to 1998 figures).** Eventually, however, tribal fishing could resume in the river if access were provided along the new river shoreline.

Warmwater game fish angling opportunities and success would be drastically reduced. Popular angling areas in the existing large backwaters would be eliminated and fishermen would then have to seek out smaller isolated backwater locations along the new barren shoreline created as the river receded. Angling in areas such as the John Day River arm, which supports a significant smallmouth bass and channel catfish fishery, would be eliminated.

Boat ramps now used by anglers will be unusable when the river level drops. Some of the more popular ramps which would be affected are at Sundale, Threemile Island, Paterson Ferry Road, Plymouth Park, and the Umatilla River. Other more primitive boat launch sites around the reservoir would also be affected. Boat marinas on the John Day River arm (Lepage and Phillipi Parks) would be left dry as the reservoir would be over 100 feet lower than existing conditions. The drawdown would also eliminate marina operations at Boardman, Arlington, Crow Butte State Park, Irrigon, and Umatilla.

The pump stations to be installed upstream of McNary Dam and downstream of The Dalles Dam for supplying irrigation water to the proposed canals are to be designed in accordance with fish screening criteria acceptable to State and Federal fishery agencies. Therefore, impacts to juvenile fish from these facilities are not expected. Although the specific alignments of the canals are not yet known, they will be located upland and are not expected to significantly impact fish resources.

**From Treaty Indian Fall Gillnet Daily Landings (phone survey report), 1994 to 1998 screening criteria acceptable to State and Federal fishery agencies.

It would take several years for the new aquatic environment to stabilize. During that time some significant short-term adverse affects on anadromous fish would occur. These impacts would occur during the construction period and for a limited time thereafter. Dam breaching and construction activities would take from 4½ to 10½ years (depending on "with" or "without" flood control). Inwater work would be carried out from December 1 through February 28 to minimize adverse effects on anadromous fish. However, construction and removal activities would cause turbidity levels to increase during that time. In addition to construction turbidity, when the dam is breached, the accumulated bedload behind the dam would be carried downstream. This bedload movement would occur over a period of time (probably several years) during high flow periods. The material would move downstream as suspended sediment and heavier gravel and cobble. Much of the accumulated sediments at the mouths of tributaries such as the Umatilla River, Willow Creek, Glade Creek, and the John Day River would also be carried downstream.

All forms of aquatic life could be adversely affected by the suspended sediment released from John Day reservoir after the dam is breached. Lifeforms both in the reservoir and downstream of the dam would be affected. Short term exposure (less than 6 days) of very high sediment concentrations (excess of 3,000 to 20,000 mg/l) might cause some salmonid mortalities (Newcombe and Jensen 1996; Newcombe and MacDonald 1991, Alabaster and Lloyd 1982; Servizi Martens 1987). Long-term exposure (several weeks or months) to sediment concentrations over 200 mg/l might cause death to some fish (Alabaster and Lloyd 1982). Much lower concentrations (20 to 50 mg/l) can reduce the rate of feeding, increase stress, and adversely impact fish in the sac fry stage (Newcombe and Jensen 1996). Populations of invertebrates are also affected by increased sediment loads. Temporary reductions in aquatic insects and other benthic invertebrate populations would occur following dam breaching. Since these invertebrates are a primary food source for some species of fish, those populations would also be affected. Sediment deposits in the upper portions of the reservoir would likely remain because they would rarely be in water or have little current to move them. High turbidity levels would provide some short term benefits to juvenile salmonids by creating increased cover which would result in their predators being less effective.

WILDLIFE RESOURCES

WITHOUT THE PROJECT

Vegetation surrounding the project area consists primarily of the shrub/steppe/grassland type. Big sagebrush and rabbitbrush are the most common shrub species. Closer to the water, riparian herb, shrub, and tree habitats present a more varied vegetative cover. Common riparian shrubs include young trees, willows, and false indigo. The dominant riparian tree stands are black cottonwood, but Russian olive, large willow, and some alder are also present. Much of the reservoir shoreline is bordered by riprapped highway or railroad fill with no vegetation adjacent to the water. From John Day Dam upstream to the Whitcomb Island area almost all vegetation behind the riprap consists of shrub/steppe/grass. Riparian shrub and tree habitats generally occur from Whitcomb Island up to McNary Dam. Much of this riparian habitat is located on the Umatilla National Wildlife Refuge around Paterson and McCormack Sloughs. Approximately 350 acres of emergent wetland and riparian vegetation are present on Paterson Slough and 270 acres are found on McCormack Slough. Other significant riparian habitat includes 228 acres on the Irrigon Wildlife

Management Area (which is managed by the ODFW), Plymouth Park, Glade Creek, and Whitcomb Island. Important riparian and emergent wetlands are also found in the Willow Creek Wildlife Management area.

Some of the most valuable habitats in the reservoir are the islands. These are used extensively by a wide variety of wildlife species. Islands are used for nesting, almost to the exclusion of shoreline habitat, by the Great Basin Canada goose. The Great Basin Canada goose, a year-round resident, nests on islands free of mammalian predators and requires suitable brooding pastures nearby for rearing the young. Goose nest surveys on the Umatilla National Wildlife Refuge islands found up to 240 nests in 1991 but this figure has gradually declined to around 200 nests in recent years. River island habitat was once abundant in the John Day Pool. However, construction of John Day and McNary projects inundated thousands of acres of islands, which included most of the goose nesting islands. John Day reservoir alone inundated 6,700 acres of islands (Rasmussen and Wright 1990). Today, only about 1,900 acres remain. Historically, goose production was distributed on islands from John Day Dam to McNary Dam. Now, essentially all nesting is concentrated on the few remaining islands in the Paterson area. These remaining islands are rapidly being reduced in size by wind and wave erosion and flooding. This is readily apparent when looking at the acreages of five islands during the 1973 to 1989 period in the Paterson-Irrigon area of the John Day Reservoir (Table 3).

Table 3. Acreage Figures for Islands in John Day Reservoir

Island	1973	1979	1989
Straight Six	10.6	0	0
Blalock	92.8	86.8	82.6
Coyote	36.1	0	0
Long Walk	129.6	101.3	64.3
Sand	140.6	25.7	18.5
Total Acres	409.70	213.80	165.40

Colonial nesters such as California and ring-billed gulls, Caspian and Forster's terns, and great blue and black-crowned night herons also utilize the islands for nesting purposes. The black-crowned night heron populations are very low and are listed in Oregon's "Fish and Wildlife Habitats and Species of Special Concern." Threemile Island supports 7,000 to 10,000 nesting ring-billed and California gulls, some Forster's and Caspian terns, and about 35 nesting black-crowned night herons. Other species of waterfowl, shorebirds, and nongame birds also concentrate on island habitat.

Mule deer are the principal big game species found in the project area. These animals are partially dependent upon islands for fawning where mammalian predators are not present. Deer populations represent an important part of the island and riparian community. About 400 deer presently utilize this habitat on the Umatilla Refuge.

Common upland game along the shoreline areas include ring-necked pheasant, chukar, valley quail, and mourning dove. These species are found in the shrub-steppe vegetation bordering the

river.

The river and riparian areas support a variety of fur animals; common species include beaver, muskrat, mink, otter, skunk, raccoon, bobcat, and coyote. Some trapping occurs in the reservoir area.

Waterfowl are the most common and abundant wildlife species within the project area. This portion of the Columbia River attracts large numbers of mallard, American wigeon, pintail, green-winged teal, and three subspecies of Canada geese. Other species found in the area in lesser numbers include the white-fronted goose, snow goose, tundra swan, canvasback, lesser scaup, northern shoveler, cinnamon teal, redhead, and ruddy duck. Waterfowl numbers are highest during winter months but large numbers of waterfowl also use habitat in the project area for resting and feeding during spring and fall migration. Total wintering waterfowl on the Umatilla Refuge range from a high of 560,000 birds in 1985 to a low of 17,000 in 1996. A maximum of 131,000 wintering ducks have been documented (USFWS 1997) using the area of the John Day Pool upstream of RM 250. Wintering Canada geese populations have averaged 33,550 birds from 1987 to 1992 (USFWS 1997) in this same area. Concentrations are highest in the area around Umatilla Refuge. In 1992, there were 12 species of waterfowl nesting on McCormack Slough. Waterfowl production fluctuates, but good conditions in 1992 found 76 broods totaling over 600 ducklings on McCormack Slough. In addition to waterfowl, there were also rail, coot, killdeer, common snipe, spotted sandpiper, avocet, black-necked stilt, long-billed marsh wren, grebe, and blackbirds nesting around the slough.

During the spring months, geese and ducks nest along shorelines and on river islands where suitable nest sites and brooding areas for young are available. Considerable duck nesting also takes place in the subimpoundments constructed on the wildlife refuges.

Waterfowl hunting is a popular activity in the project area. Hunting occurs during the late fall and early winter and largely on the refuge and management areas.

Numerous species of songbirds, shorebirds, and raptors also inhabit the riparian zone. The northern bald eagle (classified as a threatened species) is among the raptors present in the project area. The white pelican and longbilled curlew are also found on the John Day Reservoir.

There are many species of small mammals found in the project area including mountain cottontail, blacktail jackrabbit, porcupine, short-tailed weasel, and a variety of rodents.

All of the aforementioned wildlife species provide environmental education, wildlife observation, and photographic opportunities. Most of these activities are concentrated within the managed wildlife areas.

WITH THE PROJECT

Spillway Crest and Natural River

The analysis of both spillway crest and natural river impacts on wildlife is combined into one section because the impacts are very similar. Essentially, all of the wetland and riparian habitat would have already been eliminated even with the spillway crest drawdown to elevation 218.0. The only additional impact from the more severe natural river drawdown to elevation 160.9 would be the loss of some additional open water areas in the lower portions of the John Day and Willow Creek arms and the main reservoir.

Major adverse impacts to wildlife and their associated habitats are expected with the proposed reservoir drawdowns. Approximately 8,836 acres of shallow water habitat (almost all of the available shallow water habitat in John Day Pool) would be dewatered with a reservoir drawdown to elevations 213.0 or 165.0. These aquatic areas and adjacent riparian zones represent a valuable and unique habitat for fish and wildlife in the desert areas of eastern Oregon and Washington.

The extensive backwater areas at McCormack Slough, Paterson Slough, Willow Creek, Glade Creek, Whitcomb Island Slough, and Crow Butte Slough would cease to exist. The large backwater areas in Willow Creek and the John Day River would also disappear as the water levels drop to 50 feet below existing elevations with a drawdown to spillway crest. A drawdown to natural river would lower the latter backwater areas by about 100 feet. Total losses of riparian, emergent, and submergent vegetation would occur in all of these backwater areas. This represents a loss of an estimated 2,854 acres of extremely valuable riparian and wetland habitats along with hundreds of thousands of animals dependent upon this habitat. Shallow water habitat losses would amount to 8,836 acres. Just within the Umatilla National Wildlife Refuge, about 4,960 acres of shallow water habitat would be lost. Loss of these backwater and shallow water habitats would mean the destruction of extensive areas of aquatic vegetation. Much of this vegetation, such as sago pondweed, provides an important food source for waterfowl. Emergent beds of bulrush and cattail would also be eliminated. An estimated 1,899 acres of established riparian communities and wetlands along the main reservoir area, including the Irrigon Wildlife Management Area, would also be desiccated. The benthic communities of the shallow water areas would also be destroyed. This biomass of aquatic invertebrates represents a major food source for fish and wildlife and is a vital part of the aquatic ecosystem.

Drawdown of John Day Pool would essentially eliminate the use of Umatilla Refuge as a source of wintering waterfowl habitat. From 1984 to 1988, the average number of waterfowl use days supported by Umatilla Refuge was 34,416,934 (ducks) and 2,672,838 (geese). The immediate effect of drawdown would be the short-term loss of habitat and use of the Refuge by waterfowl. The long-term outlook would also involve substantial reductions in waterfowl use of the area because of decreased carrying capacity.

Loss of aquatic plant and benthic communities would create severe food shortages in a critical period for hundreds of thousands of waterfowl during their migration stopover each fall. In the spring and summer, waterfowl nesting and rearing activity would be eliminated in most of the dewatered backwater areas. This is expected to result in a significant reduction in waterfowl production. At McCormack Slough alone, a production loss of 400 ducks could occur.

Production losses to rail, snipe, sandpiper, avocet, and stilt populations would also occur in these backwaters.

The loss of water and, subsequently, the riparian habitat in the many backwater areas would significantly impact aquatic furbearers such as beaver, muskrat, mink, and river otter. With very little alternative habitat available, most of the furbearers would not survive. Some may move down to the new shoreline, but most of the new water's edge would have inadequate cover. It would take a number of years to establish a new riparian zone with adequate habitat for furbearers.

Numerous wetland areas not directly connected to but near the John Day Reservoir would also be severely impacted. These wetlands and ponds, like those in the Irrigon Wildlife Management Area, go dry almost immediately when the reservoir level drops. It is anticipated that these ponds and wetlands will be gone with the proposed drawdown levels. Like the backwater areas described above, these wetlands are very important habitat for many species of wildlife. Waterfowl, shorebirds, nongame birds, and furbearers all utilize this habitat. A population of western painted turtles, listed as a sensitive species by the State of Oregon, would also be lost or severely impacted by the loss of these ponds.

Other impacts are expected along the main reservoir. The drawdown would create large exposed mud flats between the water's edge and the former shoreline. Canada goose goslings would have to traverse large, open, exposed areas to and from feeding sites located above the original shorelines. This increased vulnerability to predators would cause additional losses to juvenile geese. This would occur along the main Columbia River shoreline as well as backwater areas like the Willow Creek arm. Many of the grass areas adjacent to the shoreline that are now popular grazing sites for goslings would be lost because of the lack of subirrigation from the reservoir.

Some of the existing islands within the reservoir would become connected to the main shoreline as the water level drops. This land-bridging would allow mammalian predators easy access to the islands. Significant losses to island nesters such as waterfowl, gulls, terns, and shorebirds would result. Approximately 50 nests each of great blue herons and black-crowned night herons would be vulnerable at the low reservoir level. Islands of particular concern include Threemile, Longwalk, and McCredie. On Threemile Island alone, there is a potential impact for 7,000 to 10,000 nesting gulls, Caspian terns, and Forester's terns. An evaluation of other islands and water depths is necessary to determine all potential land-bridge sites.

This loss of island habitat would be offset by the restoration of from 77 to 84 new islands totaling about 5,000 to 6,200 acres. The new islands, however, would initially be barren, lacking adequate vegetative habitat to accommodate most nesting birds. Eventually, the island vegetation and cover would develop and provide some of the most important wildlife habitat in the reservoir area. It is expected that there would be significant use of the islands by Canada geese, other waterfowl, great blue and black-crowned night herons, gulls, terns, shorebirds and nongame birds. Mule deer would also be expected to use the new islands as fawning areas each spring.

The riparian herb, shrub, and tree habitat that is adjacent to the main reservoir shoreline would be severely impacted. As the water recedes away from the shorelines, much of the riparian vegetation would die. This would impact many species of wildlife dependent upon the riparian vegetation. Some of the impacted wildlife includes beaver, muskrat, mink, river otter, mule deer, California

quail, songbirds, cottontail rabbit, heron, raptors (including bald eagles), and woodpeckers.

Some wildlife habitat losses may be reduced by the re-seeding effort planned by the Corps. However, the extent of the habitat recovery from re-seeding, and how long it would take to become usable habitat, are unknown at this time.

The Umatilla National Wildlife Refuge operates five wells along the Columbia River. Operation of these wells, which are utilized for irrigation and domestic purposes, would be eliminated by the proposed drawdown. As a result, refuge operations would be adversely affected.

