Biological Evaluation

South Jetty Breach Fill Maintenance

Westport, Grays Harbor County, Washington
November 2004

US Army Corps
of Engineers®
Seattle District

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1. INTRODUCTION

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, this document examines the impacts of the placement of approximately 20,000 cubic yards of sand along a rapidly eroding beach located in Half Moon Bay adjacent to the Grays Harbor South Jetty and the potential placement of up to an additional 20,000 cubic yards should the existing breach fill area overtop from wave action from the west. The existing erosion currently poses a threat to the south jetty breach fill placed in 1994 and re-nourished in 2002 and 2004. The proposed placement and potential subsequent placement (see Section 2) are interim measures that will be taken only if conditions require doing so, and are intended to stabilize the Half Moon Bay shoreline until a long-term management strategy (LTMS) [1] can be formulated and implemented. The proposed interim work would likely occur between November 2004 and February 2005, and will extend no later than February 14, 2005.

1.1 Action Area

The project area is located along the shoreline of Half Moon Bay in southwestern Grays Harbor, adjacent to Westhaven State Park in Westport, Grays Harbor County, Washington (T16N, R12W, Section 1). The location of the proposed work is shown on the map in Figure 1.

The action area for this proposal includes the shoreline and waters of Half Moon Bay, as well adjacent dune areas to the west and south. The upland portion of the action area is entirely within Westhaven State Park, and is included in the action area because of the potential for noise associated with dump trucks and grading equipment to carry over into adjacent uplands.

1.2 Background

The Grays Harbor navigation project is located at the mouth of the Chehalis River on the Washington coast, about 45 miles north of the Columbia River and 110 miles south of the entrance to the Strait of Juan de Fuca. The harbor is 15 miles long and 11 miles wide and enclosed by two long spits, Point Brown to the north and Point Chehalis to the south. The Grays Harbor authorized project consists of a deep-draft channel with a width ranging from 350 to 1000 feet and a depth of 32 to 38 feet and two jetties. The two jetties are 17,200 feet and 13,734 feet long (north and south, respectively) and are made of large armor rock. The jetties extend seaward from Point Brown (north) and Point Chehalis (south), constricting the harbor entrance width to about 6,500 feet. The Corps performs two major maintenance dredging and disposal efforts annually on the outer and inner channel reaches at Grays Harbor (approximately 1.7 million cubic yards of channel dredging at an approximate cost of $9 million annually). The dredged material disposal activities are managed for placement at several (6-8) resource agency approved dredged material disposal sites selected to benefit the stability of the navigation project and other authorized projects in the area.

An additional navigation feature at Grays Harbor is the Corps' Westhaven Cove (Westport) Marina, which is also sponsored by the Port of Grays Harbor. The marina provides 60 acres of protected moorage for a significant fishing fleet and the US Coast Guard Westport Station. The Corps' Westport Marina at Point Chehalis is protected with a Corps' groin and revetment system including six groins and approximately 7,000 feet of exposed and buried revetment (see Figure

[1] The LTMS is expected to be completed and implemented in 2006.

1). This project and other facilities may be impacted by actions associated with the navigation project.

The shoreline to the west and south of Point Chehalis has undergone major changes since the north and south jetties were constructed between 1898 and 1917 by the Corps of Engineers, Seattle District (Corps) to provide a navigation channel through the Grays Harbor coastal inlet. The South Jetty is a barrier to northerly long shore drift, and by 1904 South Beach had advanced 3,000-feet to the west. During much of the 20th century, the shoreline advanced or retreated depending on the condition of the jetty structure. However, since the 1960's a long-term trend of erosion along the South Beach shoreline has been apparent. Since 1967, South Beach has seen recession rates ranging from 2 to 62 feet per year.

