BIOLOGICAL ASSESSMENT
SNOHOMISH RIVER NAVIGATION CHANNEL
UPSTREAM SETTLING BASIN
AND
JETTY ISLAND NOURISHMENT

US Army Corps
of Engineers®
Seattle District

CENWS-PM-PL-ER

BIOLOGICAL EVALUATION SNOHOMISH RIVER NAVIAGATION CHANNEL, UPSTREAM SETTLING BASIN AND JETTY ISLAND NOURISHMENT, EVERETT, WASHINGTON

1.0 Project Location and Purpose

The primary purpose of the proposed maintenance dredging is to maintain a safe, reliable navigation channel for continued waterborne commerce on the Snohomish River at Everett Harbor, Washington. The secondary purpose is to place dredged materials (sediment) onto Jetty Island, to restore portions of the protective berm that has eroded away (western shore) due to severe wave action during storm events. Nourishment of the protective berm will protect the developed salt marsh that has established on Jetty Island after the initial berm construction in December 1989. This project is described in the multi-year Public Notice CENWS-OD-TS-NS-99 U.S. Army Corps of Engineers Fiscal Year 1997-2001 Maintenance Dredging, Snohomish River navigation Channel, Downstream and Upstream Settling Basins, Everett, Washington. A finding of no significant impact was signed August 15, 1997; however, since the FONSI was signed, the Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*) and Bull Trout (*Salvelinus confluentus*) have been listed as a threatened species under the Threatened and Endangered Species Act of 1973.

On May 26, 1999 a letter of concurrence was obtained from National Marine Fisheries Service for a may effect not likely to adversely effect chinook salmon for the dredging of the upstream settling basin and channel. The maintenance-dredged material was used beneficially for the grading material at the Tulalip Superfund Site. This year material from the upstream settling basin will be used beneficially at the upland Port owned Riverside disposal site. Material located just upstream from the downstream settling basin will be used for nourishment on Jetty Island.

This maintenance dredging project will occur in the upstream settling basin and a short reach above the downstream settling basin that has become shoaled in the river channel. Pipeline dredged material will be pumped across Jetty Island via pipeline to the upland berm area of Jetty Island and discharged for nourishment of the protective berm. A dozer will be used to construct temporary construction berms to maximize retention of discharged dredged material. Dozers will also be used to extend the discharge pipeline and grading of dredged materials to the required berm cross sectional, top elevation, width, and side slopes. These requirements also apply to the Riverside Site.

2.0 PROJECT HISTORY

Part one of this dredging project, adopted June 25, 1910 and modified by subsequent acts, consists of navigation channels, two settling basins, and dikes to serve navigation in Everett Harbor and Snohomish River. The overall navigation project includes:

(1) a one-mile channel from Puget Sound up the Snohomish River, 15 feet deep at mean lower low water (MLLW) and 150 to 425 feet wide.

(2) an upper channel extending to river mile 6.3, 8 feet deep at MLLW and 150 feet wide.

(3) two settling basins in the river channel;

a. the downstream basin with 200,000 cubic yards (cy) capacity

b. the upstream basin with 1 million cy capacity.

Part two consist of the dredged material developed Jetty Island. The Jetty Island berm project was planned, designed, and coordinated by the Port of Everett (Port),U.S. Army Corps of Engineers (Corps), Seattle District, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and the Environmental Protection Agency to demonstrate beneficial use of clean dredged material for habitat development.

Construction of the navigational channel in Everett Harbor from 1894 to 1903 resulted in large volumes of sediment requiring disposal. Creation of the Jetty Island began in 1903 with construction of a rock jetty behind which these dredged materials could be placed. Maintenance of the channel and placement of the dredged material to build the island continued until 1969 (Houghton 1995). Today this island is approximately 3 km. Long and covers approximately 40 hectares, above mean higher high water (MHHW). The upland vegetation is dominated by Scot's broom (*Cytisus scoparius*), blackberry (*Rubus spp*.), and many other shrubs and herbaceous species. Mudflats and Possession Sound lie to the west of the island; the Snohomish River estuary, the federal navigation channel, and the City of Everett to the east (Figure 1).

In the 1980's the Corps realized an opportunity to increase the size of the habitat on Jetty Island by continuing to use material from the lower settling basin and navigation channel. With the placement of this material as a berm along the western portion of the island created a 7.7 ha. mudflat within a protected embayment on what had been the sandy west shore of the island. This created valuable habitat for salmon, Dungeness crab, birds, benthic infauna and epibenthic crustacea on Jetty Island.

3.0 EXISTING CONDITIONS AND ACTION AREA

3.1 Jetty Island

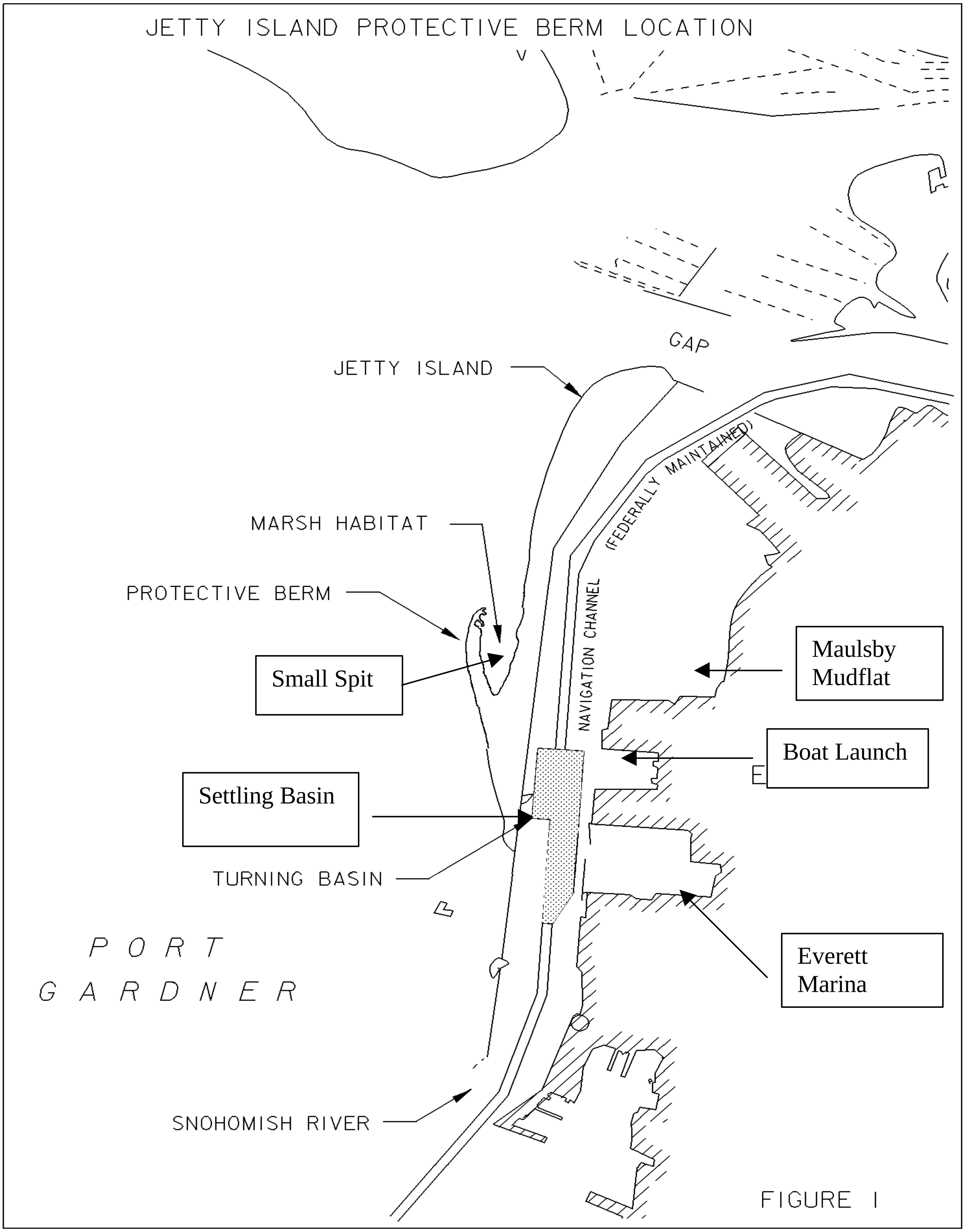
The upper intertidal and riparian areas on the west side of Jetty Island are mainly composed of sandy materials and flat slopes. Wave energy apparently limits productivity of infauna and epibiota in the middle and upper intertidal areas. The lower intertidal areas and the areas created by the berm within the lagoon are silty sands, sandy silts, and muds. A high degree of bioturbation, primarily by ghost shrimp (F*neotrypaea californiensis*) make these areas soft (Pentec 2000).