Construction of the irrigation canals in Oregon and Washington is expected to cause some adverse impacts to wildlife resources. A primary concern is that mammals, especially deer, will become trapped and die in the canals. Impacts along the canal in Oregon would primarily be to shrub steppe habitat within the right of way of the existing WEID canal which is not a major concern. Potential impacts associated with the Washington canal would be to shrub-steppe habitat except where the canal would cross riparian or wetland areas such as Glade Creek. These crossings are of special concern since these habitats are very limited in the project vicinity.

A possible beneficial effect, although probably short-term, would be increased shorebird habitat. As the reservoir shoreline recedes, new mudflats would appear that would attract many feeding shorebirds. However, since the water level would remain low, the flats would dry out, no longer providing good shorebird habitat. Increased nesting habitat may be available for killdeer and spotted sandpiper, and, where water remains nearby, avocets and stilts.

DISCUSSION

Each of the four alternative drawdown levels would be expected to cause both beneficial and adverse impacts to fish and wildlife in the John Day Reservoir area. The lower reservoir levels and the natural river option may significantly benefit anadromous fish. Decreased travel time for downstream migrants and the restoration of spawning habitat could result in an overall increase in run sizes. The restoration of valuable island habitat would also benefit Canada geese and other species of wildlife which utilize island habitat. However, in conjunction with these benefits, there would also be adverse impacts to aquatic habitat, anadromous fish, wildlife habitat, and wildlife species. A total of 8,836 acres of backwater areas, which are important food production zones for fish and wildlife, would be eliminated. These shallow waters are a significant food source and rearing area for both resident and anadromous fish species as well as wildlife, particularly waterfowl. A significant number of acres (2,854) of emergent marsh and riparian habitat would also be eliminated by the drawdown. Loss of this habitat would impact anadromous and resident fish, shorebirds, waterfowl, passerine birds, aquatic and terrestrial furbearers, raptors, big game, reptiles and amphibians. These overall benefits and losses need to be carefully considered before a decision is made to do a Phase II study.

Mitigation

Major losses to backwaters, wetlands, riparian zones, and island habitat would result without

measures to reduce drawdown impacts. Therefore, efforts to reduce these losses must be considered in the project plans. Providing water to diked off portions of Paterson Slough, McCormack Slough, Willow Creek, Glade Creek (and possibly other areas) would reduce impacts to existing slough and backwater habitats and should be evaluated. Water could also be provided to the numerous ponds and wetlands in the Irrigon Wildlife Management Area. One potential source for this water would be the new irrigation canals. Studies are necessary to determine how much water would be needed to maintain existing backwater levels, other sources of water, and the best way to distribute the water. Plans should also be developed to irrigate key riparian habitats that would be dewatered by the drawdown.

Some of the wildlife habitat losses caused by the reservoir drawdown will be offset by the reestablishment of vegetation, including riparian habitat, along the new reservoir shoreline. However, the new vegetative community is not likely to be the same as that present during pre-project conditions. Sedimentation, land use, seeding sources, and other influences would probably result in a different vegetative matrix. Further, the composition and location of reestablished vegetation along the perimeter of the new shoreline would be different for each alternative. The re-seeding effort planned by the Corps would be in conjunction with natural vegetative development. The re-seeding should include both shoreline and island areas.

The new habitat would require many years to reach maturity and significant reductions in wildlife populations would occur in the interim. Mitigation measures would need to be developed and implemented to maintain existing wildlife habitat and values as the replacement habitat becomes established. The goal of this effort would be to allow no net loss of wildlife values between the time of impact and actual compensation. Mitigation plans and levels could be different depending on the project alternative selected. Post project monitoring and evaluation in an adaptive management approach would be necessary to assess the changes in conditions and the success of mitigation features. This would require followup studies to determine the quantity and quality of the new habitat. If mitigation efforts are not successful, contingency funds should be provided by the project to develop alternative mitigation features. All mitigation actions should be coordinated with and approved by the ODFW, WDFW, Tribal interests, and the FWS. It would also be necessary to develop detailed estimates of all wildlife losses and measures to compensate these losses with little or no loss between impact time and actual compensation. Project funds should provide for this mitigation effort.

If dredging is performed to maintain anadromous fish access to tributary streams of the reservoir, up to 9,346,000 cubic yards of sediment could be removed. This could cover an area up to 519 acres. It is important that all dredge spoils be placed in upland sites away from waterways and wetlands.

Potential wildlife losses from habitat changes and drowning or injury associated with the proposed canals is a concern. Canals can be designed so that losses are significantly reduced. It is important, therefore, that the appropriate State and Federal wildlife agencies are involved in the decisions regarding canal location and design.

Implementation of any of the alternatives would require years of construction activities to complete. During that time, safe fish passage conditions must be provided. This would involve many modifications and/or new construction of fish ladders, screens, and bypass facilities. Close

coordination with the NMFS, ODFW, WDFW, Tribal interests, and FWS would be required to assure that the best procedures to protect fish are incorporated into construction plans. Proper design of the water intake facilities in The Dalles and McNary Reservoirs also requires coordination with the fisheries agencies. These agencies should also be consulted to make certain adequate passage for anadromous fish continues at the mouths of tributary streams.

Substantial losses to the hatchery system are expected with the drawdown. The Irrigon and Umatilla Fish Hatcheries would be inoperable. A production loss of about 5 million salmon and steelhead is expected with the proposed project if a new water supply is not provided. Finding an alternative water supply for the hatcheries would be difficult because of the stringent water quality and temperature requirements for rearing salmonids. Studies would be necessary to determine if an alternative water supply for the hatcheries is available. If water is not available, a search must be made to determine if there are any satisfactory sites for constructing new facilities to replace the Irrigon and Umatilla Hatcheries.

RECOMMENDATIONS

To protect and restore fish and wildlife resources in conjunction with the John Day Reservoir Drawdown, we recommend that:

1. Should a Phase II study be conducted, the Corps complete a detailed assessment to document and quantify specific net impacts to fish and wildlife resources, including potential anadromous fish benefits in terms of increases in smolt survival numbers, increases in adult returns, and the economic value of these increases. Reduced mitigation needs at Federal and state hatcheries because of increased salmon spawning habitat and capacity in the mainstem Columbia River should also be investigated.

2. There be development of appropriate detailed and specific mitigation and enhancement recommendations under the Fish and Wildlife Coordination Act that includes:

    a) Project plans to maintain water levels in portions of McCormack Slough, Paterson Slough, the Willow Creek backwater area, Glade Creek, Mesner Pond, and Irrigon Wildlife area ponds;

    b) Identification of key areas of riparian vegetation that would be dewatered by the drawdown and plans to retain those habitats through irrigation;

    c) Water from irrigation sources to ponds being made available to sustain turtle populations;

    d) Close coordination with the WDFW, ODFW, NMFS, Tribal interests, and the Service in locating and designing the proposed irrigation canals and the water intake structures (in McNary and The Dalles Reservoirs) for the canals (and any other changes to the irrigation infrastructure) to minimize adverse impacts to wildlife;

e) Development of an acceptable alternative water supply for the Irrigon and Umatilla hatcheries or locating sites for constructing new hatchery facilities;

f) Coordination with fisheries agencies and Tribal interests in: 1) development of plans and schedules for drawing down the level of the reservoir, 2) the design and location of new fish ladders, screens, and bypasses, and 3) the evaluation of anadromous fish passage at the mouths of the tributary streams;

g) Development of post-project monitoring and evaluation of mitigation actions to determine their success. This work would be coordinated through interagency meetings of the Corps, WDFW, ODFW, NMFS, and Tribal representatives. Contingency funds would be provided by the project for alternative measures if the mitigation goals are not being achieved; and

h) Provisions to assure that drawdown areas are seeded, initial drawdown rates are ramped to reduce stranding losses, and other drawdown issues related to sediment transport and fish passage are identified and plans are developed for mitigation.

Sincerely yours,

Ronald L Lirst

for State Supervisor
Oregon State Office

LR/lr,kl/jondaydd

cc: ODFW, Pendleton
ODFW, Portland
WDFW, Vancouver
WDFW, Spokane
NMFS
Umatilla NWR
Columbia River Inter-Tribal Fish Commission
Confederated Tribes of the Umatilla Indian Reservation
Irrigon and Umatilla Hatcheries

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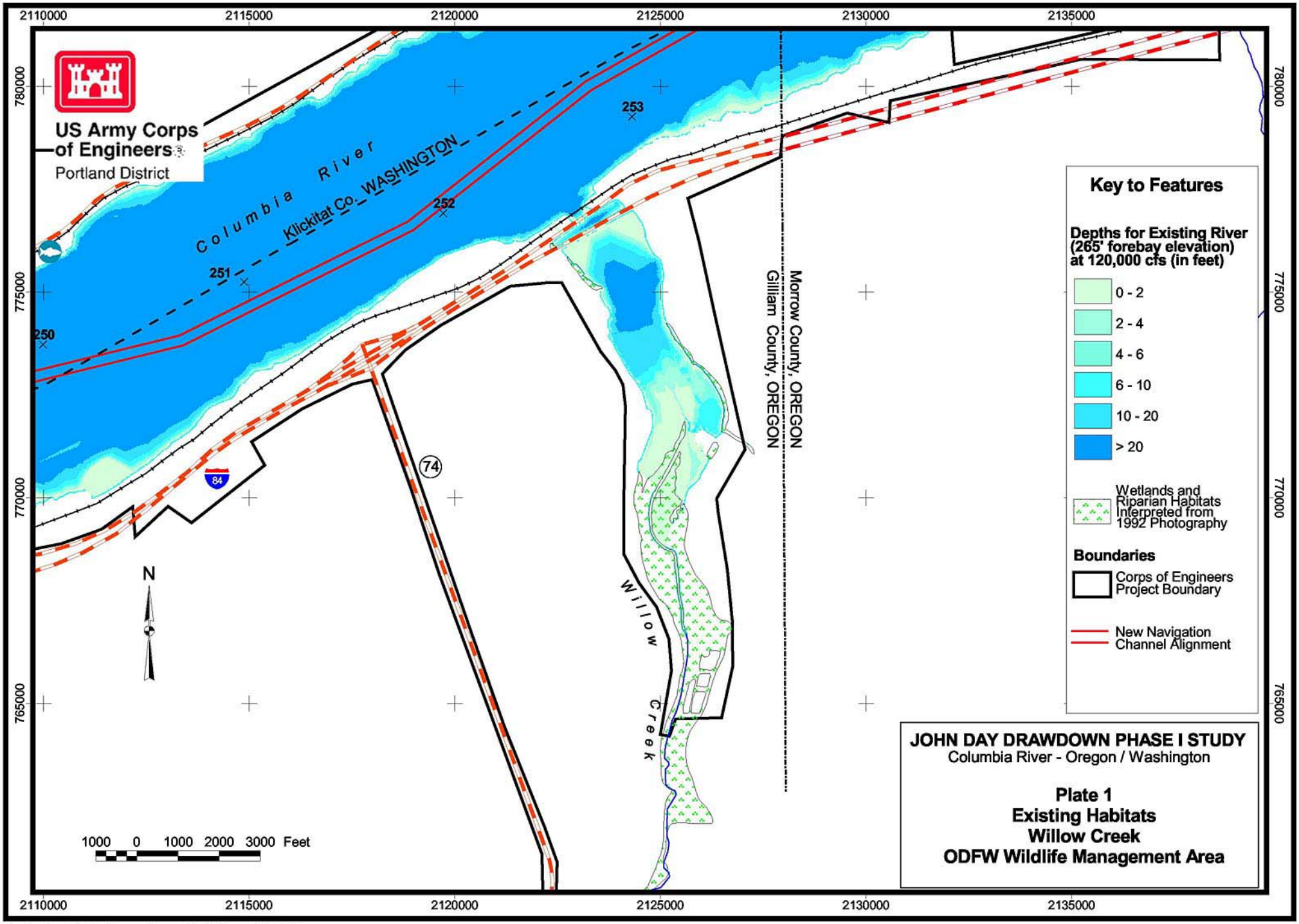

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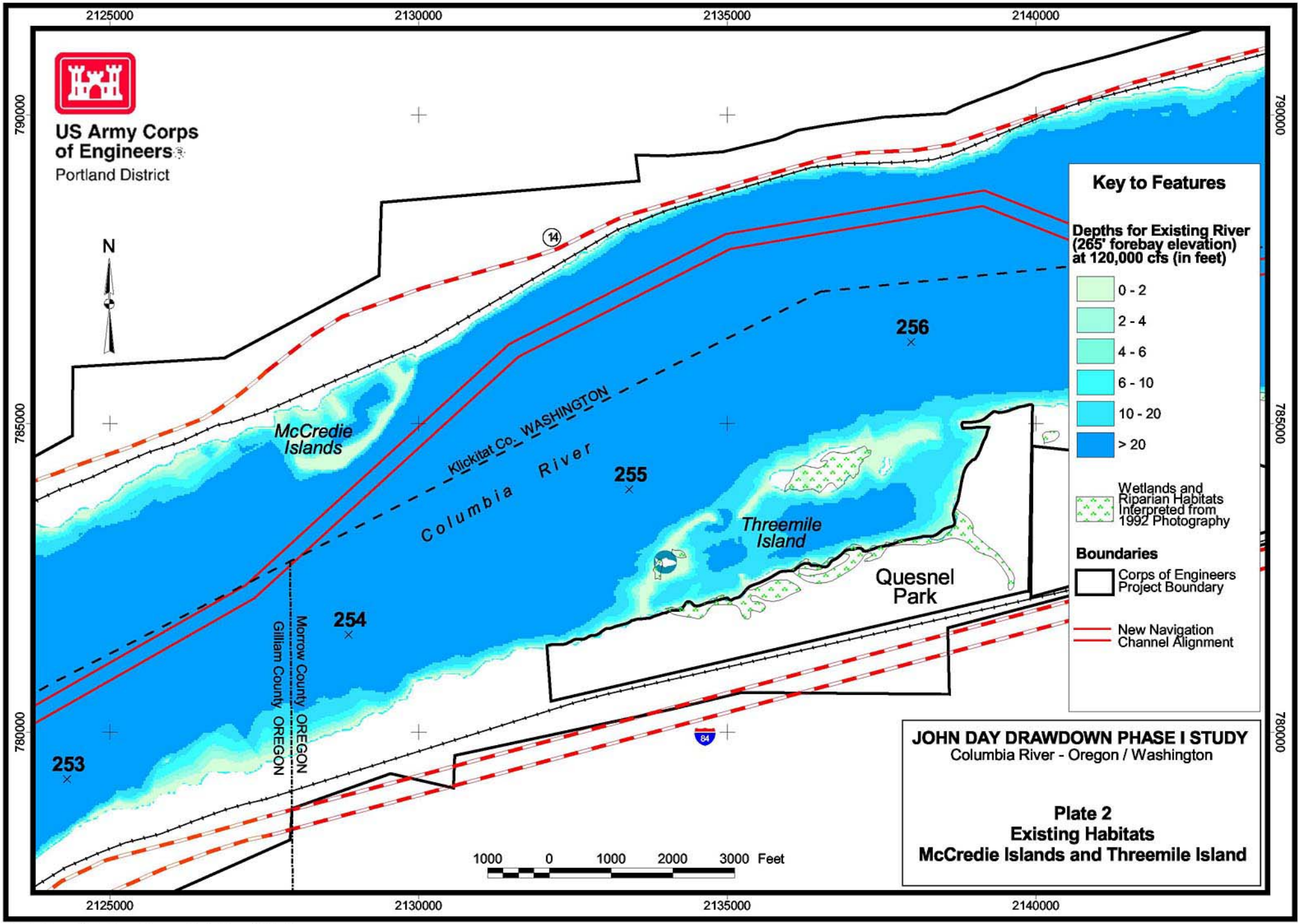
Depths based on Corps of Engineers Hydrosurveys, 1994
Produced by GIS, Survey and Mapping Section
US Army Corps of Engineers, Portland District



