

FINAL ENVIRONMENTAL ASSESSMENT  
Proposed Carty Lake Remedial Action at Ridgefield  
National Wildlife Refuge

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## ACRONYMS AND ABBREVIATIONS

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BMP	best management practice
CCP	Comprehensive Conservation Plan
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
LPP	Land Protection Plan
LRIS	Lake River Industrial Site
MBCA	Migratory Bird Conservation Act of 1929
MBCC	Migratory Bird Conservation Commission
NEPA	National Environmental Policy Act
NWRS	National Wildlife Refuge System
Port	Port of Ridgefield
PWT	Pacific Wood Treating Co.
Refuge	Ridgefield National Wildlife Refuge
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WillametteCRA	Willamette Cultural Resources Associates, Ltd.

# 1 PURPOSE AND NEED FOR ACTION

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## 1.1 Background

The Ridgefield National Wildlife Refuge (Refuge) is managed by the U.S. Fish and Wildlife Service (USFWS) under the U.S. Department of the Interior and is a unit of the National Wildlife Refuge System (NWRS).

The mission of the NWRS is:

To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. (National Wildlife System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee])

The goals of the NWRS are (601 FW 1):

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered and threatened with becoming endangered.
- Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretations).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

## RIDGEFIELD NATIONAL WILDLIFE REFUGE PURPOSES AND OBJECTIVES

On May 18, 1965, the Migratory Bird Conservation Commission (MBCC), under the authority of the Migratory Bird Treaty Act (MBCA) of 1929, approved the establishment of the Refuge and identified a 6,130.8-acre acquisition boundary for the Refuge. The stated purpose of the new Refuge, from Memorandum 1 of the MBCC, was to “provide wintering habitat for dusky Canada goose and other waterfowl.” The memorandum also specified peak populations of migratory waterfowl, including 3,000 geese and 125,000 ducks, and required that the Refuge also provide for “breeding and migration use” for waterfowl.

The importance of the Refuge to dusky Canada geese was explicitly recognized in the Memorandum:

The dusky Canada goose has an extremely limited winter range, concentrated along the Willamette and lower Columbia rivers. This subspecies is limited in numbers and requires protection and habitat to insure its continued existence.

The Memorandum also specifically mentioned that the Refuge would provide “substantial public shooting” and “[a] portion of the area in line with management findings, not to exceed 40 percent, will be considered for waterfowl hunting in the future.” A number of tracts on the River S and Carty units, totaling 2483.03 acres, were acquired under this purchasing authority using Migratory Bird Conservation funds. Tract 21-I on the Carty Unit (24.99 acres) was also donated to the USFWS under authority of MBCA.

Subsequent MBCC memoranda (Memorandum 4, dated August 5, 1965; Memorandum 6, dated January 22, 1974; and Memorandum 8, dated February 5, 1985) reapproved the purchase price of remaining acreage within the acquisition boundary because of increased land values. In all of these memoranda, the justification for acquisition was “to provide resting and wintering area for migratory waterfowl.” Tracts on the Roth Unit, totaling 510.4 acres, were acquired under this purchasing authority using Migratory Bird Conservation funds.

The Environmental Impact Statement, Land Acquisition—Zimmerly Tract for Addition to Ridgefield National Wildlife Refuge, Washington, dated March 1980, covered the acquisition of 1,610 acres of Bachelor Island within the approved refuge boundary. In the environmental impact statement, the USFWS stated that its objective for the acquisition was “to preclude uses that would be incompatible with wildlife use, such as industrial, commercial, or residential development, and to gain the capability to manage land for increased wildlife benefits.” The environmental impact statement mentioned the following species and species groups as priorities for management: wintering waterfowl, bald eagle, sandhill crane, and great blue heron.

The Environmental Assessment (EA), Acquisition of Remaining Tracts, Ridgefield NWR, Clark County, Washington, dated December 1983, applied to 1,609.97 acres of Bachelor Island and 589.31 acres of the Ridgeport Dairy, the remaining tracts within the approved refuge boundary. In the EA, the USFWS stated that its objectives for the acquisition were:

To preclude activities, such as industrial, commercial, and residential development, that would be incompatible with wildlife use; to prevent changes in the present pattern of land use; and to gain authority to manage the lands for increased wildlife benefits...To increase overwintering carrying capacity for dabbling ducks...To maintain current capacity in support of existing overwintering use by Canada geese, swans, and diving ducks.

The Land Protection Plan (LPP) for Proposed Acquisitions to the Ridgefield NWR, dated November 1984, covered the same areas identified in the December 1983 EA. The LPP mentioned the following species and groups as priorities for management: wintering waterfowl, bald eagle, sandhill crane, and great blue heron. In February 1985, Tracts 23 and 23a (1,609.97 acres) on Bachelor Island were purchased from Bachelor Island Ranch, Inc. with Migratory Bird Conservation funds.

The Preliminary Project Proposal (May 1989) and the Decision Document (Categorical Exclusion), Acquisition of Port of Vancouver Tract, Ridgefield NWR, Clark County, Washington (October, 1989) acquired 520.81 acres (Tract 12) of the Ridgeport Dairy Unit. Described in the Categorical Exclusion for the property transfer, the USFWS stated its objectives for the acquisition:

To preclude human activities, such as land development and commercial enterprise (both with potential for altering habitat and polluting areas) that would be incompatible with wildlife use; to prevent major changes in the present pattern of wildlife use; and to manage added refuge land for increased wildlife benefits.

The Categorical Exclusion mentioned the following species and species groups as priorities for management:

over 20 species of waterfowl wintering along the lower Columbia River including mallard, pintail, and blue winged teal...; six subspecies of Canada geese (Taverner's, dusky, western, cackling, lesser, and the endangered Aleutian [the Aleutian is no longer listed as an endangered species]); bald eagle; peregrine falcon; tundra swan; sandhill crane; shorebirds; marshbirds; and songbirds.

It should be noted that the status of some of these species has since changed (e.g., because of recovery, the Aleutian Canada goose has been removed from the federal list of threatened and endangered species) and the taxonomy of Canada geese has changed (e.g., the various types are now included in two different species). Tract 12 was purchased from the Port of Vancouver in March 1991, using Land and Water Conservation Funds, under the authority of the Fish and Wildlife Act of 1956. This is the only portion of the Refuge for which this funding source was used, all other tracts being purchased with Migratory Bird Conservation funds.

The MBCC's Memorandum 10, dated March 1995, approved the purchase price for 68.5 acres (Tracts 14 and 14a) of the Ridgeport Dairy Unit. The purpose of this acquisition was "to preserve a major wintering area for migratory waterfowl along the Pacific Coast."

These tracts were purchased on September 5, 1995, with Migratory Bird Conservation funds.

