BIOLOGICAL EVALUATION
for
BEACH RE-NOURISHMENT
at
LINCOLN PARK, SEATTLE, WASHINGTON

July, 2002

US Army Corps
of Engineers ®
Seattle District

TABLE OF CONTENTS

FIGURES

TABLES

ACRONYM INDEX

BE: Biological Evaluation

cy: cubic yard

CFR: Code of Federal Regulations

DPS: distinct population segment

ESA: Endangered Species Act

ESU: evolutionarily significant unit

MLLW: mean lower low water

NMFS: National Marine Fisheries Service

USFWS: United States Fish and Wildlife Service

USC: United States Code

1. INTRODUCTION

The United States (U.S.) Army Corps of Engineers (Corps) proposes place 1,750 cubic yards (cy) of select gravel and sand substrate onto 0.75 of an acre of Puget Sound beach, including upper intertidal areas, at southern Lincoln Park in Seattle, Washington. The proposed work would occur in the fall of 2002. In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, this document examines the potential impacts of the proposed beach re-nourishment on threatened and endangered species that may occur in the vicinity of the project.

2. PROJECT HISTORY

In the 1930's, the Works Progress Administration constructed a cobblestone and concrete seawall along the Lincoln Park shoreline. In subsequent years, erosion and scour lowered the beach profile along the southwestern beach and damaged the seawall (Figure 1). In the early 1980's, the beach had almost completely eroded down to a hardpan layer of clay, and portions of the seawall had collapsed. Complete loss of the seawall would have likely led to loss of important infrastructure, including a 30-inch diameter sewer force main, and a variety of park amenities behind the seawall. As a long-term solution to address the shoreline erosion, the Corps and the City of Seattle (the City) initiated the Lincoln Park Beach Re-Nourishment Project.

Figure 1. Lincoln Park seawall and steps in 1975 prior to the first beach nourishment project.

The first phase of the project was constructed in 1988, with placement of a 5-foot-thick layer of armor rock placed upon a 2-foot-thick quarry spall filter blanket along 250 feet of beach at Williams Point; and beach nourishment consisting of 18,000 cy of sand and gravel along 2,300 feet of beach south of the point and 1,000 cy along the 250 feet of rock revetment. The substrate