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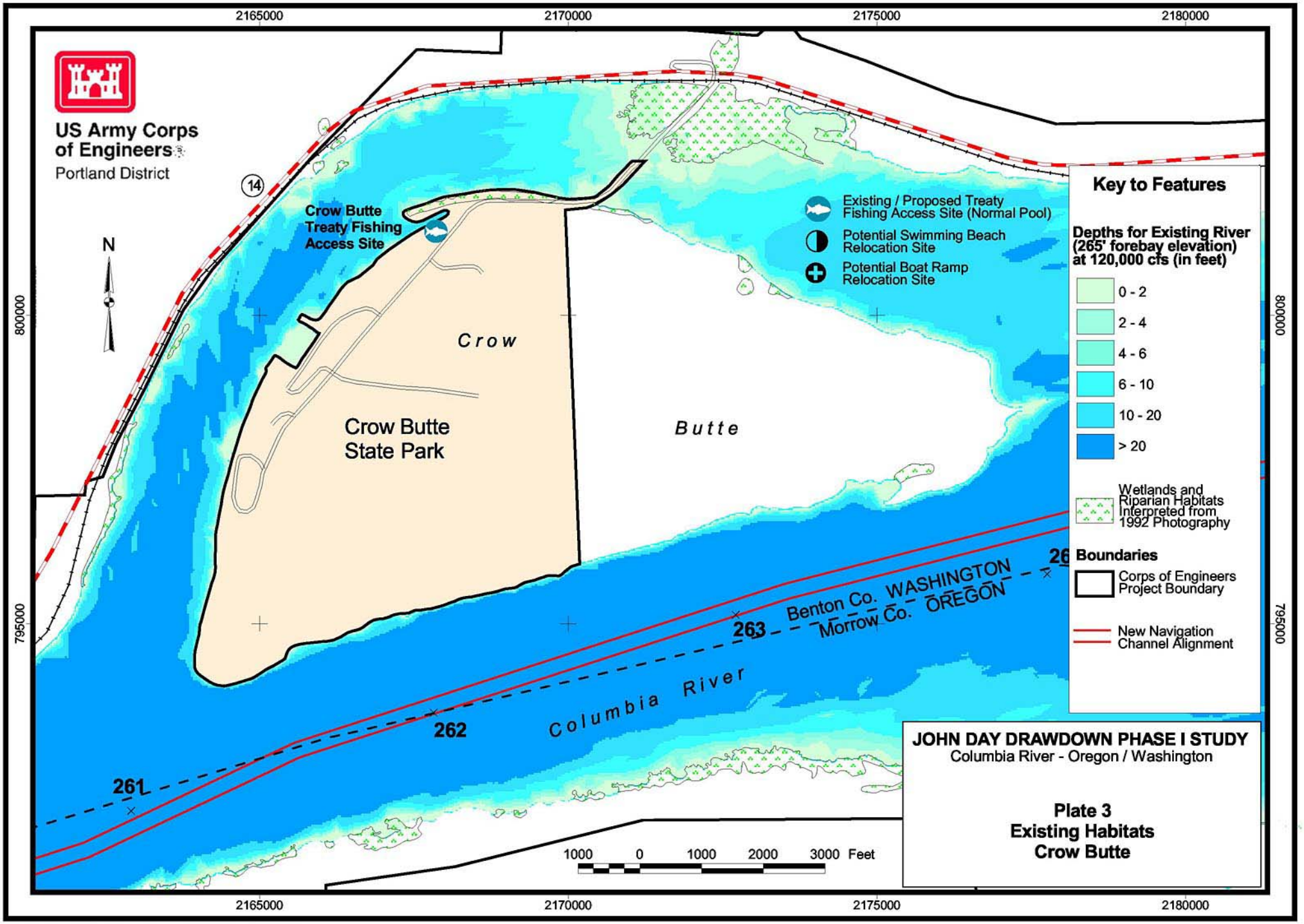

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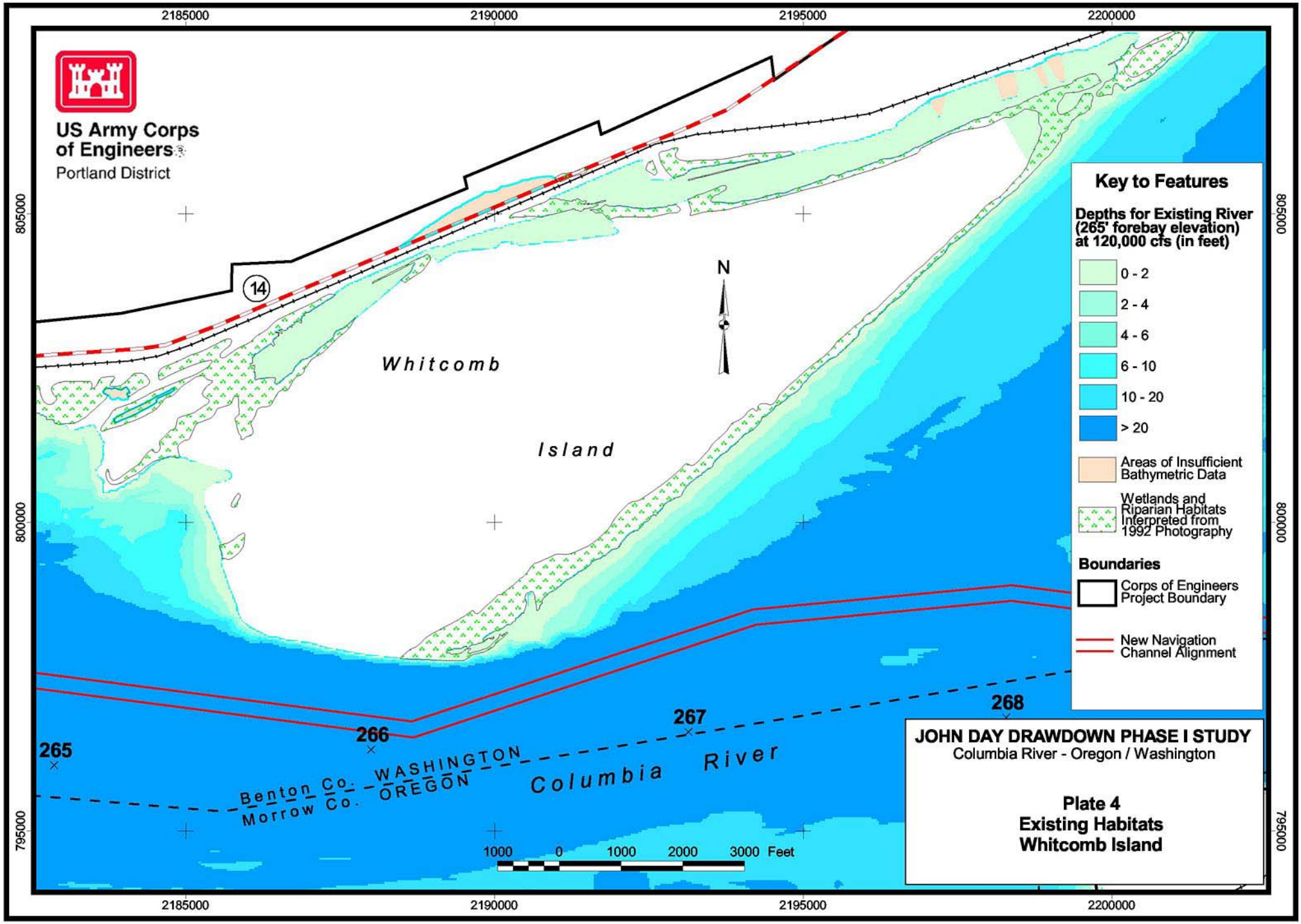

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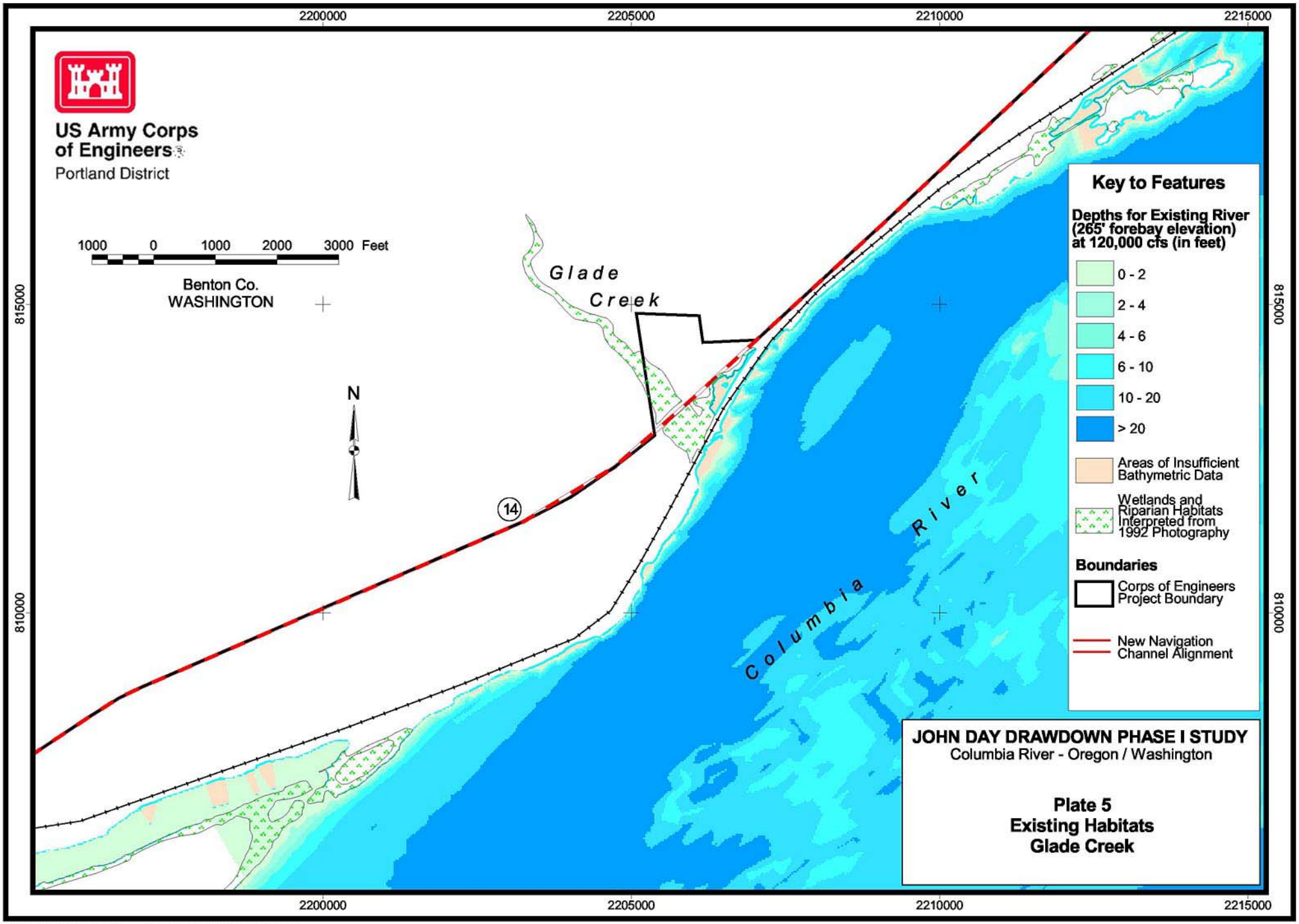

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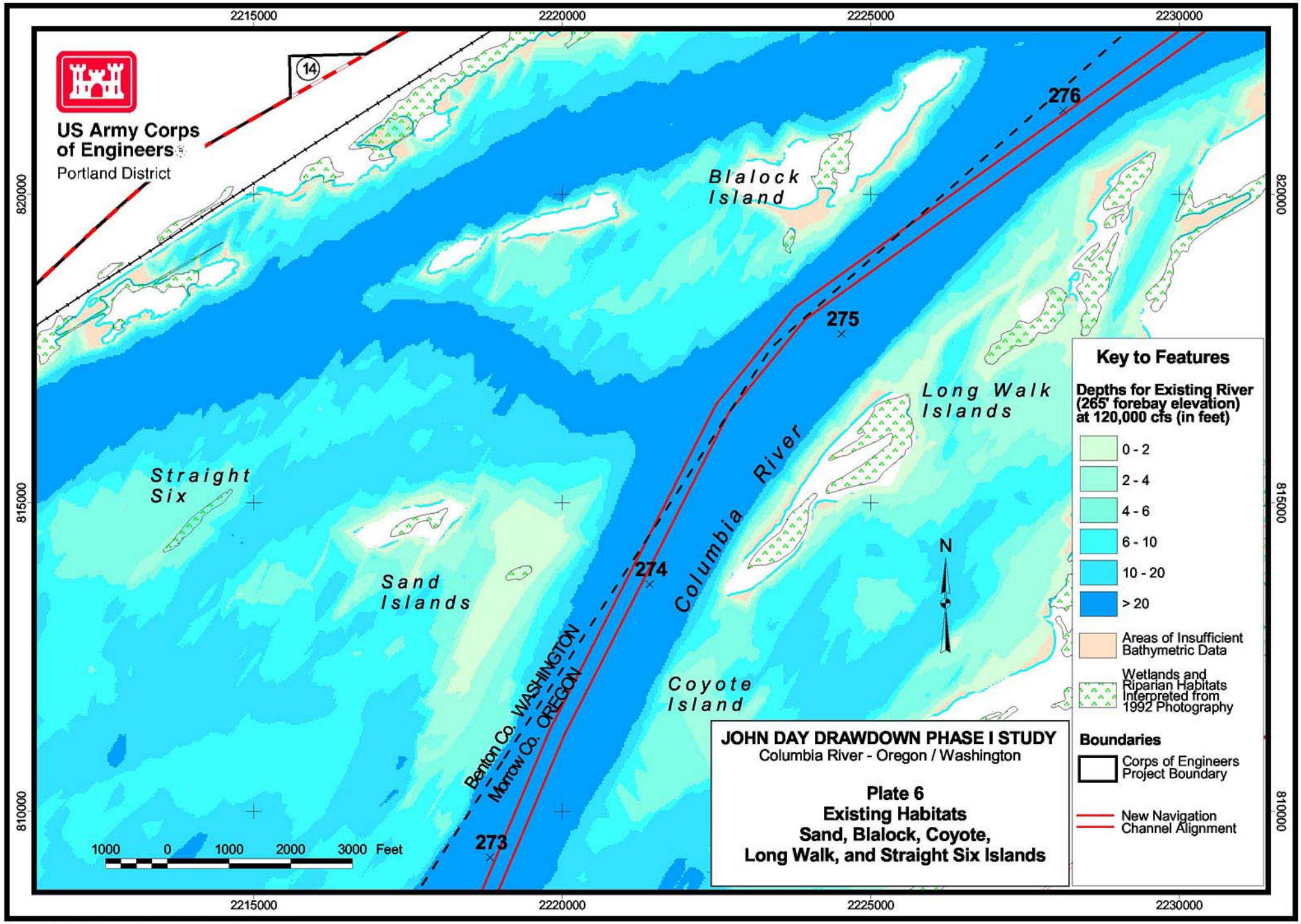