In December 1993, a breach formed during a storm when the South Beach shoreline outflanked the east end of the South Jetty. In late 1994, at the direction of the Department of the Army, the breach was filled with approximately 600,000 cu yd of material dredged from the Federal navigation channel at a cost of $4 million. The breach was filled to alleviate local concerns and to reduce the risk of damage to the South Jetty. Seattle District was also directed to conduct a comprehensive study to document and evaluate on-going erosion problems in the vicinity of the Grays Harbor navigation improvement project and to identify the most appropriate long-term solution for protecting both Federal project features and local improvements. This study, completed in June 1997, concluded that extending the existing South Jetty eastward to meet a southward extension of the Point Chehalis Revetment, combined with placement of maintenance dredged material within and directly on the shoreline of Half Moon Bay, was the most effective, efficient, and acceptable long-term solution to the erosion problems in the vicinity of the South Jetty.

Construction of the southward extension of the Point Chehalis revetment began in the fall of 1998. The eastward extension of the South Jetty was scheduled to begin in the summer of 1999 but the State of Washington and Federal resource agencies, City of Westport, and other public interests had serious concerns related to environmental and recreational impacts associated with an eastward extension of the south jetty. In addition, surveys indicated that the breach fill material was eroding more slowly than originally anticipated. Therefore, the jetty extension project was deferred and a modified plan to extend the life of the breach fill was developed. The new plan consisted of three elements: (1) construction of a wave diffraction mound intended to maximize wave refraction-diffraction, thereby reducing wave-induced erosion of the shore in the western portion of Half Moon Bay adjacent to the jetty; (2) a gravel/cobble transition beach designed to slow erosion of the beach directly adjacent to the south side of the jetty, and to eliminate the dangerous 8-foot high scarp that had formed in that location; and (3) major repair work on the inner (landward) end of the jetty structure to improve the ability of the jetty to withstand the undermining effects of any future breaches and to help reduce wave-caused erosion of the unprotected portion of Half Moon Bay. As mitigation for this work, the Corps removed armor stone from a 250-foot long remnant of the south jetty east of the diffraction mound. The crest elevation was lowered from +8 feet MLLW to +2 feet MLLW.

In November of 2002, erosion of the fill on both the ocean and Half Moon Bay shorelines resulted in overtopping of the fill and raised concerns about a possible reforming of the breach. Immediate measures were undertaken to re-handle 135,000 cubic yards of dredged material and place it on the breach fill and 24,000 tons of additional gravel and cobble on the Half Moon Bay transition beach. An additional 27,000 cubic yards of sand was placed in the southwest corner of Half Moon Bay in February 2004 as an interim measure intended to stabilize the Half Moon Bay shoreline and reduce the risk of another breach occurring until a long-term management strategy could be formulated and implemented.