## SUMMARY OF PURPOSES AND MANAGEMENT DIRECTION FOR REFUGE

The purposes for the Refuge have been identified in legal documentation establishing and adding to the Refuge's lands. Because the Refuge was originally established to preserve migration and wintering habitat for dusky Canada geese and other migratory waterfowl in the Pacific Flyway, this represents a priority for managing to achieve refuge purposes. In accordance with Director's Order No. 132, all lands acquired since the original establishment of the Refuge retain this purpose. Along with specifying management approaches for achieving refuge purposes specifically as they pertain to dusky Canada geese and other migratory waterfowl, legal documentation regarding adding lands to the Refuge identified managing habitats for the following species or species groups as management priorities:

- Bald eagle
- Sandhill crane

- Great blue heron
- Peregrine falcon
- Shorebirds
- Marshbirds
- Songbirds

The Refuge has developed a Comprehensive Conservation Plan (CCP), finalized in 2010, that provides a 15-year management plan that is consistent with USFWS policy and legal mandates. The CCP establishes operational goals and objectives for wildlife, habitat, and public use. The goals are to:

- Protect, maintain, and, where feasible, restore habitat for priority species, including dusky Canada geese and other waterfowl, and imperiled federal and state-listed species
- Meet Pacific Flyway management plan goals for dusky Canada geese and cackling geese
- Maintain high-quality green forage for geese in improved pastures and wet meadows, and increase cropland and wet meadow acreage
- Manage wetlands to increase productivity and reduce water pumping costs
- Manage invasive species and state- and county-listed noxious weeds
- Increase enhancement and restoration of bottomland forest and oak woodland habitats
- Conduct habitat assessments to guide stream and tidally influenced wetland restorations
- Increase inventory and monitoring efforts
- Conduct studies to assess the feasibility of reintroducing native species such as Columbian white-tailed deer and western pond turtle
- Maintain current public use areas and closures
- Maintain the current waterfowl hunt area
- Develop a new access point to the Refuge's River "S" Unit, including a two-lane bridge and 1-mile entrance road
- Shorten the auto tour route slightly to provide habitat for dusky Canada geese and cranes
- Construct a new 1.5-mile dike top walking trail

## REGULATORY CONTEXT

A Special Use Permit enables non-NWRS entities to engage in activities on a national wildlife refuge, including implementation of environmental remedial action. Issuing a Special Use Permit is a federal action that triggers the need for the USFWS to address several environmental compliance requirements, including an EA to meet National Environmental Policy Act (NEPA) requirements.

## 1.2 Proposed Action

The Port of Ridgefield (the Port) proposes to remediate sediment in the southern end of Carty Lake. Carty Lake is located in the Refuge, adjacent to the former Pacific Wood Treating Co. (PWT) site in Ridgefield, Washington (see Figure 1-1). PWT operated a wood-treating facility from 1964 to 1993 at the Port's Lake River Industrial Site (LRIS); historical PWT activities impacted sediments in the southern end of Carty Lake. The proposed Carty Lake remedial action involves mechanical sediment excavation, the placement of a clean layer of sand to manage residuals, and stabilization of a treated-wood bulkhead (Washington State Department of Ecology [Ecology], 2013b). The action includes in-water and upland components; the proposed actions are conducted primarily on Refuge property, with some upland project components extending to the LRIS (see Figure 1-2). Construction is proposed to take place over a two-month period in summer 2014.

## 1.3 Need and Purpose for the Proposed Action

The project purpose is to conduct remedial actions required by Ecology to address legacy contamination in sediments in Carty Lake, as described in the Ecology-issued cleanup action plan for the former PWT site (Ecology, 2013b). Through the completion of a remedial investigation and feasibility study conducted consistent with an Agreed Order between the Port and Ecology, it was determined that Carty Lake sediments are contaminated at levels that present unacceptable risk both to human and to ecological receptors, including benthic organisms and fish.

The purpose of this remedial action is to address the presence of chemicals above screening criteria or cleanup levels, including chlorinated dibenzo-p-dioxins and dibenzofurans (dioxins), pentachlorophenol, and metals (arsenic and chromium) found in sediment in the southern portion of Carty Lake. Dioxins were identified as the primary chemical of concern. The remedial action was selected by Ecology (Ecology, 2013b) in accordance with Washington Administrative Code (WAC) 173-340-380.

## 1.4 Public Involvement

Ecology and the Port have addressed community concerns throughout the history of former PWT site cleanup actions. Consistent with WAC 173-340-600, Ecology provided public notice for the cleanup action plan, and public comments on the project were solicited from the community during the formal comment period (July 25, 2013, through August 23, 2013). A public participation plan describing the tools that Ecology uses to inform the public about site activities has been developed (Ecology, 2013a). In addition, a public open house was held in February 2012 at the Ridgefield Community Center, 210 N. Main Avenue, Ridgefield, Washington, in an effort to inform interested parties of the cleanup actions related to the former PWT site.

Public comment was solicited by USFWS on the draft EA document at <http://www.fws.gov/ridgefieldrefuges/ridgefield/>. Comments were requested by December 27, 2013. No comments were received and formal responses are therefore not included in this final EA document.

## 2 ALTERNATIVES, INCLUDING PREFERRED ACTION

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### 2.1 Alternative A—No Action

Under the No Action Alternative, the Port would not conduct the remedial action required by Ecology in Carty Lake. The existing contaminated sediments would remain in Carty Lake, non-native vegetation would remain in the project footprint, and additional components associated with the project would not be constructed. The vegetated upland footprint and the wetland footprint would not be modified in the Carty Unit.

### 2.2 Alternative B—Carty Lake Remedial Action (Preferred Alternative)

Under Alternative B, the Port would conduct cleanup actions and construct associated components. The Alternative consists of in-water and upland components. The in-water components would consist of:

- Removal of up to 5,200 cubic yards (area of up to 1.5 acres) of contaminated sediment via mechanical sediment excavation conducted in the dry, and placement of an approximately 1-foot-thick, clean sand layer (up to 2,100 cubic yards).
- Installation of a temporary isolation barrier to facilitate dewatering of the sediment excavation area.
- Restoration of the wetland habitat by removal of non-native plants and planting of native wetland plant communities in the construction area.
- Evaluation and implementation of best management practices (BMPs); BMPs may include operational controls, excavation methods, and construction dewatering of the south end of Carty Lake.
- Disposal of excavated material as nonhazardous material waste at a Subtitle D landfill facility.
- Implementation of a long-term institutional control on fish consumption to protect human health; an updated characterization of sediment conditions may be needed before initiation of any future activities, such as in-water construction or sediment excavation that may result in significant sediment disturbance.

Upland actions would include the following:

- Access improvements, e.g., clearing and grubbing, construction of a permanent access ramp from the Port's property to the Carty Unit, and construction of a staging area.