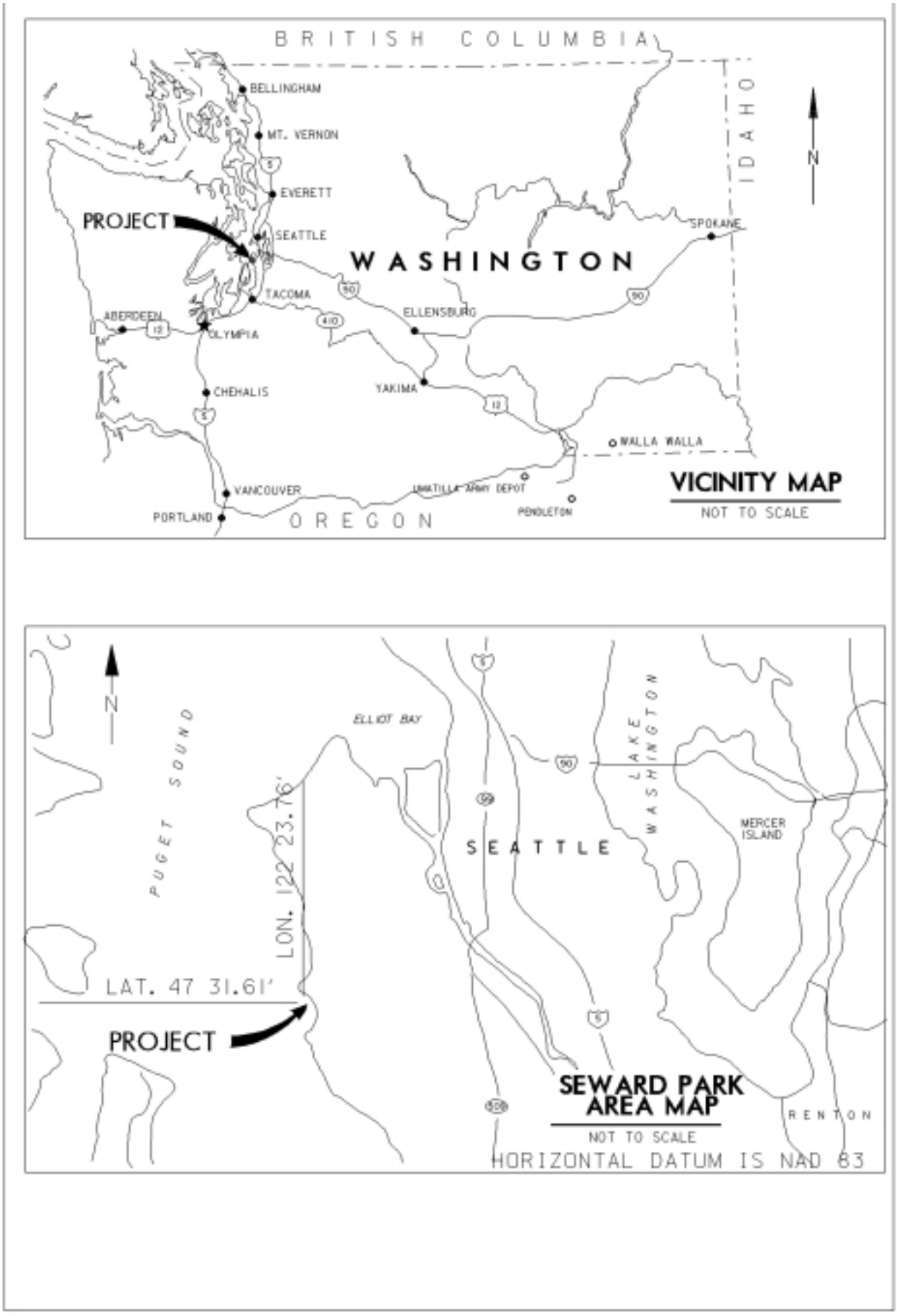

Figure 2. Location and Vicinity Map

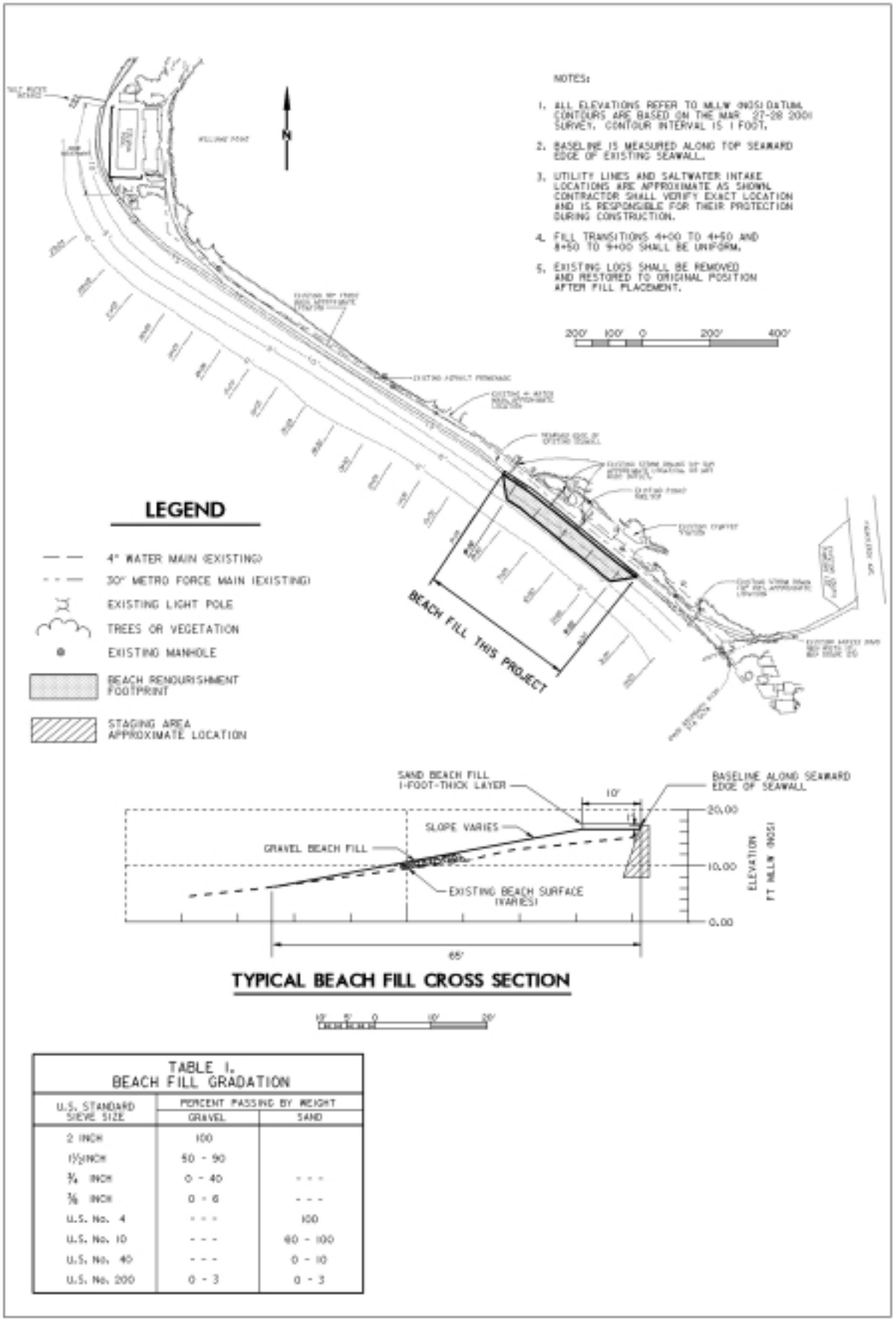

TABLE 1.
BEACH FILL GRADATION

U.S. STANDARD SIEVE SIZE	PERCENT PASSING BY WEIGHT	
	GRAVEL	SAND
2 INCH	100	
1½ INCH	50 - 90	
¾ INCH	0 - 40	- - -
⅜ INCH	0 - 6	- - -
U.S. No. 4	- - -	100
U.S. No. 10	- - -	60 - 100
U.S. No. 40	- - -	0 - 10
U.S. No. 200	0 - 3	0 - 3

Figure 3. Plan and Section Views

placement created a gravel beach along the south Lincoln Park shoreline where erosion had previously scoured all substrate down to a hard clay layer at the toe of the seawall.

The authorizing document for original construction programmed periodic beach nourishment for project year 5 (the fifth year following project construction), or as necessary, and approximately every 5 years thereafter, with major rehabilitation of the revetment at project year 25 of the 50-year project life. The initial construction was designed to re-create a beach at the site and with the realization that periodic substrate re-nourishment would be needed. The first re-nourishment event occurred in October-November of 1994 and consisted of placement of 3,321 cy of coarse beach fill (gravel larger than $^{3}/_{8}$-inch diameter) and 1,923 cy of fine beach fill (pit run sand and gravel) placed along the seaward side of the existing seawall for a distance of 1,800 feet north from the southern park boundary.

3. PROJECT DESCRIPTION

3.1. Project Location

Lincoln Park is located in King County, Washington, within the City of Seattle (Figure 2). The 130-acre park is operated by the Seattle Department of Parks and Recreation and bordered by the East Passage of Puget Sound on the west and by Fauntleroy Way on the east.

3.2. Project Description and Construction Techniques

The proposed project consists of placing approximately 250 cy of fine beach fill and 1500 cy of coarse beach fill material along 500 feet of the Lincoln Park shoreline. The substrate would be placed on the beach between 400 and 900 feet from the park's southern boundary (Figure 3).