Seedlings from 12 to 15 species have become established since the spring of 1990, and the community continues to develop. The berm supports several shrub and tree species that have grown to more than 3 meters in height (Pentec 2000). Dunegrass was planted in 1990 from nursery stock and plants dug on the island and have become very successful and are spreading throughout the top of the berm. Unfortunately, most of the area that was planted with Dunegrass has eroded.

Natural colonization of dunegrass from waterborne seeds and rhizomes from eroding areas of the island to the north developed into a similarly dense growth along the lower elevations (+12 to +14 ft) on the east side of the berm (Pentec 2000).

The area inside the small spit that formed at the end of the berm appears to have excellent elevations and hydrographic characteristics and had developed a significant area of salt-marsh by 1995 (Pentec 2000). However, it was obliterated in 1997 when the spit was overtopped and 2+ feet of sand was deposited within the area of the salt-marsh.

Annual surveys have been conducted since construction of the berm. The evolution of the berm shoreline and the rate of erosion (or accretion) at various locations along the berm was determined through the use of digital terrain models (DTMs) that were created from the survey data. Figures 2 and 3 show the changes in the location of the mean higher high water (MHHW) contour, (+11ft) and the (+14ft) contour for the years 1990, 1993, 1998, and 1999. The present (1999) condition of the berm and a comparison of the berm cross sections are shown in Figure 4. Based on the values shown on Figure 4, the berm is undergoing the most rapid erosion along its middle with an estimated lost of 98,000 cy since 1990. This rate of erosion is about 11,000 cy/yr, or about 5.5 cy/yr/lineal foot of berm. Fortunately the winter of 1999-2000 and 2000-2001 were unusually mild and as elsewhere along the Washington coast, little erosion was experienced.


JETTY ISLAND PROTECTIVE BERM LOCATION
GAP
JETTY ISLAND
MARSH HABITAT
PROTECTIVE BERM
Small Spit
(FEDERALLY MAINTAINED)
NAVIGATION CHANNEL
Maulsby Mudflat
Boat Launch
Settling Basin
TURNING BASIN
Everett Marina
PORT
GARDNER
SNOHOMISH RIVER
FIGURE 1