- Construction of an earth and rock embankment to permanently stabilize the soils behind the existing treated-wood bulkhead. Embankments will be planted with native vegetation selected in consultation with the USFWS.
- Evaluation and implementation of BMPs.
- Paving of a portion of the Cell 2 hard trail on Port property (work delayed from a previous upland remedial action to provide better construction access for the Carty Lake remedial action).

## 2.3 Other Alternatives—Alternatives Considered but Eliminated from Further Study

- The USFWS agrees that Alternative B is consistent with the goals of the Refuge and minimizes environmental impacts. The USFWS and the Port coordinated design of Alternative B, including the following elements:
- Sediment excavation is designed to result in a leave surface that is a minimum of 6 inches deeper than the existing elevation. The depth increase will suppress red canary grass reestablishment.
- Bank stabilization on the southern side of the wetland is designed at a 2:1 slope. This slope was selected as the preferred alternative among several design options because it minimizes encroachment into the wetland. Other evaluated stabilization designs (e.g., 3:1 slope, ecology blocks) would result in greater encroachment or were infeasible.
- Bank stabilization along the eastern side of the wetland was redesigned from a 3:1 soil slope to a 2.5:1 (minimum) slope to avoid wetland encroachment.
- A native planting plan consistent with USFWS objectives is in development.

Alternative B<sup>1</sup> is one of four alternative remedial actions considered during a feasibility study (MFA, 2013) conducted for Carty Lake as part of the remediation planning process in accordance with the Model Toxics Control Act. The feasibility study evaluated a range of potential remediation options against a set of criteria defined in state regulations (WAC 173-340-350). The feasibility study was reviewed and approved by Ecology, and Alternative B was selected as the preferred remediation option. Other feasibility study Alternatives are not evaluated further for the EA but are briefly summarized below; details are provided in the cleanup action plan for the former PWT Site (Ecology, 2013b).

The feasibility study Alternatives assessed protection of human health and the environment, removal and capping of impacted sediment, and/or institutional controls to manage the potential for exposure to impacted sediment. A No Action Alternative was considered, but was dismissed from further evaluation, as it is not protective of human health and the environment. Alternative 1 (Monitored Natural Recovery) was not selected because it is less protective of human health and the environment over the short and long terms, as high chemical concentrations would remain (i.e.,

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<sup>1</sup> Alternative B is called “Alternative 2” in the feasibility study.

there would be no removal) and the remedy would require a prolonged restoration time frame. The other Alternatives all include the same amount of sediment removal, with varying amounts of clean sand placement. Alternatives 3 (Focused Dredge and Expanded Residuals Cap) and 4 (Focused Dredge and Full Residuals Cap) achieve a level of protectiveness similar to that of the selected Alternative (Alternative B; see Section 2.2), with a higher level of disturbance to sediments (e.g., Alternative 4 includes covering all of Carty Lake with a clean sand layer) and with a significantly higher cost. The selected Alternative B provides a high degree of certainty for long-term protectiveness, provides immediate short-term reductions in surface concentrations (including achieving concentrations protective of ecological receptors upon implementation), avoids unnecessary short-term habitat disturbance by minimizing the project footprint, and is proportionately cost effective when the benefits are considered. All alternatives require institutional controls to continue to limit consumption of fish from Carty Lake.

## 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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### 3.1 Habitat, Wildlife, and Fish

This section presents a general description of the plant communities, wildlife, and fish that may be present near the project area and that have the potential to be influenced by project activities. Following these descriptions, an analysis of how project Alternatives may impact valued ecological entities is presented.

#### HABITAT

Oregon ash, black cottonwood, and several willow species comprise the vast majority of the canopy cover in forested habitat of the Refuge. The understory is typical of lower Columbia River floodplain habitats, with nettles, red-osier dogwood, and non-native Himalayan blackberry providing the bulk of the shrub and forb layer. Remnant stands of western red cedar and Douglas fir occur on the highest portions of the Carty Unit, with species such as snowberry and Himalayan blackberry dominating the understory. Oregon white oak woodlands (Washington State priority designated habitat) occur to the east and north of Carty Lake but not near the project area at the southern end of Carty Lake.

Virtually all of the grasslands in the Refuge have been impacted by past agricultural activities, including row crop and field crop production and grazing. Near Carty Lake, non-native reed canary grass is ubiquitous and generally dominates the shoreline, forming dense monocultures; Himalayan blackberry is dominant along the bulkhead separating the Carty Unit and the LRIS.

Carty Lake is a 52-acre lake in the Carty Unit “lowlands.” The National Wetlands Inventory classifies much of Carty Lake as a lacustrine, limnetic, unconsolidated bottom, permanently tidal. The southern portion of the lake is classified as palustrine, emergent and persistent; the western side

is subdesignated as temporarily or seasonally flooded; and the eastern side is subdesignated as temporary-tidal. Washington State priority designated palustrine aquatic habitats are present within 0.15 mile of the project area. Because Carty Lake lacks a consistent connection with the Columbia River system, the lake's functionality has been reduced, particularly with respect to anadromous fish-rearing habitat and native mussel beds. As with similar wetlands on the Refuge, water quality and aquatic plants have been negatively impacted by introduced carp. The southern end of Carty Lake is underwater for most of the year or exists as a wetland at the margin of the lake. Aquatic plants, including wapato (*Sagittaria latifolia*), occur in the lake, and the fringe wetland is dominated by non-native, invasive reed canary grass (ELS, 2013).

A western Washington wetlands delineation and rating for the southern end of Carty Lake in the project area was conducted in 2013 (ELS, 2013). The project area is classified as a Category II lake fringe wetland; the wetland boundary is shown in Figure 1-2. The assessment found that water quality functions scored high, with the vegetation exceeding 33 feet in width and herbaceous plants covering more than 90 percent of the area. The hydrologic functions scored low, receiving 4 out of the possible 12 for lake-fringe. The wetland scored 25 out of 48 in habitat functions, based on the high species diversity and complex habitat structure. However, species evenness is relatively low, with reed canary grass widespread. In addition, the standard wetland rating system is limited in its application to this site because it does not account for contamination impacts in scoring habitat quality. Carty Lake is not designated as federal critical habitat.

## ENDANGERED SPECIES ACT SPECIES

The Columbian white-tailed deer (*Odocoileus virginianus leucurus*) is federally designated as endangered and historically occurred in Clark County. Columbian white-tailed deer were recently transplanted from Julia Butler Hansen National Wildlife Refuge to the Refuge (USFWS, 2012) and are present in the Carty Unit. Other federally designated species are not known to occur in or near the project area. Because Carty Lake does not maintain connectivity with Gee Creek (a 4th order tributary of the Columbia River located north and east of Carty Lake) or the Columbia River, federally listed anadromous species are unlikely to utilize Carty Lake; in addition, the proposed project would be conducted in the dry. In the Blackwater Island Research Natural Area (located in the Carty Unit), there are three sites where the federally listed threatened plant water howellia (*Howellia aquatilis*) is known to occur; however, the Natural Area is more than 1 mile north of the project area. The Refuge will perform an intraservice consultation pursuant to Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) regarding the proposed remedial action.