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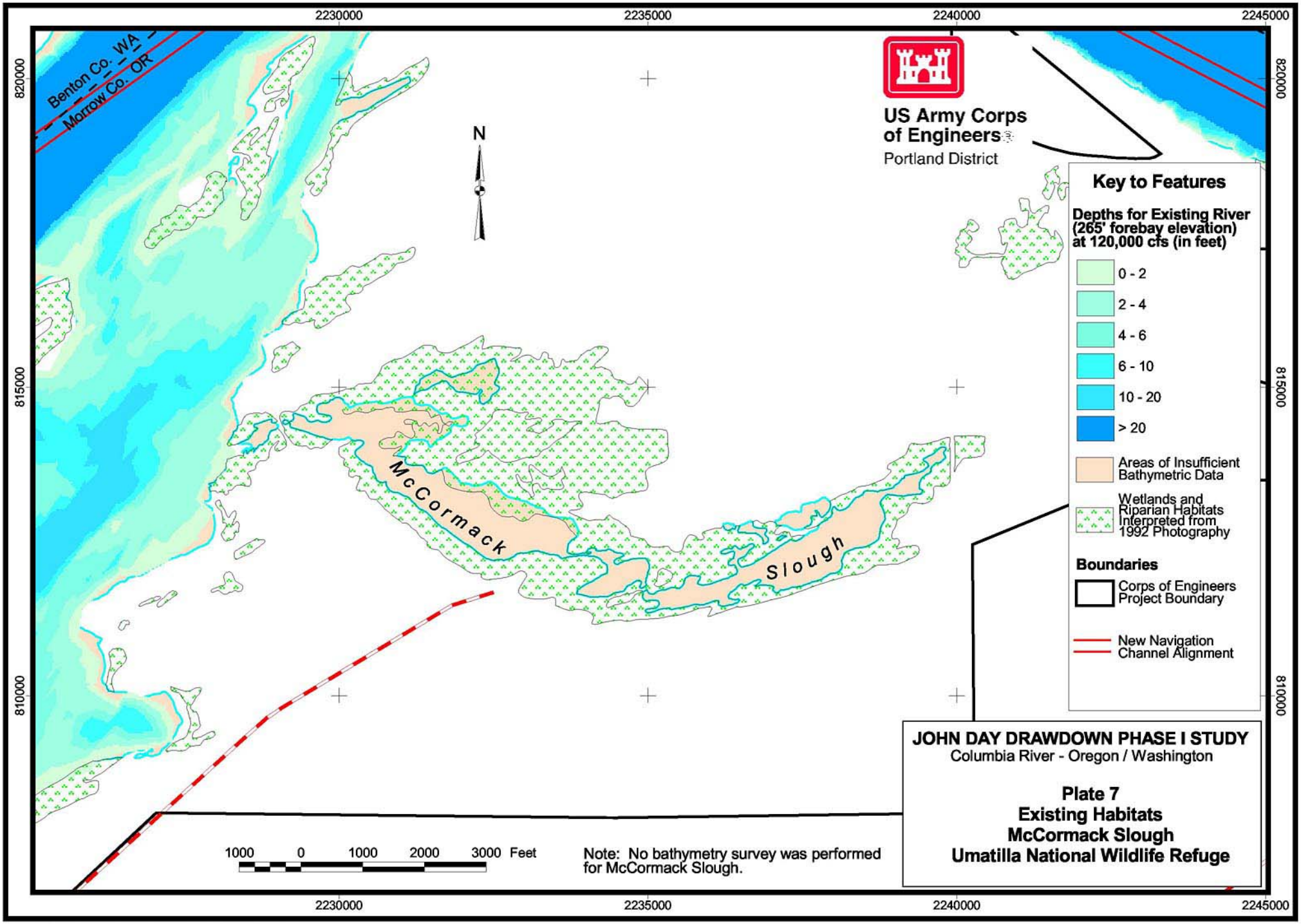

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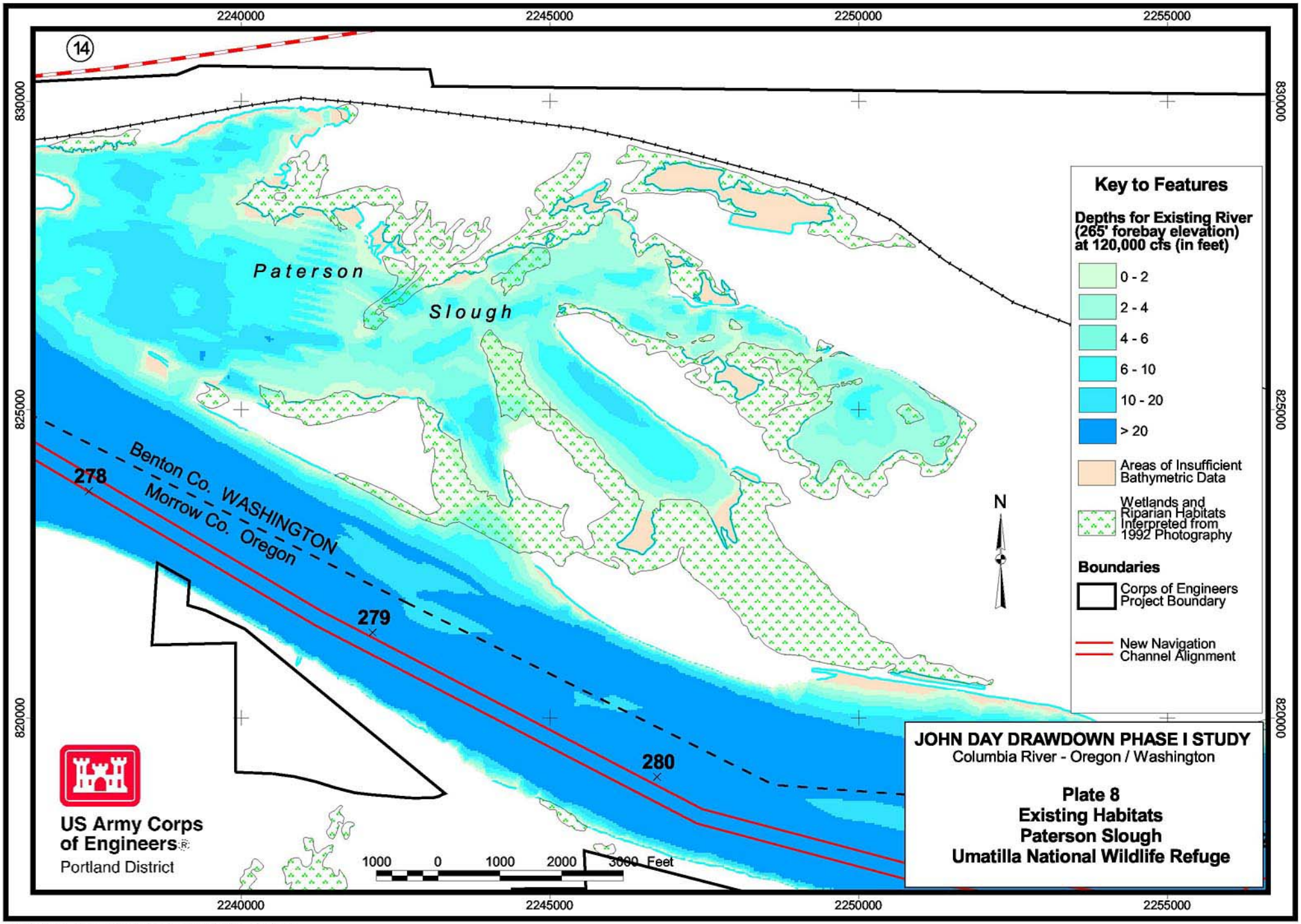

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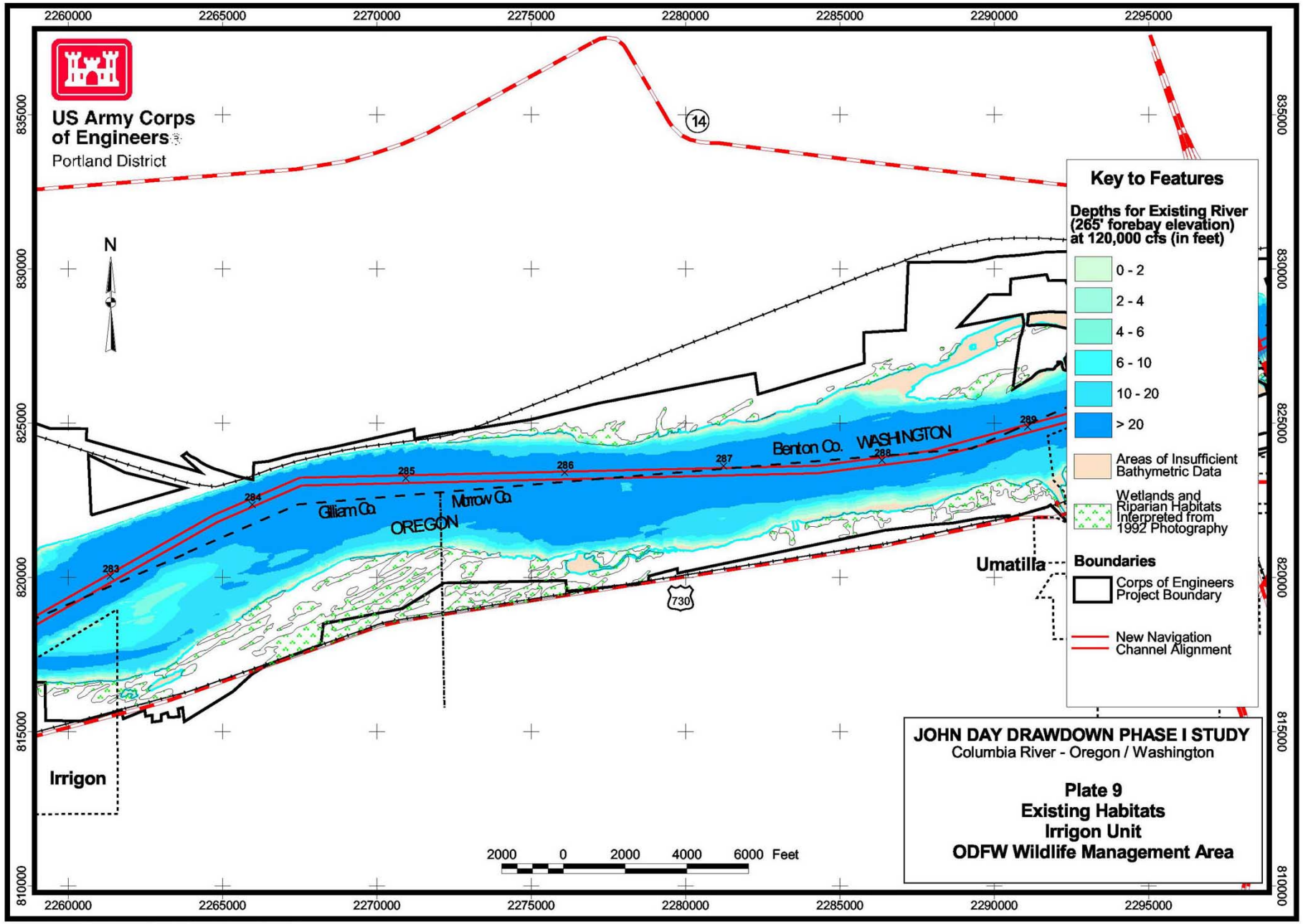

JOHN DAY DRAWDOWN PHASE I STUDY
Columbia River - Oregon / Washington

Plate 9
Existing Habitats
Irrigon Unit
ODFW Wildlife Management Area

Projection: State Plane, Oregon North Zone, NAD 27
Depths based on Corps of Engineers Hydrosurveys, 1994
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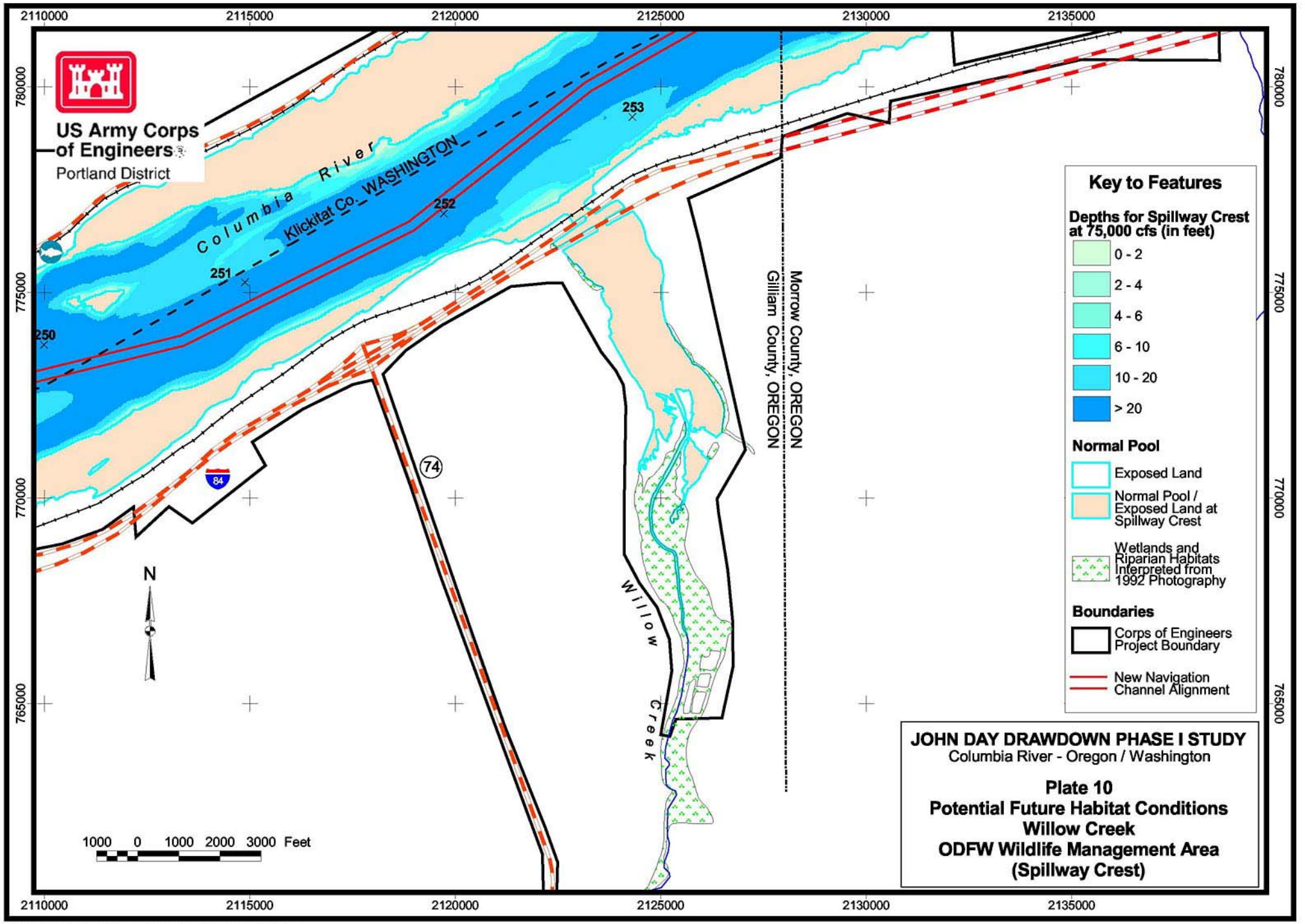
US Army Corps of Engineers, Portland District