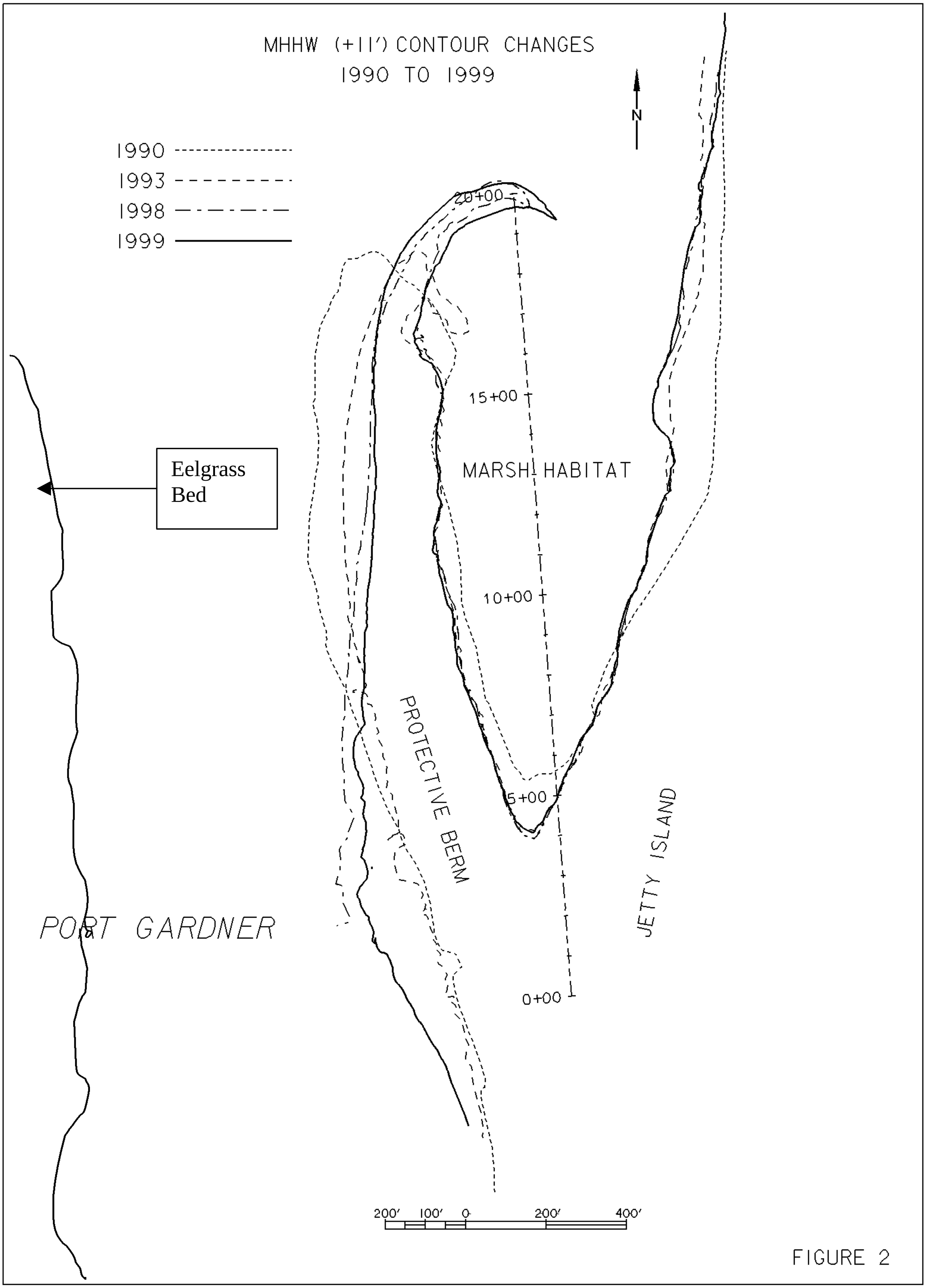

MHHW (+11') CONTOUR CHANGES
1990 TO 1999
1990
1993
1998
1999
N
Eelgrass Bed
20+00
15+00
MARSH HABITAT
10+00
5+00
0+00
PROTECTIVE BERM
JETTY ISLAND
PORT GARDNER
200'
100'
0
200'
400'

FIGURE 2

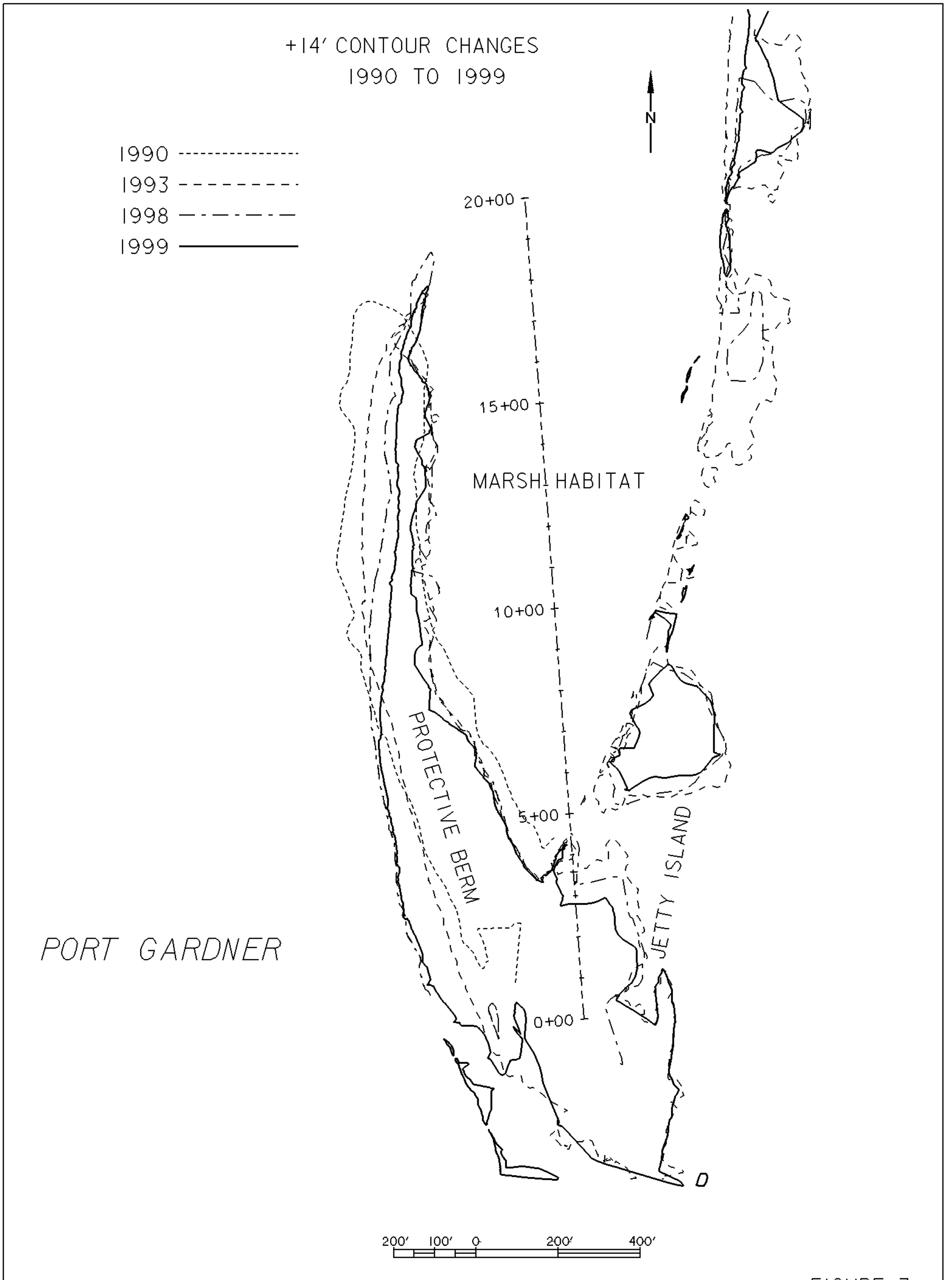
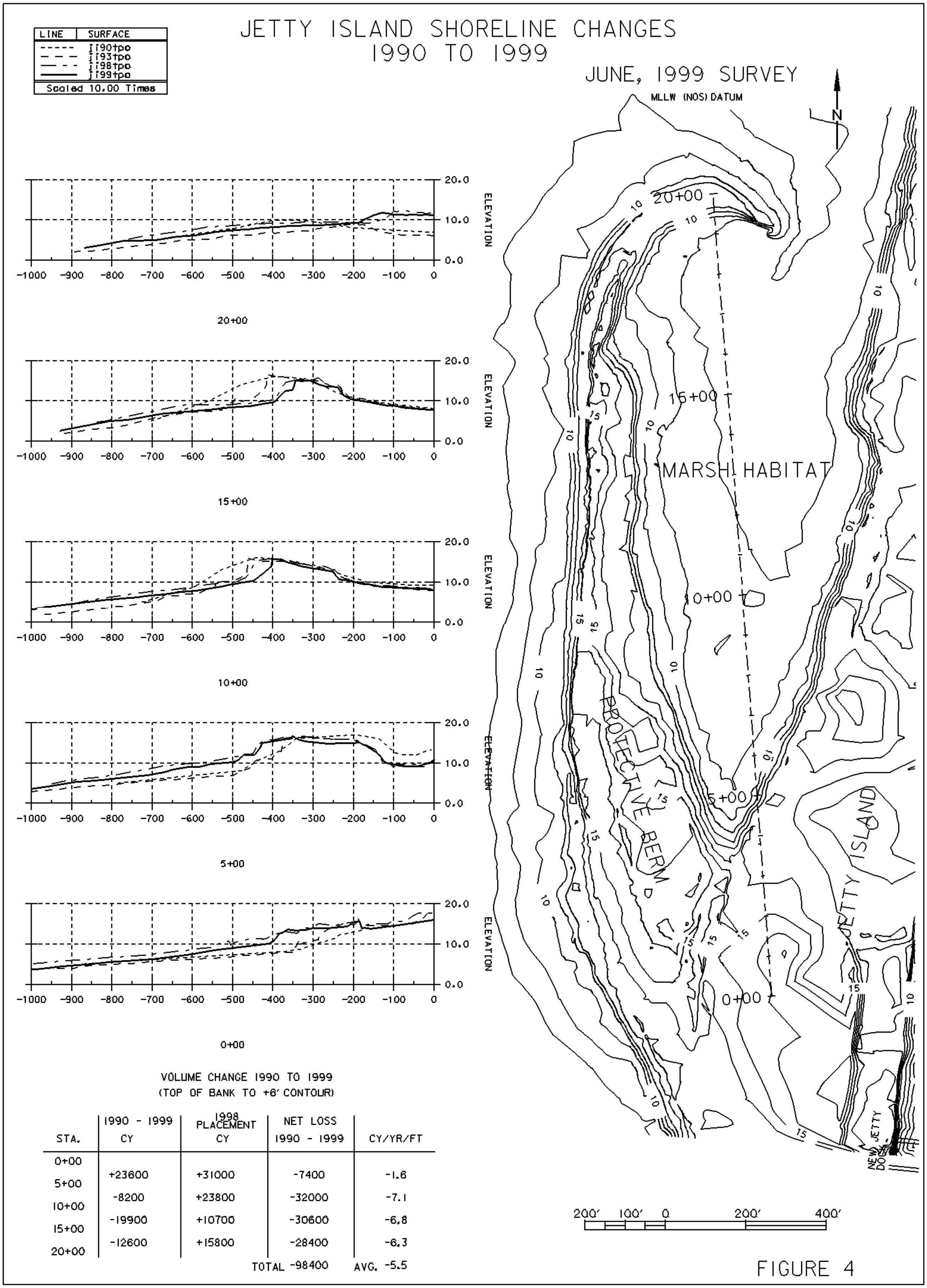