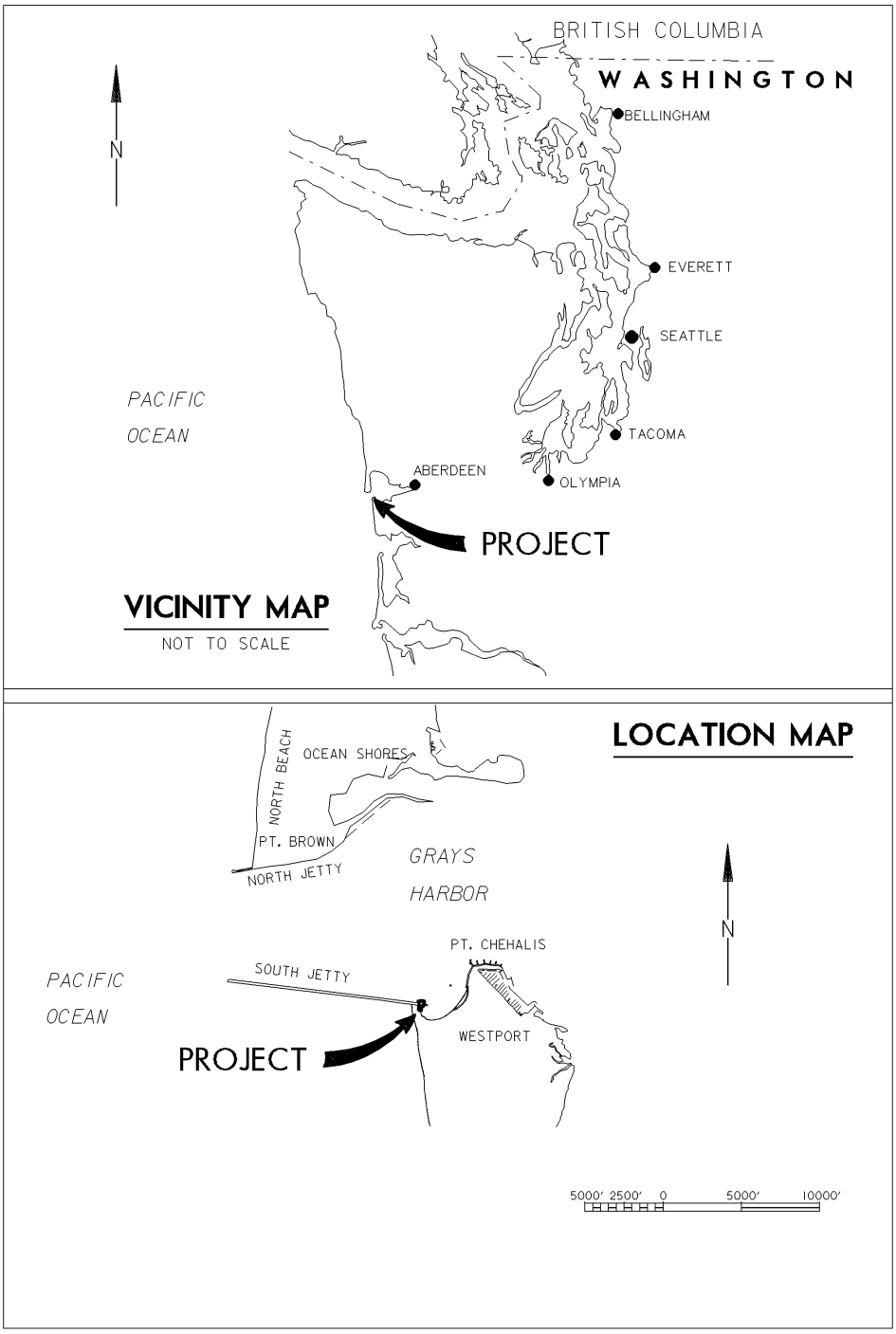

Figure 1. Location and vicinity map.

1.3 Project Purpose and Need

The purpose of the proposed work is to preserve the status quo, by protecting against an undue risk of the recurrence of a breach in the vicinity of the South Jetty. If conditions indicate that an undue risk of a breach is developing, one or both of two sand placement actions (see Figure 2) would be implemented to nourish the area(s) adjacent to the south jetty. This is needed to protect the south jetty and navigation channel from damage, which could be caused in the event of another breach. Preventative maintenance of the breach fill is a much more cost-effective strategy to maintain the status quo than after-the-fact emergency repairs, and requires a relatively small quantity of material to restore the height and width of the fill area. Proactive action could prevent more costly and voluminous replacement if a breach were allowed to develop.

2. DESCRIPTION OF THE PROPOSED ACTION

The Corps plans to protect against an undue risk of the recurrence of a breach through the placement of clean sand derived from the existing Half Moon Bay direct beach nourishment dredged material disposal site, an upland stockpile maintained in the vicinity of the Point Chehalis revetment extension constructed in 1999. The sand is intended to slow shoreline erosion by serving as an upland supply of material to nourish the beach as existing banks erode.