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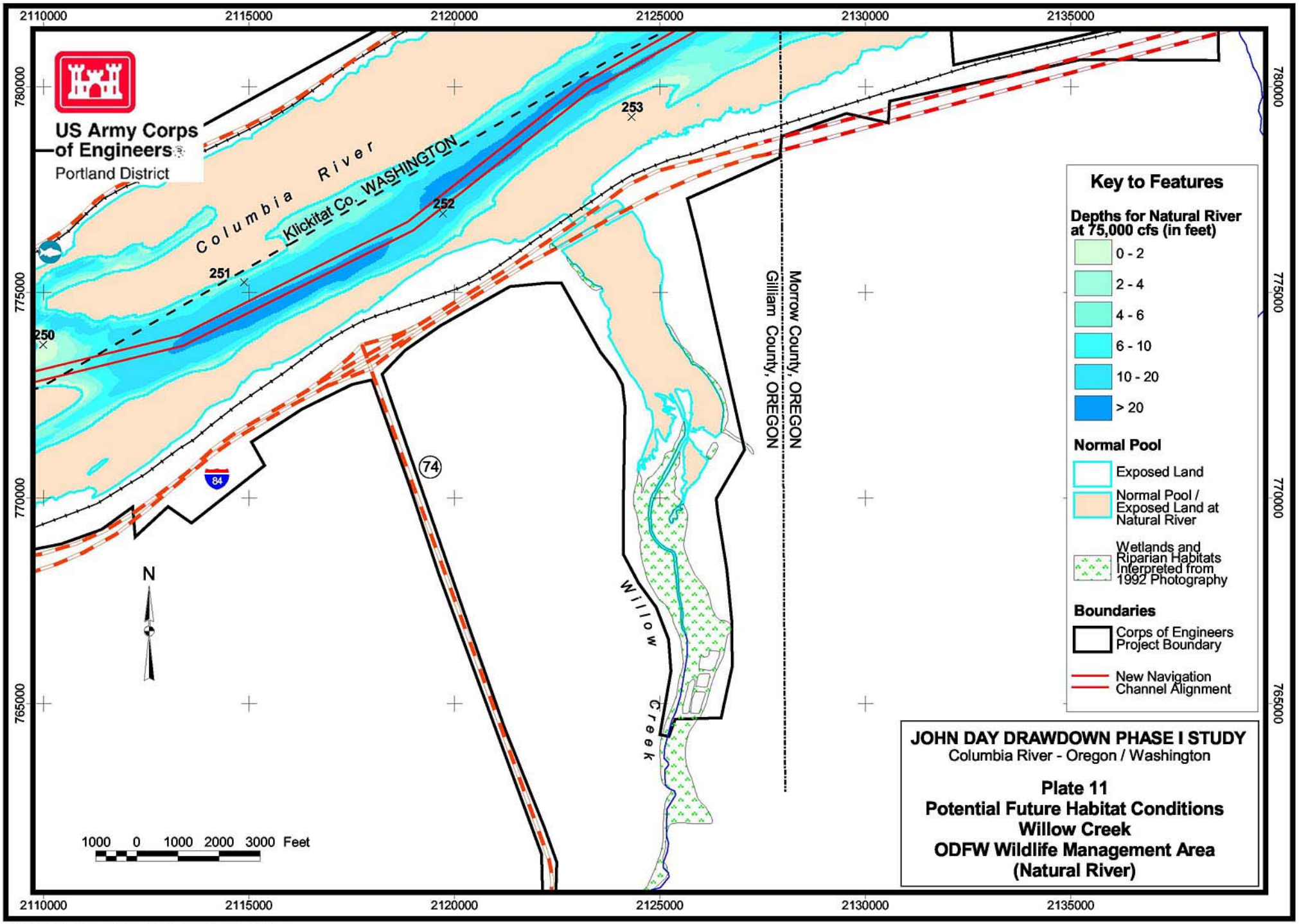

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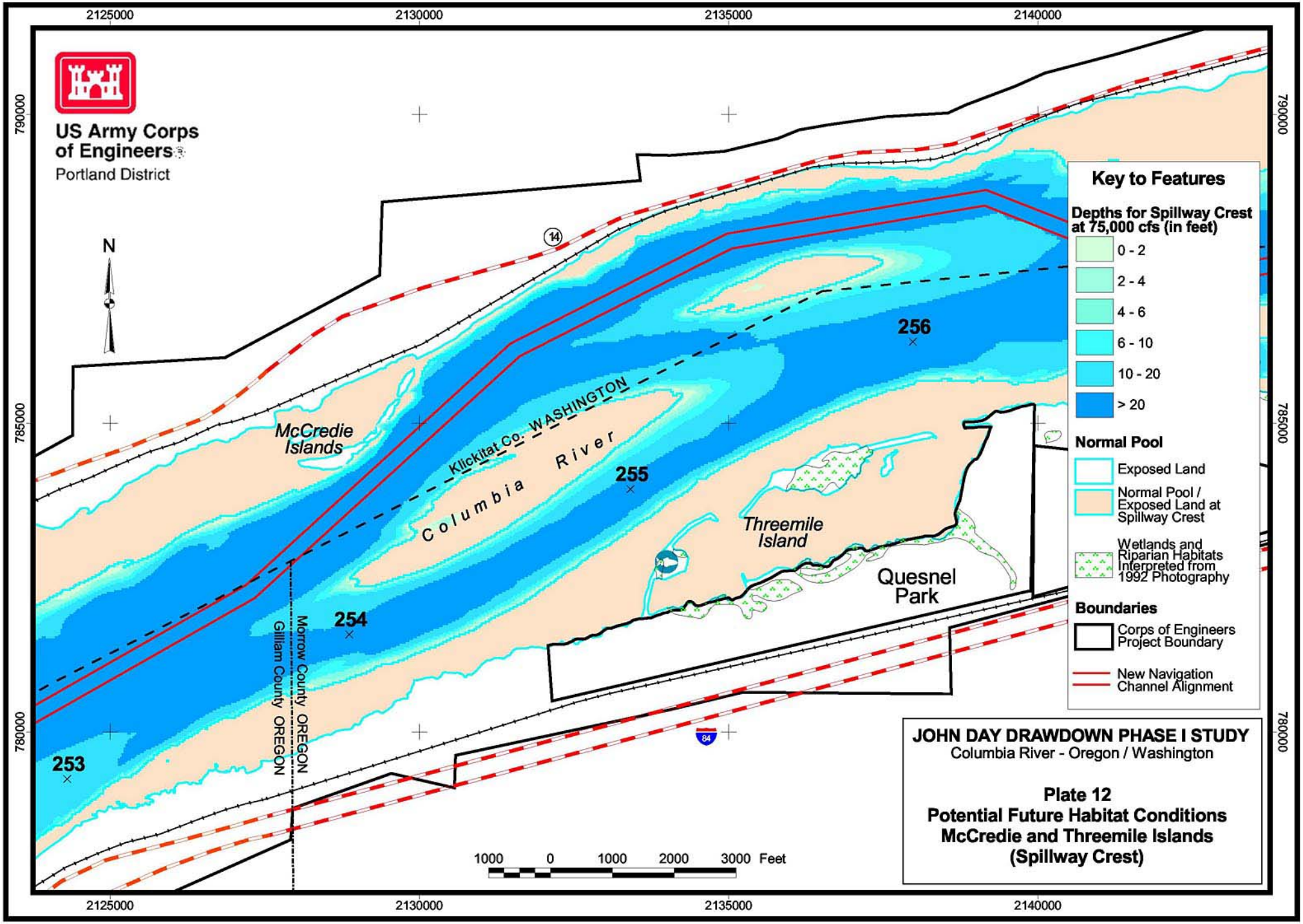

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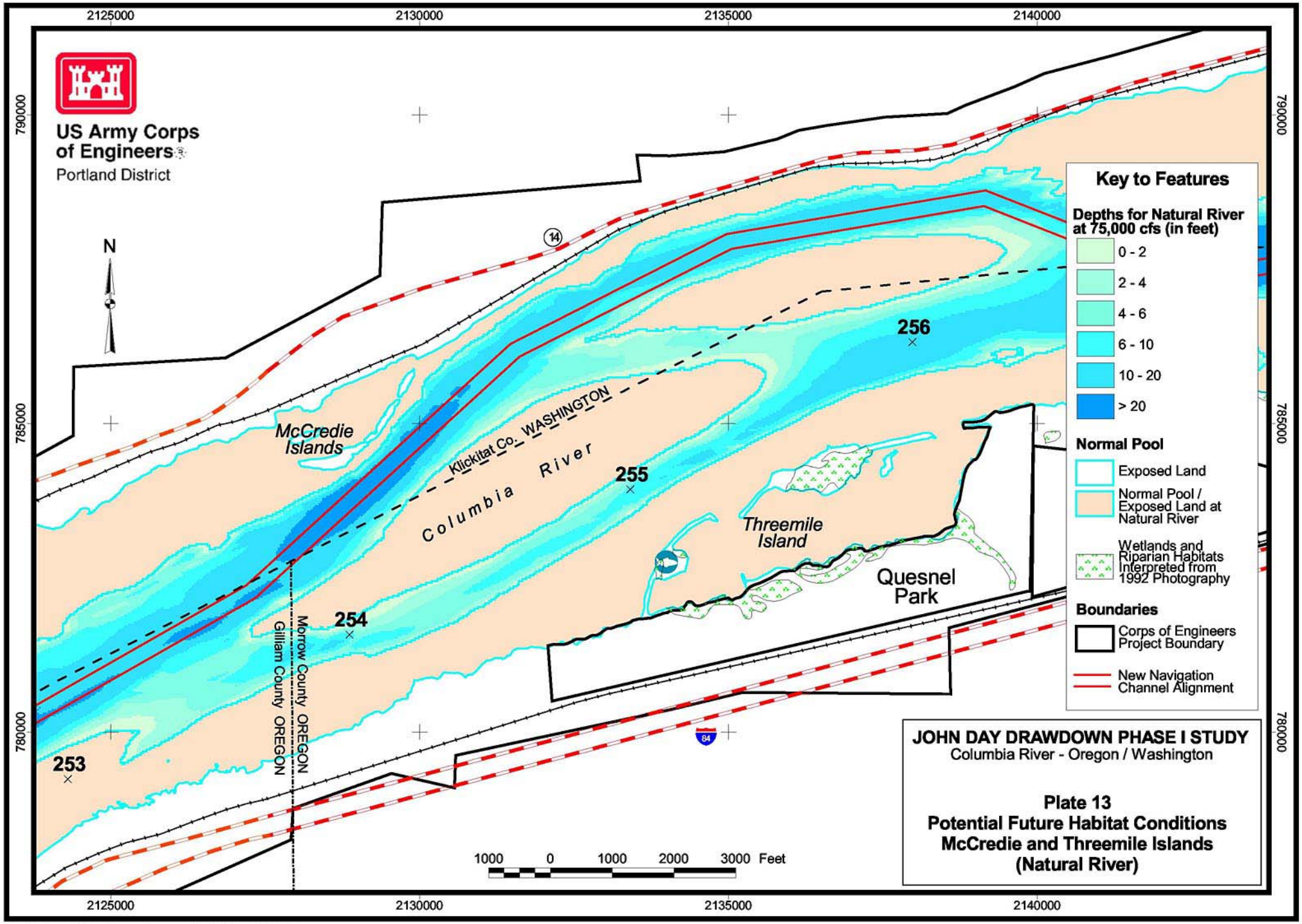

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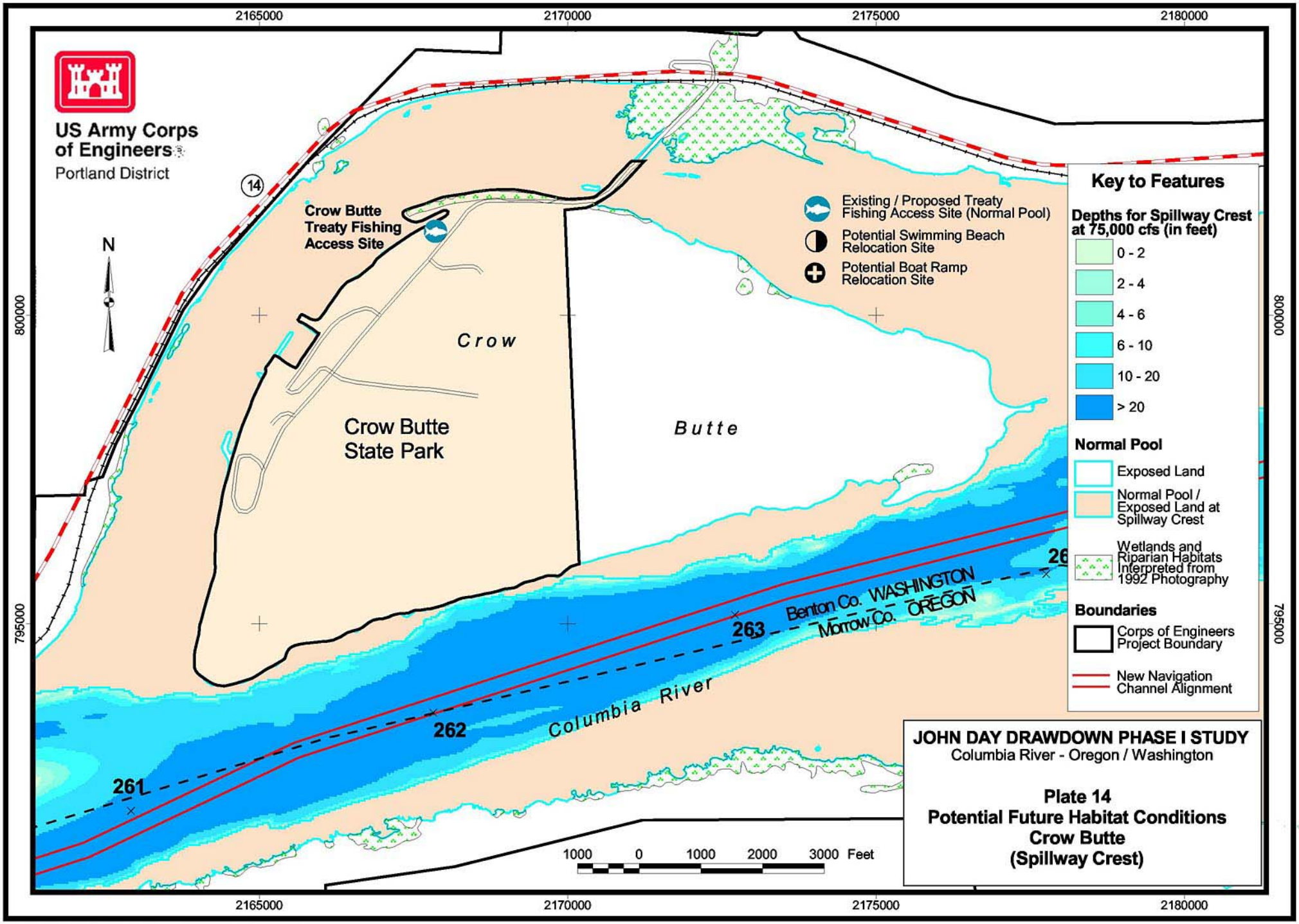