### 3.1.1 Wildlife

Surveys and incidental observations have documented over 200 species of birds utilizing the Refuge either seasonally or on a permanent basis (USFWS, 2009, 2010). Over 30 species of waterfowl have been observed, and the Refuge provides important wintering habitat for Canada geese, cackling geese, and tundra swans. Washington State priority designated waterfowl habitat and purple martin foraging areas occur in the vicinity of Carty Lake; priority bald eagle breeding areas are located over 0.5 mile northeast of the project area. Sandhill cranes use the Refuge during migrations, and small numbers overwinter on the Refuge, primarily roosting along the shore of Campbell Lake. These

cranes forage in pastures maintained in the Bachelor Island, River S, and Ridgeport Units. Over 40 species of neotropical migrants either visit during migrations or remain to breed at the Refuge.

Twenty-three species of mammals have been verified on the Refuge (USFWS, 2009, 2010). Common species include the Townsend vole, beaver, raccoon, eastern cottontail, coyote, and black-tailed deer. Non-native nutria (*Myocastor coypus*) are commonly observed in Carty Lake. In December 2012, the USFWS proposed an emergency translocation of rare Columbian white-tailed deer (*Odocoileus virginianus leucurus*) from Julia Butler Hansen Refuge near Cathlamet, Washington, to the Refuge (USFWS, 2012). Emergency relocation of the deer to the Refuge began in January 2013. Surveys conducted on the Refuge during the mid-1990s identified eight species of amphibians and five species of reptiles. Common species include western painted turtles, Pacific tree frogs, bullfrogs, red-legged frogs, and western garter snakes.

An extensive survey of invertebrates on the Refuge has not been conducted (USFWS, 2010). However, the USFWS is concerned about protecting pollinators, given the apparent declines in the populations of several types of pollinating insects. Historical flood events have deposited sandy soils on portions of the Carty Unit. These sandy areas provide burrowing sites for native bees such as the miner bee (*Andrena aculeate*), and the project is sited such that these areas would not be disturbed.

### 3.1.2 Fish

The Columbia River and its tributaries support a diversity of anadromous and resident fish species. It also hosts a variety of introduced warm-water fish such as bluegill, largemouth bass, and walleye. More than 40 species of fish have been documented in the Refuge and in the waterways that flow in and around it. Fish found in Carty Lake include primarily warm-water fish: introduced common carp and largescale sucker. Other fish commonly found in the Refuge where Carty Lake lies include introduced goldfish, longnose dace, largescale sucker, brown bullhead, mosquitofish, three-spine stickleback, introduced largemouth bass, introduced black crappie, introduced white crappie, introduced bluegill, and introduced yellow perch. Because Carty Lake does not maintain connectivity with the Columbia River, state-listed and federally listed anadromous species are unlikely to use Carty Lake for spawning or rearing habitat (USFWS, 2010).

Pacific salmon critical habitat is identified in Gee Creek to the northeast of Carty Lake; coastal cutthroat trout (federally designated as threatened), coho salmon (federally designated as threatened), and Pacific smelt (eulachon) (federally designated as threatened) may occur in Gee Creek, based on surveys conducted in the last ten years (USFWS, 2010). If a Gee Creek connection is constructed in the future, salmonids and eulachon may access Carty Lake. Other salmonid populations listed as threatened or endangered (e.g., sockeye) may pass by the Refuge in the Columbia River during migrations.

### 3.1.3 Environmental Consequences

Under Alternative A, no proposed remedial action would occur and therefore impacts to habitat, wildlife, or fish associated with the action would not occur. Existing wetland habitat would not be covered or converted. However, habitat in the proposed project area is currently severely degraded,

as sediment conditions are not protective of benthos and species that rely on benthos. Several other factors currently negatively impact habitat conditions in the remedy area. While the wetland hosts a relatively high numeric species diversity, species composition is dominated by two non-native invasives (reed canary grass and Himalayan blackberry). The south end of Carty Lake is shallow or seasonally inundated, supporting establishment and propagation of reed canary grass, which outcompetes native species. The buffer habitat around the wetland is characterized by a failing treated-wood retaining wall that is covered with Himalayan blackberry.

Under Alternative B, sediment excavation, clean sand placement, and bulkhead stabilization would take place in the southeastern portion of the Carty Unit. The area surrounding Carty Lake has a long history of agricultural practices; both the upland and the wetland areas in the project area are dominated with non-native plants and provide only modest food and cover resources for native wildlife. Wildlife species that are likely to use the upland areas include Townsend's vole, deer mouse, eastern cottontail, red-tailed hawk and American kestrel, among others. The construction would temporarily disturb wildlife because of increased noise, traffic, and lighting; however, similar available habitat for these species is relatively common in the region. Many species temporarily displaced should return once construction is completed.

Columbian white-tailed deer are present in the Carty Unit but are not known to occur regularly near the project area. If deer are present, the project construction is expected to have a minor, short-term impact on deer feeding and traveling through the site. It is anticipated that the deer likely would avoid the site during construction activity. Once the project was completed, the deer would be expected to return to former uses of the area.

Construction would take place in summer, when water levels are typically lowest and the southern end is not inundated. If surface water is present in the project area, it will be pumped from the excavation area to the main body of Carty Lake. This would result in a temporary reduction of available habitat for fish and other mobile, aquatic-dependent species. Similar aquatic habitat is available near the project area, and the excavation footprint in the 52-acre lake is minimal (approximately 1.5 acres).

Removal of sediment and placement of clean sand would temporarily decrease the abundance of benthic infauna in the excavation footprint. Although benthic prey species would be displaced, populations are expected to fully recover after sediment removal activities are completed; Bolam and Rees (2003) reviewed literature on macrofaunal recovery at coastal dredge sites and found that, generally, recovery took between one and four years in unstressed sites and nine months or less in naturally stressed sites. Adjacent undisturbed habitat north of the project area would provide an established source of benthic invertebrates to colonize the surface substrate. Since new invertebrate communities would recolonize the excavation area, no long-term loss of biological productivity or prey base for fish is expected.