+14′ CONTOUR CHANGES
1990 TO 1999
N
1990
1993
1998
1999
20+00
15+00
10+00
5+00
0+00
MARSH HABITAT
PROTECTIVE BERM
JETTY ISLAND
PORT GARDNER
200′ 100′ 0 200′ 400′

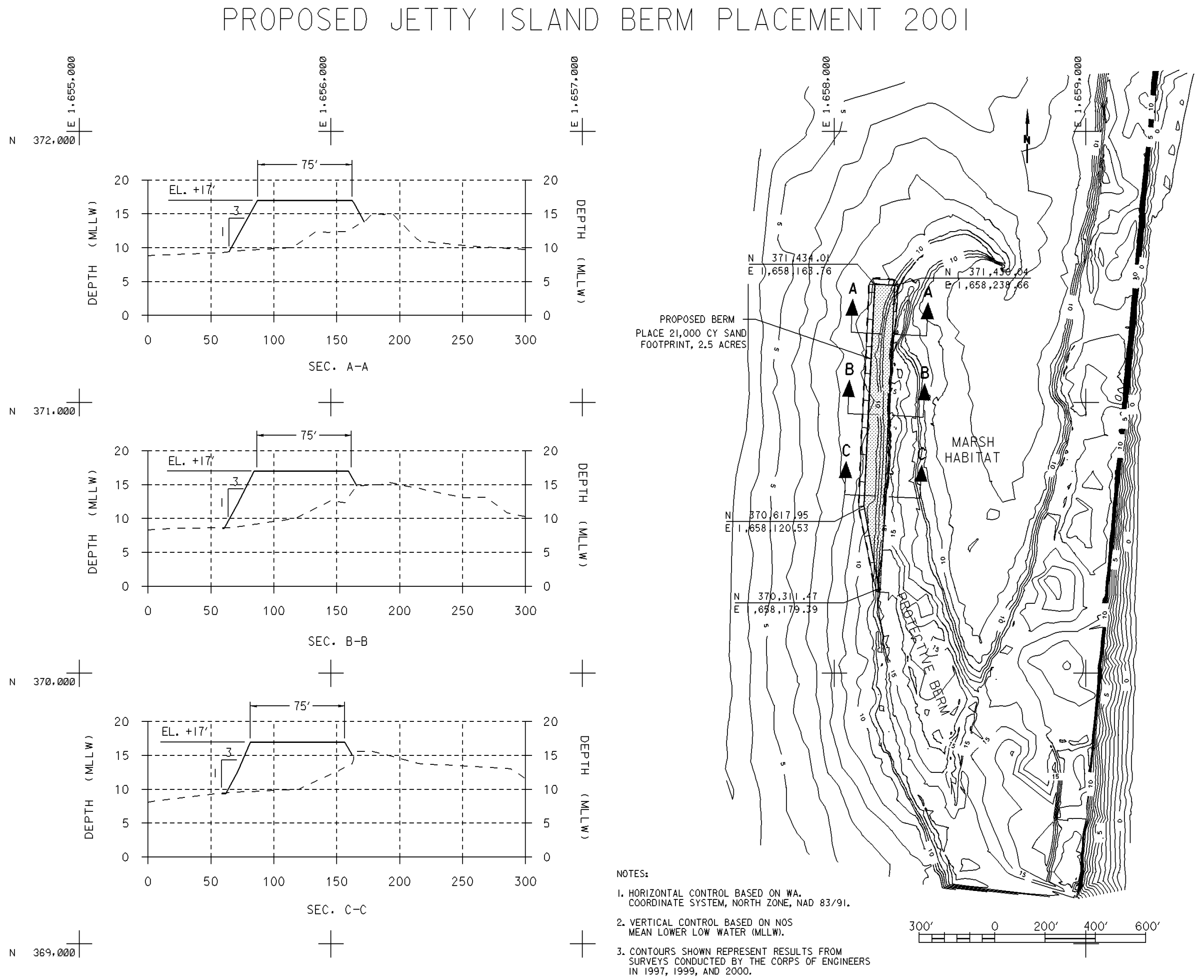
FIGURE 3



VOLUME CHANGE 1990 TO 1999
(TOP OF BANK TO +6′ CONTOUR)

STA.	1990 - 1999 CY	1998 PLACEMENT CY	NET LOSS 1990 - 1999	CY/YR/FT
0+00				
	+23600	+31000	-7400	-1.6
5+00				
	-8200	+23800	-32000	-7.1
10+00				
	-19900	+10700	-30600	-6.8
15+00				
	-12600	+15800	-28400	-6.3
20+00				
			TOTAL -98400	AVG. -5.5

Figure #5


PROPOSED JETTY ISLAND BERM PLACEMENT 2001
SEC. A-A
SEC. B-B
SEC. C-C
DEPTH (MLLW)
EL. +17'
75'
PROPOSED BERM
PLACE 21,000 CY SAND
FOOTPRINT, 2.5 ACRES
MARSH HABITAT
PROTECTIVE BERM
NOTES:
1. HORIZONTAL CONTROL BASED ON WA. COORDINATE SYSTEM, NORTH ZONE, NAD 83/91.
2. VERTICAL CONTROL BASED ON NOS MEAN LOWER LOW WATER (MLLW).
3. CONTOURS SHOWN REPRESENT RESULTS FROM SURVEYS CONDUCTED BY THE CORPS OF ENGINEERS IN 1997, 1999, AND 2000.