Coarse material would be placed waterward of the break in beach slope and finer material placed on the level bench at the upper part of the beach just seaward of the seawall. Material placement would require a barge with conveyor off-loading capability, a small hydraulic excavator to remove and replace drift logs, and a small bulldozer to grade the new substrate. A barge would deliver all equipment and materials to the work area and construction activity would be confined to the approximate 65- by 500-foot project footprint (32,500 square feet or 0.75 acre). By restricting site access and the size of the work area, disruptions to aquatic biota would be minimal. Construction is anticipated for October 2002, to coincide with daytime high tides and lower park use. Once started, construction is expected to take about 1 week.

See Appendix A for photographs of the 1994 construction. Due to the smaller size of the proposed project, the barge and conveyer would likely be smaller than that used in 1994 but the techniques used would be similar.

3.3. Need and Purpose

Periodic beach re-nourishment is necessary to maintain the shoreline processes re-established by the initial beach nourishment and to prevent the storm damage and loss of public property at Lincoln Park that would result from scour and erosion. The proposed project would replace substrate lost since the last re-nourishment event in 1994, thereby protecting public property from damage and loss. While the beach profile maintains the top elevation just below the top of the seawall (Figure 4), the width of the top bench of the beach in the project area is 5 to 8 feet

Figure 4. Lincoln Park beach in southern part of project area, November, 2001. Compare the elevation of the beach on the steps to the 1975 conditions shown in Figure 1.

Figure 5. Strip of beach vegetation north of the project area (June, 2001).

Figure 6. Strip of beach vegetation within project area (June, 2001).

narrower than adjacent sections, indicating ongoing erosion and the need for additional material to perpetuate natural beach-forming processes (Figures 5 and 6).

3.4. Conservation Measures

Several measures would be employed during construction to minimize adverse project effects on protected species and their habitat:

- All work would be completed between August 16 and October 31. The work window avoids sensitive migration periods for salmonids, the bald eagle nesting period, and the bald eagle wintering period (the actual construction would take about 1 week and is planned to occur during early October).
- No part of any beached barge may rest on the bottom below an elevation of –2 feet (mean lower low water or MLLW).
- Transportation of material between the barge off-loading site and the beach must be carried out within a clearly marked 50-foot-wide access zone. The access zone shall remain unchanged throughout construction.
- All beach fill material shall be graded in the dry during periods of low tide.
- Earth-moving equipment shall remain seaward of the existing seawall and landward of the toe of the beach fill at all times.
- Washing of material from barges or placement of fill by hydraulic means is prohibited.
- All beach logs moved during construction shall be immediately replaced after placement of the beach substrate.

- Work would occur during daylight hours only.

4. PROJECT AREA DESCRIPTION AND ENVIRONMENTAL BASELINE

Lincoln Park is a heavily wooded and intensely landscaped park consisting of three distinct geographic areas: flat uplands, steep bluffs, and gently sloping beaches. Park facilities include playfields, jogging and interpretive footpaths, picnic shelters, parking lots, restrooms, an outdoor 50-meter saltwater swimming pool (Colman Pool), and an easily accessible saltwater beach. Williams Point, extending into East Passage about midway between the north and south park boundaries, represents the most prominent point of land between Alki Point (about 3 miles to the north) and Brace Point (about ¾-mile to the south).

The 5,350 foot long shoreline of the park can be divided into three separate areas: a 2,700-foot-long northwest beach, the 250-foot-long beach at Williams Point, and a 2,300-foot-long southwest beach. A concrete and cobblestone seawall is located generally landward of the high tide line and extends the entire length of the Lincoln Park shoreline. A narrow strip of beach vegetation extends waterward of the seawall. In most areas of the beach, the vegetation strip is more than 10 feet wide (Figure 5). In the project area, the strip of beach vegetation is less than about 5 feet wide or entirely absent (Figure 6). Landward of the seawall, a paved asphalt pedestrian promenade/service road extends northward from the south park boundary along the shoreline. The paved promenade/service road provides access to public restrooms, picnic shelters, and associated utility lines. Shoreline access to the northwest beach north of Colman pool is possible by a footpath that originates near Colman pool.

A revetment on the highest part of the Williams Point beach protects Colman Pool. The southwest beach is primarily gravel, the substrate that was placed during previous nourishment events, with a small shelf between the steeper gravel beach and the seawall with a sand surface, driftwood, and sparse vegetation (such as beach grass, *Ammophila* sp.; Scot's broom, *Cytisus scoparius*; and blackberry, *Rubus discolor*). The northwest beach has a coarse sand surface and extends up to the edge of the seawall with very little driftwood accumulation or vegetation.

4.1.1. Water Quality

Water quality in East Passage is generally good, particularly considering the urban nature of the Seattle shoreline. Elevated levels of fecal coliform have been documented, primarily in months with high rainfall, at the King County water quality sampling station at Lincoln Park (King County DNR, 2002). Fecal coliform levels in nearby Fauntleroy Cove commonly exceed state water quality standards for Class AA waters. Potential nearby sources of water quality degradation includes urban runoff, several outfalls discharging to Fauntleroy Cove, and turbidity generated by ferry operations occurring less than ¼-mile from the southern park boundary.

4.1.2. Bathymetry

From the shoreline, the bottom slopes gradually to about –20 feet (MLLW), then the bottom grade gradually gets steeper. Within a ¼-mile of the shoreline, depths reach more than 200 feet.

4.1.3. Eelgrass

Eelgrass (*Zostera marina*) beds are present just offshore and north of the project area and in shallow waters all along the Puget Sound shoreline of Seattle. The eelgrass distribution along the southwestern shoreline is highly irregular with some large, dense patches and other areas of sparse colonization. Some of the existing eelgrass results from transplant efforts done in 1993.

A survey of the intertidal zone was completed in spring of 2002 during a low tide of –2 feet (MLLW). Four patches of eelgrass located at elevations at or below MLLW were observed within 300 feet of the southern park boundary. The largest eelgrass patch encompassed about 3 square feet. The eelgrass patches occur within a mosaic of dense algal growth. A cursory survey of the beach did not reveal any eelgrass within the limits of the proposed project (between 400 and 900 feet from the southern park boundary). A dive survey of the Lincoln Park beach will occur during August, 2002, to identify sensitive subtidal areas that would be avoided during barge and tug operations.