Construction would eliminate existing vegetation in the project footprint, primarily non-native and some native species. The project area would be revegetated with a diverse palette of native species suited for particular habitat zones (e.g., upland and wetland) following construction, improving habitat structure and habitat quality for associated wildlife. Up to 0.23 acre of existing wetland habitat would be covered by the southern bulkhead stabilization embankment and rounded

gravel/rock fish mix stabilization material. However, the revegetated, stabilized embankments would improve wetland buffer habitat. A plant monitoring and maintenance plan would be implemented to ensure long-term success. A permanent gravel access ramp from Port-owned property to the Carty Unit would be constructed, covering some upland habitat on the Refuge consisting of reed canary grass.

The primary environmental consequence of Alternative B is a reduction in fish and wildlife exposure to a continued release of a suite of contaminants into the aquatic environment. The proposed sediment removal would immediately reduce contaminants to below levels protective of ecological receptors. The sand layer would enhance contaminant sequestration in the short term and would provide a clean substrate for benthic community colonization and native plantings.

In summary, Alternative B would result in temporary disturbance of wildlife during construction activities, a temporary decrease in benthic populations, and some loss of degraded habitat. Over the long term, habitat quality would be significantly enhanced because of contaminant removal, removal of non-native invasive species, deepening of the wetland bottom to encourage suppression of invasive species, and planting and maintenance of native vegetation. Wildlife and fish would benefit from removal of sediment contamination to levels protective of ecological receptors and native plantings.

## 3.2 Physical Environment

The approximately 8.6-acre site is situated in and adjacent to Carty Lake in the southeast corner of the Refuge Carty Unit “lowlands” (see Figure 3-1). The Carty Unit contains forested lands, wetlands, and pasture areas that historically were used for agricultural production. The Carty Unit is bordered by the Port-owned property immediately south and east, Lake River to the west, privately owned farmland and natural areas to the north, and Burlington Northern-Santa Fe railroad tracks to the east. A portion of the Port property is separated from the southern portion of Carty Lake by a treated wooden soldier pile and lagging bulkhead. This bulkhead is approximately 1,800 feet long and between 7 and 10 feet tall.

With the exception of the existing treated-wood bulkhead and the associated grade change, the topography of the project area consists of gently rolling terrain with elevations ranging from 7 feet to 34 feet National Geodetic Vertical Datum of 1929/1947. The 100-year floodplain elevation of Gee Creek (located to the north and east of Carty Lake) is approximately 23.8 feet at the Burlington Northern Santa Fe railroad culvert (see Figure 3-1); this portion of Gee Creek and large portions of the Carty Unit function as a backwater of the Columbia River during the 100-year flood. The 100-year floodplain elevation of Carty Lake is, therefore, approximately 23.8 feet.

Grain size distribution and hydrodynamics indicate that Carty Lake features a low-energy, depositional environment (MFA, 2013). Percent fines in Carty Lake are uniformly high, generally over 75 percent fines. During the rainy season, Gee Creek and Carty Lake can be hydraulically connected at the lake’s northern end. During most of the year, Carty Lake has no outlet. Water fluctuations are generally muted and range from 3 to 10 feet, with increases and decreases occurring gradually because there is no direct connection with the Columbia River. Water levels in the project

area are generally shallow and the southern lake end can be dry during low-water conditions (e.g., in the summer).

Carty Lake has limited recreational uses (USFWS, 2010), which can include wildlife photography, wildlife observation, environmental education, and fishing. Boating is not allowed. Trails lead to the Gee Creek portion of the Carty Unit for fishing. Carty Lake itself is not currently readily accessible to visitors; the Refuge maintains a mowed seasonal footpath along the north end of the lake, but this path is flooded during high-water periods and is not heavily used. However, the potential exists for the Refuge to work with the Port to develop a loop trail adjacent to Carty Lake for the public to access from the Port property.

In the future, the USFWS may consider the feasibility of reconnecting Carty Lake either to the Columbia River via Gee Creek or to Lake River through a constructed channel. Of the two options, the Gee Creek connection likely would be most feasible in terms of construction and access for salmonids (USFWS, 2010). The resulting hydrology of the lake could vary considerably, depending on the option selected; however, some changes to the fish, wildlife, and vegetation communities would be expected.

### 3.2.1 Environmental Consequences

Under Alternative A, the remedial action would not take place, and thus there would be no immediate impacts from the construction on the physical environment. The potential for contaminant transport from the site would remain. The current treated-wood bulkhead is degraded and portions have begun to fail. Complete failure of the wall in the future could result in release of soils into Carty Lake.

Under Alternative B, removal of sediment and placement of clean sand in an area of up to 1.5 acres would temporarily alter existing surface substrate (predominantly fines and some sand) to consist of sand until naturally occurring processes redeposit fines. The bathymetry of the excavation footprint would be deepened a minimum of 6 inches. A temporary isolation berm (likely sandbags) to facilitate excavation in the dry would be removed upon construction completion.

Remedial construction would include a permanent transition from the grades on the Port property to the Refuge in the form of constructed earthen embankments against the existing southern and eastern walls of the bulkhead. Stabilization of the embankments would ensure long-term containment of residual contamination in subsurface soils south and east of the Carty Unit. The embankments would functionally replace the existing bulkhead and would generally consist of common borrow or structural fill and topsoil fill with an outer layer of topsoil approximately 18 inches thick. To eliminate the impact of the eastern embankment on the wetland, the eastern embankment would be constructed at a slope no greater than 2.5H:1V, outside the wetland boundary where possible. For the southern embankment area, a retaining wall structure (to replace the southern wall) was evaluated in collaboration with USFWS staff in an effort to determine the most effective way to minimize impact to the wetland; however, the structure was considered impractical because of significant challenges in managing contaminated soil that is contained behind the existing soldier pile wall, as well as because of cost. To minimize the embankment footprint in the area, this portion of the embankment would be constructed at a nominal 2H:1V slope.

Embankments would be revegetated with native species to enhance habitat structure and control soil erosion.

A permanent gravel access ramp to the Carty Unit from the existing Cell 2 hard trail on Port-owned property would be constructed, reducing the vegetation (currently primarily reed canary grass) footprint in the Carty Unit. A temporary staging area for construction would be identified outside the wetland boundary to avoid wetland impacts and would be sized to minimize soil disturbance. The permanent access and staging footprint in the Refuge would occupy about 0.03 acre and 0.23 acre, respectively.

It is anticipated that traffic use may increase because of construction of the permanent access ramp. Use would generally be limited to one Refuge person's access. Therefore, the minimal increase in traffic would not significantly affect local air quality.

Currently, there is little human noise at the project site and infrequent use by people. During construction, the project site would be subjected to an increase in noise and activity. After completion of construction, the noise and activity would greatly diminish but might remain slightly above current levels because of improved access.