This interim action sand placement will be undertaken only when, and only to the extent that, it is necessary. Two trigger thresholds have been developed to guide the decision of whether or not to implement an appropriate responsive action. These thresholds are independent of each other and hence one or both could occur this fall/winter. If neither of the triggering thresholds is met, the no action alternative would be selected and the Corps would not take an interim action to prevent further loss of breach fill material at this time. If they are required at all, actions to protect against a breach may prove necessary more than once pending completion of the LTMS. The action-triggering thresholds and corresponding responses are as follows:

Threshold No.1: It is determined through evaluation of pertinent survey data that 15,000 cubic yards of sand has eroded from the southwest corner of the Half Moon Bay beach since the February 2004 sand placement event.

Responsive Action No.1: Placement of 20,000 cubic yards of clean sand along approximately 1,000 linear feet of beach in the southwest corner of Half Moon Bay as illustrated in Figure 2. Sand would be excavated from the existing buried revetment mitigation stockpile near the eastern end of Half Moon Bay and truck hauled on the existing state park access road. Minor grading would occur for pioneering an access route on the sand and for truck safety dozing sand over the bank top. No road building materials (i.e., rock) will be used in transporting the sand. The excavated material would be placed shoreward of the +9 foot MLLW contour line (the mean higher high water contour) at its natural angle of repose to minimize impacts on intertidal ecology. Currents and wave action are expected to regrade and disperse this sand eastward along the beach and offshore. Sand grain size would be consistent with existing beach sand grain size. Care would be taken to minimize impacts on dune grass.

Threshold No. 2: The breach fill footprint south of the South Jetty is overtopped by water from the west, resulting from a storm event(s).

Responsive Action No. 2: Placement of up to 20,000 cubic yards of clean sand on top of the breach fill area, above elevation +9 feet MLLW (mean higher high water) at a location within the fill footprint as illustrated in Figure 2. The precise location and quantity of placed sand would be selected based on an analysis of the most effective means of responding to the observed overtopping conditions and the most efficacious means of addressing the risk of further overtopping and head-cutting. The sand would be excavated and mechanically transferred from the existing buried revetment mitigation stockpile to the placement area, utilizing either track vehicles that require no improved road or with trucks, by constructing a temporary access route using removable steel plates.

These responsive actions are proposed as the most effective actions to address breach risk conditions actually presented in the winter of 2004-05. Any subsequent contingent interim actions triggered during the LTMS study period may vary from the 2004-05 action. If there is appreciable variation from the 2004-05 action plan in subsequent contingent interim action episodes, this Biological Evaluation will be further supplemented with more specifically tailored analysis of responsive action plans and their expected environmental effects.

In October 2004, the Corps determined that at least 15,000 cubic yards of sand has eroded from the southwest corner of the Half Moon Bay beach since the most recent sand placement event, therefore activating *Trigger No. 1*. In order to address this erosion, the Corps plans to construct the project detailed above in *Responsive Action No. 1*. Overtopping described in Trigger No 2. has not yet occurred at the time this document was drafted.