3.2 EELGRASS

There is an area west of Jetty Island that contains eelgrass estimated to be in excess of 1,000 acres (Figure 2). This area is a single functioning eelgrass meadow, as no physical features divide the area into multiple beds.

Unconfined hydraulic placement of dredged material to form the berm does not appear to have adversely affected adjacent eelgrass beds (Pentec 2000).

3.3 SNOHOMISH RIVER & ESTUARY

The Snohomish River and Estuary are part of the larger Snohomish River Basin that has a varied topography ranging from low, rolling terrain next to tidewater to steep cliffs along the eastern border. Although forests cover approximately 82 percent of the area, agricultural lands predominate throughout the coastal lowlands and extend inland along the alluvial river bottoms.

The Snohomish River is formed by the confluence of the Snoqualmie and Skykomish Rivers about 22 miles southeast of Everett, Washington. The river enters Puget Sound at Everett about 30 miles north past the City of Everett, then curves westward to enter Puget Sound via Port Gardner Bay. Additional drainage of the delta area is provided by the three major sloughs: Union, Ebey, and Steamboat. The river has an approximate mean annual flow of 9,100 cubic feet per second, which is the second highest annual runoff of the 11 river basins in the Puget Sound area. Lower reaches of the Snohomish River, as well as Ebey, Steamboat, and Union Sloughs, with their associated wetlands, are estuarine areas under saltwater influence. Marine portions of the project area include Port Gardner and Possession Sound that are part of Puget Sound.

There is a downstream settling basin that was developed by the U.S. Army Corps of Engineers to catch sediment and reduce the frequency of dredging required on the Snohomish River. Figure #1 has the area labeled as the turning basin; however, they are one in the same. The basin is approximately 700 feet wide, 1,200 feet long, and 20 feet deep. The navigation channel extends on upstream for a distance of approximately 6.3 miles at a depth of 8 feet and 150 feet wide.

The Snohomish Estuary also supports a wide variety of wildlife. The habitats of the Snohomish Estuary serve as corridor, linking urban and rural open spaces from the Cascade foothills to Puget Sound lowlands and waters. In a 1994 study, 71 bird species, 15 mammal species, and 3 reptile/ amphibian species were observed in the Estuary (City of Everett et al. 1995). However, a variety of anthropogenic changes have degraded the habitats of the Snohomish. Often implicated in the decline of the Basin's salmonid stocks are agricultural diking, which resulted in a significant loss of wetland habitats, and the reduction of large woody debris in the River due to logging and clearing for agricultural/residential development.

4.0 PROJECT DESCRIPTION

Hydraulic pipeline dredging of approximately 170,000 cubic yards (c.y.) of clean sandy material will be removed from the upstream settling basin and disposed at the city owned Riverside Site. Once this site is completed it is slated for future use by the Port of Everett for development.

Riverside Site – Approximately 170,000 c.y. will be placed on the Riverside Redevelopment site. This upland site consists of three areas on their property located on the left bank of the Snohomish River. Weyerhaeuser formerly used this site for lumber production. Prior to the purchase by the Port of Everett this site had over 300,000 c.y. of wood waste debris removed by Weyerhaeuser in an agreement with the Washington State Department of Ecology to clean up contaminants. The site is now being filled by the Port of Everett with clean sediment with the idea of redeveloping this site.

There is a reach of the river channel just above the lower settling basin that requires removal of approximately 30,000 c.y. of material. This material will be added to Jetty Island. The plan is to re-nourish the berm at Jetty Island to prevent the berm from being overtopped and breached. The material will be placed directly on top of the berm in accordance with Figure 5. This will require placing the material along the +8 contour of the existing berm. By remaining out of the intertidal zone this addition will result in no further loss of intertidal habitat. Existing material will be used to push berms into position to hold the pipelined material. Effluent material will be allowed to exit at the north end of the berm structure and remain within the guidelines of sedimentation as described in this BA. This is considered a short term and temporary fix to the loss of material that protects the man made estuary and mud flat.

The dredged material disposal area berm on Jetty Island shall be constructed to the dimensions indicated on Figure 5. The top elevation will initially be constructed to +18 foot MLLW. The berm shall be constructed from the south to the north. Side slopes shall be approximately 25 horizontal to 1 vertical. Overall length of the berm will vary depending on actual dredged volume. Just prior to completion of dredging the top of the berm will be graded to the +15 foot elevation and the slopes of the disposal berm uniformly graded as necessary.

Discharge points will be constructed to direct return flow to the North Side of the disposal berm and to minimize erosion of the existing beach. The contractor shall take a minimum of two samples daily from the dredge effluent stream before it enters the Port Gardner Bay waters to assure that at all tides the total suspended solids (TSS) does not exceed 50 milliliters per liter (ml/l). The test shall be conducted with an Imhoff cone, allowing 1-hour settling time under quiescent conditions. Samples shall be adjusted to near ambient and the test conducted in a location where direct sunlight does not interfere with normal settlement of solids. Test results and time of test shall be recorded in the contractor's daily log. Should settlement solids exceed 50 ml/l and a second sample exceed 50 ml/l, the contractor shall immediately notify the U.S. Army Corps of Engineers and take immediate action to improve retention of the dredged material in the disposal area to lower the total suspended solids below 50ml/l. The dilution zone for all other water quality parameters shall extend 150 feet radial from the point where the hydraulic dredge enters Port Gardner receiving waters. Total dissolved oxygen levels shall not be caused to drop below 6.0 mg/l within the dilution zone and shall meet State Class A water quality standards outside of the dilution zone (greater than 6.0 mg/l). The Government will perform all testing other than for total suspended solids.

The material has been determined suitable for open water disposal by the PSDDA suitability determination dated November 14, 1996 and Memorandum for Record dated November 21, 2000.