4.1.4. Macroalgae

A sparse bed of bull kelp (*Nereocystis luetkana*) lies offshore of the southwest beach at Lincoln Park. A large kelp bed occurs north of Point Williams. While the density of the bull kelp in this area has decreased precipitously since the mid-1980's, the distribution of the kelp does not appear to have substantially changed over the same time frame (Antrim and Thom, 1995). In 1996, *Laminaria* kelp was observed in many places where bull kelp was observed in previous years (EPA, 1996).

In the intertidal zone in the vicinity of the project area, a variety of algal species occur. In the upper intertidal zone (above +6 feet, MLLW), the gravel beach is mostly bare of algae. At lower elevations, the substrate changes to cobble. *Ulva* and *Enteromorpha* dominate the zone between about +6 and +2 feet (MLLW). Between +2 and –2 feet (MLLW) and lower, a mix of *Laminaria*, *Iridea*, *Fucus*, and *Sargassum muticum* almost completely covers the substrate.

4.2. Action Area

The action area includes not only the activity proposed by the Corps but also all interrelated and/or interdependent activities. For this project, the action area encompasses the work area, the adjacent beach areas between Williams Point (about ¼-mile to the north) and Fauntleroy Creek (about ¼-mile to the south), and ¼-mile to the west and east.

5. SENSITIVE, THREATENED AND ENDANGERED SPECIES THAT MAY OCCUR IN THE ACTION AREA

In accordance with Section 7(a)(2) of the ESA, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Species lists obtained for other Corps projects in the central Puget Sound area were used to identify threatened and endangered species under jurisdiction of the U.S. Fish and Wildlife Service (USFWS). National Marine Fisheries Service (NMFS) Northwest Region web sites (*http://www.nwr.noaa.gov/1habcon/habweb/listnwr.htm* and *http://www.nwr.noaa.gov/1seals/marmamlist.html*) were consulted on July 10, 2002 to determine which species under NMFS's jurisdiction potentially

Table 1. ESA Protected Species Potentially Occurring in the Project Vicinity

Species	Listing Status	Critical Habitat
Bald Eagle *Haliaeetus leucocephalus*	Threatened	—
Marbled Murrelet *Brachyramphus marmoratus*	Threatened	Designated
Coastal/Puget Sound Bull Trout *Salvelinus confluentus*	Threatened	—
Puget Sound Chinook Salmon *Oncorhynchus tshawytscha*	Threatened	—
Steller Sea Lion *Eumetopias jubatus*	Threatened	Designated
Humpback Whale *Megaptera novaeangliae*	Endangered	—
Leatherback Sea Turtle *Dermochelys coriacea*	Endangered	Designated
Puget Sound/Strait of Georgia Coho Salmon *Oncorhynchus kisutch*	Candidate	—

occur in the project area. Seven species protected under the Act and one candidate species (Table 1) may occur in the vicinity of the project.

6. EVALUATION OF PROJECT IMPACTS ON PROTECTED SPECIES

6.1. Bald Eagle

The Washington State bald eagle population was listed as threatened under the ESA (64 FR 16397) in February, 1978. Since DDT was banned in 1972, bald eagle populations have rebounded. The bald eagle was proposed for de-listing in July, 1999.

The bald eagle wintering season extends from October 31 through March 31. Food is recognized as the essential habitat requirement affecting winter numbers and distribution of bald eagles. Other wintering habitat considerations are communal night roosts and perches. Generally large, tall, and decadent stands of trees on slopes with northerly exposures are used for roosting; eagles tend to roost in older trees with broken crowns and open branching (Watson and Pierce, 1998). Bald eagles select perches on the basis of exposure, and proximity to food sources. Trees are preferred over other types of perches, which may include pilings, fence posts, powerline poles, the ground, rock outcrops, and logs (Steenhof, 1978).

The bald eagles nest between early January and mid-August. The characteristic features of bald eagle breeding habitat are nest sites, perch trees, and available prey. Bald eagles primarily nest in uneven-aged, multi-storied stands with old-growth components. Factors such as tree height, diameter, tree species, position on the surrounding topography, distance from water, and distance from disturbance also influence nest selection. Snags, trees with exposed lateral branches, or

trees with dead tops are often present in nesting territories and are critical to eagle perching, movement to and from the nest, and as points of defense of their territory.

Birds and fish are the primary food source for eagles in Puget Sound, but bald eagles will also take a variety of mammals, and turtles (both live and as carrion) when fish are not readily available (Knight et al., 1990). Eagles in tidally influenced habitats also scavenge and pirate more prey than do eagles at rivers or lakes, possibly resulting from expanded feeding opportunities provided by dead and stranded prey on tide flats (Watson and Pierce 1998).

6.1.1. Utilization of the Action Area

There is an eagle nest approximately ¼-mile north of the project area. Many potential perch trees occur in the forest on the bluff slope behind the Lincoln Park beach. Eagles utilizing the Lincoln Park shoreline are likely acclimatized to human activity at the park facilities. Eagles may be attracted to salmon carcasses in the late fall and early winter in the vicinity of the mouth of Fauntleroy Creek, about ¼-mile south of the project area.

6.1.2. Effects of the Proposed Action

The work window for the project is July 16 to October 31 of any year and project construction is planned to occur during October 2002. Accordingly, the work would occur outside of the bald eagle nesting and wintering periods. No pile driving or other impact-related construction activities would occur, nor would the work directly affect any perch, nest, or roost sites. The construction activities would increase the level of activity along the Lincoln Park shoreline compared to normal levels in October, but should not generate excessive noise or disturbance during the approximately one-week construction period. The availability of prey or forage opportunities is not expected to be affected before, during, or after construction.