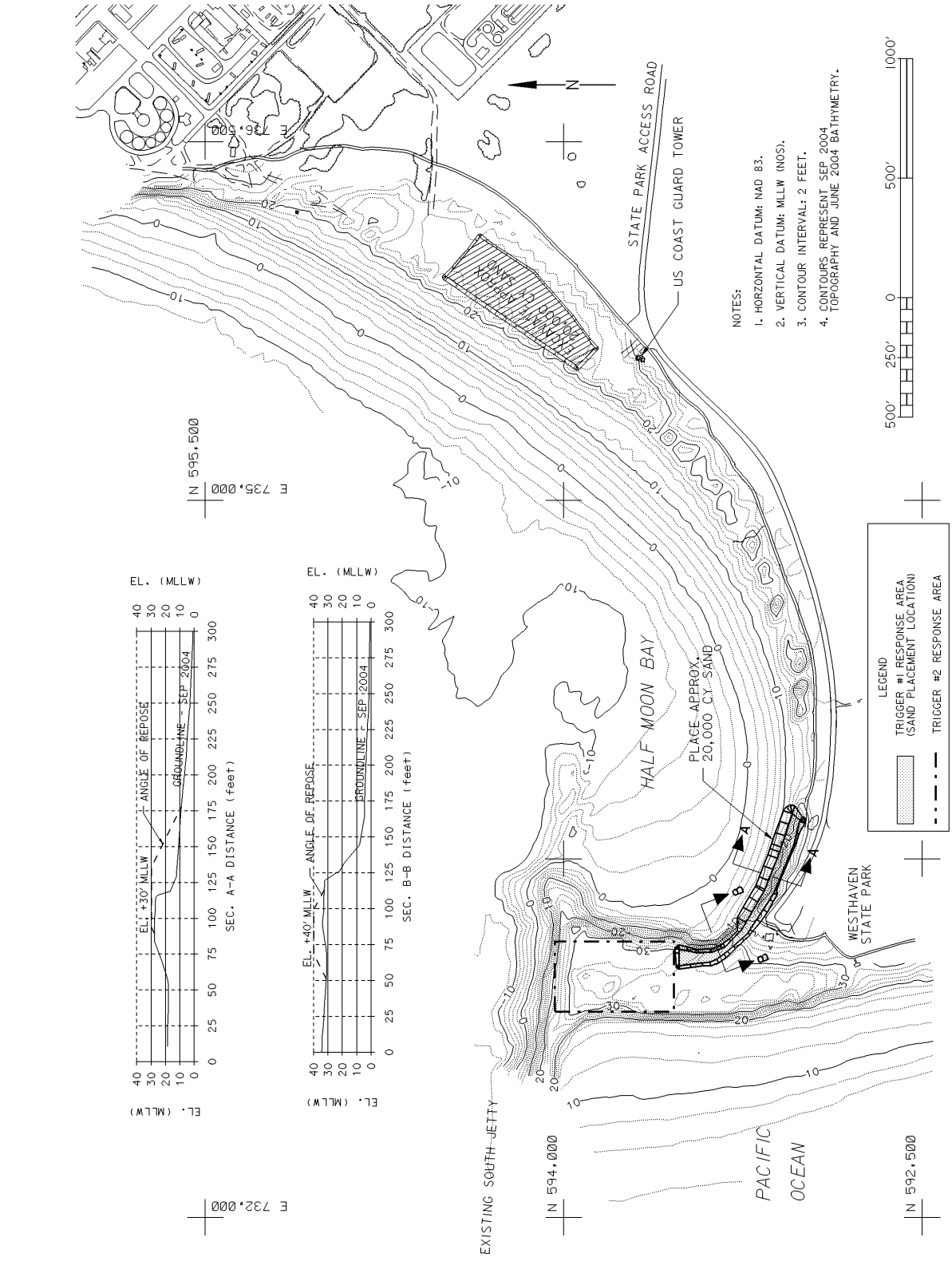

Figure 2. Proposed project.

3. INTERRELATED AND INTERDEPENDENT ACTIONS

There are no interrelated or interdependent actions associated with the proposed action. However, the proposed action is a short-term, interim action intended to reduce erosion in one problem area. The larger question regarding what should be done to prevent another breach from occurring over the long-term remains unanswered. Many potential solutions/strategies have been raised, but they would require engineering feasibility analyses and extensive coordination with a variety of affected parties and are therefore not immediately able to be implemented. This project has been proposed because there is a need for short-term action to minimize damage to the breach fill prior to implementation of a long-term management strategy. It is expected that a long-term solution could not be implemented before 2006, at the earliest. Another Section 7 consultation would be initiated before a long-term management strategy is implemented. In the meantime, the Corps may continue to place sandy material dredged from the Grays Harbor navigation channel at nearshore and direct beach disposal sites in Half Moon Bay and off of South Beach to replace some of the material lost through erosion. These dredging and disposal actions have been addressed in separate Section 7 consultations (NMFS: WSB-00-559 and USFWS: 1-3-03-I-0771).