Construction impacts will be temporary, controlled, and eliminated or minimized where possible, and appropriate BMPs will be utilized. A perimeter sediment control (silt) fence placed along the limits of construction will prevent unnecessary impacts to roadways, adjacent properties, and the main portion of Carty Lake. Removal of sediment will be completed with the excavation in an isolated and dewatered condition, using land-based, fixed-arm equipment (excavator). Construction is scheduled for summer, when water levels are typically lowest and the southern end is not inundated; if surface water is present it will be pumped and treated for turbidity, if necessary, prior to discharge to the main body of Carty Lake. Because construction will be conducted in the dry, direct impacts to water quality (e.g., turbidity, dissolved oxygen) will be minimized or eliminated. The sediment handling and dewatering area will be constructed and managed consistent with all erosion-control BMPs to prevent exposed or stockpiled soil erosion due to wind or other natural events and to prevent free decant water from migrating into the adjacent Refuge. During dewatering operations, water quality will be closely monitored for turbidity; water will be treated prior to discharge if necessary. Because of the proximity of the main body of Carty Lake, debris booms and supporting vessels will be required to be on hand and deployed if and when needed. All equipment will be fueled upland or, where fueling near or in water is necessary, within a floating sorbent boom. In order to prevent the migration of site sediments and soil off site during transport of sediment to the landfill, a gravel construction entrance will be built.

### 3.3 Cultural Resources

A Cultural Resources Inventory and Survey was prepared in 2013 by Willamette Cultural Resources Associates, Ltd. (WillametteCRA) for the proposed remedial action (WillametteCRA, 2013). The cultural resources survey was conducted to specifically address the Archaeological Resources Protection Act, Section 106 of the National Historic Preservation Act, and NEPA requirements. The primary goal of the cultural resources survey and inventory was to assess the likelihood that an undertaking at the site will directly or indirectly alter the character or use of historic properties.

The cultural material located does not constitute an archaeological record that is eligible for the National Register of Historic Places. After a survey of 2 acres and an excavation of 19 shovel probes, one previously unrecorded resource, a precontact lithic isolate, was identified. This artifact is isolated, and it is the professional opinion of WillametteCRA that no significant archaeological or historic resources would be affected by the proposed remedial action. No additional archaeological investigations for the area are recommended at this time.

### 3.3.1 Environmental Consequences

Under Alternative A, the site and, subsequently, associated resources would not be disturbed.

In regard to Alternative B, the Cultural Resources Inventory and Survey indicated that it is unlikely that significant cultural resources would be found at the site. However, an Inadvertent Discovery Plan has been developed that specifies that an archaeological monitor would be present during sediment excavation and berm construction at Carty Lake. Tribes may also choose to have monitors present during cleanup activity. The plan also defines procedures to be followed should human remains or archaeological resources be encountered.

### 3.4 Environmental Justice

No one group or tribe represented in the community would be disproportionately impacted by construction of the remedial action. Tribes historically used Carty Lake for wapato harvest (USFWS, 2010) and may desire to use the area for this purpose in the future (Mercuri, 2012).

Under Alternative A, no action would take place. The potential for dioxin exposure due to wapato harvest and consumption was not explicitly evaluated, however, future use under current conditions is not expected to result in unacceptable risk to human health. Studies have shown that dioxins are not likely to be incorporated into any substantial fraction of the edible plant material (Paustenbach et al., 2006). In addition, a model developed for restoration workers showed sediment direct contact and incidental ingestion is not expected to result in unacceptable risk (MFA, 2013).

Under Alternative B, impacted sediment would be removed and wapato would be replanted as specified in the planting plan (forthcoming). Wapato would therefore continue to be available in the project area for Tribal members who may choose to harvest and consume wapato. Thus, the Alternatives would not result in any environmental justice issues.

### 3.5 Cumulative Effects

Cumulative effects result from the incremental impact of an action when added to other “past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions” (40 CFR 1508.7). The effects of an action may be insignificant when evaluated individually, but when added to other actions outside the immediate project area, they may contribute cumulatively to measurable environmental change. The scope for analysis of cumulative impacts is therefore larger than the immediate project area to more broadly consider the effects of

other activities occurring within the adjacent landscape. This scope includes consideration of an action in relation to the stated missions for refuge lands.

The mission of the NWRS is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats in the United States for the benefit of present and future generations of Americans. Missions specific to the Refuge include its “use as an inviolate sanctuary, or for any other management purpose, for migratory birds” 16 U.S.C. § 715d (MBCA) and “to provide wintering habitat for dusky Canada goose and other waterfowl” (MBCC Memorandum Number 1, May 18, 1965). In addition, the Refuge has developed a CCP that establishes operational goals and objectives for wildlife, habitat, and public use (see Section 1.1). These missions and goals underline the continued need for habitat quality supportive of fish, wildlife, and plant resources on Refuge lands.

### 3.5.1 Environmental Consequences

Under Alternative A, impacts to habitat, wildlife, and fish associated with construction would not occur. However, not implementing the remedial action does not address environmental contamination present in sediments and is therefore not consistent with Refuge goals. Species directly associated with site sediments (e.g., benthic invertebrates) would continue to be exposed to chemical concentrations above risk-based levels, potentially resulting in long-term impacts to individuals and populations. Loss of benthos may negatively impact dependent species. Species indirectly associated with site sediments (e.g., predatory fish, birds, and mammals) would continue to ingest prey potentially impacted by chemicals, resulting in chemical bioaccumulation and associated impacts. Chemical concentrations and potential for contaminant transport could impede reasonably foreseeable activities in the project vicinity, including activities that would benefit listed salmonids in nearby waterways (e.g., reestablishing the former connection between Carty Lake and the Columbia River). Structural issues related to the existing treated-wood bulkhead would not be addressed; complete failure in the future could result in release of impacted subsurface soils to the Carty Unit. Non-native species such as reed canary grass would remain established and likely would continue to outcompete and supplant remaining native species.

Alternative B supports both the NWRS’s and the Refuge’s missions by providing improved habitat quality on Refuge land. The proposed project would improve long-term habitat quality by employing a technique (sediment removal) that permanently reduces contaminants in sediments. Long-term beneficial effects to aquatic-dependent species would be realized by significantly reducing chemicals in sediment that transfer directly or indirectly (via trophic transfer) to organisms utilizing the project area. Provision of clean substrate (sand) is expected to promote natural attenuation of the biologically active surface sediments, increasing benthic invertebrate abundance in the long term and thereby enhancing the prey base for higher-trophic-level species. Clean substrate also would be expected to promote growth and establishment of wetland vegetation in the long term. Native plantings would increase habitat quality and provide erosion control on constructed embankments.

Alternative B would result in some habitat loss and temporary disturbance of wildlife during construction activities. However, based on the environmental enhancement that would result,

implementation of BMPs to minimize construction impacts, and a remedy design that minimizes wetland habitat loss, the proposed construction does not represent a significant adverse impact on the natural environment.