6.1.3. Effect Determination

The proposed project **may affect, but is not likely to adversely affect** the bald eagle since eagles may be present in the action area but the work period is short, the construction activities are relatively minor, the work would occur outside of sensitive nesting and wintering periods, and the finished project would not alter the forage opportunities or other eagle habitat compared to current conditions.

6.2. Marbled Murrelet

The marbled murrelet was listed as a threatened species under the ESA in October, 1992. Primary causes of population decline include the loss of nesting habitat, and direct mortality from gillnet fisheries and oil spills.

The subspecies occurring in North America ranges from Alaska's Aleutian Archipelago to central California. Marbled murrelets forage in the near-shore marine environment and nest in inland old-growth coniferous forests of at least seven acres in size. Marbled murrelets nest in low-elevation forests with multi-layered canopies; they select large trees with horizontal branches of at least seven inches in diameter and heavy moss growth. Of 95 murrelet nests in North America during 1995, nine were located in Washington. April 1 through September 15 is considered nesting season; however in Washington, marbled murrelets generally nest between

May 26 and August 27 (USFWS, 1999). Adults feeding young fly between terrestrial nest sites and ocean feeding areas primarily during the dawn and dusk hours.

Marbled murrelets spend most of their lives in the marine environment, where they forage in areas 0.3 to 2 km from shore. Murrelets often aggregate near localized food sources, resulting in a clumped distribution. Prey species include herring, sand lance, anchovy, seaperch, sardines, rockfish, capelin, smelt, as well as euphasiids, mysids, and gammarid amphipods. Marbled murrelets also aggregate, loaf, preen, and exhibit wing-stretching behaviors on the water.

Although marine habitat is critical to marbled murrelet survival, USFWS' primary concern with respect to declining marbled murrelet populations is loss of terrestrial nesting habitat. In the marine environment, USFWS is primarily concerned with direct mortality from gillnets and spills of oil and other pollutants (USFWS 1996).

Critical habitat was designated for the marbled murrelet on May 24, 1996 (USFWS 1996), consisting of forest areas suitable for nesting or roosting. No marine areas are included as critical habitat for marbled murrelets. The critical habitat units nearest to the project site are approximately 25 miles away, on the west side of Hood Canal in the Olympic National Forest.

6.2.1. Utilization of the Action Area

Marbled murrelets occur in Puget Sound marine habitats in relatively low numbers (Speich and Wahl, 1995). The species moves about a great deal over several temporal scales: seasonally, daily, and hourly. Regional patterns of activity tend to be seasonal, and are tied to exposure to winter storm activity. There is generally a shift of birds from the Strait of Juan de Fuca and British Columbia during spring and summer to areas in the San Juan Islands and eastern bays during the fall and winter (Speich and Wahl, 1995). Murrelets are often found in specific areas (e.g., Hood Canal, Rosario Strait/San Juan Islands), as foraging distribution is closely linked to tidal patterns. However, occurrences are highly variable as they move from one area to another, often in short periods of time.

6.2.2. Effects of the Proposed Action

Construction activities would have no effect on murrelet nests or nesting habitat, as none occurs in the vicinity of the project. However, construction activities would occur in and adjacent to foraging habitat. The noise associated with the operation of the barge, tug, and earth-moving equipment could disrupt foraging activities and cause murrelets to temporarily avoid the area.

The effects of human disturbance on murrelets at sea are not well documented, but they apparently habituate to heavy levels of boat traffic (Strachan et al., 1995). USFWS guidance suggests that noise above ambient levels is considered to potentially disturb marbled murrelets when it occurs within ¼-mile of suitable foraging habitat (USFWS, 1996). Construction activities would occur adjacent to suitable foraging habitat, but substantial human activity on both the waterward and landward sides of the shoreline is common and construction noise would be in highly localized with respect to this species' foraging range. Marbled murrelets are relatively opportunistic foragers; they have a flexibility in prey choice that likely enables them to respond to changes in prey abundance and location (USFWS, 1996). This indicates that if murrelets are present in the immediate vicinity of construction activities and they are disturbed

while foraging, they would likely move without injury or harm. Therefore, the effect of noise disturbance associated with the proposed project is expected to be insignificant.

The beach re-nourishment is not expected to result in a long-term reduction in the abundance and distribution of murrelet prey items. Temporary, highly localized increases in turbidity associated with the proposed work could reduce visibility in the immediate vicinity of the project, thereby reducing foraging success for any murrelets that remain in the area. Any reduction in prey availability would subside rapidly upon completion of the construction work. The proposed project would not increase boat traffic in the action area.

6.2.3. Effect Determination

Since construction activities would have no effect on nesting habitat or the murrelet food base, and the effects of any noise disturbance during construction are expected to be insignificant, the proposed project **may affect, but is not likely to adversely affect** the marbled murrelet. The project would have **no effect** on designated critical habitat for this murrelets since no critical habitat is located near the project.

6.3. Listed and Candidate Fish Species

All listed and candidate fish species that may occur in the action area are salmonids. Different species of salmonids utilize the Puget Sound nearshore slightly differently but, given the type of project at hand, potential impacts to salmonids would be similar for each of the listed and candidate species. This section is organized to give a general discussion of species life history and utilization of the project area, followed by summary sections discussing potential effects of the proposed work and species-specific effect determinations.

6.3.1. Coastal/Puget Sound Bull Trout

The Coastal/Puget Sound bull trout population segment was listed as a threatened species under the ESA in October, 1999. Bull trout populations have declined through much of the species' range; some local populations are extinct, and many other stocks are isolated and may be at risk (Rieman and McIntyre, 1993). A combination of factors, including habitat degradation, expansion of exotic species, and exploitation, has contributed to the decline and fragmentation of indigenous bull trout populations.