4. CUMULATIVE EFFECTS

The cumulative effects of Half Moon Bay and vicinity maintenance activities up to February 2004 are discussed in Section 7 and Appendix B of the February 2004 *South Jetty Breach Fill Maintenance Final EA*. Interim actions that would be implemented in response to trigger thresholds being met would merely maintain the status quo through the placement of sand in the vicinity of Half Moon Bay and South Beach, in order to protect against an undue risk of development of conditions that could eventually lead to a breach of the South Jetty area. Especially with responsive action No. 1 (placement of sand along the west/southwest shoreline of the bay) this material would eventually be replacing sand lost to erosive forces. Contingent interim action, if implemented, preserving the status quo, would not produce any incremental or cumulative environmental effects on biological resources of the South Jetty, Half Moon Bay, and environs.

4.1 Non-Federal Actions Reasonably Certain to Occur

Currently, the Corps is reviewing a permit application for a destination/golf course resort located in the dunal wetlands adjacent to project area. The Corps has determined that the construction of a destination/ golf course resort as proposed may adversely affect the ESA-listed western snowy plover by directly impacting foraging habitat and by adversely impacting foraging behavior due to increased human use of the surrounding environment. Mitigation for the project may provide potential foraging habitat for the western snowy plover. The destination/golf course is not anticipated to adversely affect any other ESA-listed species. The Corps office that is evaluating and processing this permit application is independent of the office that is reviewing and considering for implementation the contingent interim action that is the subject of this biological evaluation.

5. CONSERVATION MEASURES

The contractor would be instructed to avoid impacting native dune grass (*Elymus mollis*) planted in November, 2002 to the maximum extent possible. Construction techniques that are being considered in this effort include the use of unvegetated access ways, use of vehicles with large tires that require no improved road, or construction of a temporary access route using removable steel plates.

If any native dune grass plants were severely damaged by construction, the Corps would replant affected breach fill areas with appropriate numbers of sprigs to compensate for plants lost. Up to 20,000 sprigs would be planted during the spring of 2005. Dune grasses that would be unavoidably present in the construction footprint would be harvested and used potentially as donor plants.

This effort will concentrate on areas that were disturbed as part of construction activities, and areas not densely planted as part of the 2002 revegetation effort. The dune grass will reduce wind erosion of the breach fill.

6. ENVIRONMENTAL BASELINE AND EFFECTS OF THE PROPOSED ACTION

6.1 Habitat Conditions

6.1.1. Geology

The beach along Half Moon Bay is generally sandy, but in areas where transition fill material has been placed in the past the beach is composed of cobbles. Wave energy has sorted the transition material so that larger cobbles are generally present in upper intertidal areas and smaller gravels are found along the lower portion of the beach profile. In addition, adjacent sandy areas do have patches of gravels present due to down drift transport of the transition material from previous placement activities by waves and currents.

The proposed action is expected to slow erosion in the southwest portion of the bay. Approximately 2.3 acres[2] of upland bluff (above +9.0 MLLW) will be directly impacted by the placement of sand. Waves and currents will likely redistribute sand to the east, further extending the footprint affected by the placement action.

6.1.2. Water and Sediment Quality

Waters in the project vicinity are rated as class AA (extraordinary) by the Washington Department of Ecology. Sediments in the action area are clean, ocean-derived sands.

[2] Responsive Action No. 1 will directly impact 2.3 acres of upland bluff (above +9 MLLW). If Responsive Action No. 2 is triggered, an additional amount of upland bluff will also be directly impacted, within the area illustrated in Figure 2.

Baseline water quality conditions will not be degraded as a result of the proposed project. Turbidity is not expected to increase substantially above ambient conditions, as no sand will be placed below +9 foot (MLLW) depth contour.