## PREPARERS AND REVIEWERS

<b>Name</b>	<b>Position</b>	<b>Degrees</b>	<b>Experience</b>
Phil Wiescher, PhD	Ecologist	PhD Ecology	Two years
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Benjamin Harrison	USFWS— Deputy Regional Chief		

## LIMITATIONS

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The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

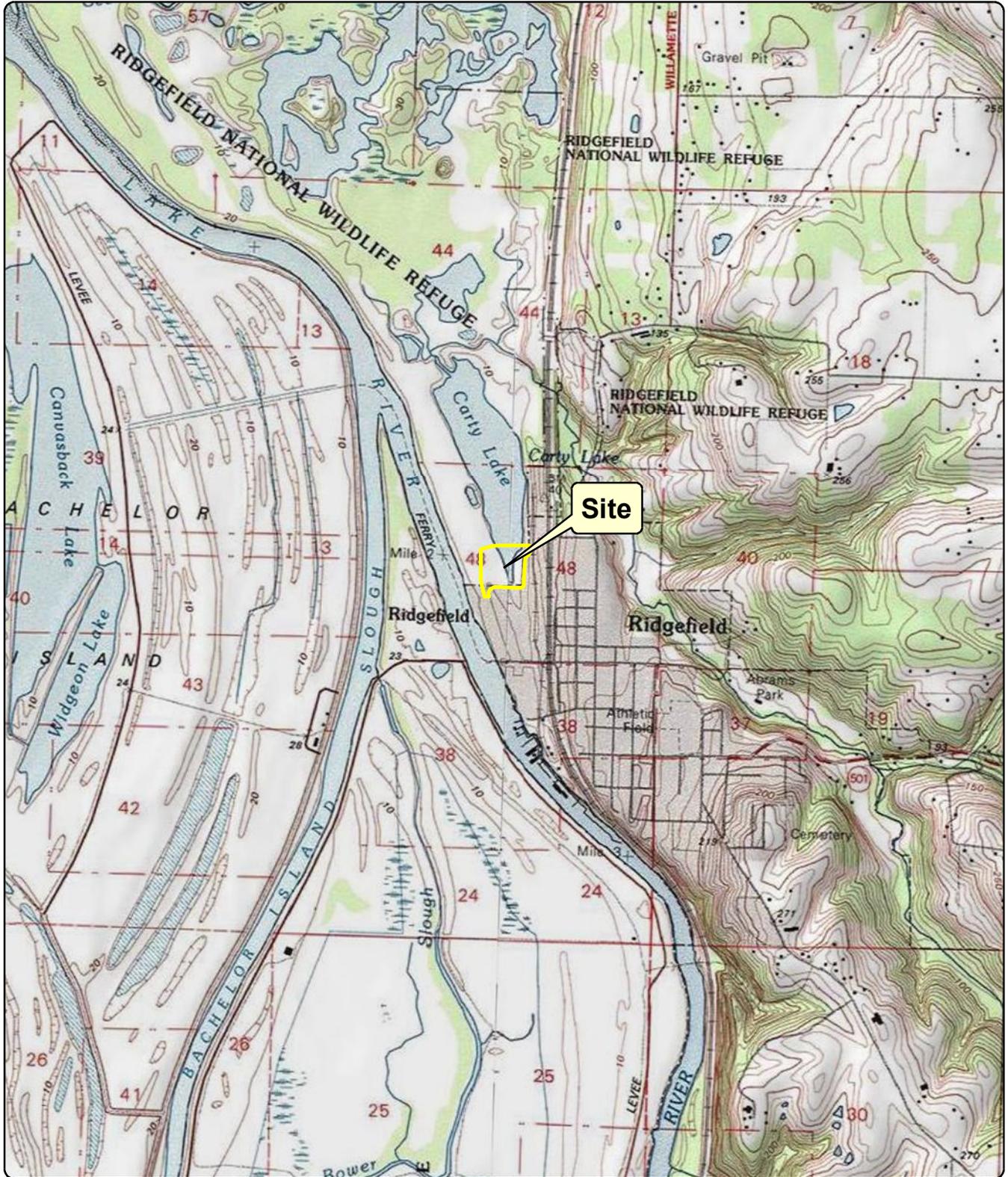
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# FIGURES





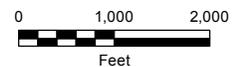
Source: Topographic Quadrangle obtained from ArcGIS Online Services/NGS-USGS TOPO! US Geological Survey (1999)  
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 111 W. Division Street, Ridgefield, WA 98642  
 Section: 24 Township: 4N Range: 1W Of Willamette Meridian