Bull trout and Dolly Varden (*S. malma*) are two closely related char species native to the Pacific Northwest and western Canada. The taxonomy of the species is difficult and it was only in 1978 that the two separate species were recognized (Cavender, 1978). The Washington Department of Fish and Wildlife (WDFW) manages the species together as "native char" because bull trout and Dolly Varden can be readily distinguished only by genetic testing. Washington's native char exhibit four life histories: anadromous, adfluvial, fluvial, and resident. The least information is available on the anadromous form of bull trout, but it is assumed that they occur in a number of Puget Sound basins, possibly as far south as the Puyallup River.

Bull trout movement in response to developmental and seasonal habitat requirements make their movements difficult to predict both temporally and spatially. A recent WDFW (1999) summary paper on bull trout in Stillaguamish Basin provided some general information on bull trout distribution in Puget Sound river basins. Newly emergent fry tend to rear near spawning areas,

while foraging juvenile and sub-adults may migrate through river basins looking for feeding opportunities. Post-spawn adults of the non-resident life form quickly vacate the spawning areas and move downstream to forage, some returning to their "home" pool for additional rearing. Anadromous sub-adults and non-spawning adults are thought to migrate from marine waters to freshwater areas to spend the winter.

6.3.1.1. Utilization of the Action Area

Little data is available on the life history and distribution of bull trout in Puget Sound river basins (WDFW, 1998). Bull trout have been captured in the estuarine parts of the Duwamish River (D. Hotchkiss, Port of Seattle, pers. comm..), but it is not know if those fish were produced in the basin or strayed from other locations.

Anadromous sub-adults and adults utilize estuarine and nearshore marine habitats in Puget Sound for the feeding opportunities these areas present. Any bull trout occurring in the action area would not be resident fish, but individuals on foraging forays. Based on research in the Skagit Basin (Kraemer 1994), anadromous bull trout juveniles migrate to the estuary in April-May, then re-enter the river from August through November. Most adult fish entered the estuary in February-March, and returned to the river in May-June. Sub-adults, fish that are not sexually mature but have entered marine waters, move between the estuary and lower river throughout the year.

6.3.2. Puget Sound Chinook Salmon

The Puget Sound chinook salmon evolutionarily significant unit (ESU) was listed as a threatened species under the ESA (64 FR 16397) in March, 1999.

Puget Sound chinook, including those occurring within the action area, are of the ocean-type race (NMFS, 1998). Ocean-type chinook migrate to sea during their first year of life, normally within three months after emergence from spawning gravel. Growth and development to adulthood occurs primarily in estuarine and coastal waters (NMFS, 1998). Ocean-type chinook return to their natal river in the fall, though actual adult run and spawning timing is in response to the local temperature and water flow regimes (Myers et al., 1998). After spawning, females remain on the redd from 4 to 26 days until they die or become too weak to hold in the current (Neilson and Green, 1981, Neilson and Banford, 1983). During this period, females will vigorously defend the redd against the spawning activity of newly arriving fish. Duration of incubation varies, depending on location of redds, but is generally completed by the end of February. Young chinook reside in stream gravels for 2 to 3 weeks after hatching (Wydoski and Whitney, 1979) before moving to lateral stream habitats (e.g., sloughs, side channels, and pools) for refugia and food during their migration downstream and out to Puget Sound. Peak emigration occurs from March to June.

The amount of time juveniles spend in estuarine areas is dependent upon their size at downstream migration and rate of growth. Juveniles disperse to deeper marine areas when they reach approximately 65-75 mm in fork length (Simenstad et al., 1982). While residing in upper estuaries as fry, juvenile chinook have an affinity for benthic and epibenthic prey items such as amphipods, mysids, and cumaceans. As the juveniles grow and move to deeper waters with higher salinities, this preference changes to pelagic items such as decapod larvae, larval and juvenile fish, drift insects, and euphausiids (Simenstad et al., 1982).

6.3.2.1. Utilization of the Action Area

The Duwamish/Green basin (about 5 miles to the north) and Puyallup/White basin (about 18 miles to the south) are the closest chinook-bearing rivers to the project site. The Duwamish/Green stock have exhibited relatively stable numbers in recent years (WDFW, 1992). Chinook stocks in the Puyallup River are depressed, particularly White River spring chinook.

Chinook life history stages that might occur near the project site include larger juveniles and adults. Since the project site is a good distance from sources of outmigrating juvenile salmonids, juvenile chinook are likely relatively large by the time they encounter the project site and, therefore, they do not rely as heavily on nearshore areas as when they enter the marine environment. However, some juvenile chinook likely do forage in nearshore areas in the project vicinity. The sloping Lincoln Park beach may provide juvenile chinook a refuge from predators. Adult chinook may orient their migrations and movements with the shoreline but are not likely heavily dependent upon shoreline resources for food or refuge.

In July 1995, NMFS determined that listing was not warranted for the Puget Sound/Strait of Georgia ESU coho salmon. However, the ESU is designated as a candidate for listing due to concerns over specific risk factors.

6.3.3. Puget Sound/Strait of Georgia Coho Salmon

Coho salmon have one of the more predictable life histories of the Pacific salmon. After 1 or 2 years in ocean waters, adult coho return to Puget Sound from late August through November, enter their parent rivers in beginning in October, and begin to spawn in November. Coho larvae spend 2 to 3 weeks absorbing the yolk sac in the gravels of the redd before they emerge. Juvenile coho salmon then rear in freshwater for approximately 15 to 18 months prior to migrating downstream to the ocean. Newly emergent fry usually congregate in schools in pools of their natal stream. As juveniles grow they move into riffle habitat and aggressively defend their territory, resulting in the displacement of excess juveniles downstream to less favorable habitat (Wydoski and Whitney, 1979). This aggressive behavior may be an important factor maintaining the numbers of juveniles within the carrying capacity of the stream, and distributing juveniles more widely downstream. As territories are established, individuals rear in selected areas of the stream and feed on drifting benthic organisms and terrestrial insects. Territories expand as juveniles grow. Feeding and growth slow considerably in the fall and winter, as food production and fish metabolisms slow. Coho seek off-channel sloughs and ponds in which to spend the winter.