6.1.3. Vegetation

The majority of the project footprint is unvegetated. Along the steep bank directly upland from the project footprint, erosion is actively eating away at the dune adjacent to the access road. Existing vegetation is comprised of the invasive non-native European beach grass (*Ammophila arenaria*) as well as plantings of the native dune grass (the dune wild rye, *Elymus mollis*) planted by the Corps in 2002. Other non-native invasive plants such as Scot's broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus discolor*) are present to the east along the backside of this dune and a haul road used during previous construction projects.

A large deflation plain wetland is present on the south side of the State Park access road. Vegetation in the wetland is dominated by shore pine (*Pinus contorta*), Hooker's willow (*Salix hookerana*), California wax myrtle (*Myrica californica*), slough sedge (*Carex obnupta*), common rush (*Juncus effusus*), and silverweed (*Potentilla anserina*). Typical of this type of dunal feature, small upland hummock areas are scattered through the wetland complex.

Given the high wave energy and sandy substrate in Half Moon Bay, no eelgrass and little macroalgae is present.

6.1.4. Fish Species

Half Moon Bay provides habitat for a variety of fish species. The Corps contracted R2 Resources, Inc. to conduct beach seine surveys in the spring of 1999 and the summer of 2004. During both years of sampling, seining occurred in two locations in Half Moon Bay (Figure 3). Seining catches included large numbers of surf smelt, northern anchovy, juvenile American shad, and various surfperch species. Salmonid catches included chinook, coho, chum, cutthroat trout, and steelhead salmon. Both Dungeness and Pacific red rock crabs were also present during seine surveys. A preliminary list of all species caught during the 2004 sampling events can be found in Table 1.

Figure 3. 1999 and 2004 beach seining survey sites.

Fish and crabs are not likely to be directly impacted by either Responsive Action because sand placement would occur above the mean higher high water line (9.0 feet, MLLW) with occasional erosive sloughing onto the higher intertidal beach areas largely during storm events. In addition, the placement would occur, if at all, during a time of the year when particularly sensitive life history stages (e.g., out-migrating juvenile salmon, settling larval crabs) are not present in any numbers in the project vicinity (USACE, 2002). Turbidity would not be expected to increase substantially above ambient conditions due to the predominantly sandy nature of the dredged material and the large quantity of suspended sand currently transported via longshore drift in the project area.

A documented surf smelt spawning area is located along the Pacific Ocean southwest of the project and herring spawning occurs in the Elk River estuary and South Bay to the southeast, but no forage fish spawning is known to occur in Half Moon Bay. Given the high wave energies and steep bathymetry of Half Moon Bay, only sparse marine vegetation is present, including patches of *Fucus* and *Ulva* sp. and bull kelp (*Nereocystis* sp.) in the protected northwest corner of the bay, that could serve as suitable herring spawning substrate.

Preferred substrate for surf smelt spawning is coarse sand and pea gravel. Substrate on the Half Moon Bay shoreline is either of a small grain size, or much larger grain size in the case of previously placed transition gravel/cobble, so it is probably not suitable for surf smelt spawning.

Washington Department of Fish and Wildlife (WDFW) has surveyed the Half Moon Bay shoreline for evidence of sand lance spawning, but has not found any eggs (Burkle, 2003). Telephone conversations with Dan Penttila, WDFW, suggest that suitable sand lance spawning substrate may currently exist along the shorelines of Half Moon Bay, however wave energy may

be too high to support successful sand lance reproduction (Penttila, 2004). The Corps is planning to partner with the WDFW to conduct forage fish egg sampling from December 2004 to April 2005 in Half Moon Bay following standard protocol established by WDFW. This survey will document the presence or absence of Pacific sand lance and surf smelt spawning in the Half Moon Bay area during the fall/winter timeframe. A final report prepared by WDFW documenting the results of the forage fish egg survey is expected in May, 2005.

Table 1. PRELIMINARY DATA: Total number of fish captured during 2004 beach seine sampling events in Half Moon Bay, Grays Harbor, WA.