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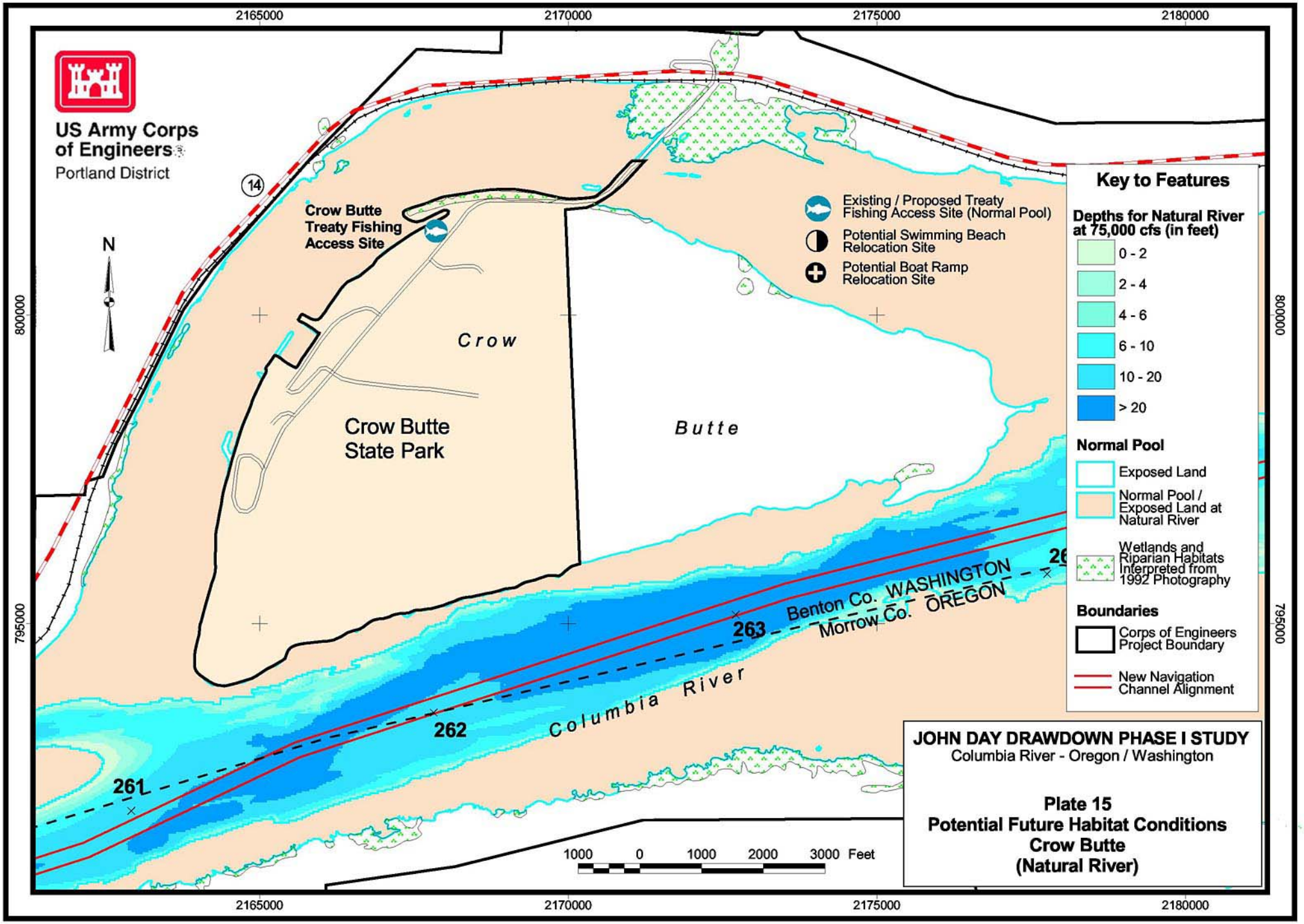

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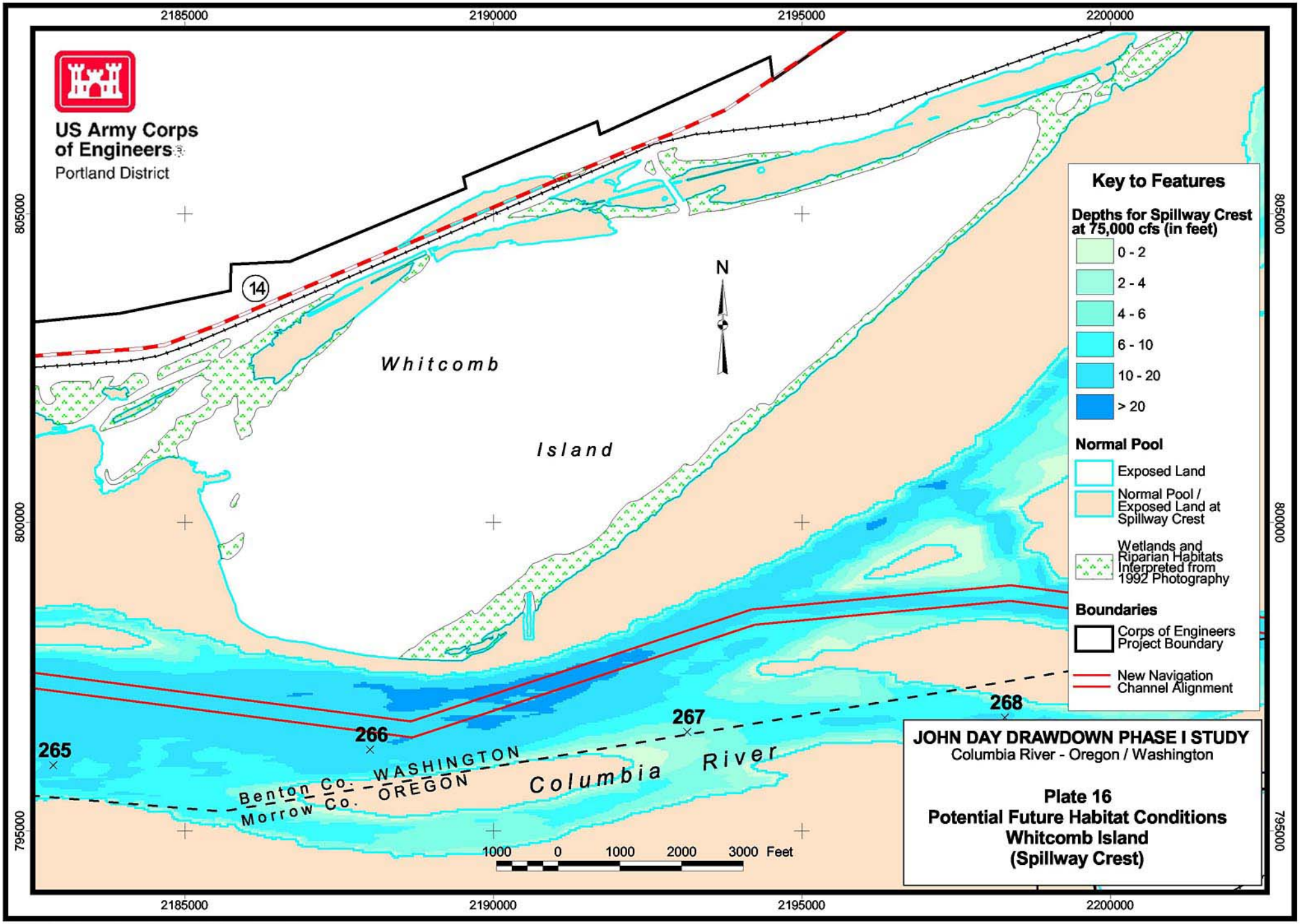

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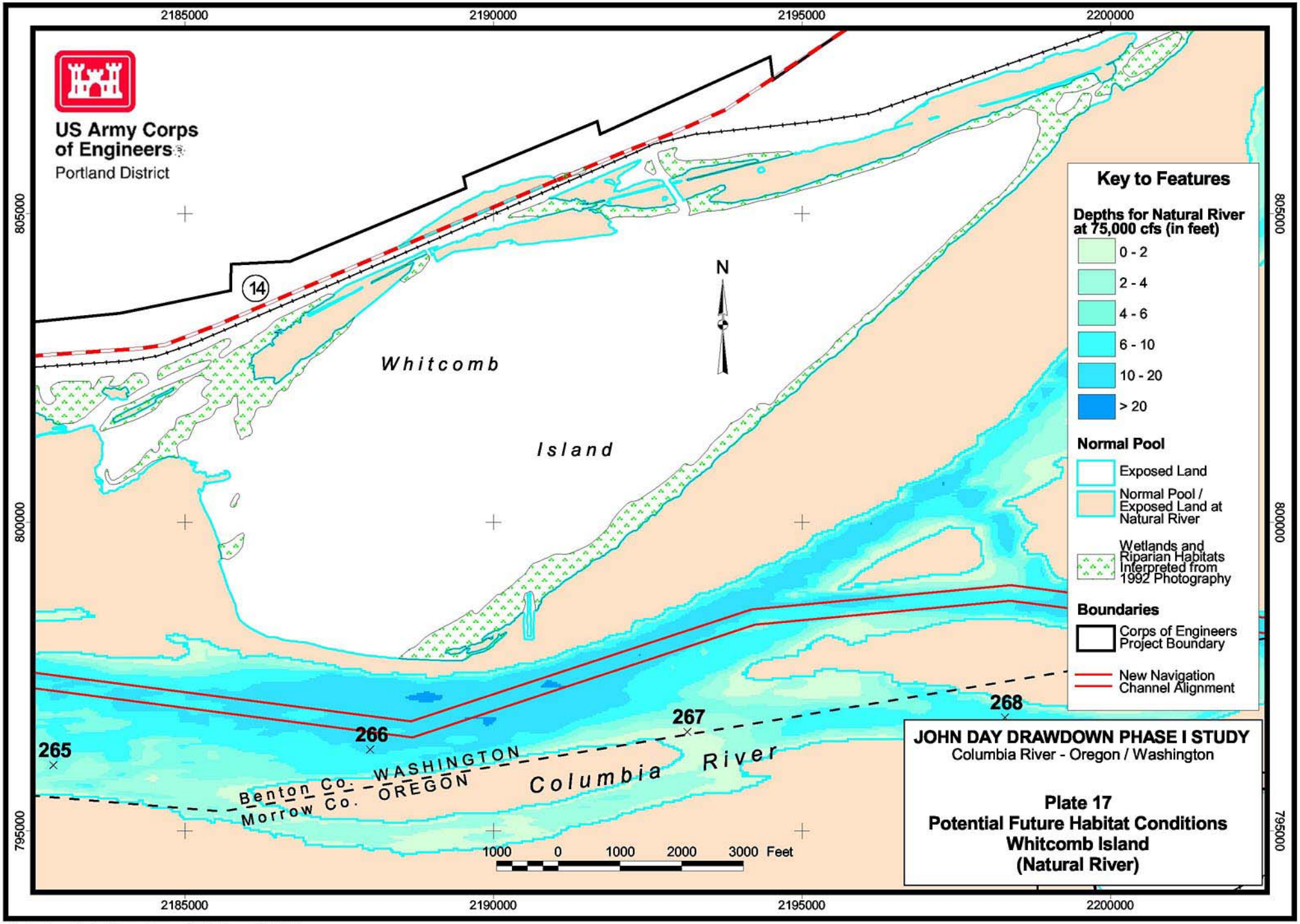

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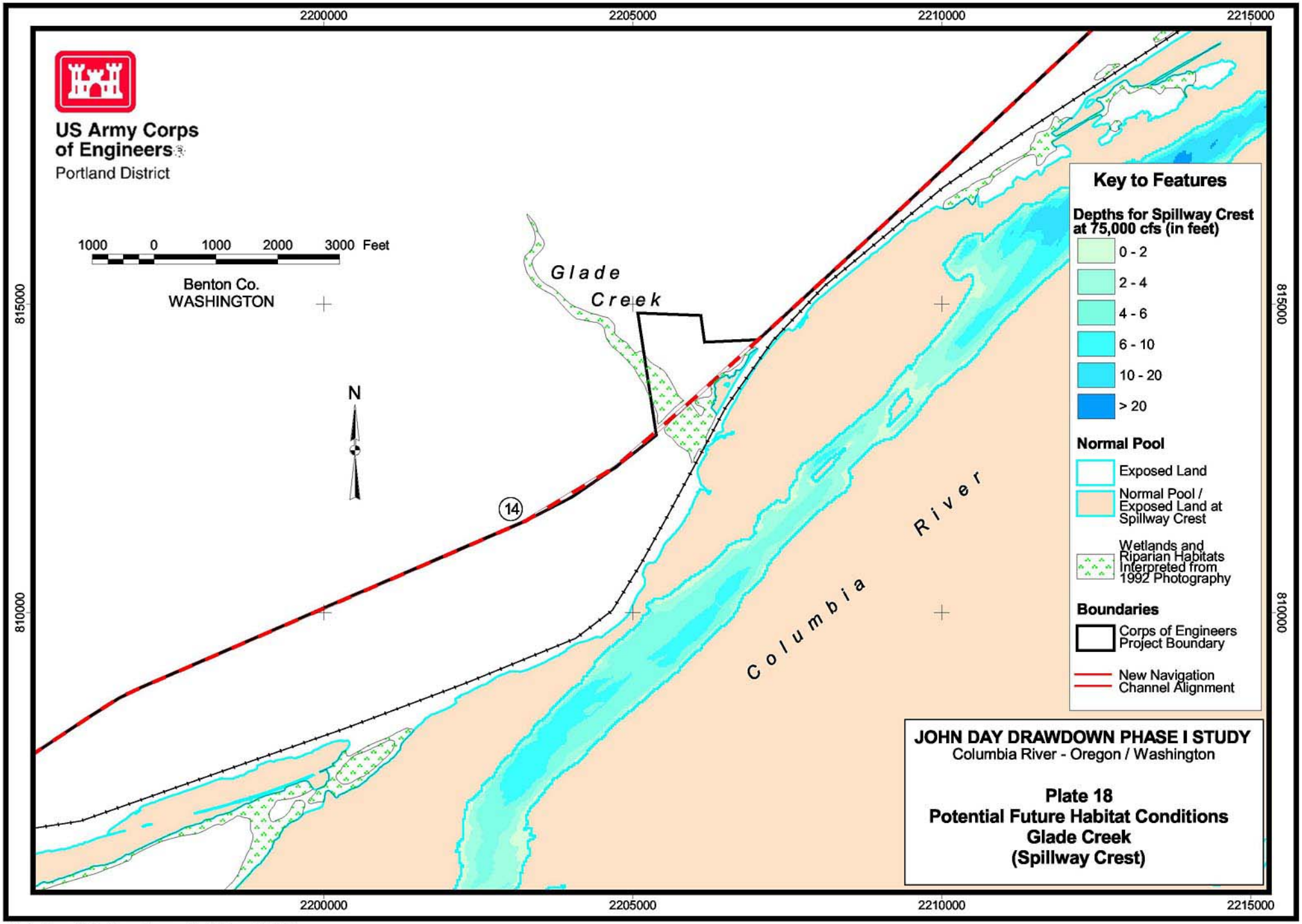

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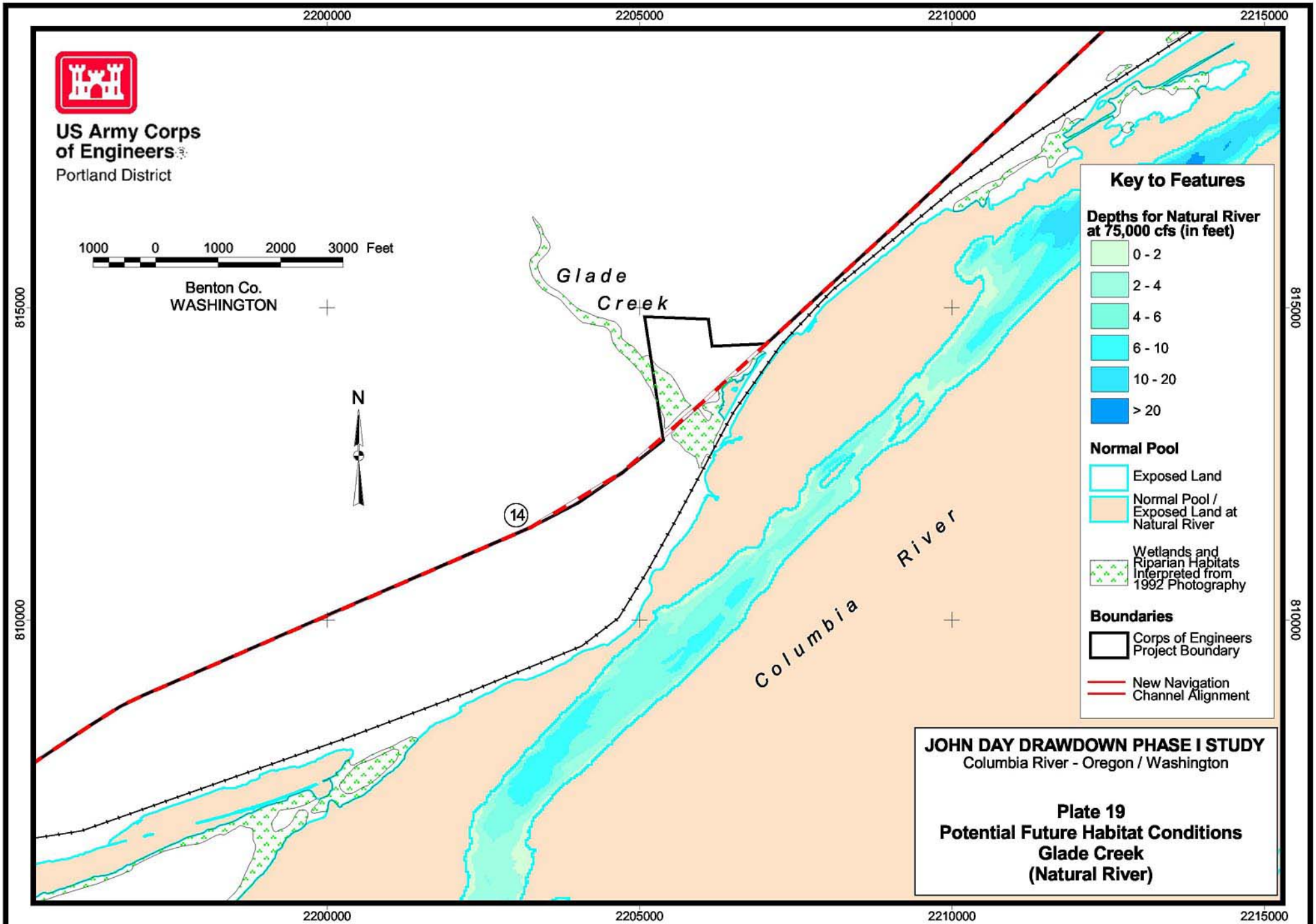