Coho salmon within this ESU are abundant and, with some exceptions, run sizes and natural spawning escapements have been generally stable. However, artificial propagation of coho salmon appears to have had a substantial impact on native, natural coho salmon populations, to the point that it is difficult to identify self-sustaining, native stocks within this region (Weitkamp et al., 1995). In addition, continuing loss of habitat, extremely high harvest rates, and a severe recent decline in average size of spawners indicate that there are substantial risks to whatever native production remains. There is concern that if present trends continue, this ESU is likely to become endangered in the foreseeable future.

6.3.3.1. Utilization of the Action Area

Coho salmon utilize almost all the accessible tributaries in the Puget Sound region. In 1998, the City of Seattle constructed a fish ladder on nearby Fauntleroy Creek and coho fingerlings have been released into the creek since the early 1990's. Adult coho, including some wild-spawned fish, have begun to return to Fauntleroy Creek, with a run size of about 100 fish.

Coho returning to Puget Sound tributaries typically enter freshwater from mid-August to early November and spawn from mid-October through mid-January. Coho begin to enter Fauntleroy Creek in mid- to late October.

6.3.4. Effects of the Proposed Action

The construction window for the project is August 16 to October 31 and project construction is planned to occur during October 2002. Hence, the project schedule is consistent with the standard work closure periods for bull trout (February 15 through July 15), chinook (March 1 through July 1), and coho (March 1 through June 14).

The primary ecological functions provided for juvenile salmonids along the shoreline of Lincoln Park are feeding and refuge. Adult salmonids use the shoreline primarily for orientation during migrations and may periodically move into nearshore areas for feeding. Monitoring of the beach following the initial construction event found that the overall density of important salmonid prey items along the southwestern beach was similar to a control beach (Pentec, 1993). By burying the beach surface, the proposed work would temporarily decrease populations of epibenthic organisms within the project footprint. Potential adverse effects would be minimal because the work would occur in the fall as epibenthic production seasonally decreases, the project footprint represents only a small proportion of the available foraging habitat in the vicinity, and any dip in epibenthic abundance would be short-term.

Grading work would occur in-the-dry to minimize turbidity in adjacent waters but, when the tide rises to cover the new fill material, increased turbidity would occur for a short period. The magnitude and duration of the turbidity is expected to be minor, resulting in minimal and temporary degradation of water quality.

Beach slope and substrate would not be changed by placement of the additional beach fill material along the shoreline. The new beach fill material would be suitable for a wide range of invertebrates. A small area of macroalgae may be destroyed or otherwise adversely affected by barge operations on the beach but the area of impact would be small and algae would rapidly re-colonize the disturbed area to restore pre-project conditions.

Peak abundance of juvenile salmonids at the project site occurs in the spring. Salmonids may occur in the vicinity of the project when the work would occur but these fish would be larger and not heavily dependent upon the nearshore environment.

The proposed construction would occur just prior to the peak of the migration of adult fish returning to Fauntleroy Creek (Lynch, 2002). Although adult coho may orient along the shoreline during their migration, they are not specifically dependent upon the nearshore during migration. Coho may stage near the creek prior to their terminal migration but the project is likely too far from the creek mouth to be considered an important staging area. In-water

disturbance during construction would be minimal and, in any event, much less magnitude than the regular ferry dockings at the terminal directly adjacent to the creek.

Sand lance and surf smelt spawn on beaches bracketing either side of the Fauntleroy ferry terminal. The beaches in these areas have a finer, sand substrate than that along the southwestern beach of Lincoln Park. Typically, sand lance and surf smelt prefer a beach substrate substantially less than 1-inch-diameter; pea gravel or smaller sized substrate is ideal. The beach substrate at Lincoln Park is larger than 1-inch-diameter and unlikely to be utilized by sand lance or surf smelt. Adverse effects to other marine fish are not anticipated since the work would occur at relatively high elevations (higher than +6.0 feet, MLLW), the disturbance would be temporary, and the project area is small.

6.3.5. Effect Determinations

The proposed project **may affect, but is not likely to adversely affect** Puget Sound/Coastal bull trout and Puget Sound chinook. This determination is made based upon the limited scope and duration of the project, the low likelihood that chinook and bull trout would be present in the action area during construction, and the temporary and minor nature of project impacts. Effect determinations are not made for candidate species such as Puget Sound/Strait of Georgia coho salmon.

6.4. Steller Sea Lion

The Steller sea lion was listed as a threatened species under the Endangered Species Act of 1973, as amended (64 FR 16397), in November, 1990. In 1997, the North Pacific's population of Steller sea lions was separated into two distinct stocks, one of which was reclassified as endangered. The status of the eastern stock, which includes the population inhabiting the waters of the Washington coast, remains unchanged.

The present range of the Steller sea lion extends from northern Japan, through the Bering Sea and Aleutian Islands, along Alaska's southern coast, and south to California. The centers of abundance and distribution lie in the Gulf and Alaska and Aleutian Islands. Steller sea lions are not known to migrate, but they do disperse widely during portions of the year other than the breeding season. Most information on the distribution of Steller sea lions has been collected during summer months, so their distribution during late fall and winter is poorly known (Steller Sea Lion Recovery Team, 1992).

Two types of terrestrial habitats are utilized by Stellar sea lions: rookeries are areas where adults congregate for breeding and pupping, and haul-outs are areas used for rest and socializing. Sites used as rookeries during the breeding season may be used as haul-outs during the remainder of the year. Steller sea lions haul-out on offshore islands, reefs, and rocks, while rookeries generally occur on beaches. Preferred rookeries and haul-out areas are located in relatively remote areas where access by humans and mammalian predators is difficult; locations are specific and change little from year to year (Steller Sea Lion Recovery Team, 1992).

When not on land, Steller sea lions are generally seen inshore, less than 5 miles from the coast. Steller sea lion foraging patterns vary depending upon age, season, and reproductive status, as well as the distribution and availability of prey. Foraging patterns of females during the winter

months vary considerably; individuals travel an average of 133 km and dive an average of 5.3 hours per day. The vast majority of feeding dives occur to a depth of 100 m. The diet of Washington's Steller sea lions is not well known; primary prey items may include cod, pollock, rockfishes, herring, and smelt (Gearin and Jeffries, 1996). They appear to be largely opportunistic feeders.