5.0 SPECIES

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973 (ESA), as amended, the Corps is required to assure that its actions have taken into consideration impacts to federally listed or proposed threatened or endangered species for all federally funded, permitted, or licensed projects. Six species listed as either threatened or endangered species are potentially found in the project action area:

- Bald Eagle (*Haliaeetus leucocephalus*)
- Puget Sound Chinook Salmon (*Oncorhynchus tshawytscha*)
- Bull trout (*Salvelinus confluentus*)
- Marbled Murrelet (*Brachyramphus marmoratus*)
- Coho Salmon (*Oncorhynchus kisutch*)

5.1 BALD EAGLE

Male bald eagles generally measure 3 feet from head to tail, weigh 7 to 10 pounds, and have a wingspan of approximately 6 ½ feet. Females are larger, some reaching 14 pounds and having a wingspan of up to 8 feet. Bald eagles have large pale eyes; yellow beak; and black talons. The distinctive white head and tail feathers appear after the bird is 4 to 5 years old. As juvenile eagles they are completely dark brown. Their life span is believed to be 30 years or longer in the wild, and even longer in captivity (U.S. Fish and Wildlife Service 1995). Nests are built usually in large trees near rivers; lakes, marshes or other associated wetland areas and are usually re-used year after year. These nests are very large, measuring up to six feet across and weighing hundreds of pounds. Bald eagles normally lay two to three eggs once a year and the eggs hatch after about 35 days.

Fish are the primary food source, but bald eagles will also take a variety of birds, mammals, and turtles (both live and as carrion) when fish are not readily available.

Known Occurrences in the Project Vicinity

Eagles are known to use parts of the action area during the winter months by perching while feeding. With no large trees to perch on the eagles utilize driftwood and pilings along Jetty Island to perch while feeding during the winter months. Bald eagles typically arrive at their traditional winter feeding grounds in late October (Anderson et al. 1986).

Effects of the Action

Activities would occur during some of the nesting season. However, the nest are located in excess of two miles from the project location (confirmed with WDFW GIS priority habitat species layers) construction activities would not directly disrupt eagle nesting and rearing of young. No communal night roosts or perch trees would be affected, as none are present near the site.

Foraging bald eagles may be displaced by the noise of heavy equipment, but the availability of prey will not be significantly disrupted by project construction. Eagles would be somewhat accustomed to high levels of human activity in and near the project site. Eagles tend to tolerate more disturbances at feeding sites than in roosting areas (Steenhof 1978).

Determination of Effect

The Corps believes this project **is not likely to adversely affect** the bald eagle. This determination is based on the lack of nests and communal night roosts in the immediate vicinity of the project location. This project would have no effects on bald eagle foraging, nesting, or roosting habitat.

5.2 PUGET SOUND CHINOOK SALMON

Chinook Salmon (Puget Sound) (*Oncorhynchus tshawytscha*). Chinook salmon are similar to Coho Salmon (*Oncorhynchus kisutch*) in appearance while at sea (blue-green back with silver flanks), except for their large size, small black spots on both lobes of the tail, and black pigment along the base of the teeth. Chinook salmon are anadromous and semelparous – meaning they migrate from marine environments into fresh water streams and rivers of their birth (anadromous) spawn and die (semelparous). Juvenile chinook may spend from 3 months to 2 years in freshwater after emergence and before migrating to estuarine areas as smolts.

After emerging, Chinook salmon fry tend to seek shallow, nearshore habitat with low water velocities, and move to progressively deeper, faster water as they grow. Juveniles rear in freshwater for up to several months before migrating to sea. Chinook salmon typically spend 2-4 years maturing in the ocean before returning to their natal streams to spawn.

Some Puget Sound chinook salmon are stream type fish. Stream type fish generally do not migrate to the ocean during their first spring after emergence, but delay migration to the following spring and migrate to the ocean as age 1 or older smolts. In Puget Sound, portions of the stream type fish remain resident in Puget Sound. These resident populations, which are commonly referred to as “blackmouth”, are primarily spring and summer-run fish of mixed origin. Although the largest components are primarily hatchery stocks, there are also native stream type fish that remain resident in the Sound.

Among Chinook salmon, two distinct races have evolved. One is more a stream-type that is commonly found in headwater streams. The ocean-type chinook is commonly found in coastal streams and typically migrates to the ocean within the first three months emergence. Ocean-type chinook return to their natal streams or rivers as spring, winter, fall, summer, and late-fall runs, but the summer and fall runs predominate (Healey 1991).

Stream-type juveniles are much more dependent on freshwater stream ecosystems because of their extended residence in these areas. A stream type life history may be more adapted to areas that are more productive and less susceptible to dramatic changes (Healey 1991).

Known Occurrences in Project Vicinity

Peaks of juvenile chinook salmon in the estuary areas of Puget Sound occur in June for most populations. They apparently disperse to deeper nearby marine areas when they reach approximately 65-75 mm in fork length (Healy 1982; Simenstad et al. 1982). The amount of time spent in the estuary is dependent on size at downstream migration and growth in the estuary. Dispersal from the estuarine areas is relatively rapid. Average length of estuarine residence for chinook salmon in the Nanaimo River estuary was about 20 to 25 days (Healey 1982).

Of the four runs identified in the Snohomish River system, two are rated depressed, one unknown, and one as healthy (50 CFR Parts 223 and 224 1999).

Effects of the Action

Although the area to have the most material removed is the settling basin, the channel just above the basin and the dock area on Jetty Island will have a loss of or reduction in the population of the benthic communities and prey species. Since new communities will be established eventually in the dredging areas, no long term loss of biological productivity is expected. Juvenile salmon will forage mainly in the shallower areas outside of the settling basin and navigational channel and are not expected to be affected. Benthic and epibenthic species will be temporarily displaced, but are expected to recover within one year after dredging is completed.

The pipeline dredging will result in a short-term suspended sediment/turbidity plume at he dredging site that will dissipate according to prevailing currents and tides; however, the sediment that does reach past the dilution zone would be far less than the 6,100mg/l that Newcombe and Flagg found in 1983 that salmon could tolerate.

Turbidity can affect surface foraging of juvenile chinook salmon according to Gregory and Northcote 1992. It can also affect the migratory behavior of chinook salmon in that they may choose not to migrate in turbid conditions (Whitman et al. 1982).

Dissolved oxygen (DO) concentrations tend to decline in the vicinity of dredging operations when the suspension of anoxic sediments creates high chemical oxygen demand. Temporary decreases in DO associated with increased suspended sediments are possible in the immediate dredging plume, levels could drop below 5.0 mg/l (Piper et al. 1982). It is anticipated that fish will avoid the dredging areas. Juvenile salmon will be less able than adults to avoid areas of decreased in DO. Therefore, the dredging will not occur during the juvenile outmigration of salmon because no dredging will occur from February 15th through July 15th of any given year. Dredging is proposed to occur during the September thru February 14th period that will have cooler water temperatures and higher levels of dissolved oxygen.