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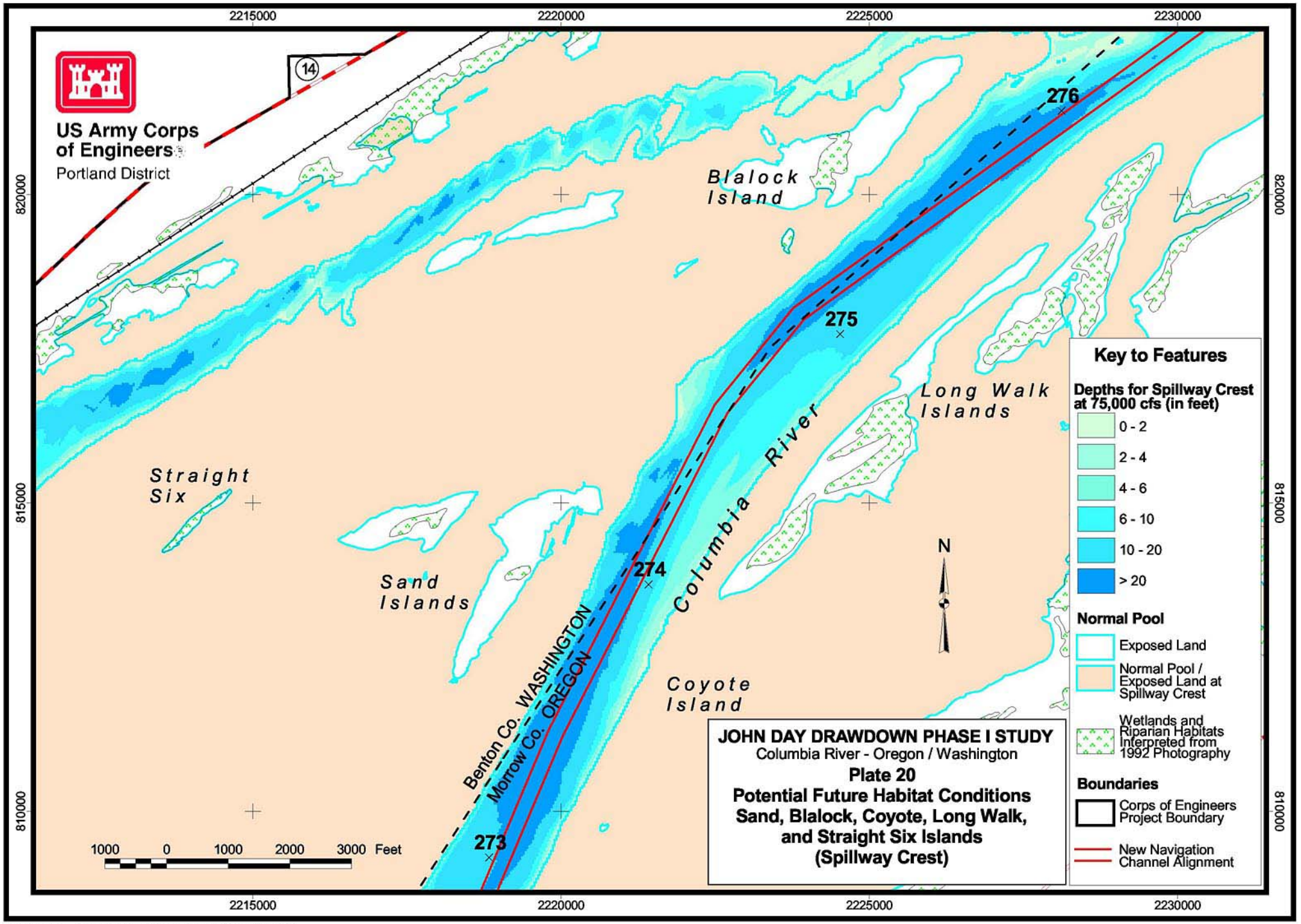

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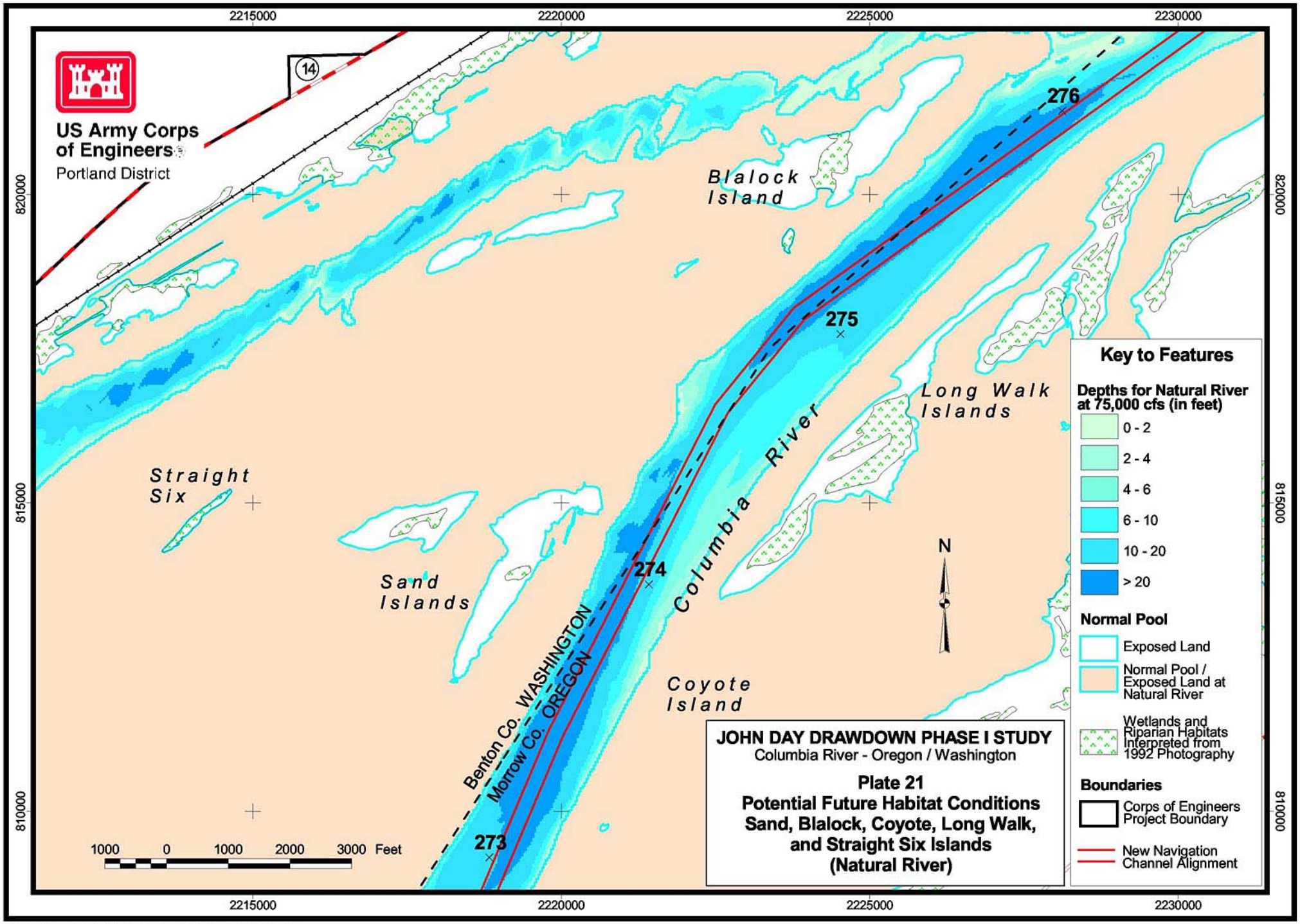

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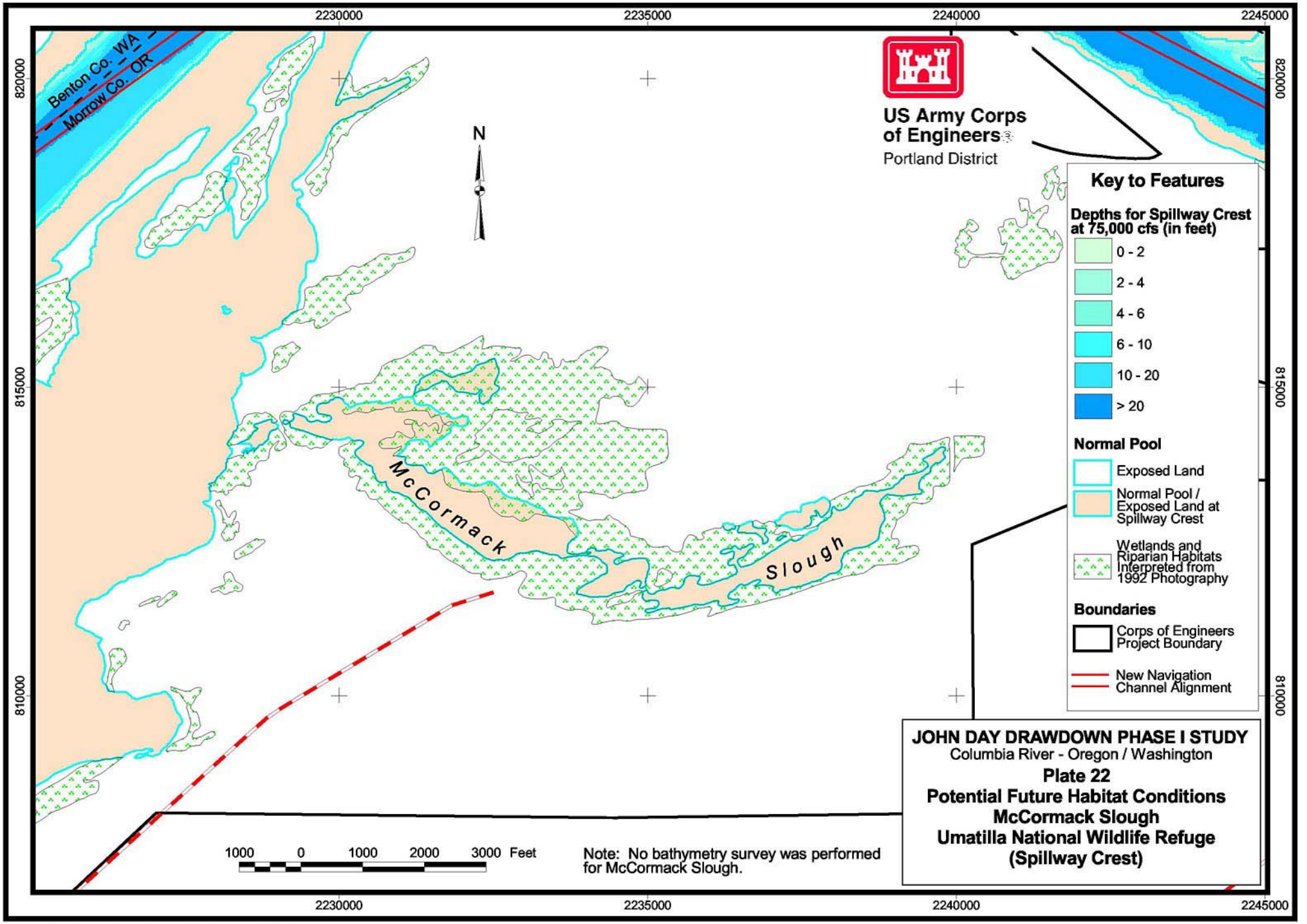

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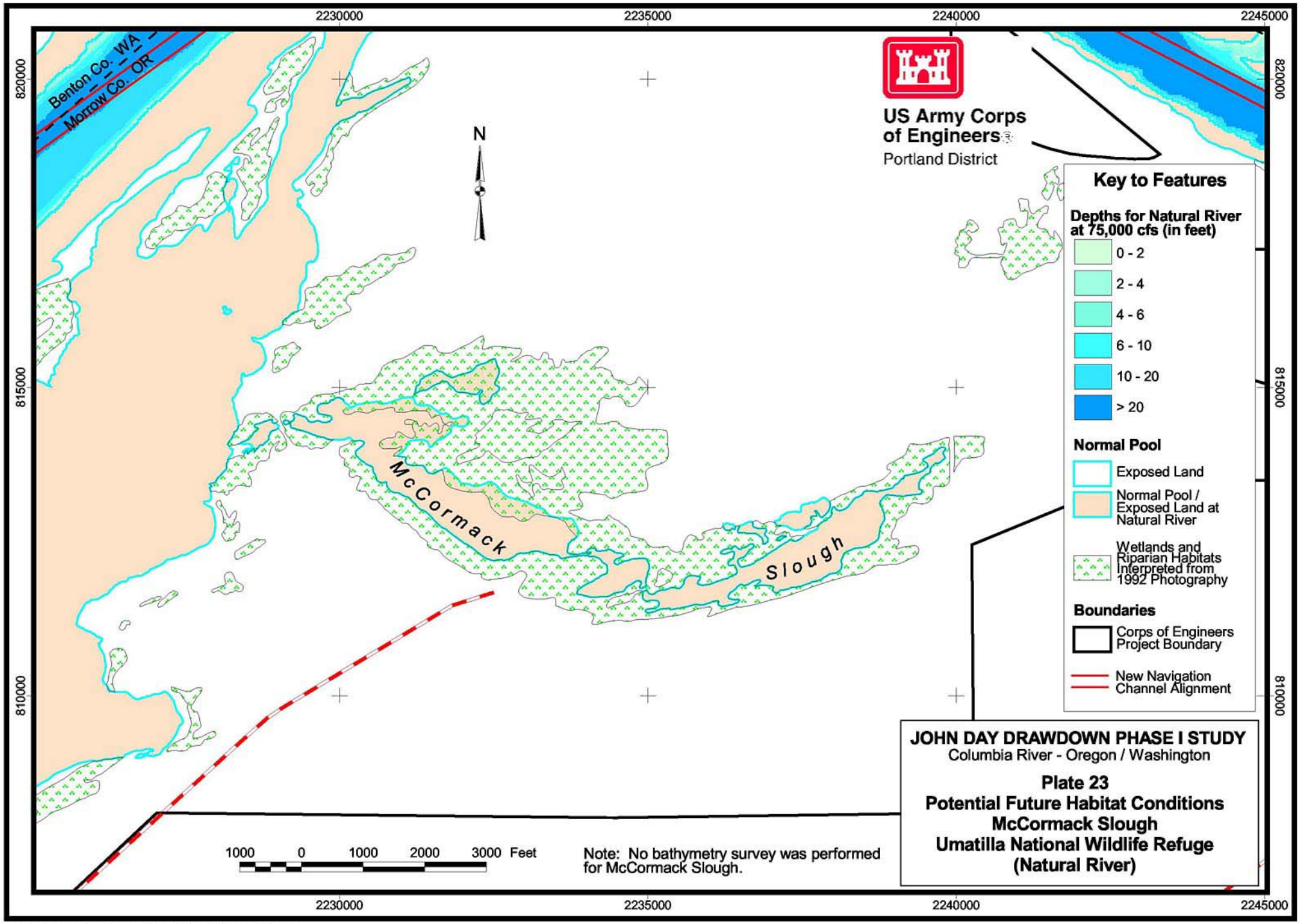