During the past 30 years, Steller sea lion populations have suffered a dramatic decline. Numbers in the rookeries of central/southern California, the central Berring Sea, and in the core Alaskan ranges have all decreased substantially. A number of natural and anthropogenic factors have been hypothesized as contributing to these declines, but a primary cause has not been definitively identified. It is generally thought that a nutritional deficiency resulting from a lack of abundance or availability of suitable prey is involved (Steller Sea Lion Recovery Team, 1992). Major shifts in the abundance of fish in the Berring Sea over the past several decades are well documented (WDFW, 1993). The Alaska pollock and Atka mackerel fisheries have specifically been implicated in decreasing the availability of prey. A similar decline has not been documented in the region from southeast Alaska through Oregon, where Steller sea lion numbers appeared to have remained stable (Steller Sea Lion Recovery Team, 1992).

On August 27, 1993, NMFS designated critical habitat for Steller sea lions. All rookeries within U.S. borders, major haulouts in Alaska, aquatic areas associated with these terrestrial habitats, and aquatic foraging habitats in waters off Alaska were designated at this time (58 FR 53138). No critical habitat occurs in Washington.

6.4.1. Utilization of the Action Area

Steller sea lions may be observed in Puget Sound year round, but they are most abundant during the fall and winter months (Jeffries et al., 2000). No breeding rookeries have been identified in Washington waters; however, in 1992 a single pup was born on Carroll Island (WDFW, 1993).

The most frequented haul-out areas in Puget Sound are located north of Admiralty Inlet. However, the species is occasionally seen on navigation buoys in Puget Sound (Jeffries et al., 2000).

6.4.2. Effects of the Proposed Action

Given the lack of rookery and major haul-out areas in southern Puget Sound, when in the action area Steller sea lions are likely on foraging expeditions. Adverse effects are not anticipated since the work would occur at relatively high elevations (higher than +6.0 feet, MLLW), the disturbance would be temporary, and the project area is small. Construction activities would have no effect on breeding habitat or behavior, and are unlikely to affect the Steller sea lion prey base. Construction activities would occur in an area with substantial human activity on the landward side of the shoreline. The potential for long-term or indirect impacts of the proposed project to Steller sea lions is insignificant. The proposed work would not increase vessel traffic in the area, and construction activities are anticipated to have extremely minor and temporary impacts to water quality.

6.4.3. Effect Determination

This project is **not likely to adversely affect** the Steller sea lion since the potential for significant sound disturbance or impacts to water quality and prey abundance are highly unlikely. The project would have **no effect** on designated critical habitat for this species.

6.5. Humpback Whale and Leatherback Sea Turtle

The likelihood that a humpback whale or leatherback sea turtle would occur along the eastern shore of East Passage, particularly in the shallow nearshore area where work would occur, is extremely low. Given their distribution, the Corps has determined that the proposed project would have **no effect** on these species or the designated critical habitat of the leatherback sea turtle.

7. INTERRELATED AND INTERDEPENDENT EFFECTS

No interdependent or interrelated actions are associated with the proposed action.

8. CUMULATIVE EFFECTS

Under the ESA, cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7. Likely future actions that will require or have required separate Section 7 consultation include planned refurbishment of the Fauntleroy Ferry terminal (to be completed by the Washington Department of Transportation and scheduled to occur concurrently with the Lincoln Park project), periodic routine maintenance of the Fauntleroy Ferry terminal, and any future beach re-nourishment projects along the Lincoln Park shoreline (which wouldn't occur for 5 years or more).

Between the ferry terminal and the southern boundary of Lincoln Park, the shoreline is lined with residential properties. Currently, the shorelines of these properties are not armored, allowing relatively natural beach profiles to persist throughout Fauntleroy Cove. The prevailing direction of the alongshore current in the project vicinity is from the south. Over time, the nearshore currents and waves are capable of mobilizing large quantities of beach sediment, as evidenced by the complete loss of the Lincoln Park beach prior to the original beach nourishment event. By stabilizing the beach at Lincoln Park, the proposed re-nourishment helps prevent erosion of beaches to the south. For that reason, bulkheads and riprap are not needed to protect the residential properties from erosion. Given the documented adverse environmental effects of marine shoreline armoring and that over half of shorelines in central Puget Sound have already been armored or otherwise modified (Berry, 2002), preservation of the natural beach grade at the residential properties south of Lincoln Park represents a potential cumulative benefit of the proposed work.

9. CONCLUSIONS

Table 2 summarizes the effect determinations made for each of the species potentially occurring in the project vicinity.

Table 2. Summary of Effect Determinations

Species	Effect Determination	Critical Habitat Determination
Bald Eagle	Not likely to adversely affect	—
Marbled Murrelet	Not likely to adversely affect	No effect
Bull Trout	Not likely to adversely affect	—
Chinook	Not likely to adversely affect	—
Steller Sea Lion	Not likely to adversely affect	No effect
Humpback Whale	No effect	—
Leatherback Sea Turtle	No effect	No effect

10. EFH ASSESSMENT

The project area is designated as Essential Fish Habitat (EFH) for various life stages of 17 species of groundfish, 5 coastal pelagic species, and three species of Pacific salmon. The Corps has determined that the proposed work would impact approximately 0.75 of an acre of EFH utilized by pacific salmon, groundfish, and coastal pelagic species. Effects of the proposed work on EFH would be essentially identical to those discussed in Paragraph 6.3 above. We have determined that the proposed action would not adversely affect EFH for federally managed fisheries in Washington waters. This determination is based on the limited scope and duration of the construction and the temporary and minor nature of project impacts.

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APPENDIX A

Photographs of 1994 Construction Equipment & Methods

Loaded Barge Approaching the Lincoln Park Beach in 1994.

Conveyor unloading beach fill onto the upper beach in 1994.