Determination of Effects

The Corps believes this project **is not likely to adversely affect** the Puget Sound Chinook Salmon. This determination is based on the results of indicators in tables one and two and Section **5.2** for salmon.

5.3 BULL TROUT

Bull trout (*Salvelinus confluentus)* members of the family Salmonidae are known to exhibit four types of life history patterns. The three fresh water forms are adfluvial (migrate between lakes and streams), fluvial (migrate within river systems), and resident (non-migratory). The fourth is anadromous (spawning in fresh water and spend a portion of their life in the ocean).

There is very little reference material on the anadromous form of bull trout, however, larger juvenile and adult bull trout are know to migrate through the marine waters of Puget Sound (Goetz 1989). According to 59 CFR Part 17 Proposed ruling by the U.S. Fish and Wildlife Service, anadromous bull trout are the least studied of the bull trout life history's and some biologist believe the existence of anadromous bull trout my be uncertain (McPhail and Baxter 1996).

It is also possible that bull trout would be going in the other direction after spawning in the streams and might use the project area for a feeding or resting area. Because bull trout exhibit a patchy distribution, even in undisturbed habitats (Rieman and McIntyre 1993), fish would likely not simultaneously occupy all available habitats (Rieman et al. 1997).

Bull trout normally reach maturity in 4 to 7 years and can live as long as 12 years. They typically spawn from August to November during decreasing periods of water temperatures. In other words, the cooler the temperature the higher probably bull trout will spawn. However, migratory bull trout frequently begin spawning migrations as early as April (Fraley and Shepard 1989). Resident adults range from 150 to 300 millimeters (mm) (6 to 12 inches) total length and migratory adults commonly reach 600 mm (24 in.) or more (Pratt 1985; Goetz 1989).

Bull trout are opportunistic feeders with food habits primarily a function of size and life history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macrozooplankton, amphipods, mysids, crayfish and small fish (Wyman 1975; Rieman and Lukens 1979 in Rieman and McIntryre 1993; Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are primarily piscivorous, known to feed on various trout (Salmo spp.) and salmon (Onchorynchus spp.), whitefish (Prosopium spp.), yellow perch (Perca flavescens), and sculpin (Cottus spp.) (Fraley and Shepard 1989; Donald and Alger 1993).

Sixteen sub-populations occur in eight river basins in the Puget Sound analysis area. The location and number are as follows: Nisqually River (1), Puyallup River (3), Green River (1), Lake Washington basin (2), Snohomish River – Skykomish River (1), Stillaguamish River (1), Skagit River (4), and Nooksack River (2).

Within the Puget Sound analysis area, the Service considers the lower Skagit River sub-population "strong" and five sub-populations "depressed." The remaining 10 "native char" sub-populations in the Puget Sound analysis area are considered “unknown” because insufficient abundance, trend, and life history information is available (Service 1998a).

Known Occurrences in the Project Vicinity

Anadromous native char are found in the Snohomish basin, spawning in the upper Skykomish River watershed during the fall, overwintering in the lower Snohomish River, and foraging in nearshore marine areas of Port Susan and Port Gardner during the spring and summer.

Effects of the Action

Potential effects of these projects on bull trout will be mitigated by timing restrictions and studies that will be conducted as indicated in Section **8.0 Conservation Measures.**

Determination of Effect

The Corps has determined that the proposed project is **not likely to adversely affect** bull trout. This determination is based upon the minimization of direct impacts that will result from scheduling work between July 15^{th} and February 15^{th}. There would be no effects to spawning habitat or behaviors. Potential effects of any disruptions to feeding would be discountable.

5.4 MARBLED MURRELET

The average length is 9 ¾ inches, with a black bill, and tail entirely dark. The adult changes plumage during different times of the year. In winter the plumage is dark above and white below. During the breeding season, it becomes mottled to blend in the forest environment. During the nesting season (April-June), these birds head inland to find suitable nesting situations. In the Pacific Northwest, they live near shore, feeding on fish and invertebrates and nesting in stands of mature and old-growth forest that could occur more than 30 miles inland. The female lays only one egg and incubation takes about 4 weeks (Ralph et al 1995). With no old growth forest near the dredging area it is highly unlikely these projects will adversely affect the nesting habitat of the marbled murrelet. However, it is possible the projects may interfere with the feeding habitats of the marbled murrelet, but only at site-specific dredging locations (Carter 1984).

Known Occurrences in the Project Vicinity

Marine observations of murrelets during the nesting season generally correspond to the presence of large blocks of nesting habitat. Studies have found that during the nesting season murrelets are more numerous along Washington’s northern coast and less abundant along the southern coast. This distribution appears to be correlated with proximity to old growth forest, the distribution of rocky shoreline versus sandy shoreline, and the abundance of kelp and prey items (USFWS 1996). Murrelets, therefore, would not be expected to forage regularly in the project vicinity during the nesting season. Since the project will have no impact on forest habitat due to the location and type of project this is would support a no effect determination on critical habitat for the marbled murrelet.

Effects of the Action

Construction activities would have no effect on murrelet nests, nesting habitat, or nesting season foraging behaviors. USFWS guidance suggests that noise above ambient levels be considered to potentially disturb marbled murrelets when it occurs within 0.25 mile of suitable foraging habitat (USFWS 1996).

The effects of human disturbance on murrelets at sea is not well documented, but they apparently habituate to heavy levels of boat traffic (Strachan et al. 1995). In addition, marbled murrelets are relatively opportunistic foragers; they have a flexibility in prey choice which 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 if they are disturbed while foraging, they would likely move without significant injury.

By the end of August marbled murrelet chicks have usually fledged and dispersed from nesting areas (Marks and Bishop 1999). With no oldgrowth forest near the project site, and no nesting sites available, marbled murrelets may be disturbed during feeding events only while near the project site.

Determination of Effect

The proposed project is **not likely to adversely affect** the marbled murrelet since the project will have no effect on nests or nesting habitat. Any disruption to foraging activities and the murrelet prey base are expected to be minor, and would be highly localized relative to this species' foraging range.

5.5 COHO SALMON

Coho salmon adults move into fresh water from late September through October, spawning mostly in smaller tributaries from late October into November. Juveniles typically spend 1 to 2 full years rearing in streams and rivers before migrating to sea.

Because of their larger size when entering saltwater, coho are generally considered less dependent on estuarine rearing that chinook or chum salmon (Simenstad et al. 1982). They tend to move through the estuary rapidly using deeper waters along shorelines. Feeding is on planktonic or small nektonic organisms, including decapod larvae, larval and juvenile fish, and euphausiids (Miller et al. 1976, Simenstad et al. 1982).

Determination of Effect

With no significant ESU established and the findings discussed in Section **6.5** the determination for coho salmon is this dredging project poses no jeopardy to the existence of coho salmon or their habitat.