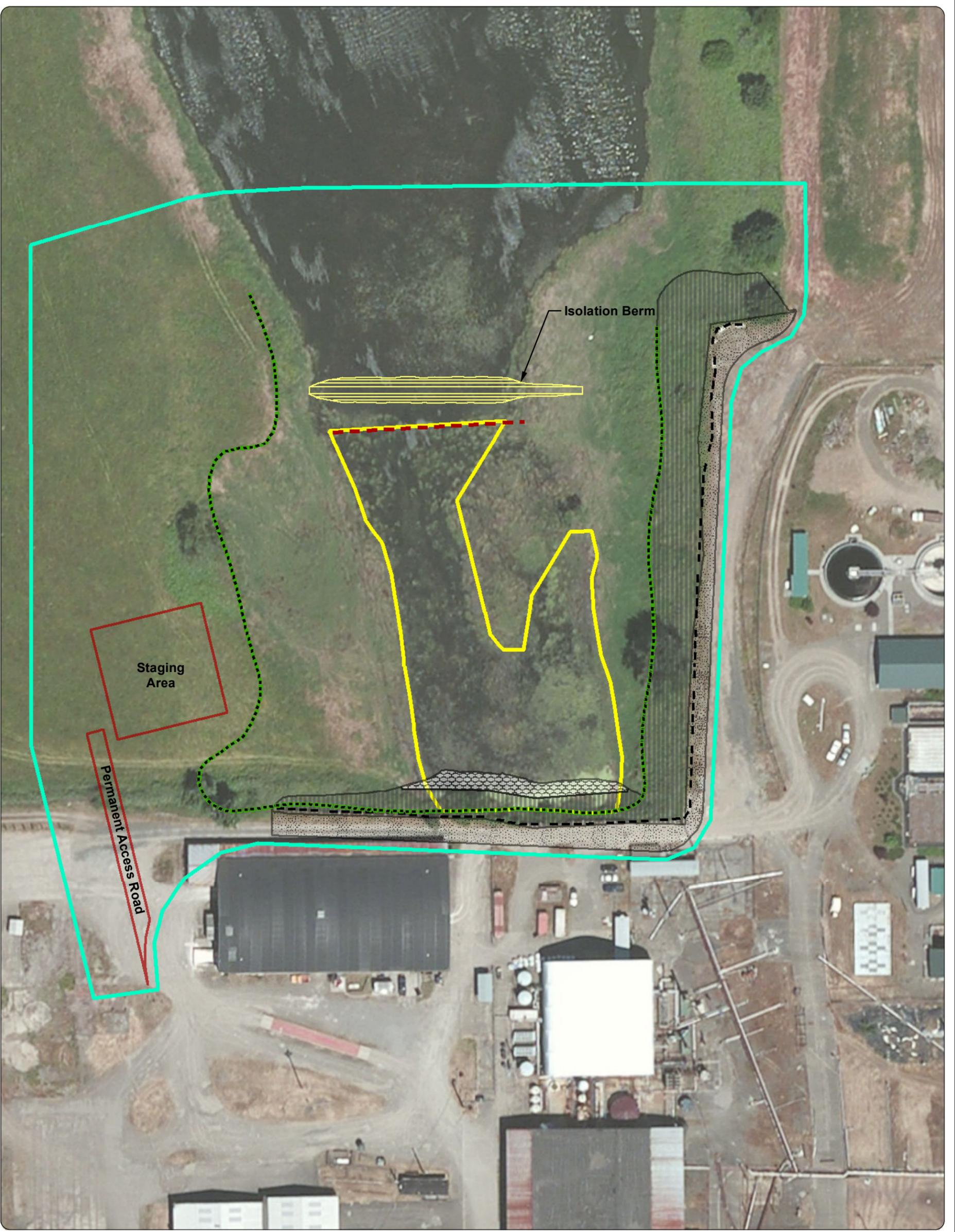
**Figure 1-1  
 Site Location**

Carly Lake  
 Ridgefield, Washington



This product is for informational purposes and may not have been prepared for, or be suitable for, legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.





Source: Aerial photograph obtained from ESRI, Inc. ArcGIS Online (2010).

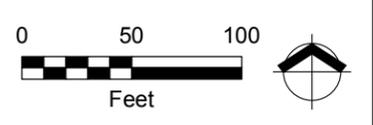
**Legend**

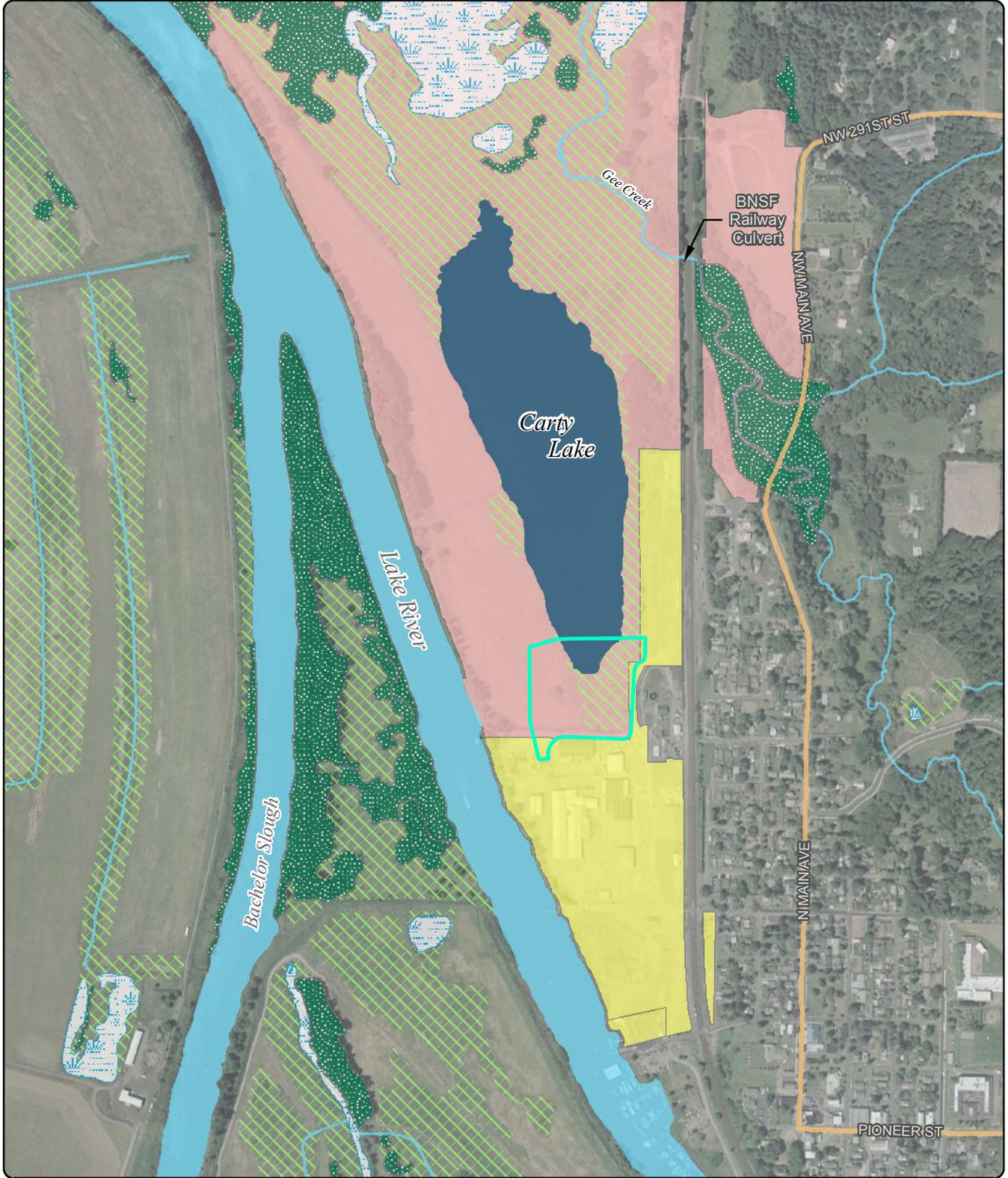
-  Earth Embankment
-  Clean Fill
-  Fish Mix Placement
-  Retaining Wall
-  Delineated Wetland Boundary
-  Excavation Boundary
-  Site Boundary

*i.e., greatest extent that may be impacted by remedial action activities including remedial construction, staging, and access.*

**Figure 1-2  
Alternative B  
Project Components**

Carty Lake  
Ridgefield, Washington





Source: Aerial photograph and shaded relief obtained from ESRI, Inc. ArcGIS Online.

Notes:  
1. Wetlands Delineation obtained from the U.S. Fish and Wildlife Service, National Wetlands Inventory.

### Legend

-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Riverine
-  Port-Owned Property
-  RNWR-Carty Unit
-  Site Boundary

## Figure 3-1 Carty Lake Setting

Carty Lake  
Ridgefield, Washington