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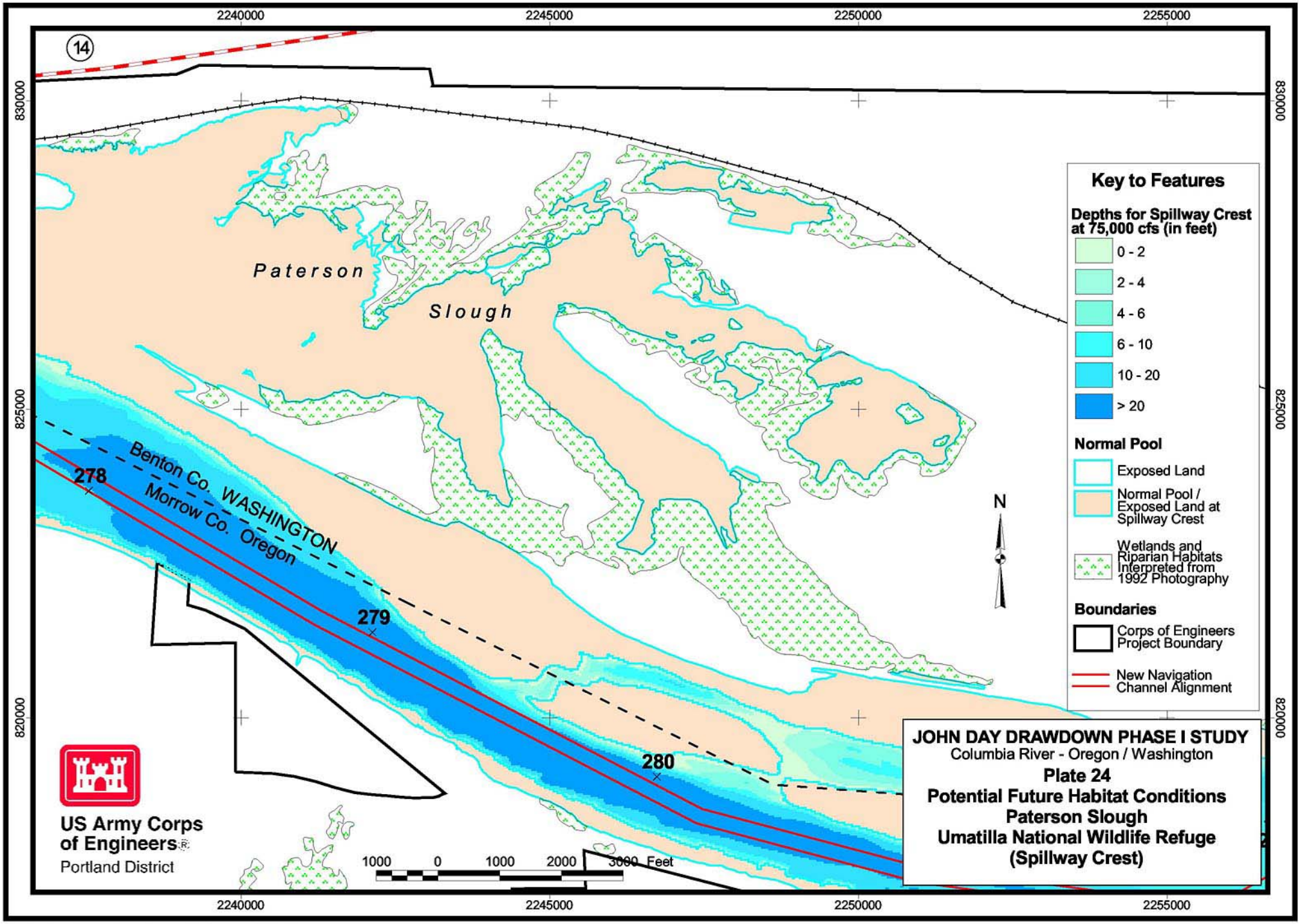

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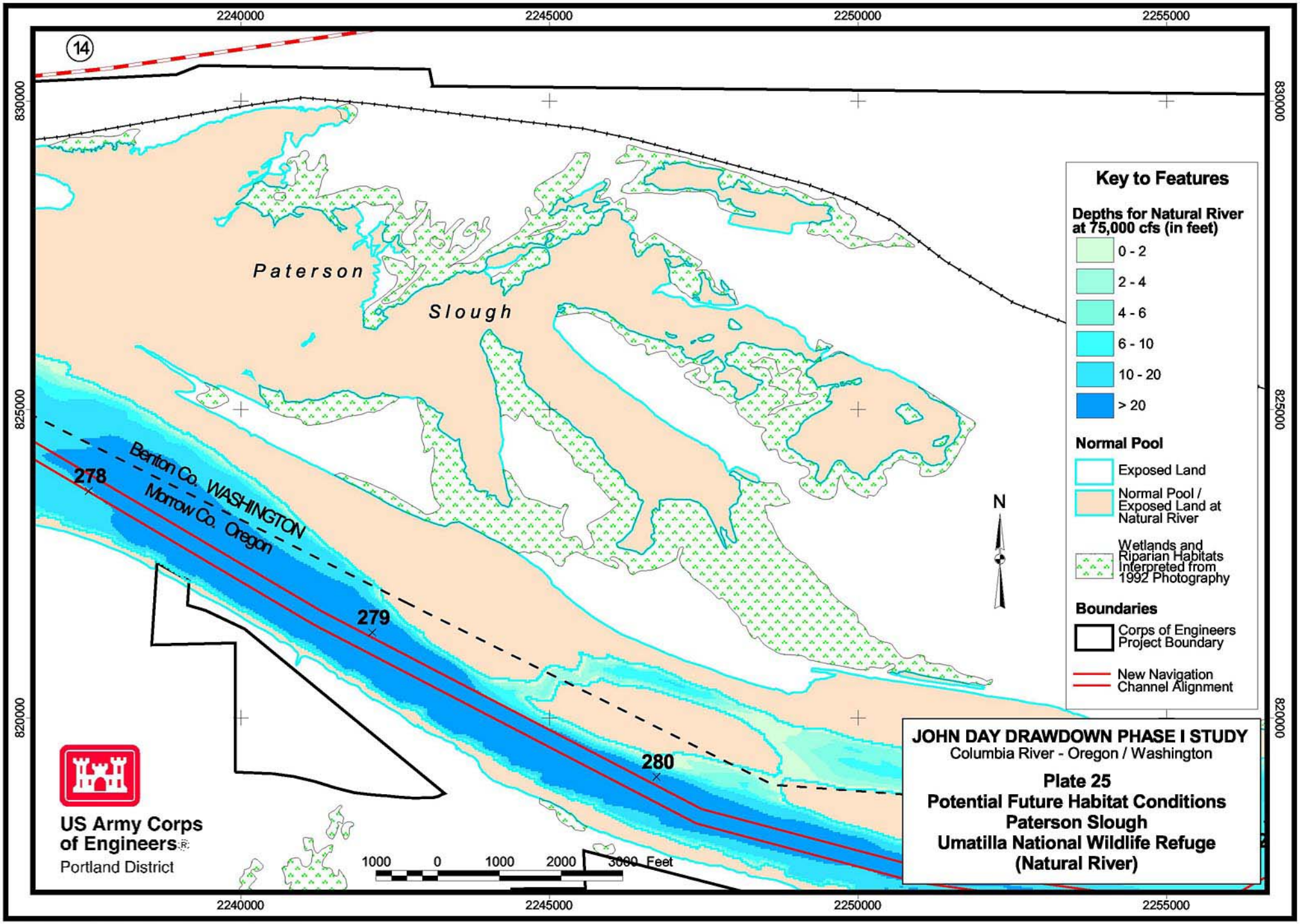

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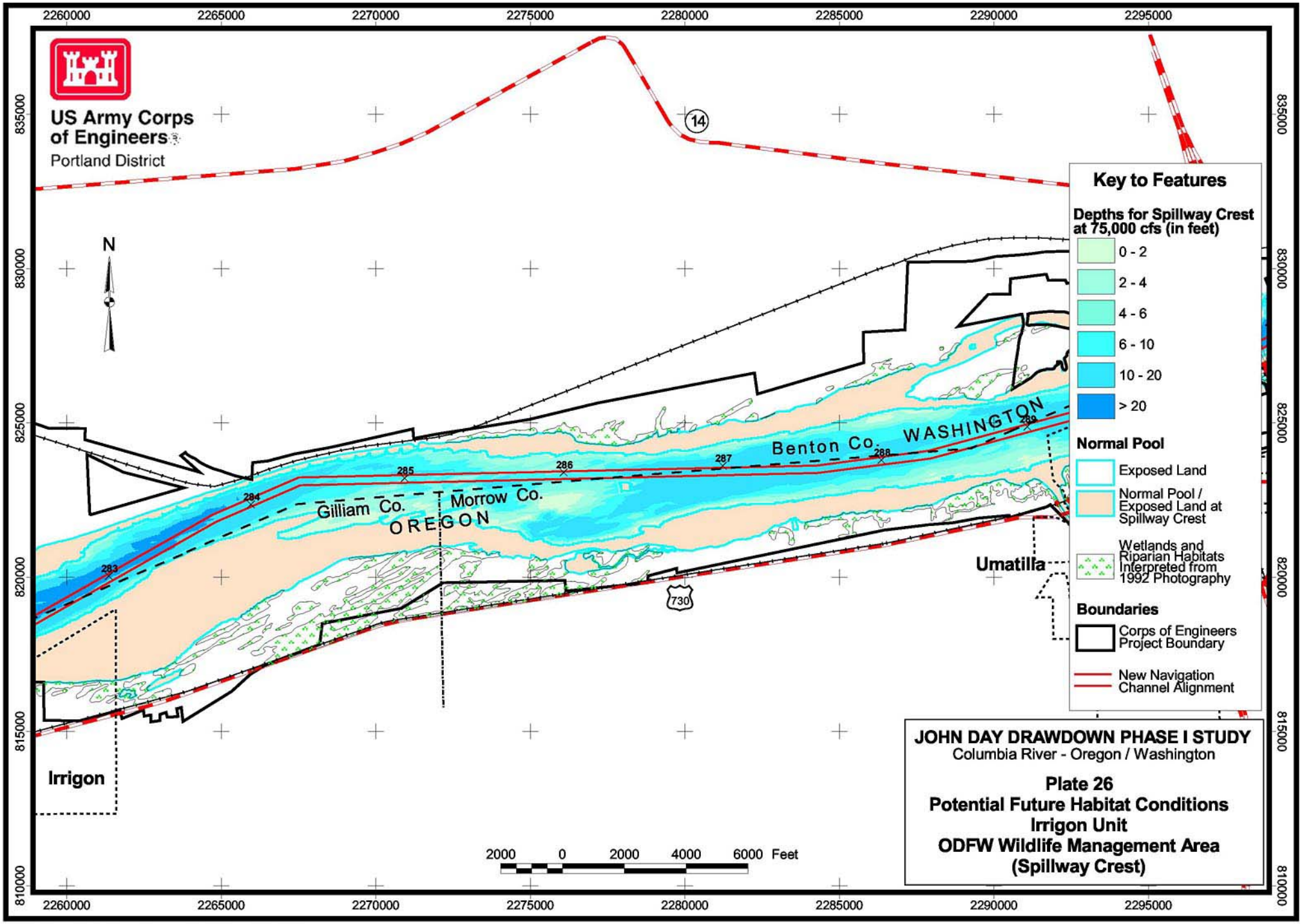

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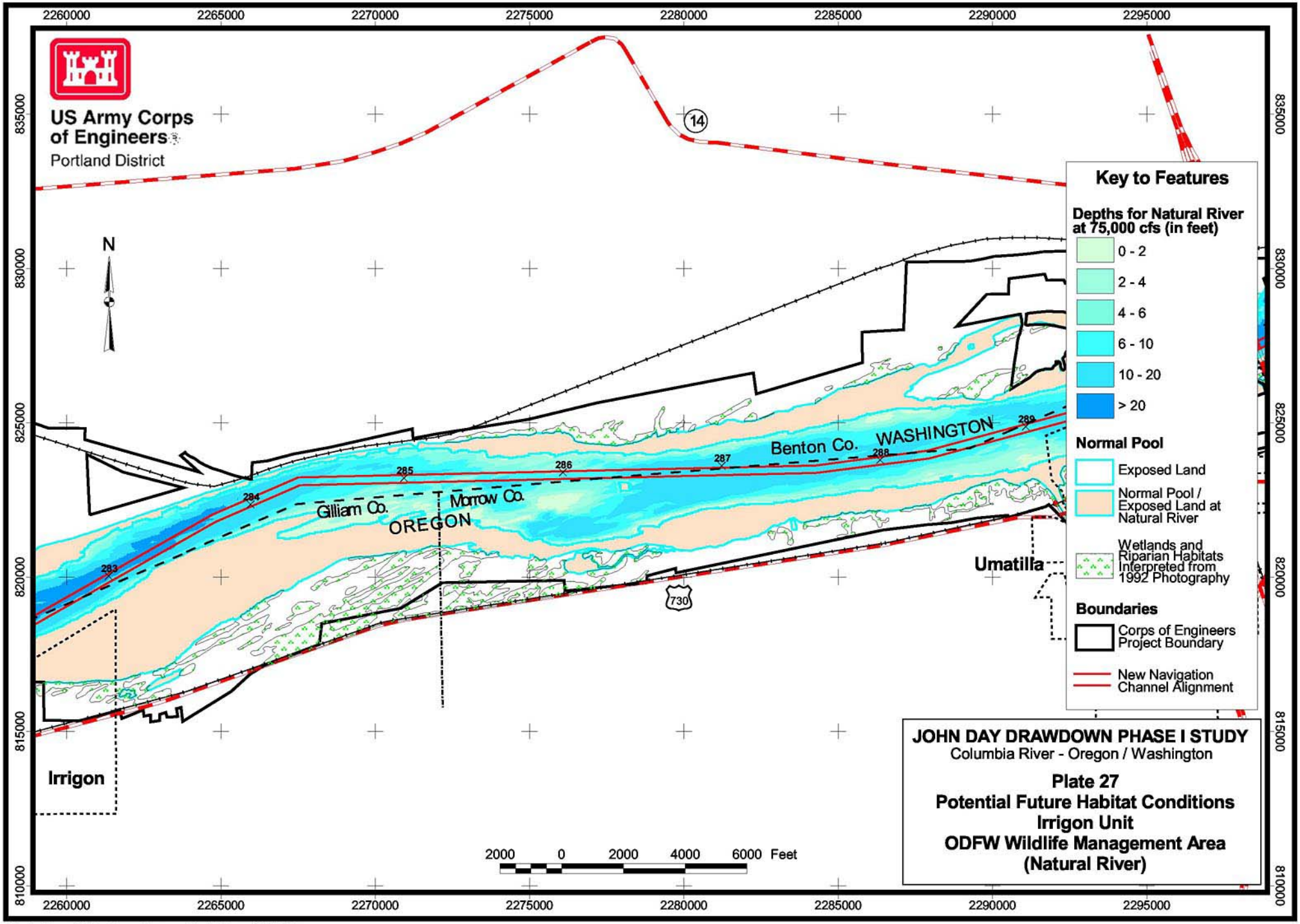

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