6.0 CONSERVATION MEASURES

Per the design plans for the dredging basin and Bob Donnelly (personal communication 1999) there will be a sufficient leave area between the edge of the settling basin and the shoreline to allow an escape route for Chinook salmon from predatory fishes.

All dredging will occur after the fish closure window of February 15th through July 15th. Benthic communities in the areas to be dredged have been influenced by previous dredging operations. These communities will be altered once again by this dredging event, but are expected to rapidly return to their present condition. Demersal fish are expected to be temporarily displaced by dredging, but little or no mortalities should occur.

Material from this dredging project will be used to protect and enhance the Jetty Island salt marsh and Salmon habitat. Analysis of effect of that placement on salmon habitat (Pentec 1996) clearly demonstrated the positive result of providing sheltered mudflat habitat. The net increase of habitat quality for juvenile salmon was an increase of approximately 4,000% (Pentec 1996). Increases in the linear distance of shoreline edge at tidal elevations above approximately +7 ft. MLLW will increase the foraging opportunities for smaller salmonids, including ocean-type chinook as they move along the west shoreline of Jetty Island. The expanded and protected lagoon will continue to increase rearing opportunities for forage fish like surf smelt and will provide a larger area for shorebirds to feed in.

A bull trout study will be conducted by methods of catch and release and beach seine as determined by numerous consultations with the USFWS and NMFS. The plan for the bull trout study is enclosed as Appendix A. This study will actually commence in July of 2001. The electronic tag study will begin in January of 2002 and is sponsored by the Port of Everett in conjunction with the Corps.

7.0 Essential Fish habitat

Public Law 104-267, the Sustainable Fisheries Act of 1996, amended the Magnuson-Stevens Act, which regulates fishing in US waters, to establish new requirements for "Essential Fish Habitat" (EFH) descriptions in federal Fishery Management Plans (FMPs) and to require federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that would adversely effect EFH (PSMFC 2000). The Pacific States Fishery Management Council amended the Pacific Groundfish Fishery Management Plan and the Coastal Pelagic Species Management Plan (1998a, 1998b) to designate waters and substrate necessary for spawning, breeding, feeding, and growth of commercially important fish species.

The marine extent of groundfish and coastal pelagic EFH includes those waters from the nearshore and tidal submerged environments within Washington, Oregon, and California state territorial waters out to the exclusive economic zone (370.4 km) offshore between the Canadian border to the north and the Mexican border to the south.

There are seven composite EFH's: estuarine, rocky shelf, non-rocky shelf, canyon, continental shelf/basin, neritic and oceanic habitats. USACE maintenance dredging occurs exclusively over sandy to gravel bottoms within the Snohomish Navigation Channel and therefore potential impacts would fall under the estuarine composite EFH.

The primary effects of dredging and disposal on benthic organisms include removal or disturbance of habitat, smothering of organisms at the disposal site, and turbidity that may interfere with feeding and respiration of benthic invertebrates. Dredging will temporarily reduce the populations of the benthic community and prey species at the project site. Although research indicates the loss of a potential food source could result in a loss of salmonid and/or groundfish presence, there were no studies accomplished to support this theory. Since new communities will eventually be established in the dredging areas, no long-term loss of biological productivity is expected. Benthic and epibenthic prey species will be temporarily displaced, but are expected to recover shortly (within one year) after dredging activities are completed. However, these species tend to recolonize quickly once the disturbance ends. Given the history of the sediment load within this estuary, rapid re-colonization, and adherence to fish windows (February 15-July 15), the determination on the benthic community is likely to adversely affect EFH for salmonids, groundfish and other finfish.

With the majority of the dredging occurring in the settling basin the Corps believes the impact although adverse is smaller in scale than dredging the entire navigation channel. By concentrating in the settling basins for dredging, this leaves the remained of the navigation channel virtually untouched by dredging with the exception of the area that has shoaled in since the last cycle of dredging. That area again has probably acquired a less mature benthic community due to the amount of bed load that has shoaled in to that area (26,000 c.y.). By placing this material on Jetty Island to protect the created mud flat and intertidal area the Corps believes this will help to reduce the impact of pipe line dredging the shoaled in area just above the lower settling basin.

- Disposal operations and material effects would be in conformance with approved disposal site management standards.
- Dredging would be carried out in compliance with permits issued by the responsible regulatory agencies. These permits may include additional conditions to protect water quality.

- Material will be placed on Jetty Island to enhance Salmon habitat.

8.0 CUMULATIVE EFFECTS

No other known activities are expected to occur except future federal actions that will require Section 7 consultation. With the exception of the Riverside site that will have the potential for future development.

9.0 CONCLUSION

In summary, the proposed project may effect but is not likely to adversely effect Puget Sound Chinook, bald eagles, marbled murrelet, or bull trout. Coho, although only a candidate species at this time, if they were to become a proposed or listed species the proposed project would have no jeopardy at this time and a may effect not likely to adversely effect if upgraded. All impacts will be minimal and short lived. The beneficial use of the dredged material will actually prolong and protect the life of the habitat that was created by the original berm on Jetty Island which has demonstrated to provide exceptionally high-quality habitat for juvenile salmonids, forage fish, shorebirds, bald eagles, and a variety of invertebrates.

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Table #1. Salmonid Stocks in the Snohomish River Basin (WDFW and WWRIR 1994, Nelson 1995).

Species/Stock	Origin	Production Type	Spawning Times
Chinook Salmon			
Snohomish, summer	Native	Wild	September
Wallace River, summer/fall	Mixed	Composite	September and October
Snohomish, fall	Native	Wild	Late September through October
Bridal Veil Creek, fall	Native	Wild	Late September through October
Coho Salmon			
Snohomish	Mixed	Wild	Late Oct. thru Jan.
Skykomish	Mixed	Composite	Late Oct. thru Jan.
S. Fork Skykomish	Non-native	Wild	Late Oct. thru Jan.
Snoqualmie	Mixed	Wild	Late Oct. thru Jan.

Table #2. Status and escapment data for salmon stocks in the Snohomish River Basin[1]

Species/Stock	Status	Goal	Years	Range	Average
Chinook Salmon					
All stocks in basin		5,250	1956-1995	1,380-18,120	7,165
Snohomish, sum.	Depressed		1979-1992	361-2,258	988
Wallace River, summer/fall	Healthy		1979-1991	200-2,850	1,000
Snohomish, fall	Depressed		1979-1991	908-2,635	1,700
Bridal Veil Creek, fall	Unknown		No data	No data	No data
Coho Salmon					
All stocks in basin		70,000	1956-1995	11,300-157,000	57,341
Snohomish	Depressed		1983-1992	636-15,174	4,407
Skykomish	Healthy		1981-1992	833-19,439	9,177
S. Fork Skykomish	Healthy		1967-1991	5,000-30,000	16,265
Snoqualmie	Healthy		1977-1992	10,183-56,920	28,817

[1] Sources: WDFW and Wwtit 1994 (Data prior to 1992).