	21-Jun-04		29-Jun-04		8-Jul-04		15-Jul-04		22-Jul-04		29-Jul-04		4-Aug-04		11-Aug-04		17-Aug-04		24-Aug-04		
	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	East	West	Total
American shad	0	0	0	4	64	1	17,083	0	0	191	0	0	0	8	0	0	0	0	0	0	**17,351**
Bay pipefish	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	**4**
Cabezon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	**4**
Chinook salmon	73	49	83	470	23	102	419	107	154	128	31	49	14	1	11	15	14	4	5	0	**1,752**
Cutthroat trout	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Dungeness crab	10	211	3	208	0	518	1	20	11	59	5	82	4	22	0	0	4	89	0	0	**1,247**
Greenling spp.	1	10	0	1	0	0	0	0	0	2	0	0	0	19	0	1	0	13	0	3	**50**
Gunnel / Prickleback spp.	0	2	0	2	1	9	0	1	0	95	0	1	0	2	0	0	0	1	0	1	**115**
Lingcod	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	**2**
Northern anchovy	0	0	0	4	480	16	24,201	1	0	190	1	4	0	5	0	1	5	0	0	0	**24,908**
Pacific herring	0	1	1	4	0	1	0	0	0	3	0	0	1	0	0	0	1	0	0	0	**12**
Pacific sandfish	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**
Pacific tomcod	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Perch spp.	422	77	808	640	305	525	364	869	815	488	214	567	454	401	304	144	82	142	83	173	**7,877**
Rainbow trout	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Red rock crab	2	1	0	1	0	2	0	0	0	9	0	0	0	0	0	0	0	6	0	0	**21**
Rockfish spp.	0	24	3	12	0	0	0	0	0	70	0	0	0	34	0	18	1	426	0	11	**599**
Pacific sand lance	0	0	0	17	0	0	69	12	5	0	0	0	0	0	0	0	65	0	0	316	**484**
Sculpin spp.	12	56	1	50	4	131	4	15	8	36	6	30	6	30	10	13	25	41	3	36	**517**
Surf smelt	52	463	374	1,154	1,000	176	4,815	1,712	506	604	20	43	202	94	340	1,165	410	133	6	29	**13,298**
Sole spp.	13	101	0	13	0	34	0	1	8	40	1	2	5	10	1	1	6	7	0	1	**244**
Starry flounder	1	6	2	4	0	2	0	0	0	0	0	1	2	4	0	0	1	0	0	0	**23**
Threespine stickleback	2	2	1	6	1	0	0	0	7	0	2	1	3	2	3	0	9	3	0	1	**43**
Total	*588*	*1,003*	*1,276*	*2,592*	*1,878*	*1,518*	*46,956*	*2,739*	*1,514*	*1,915*	*280*	*781*	*691*	*632*	*670*	*1,358*	*623*	*870*	*98*	*573*	***68,555***

6.1.5. Benthos

Because of the need to analyze benthic invertebrate communities in Half Moon Bay and South Beach in 2004, Seattle District contracted with Science Applications International Corporation (SAIC) to collect and evaluate samples from intertidal and subtidal areas in January and June, 2004. One objective of the January sampling was to obtain a good picture of winter population density and community composition that had established in spite of high dynamic conditions of erosion/deposition in the bay and previous sand placement activities that occurred in late winter, 2002. A second objective was to obtain baseline information that could be used to evaluate changes in population density and community composition following sand placement in February 2004 (Army Corps of Engineers, 2004b).

Summer sampling was also conducted in late June, 2004. Sampling methodology for collection, preservation, identification, and enumeration of invertebrates was identical to that followed in January. Additionally, concurrently with benthic sampling, several fish species, including juvenile Chinook salmon, were collected by beach seine for stomach analyses. The objective of this work was to compare numbers and types of food organisms found in the fish stomachs with organism abundance and composition of benthic communities surveyed in Half Moon Bay in June. In theory, this could help determine the bay's relative importance as a feeding area during a time when juvenile Chinook salmon were migrating through the area. Other fish species collected for the stomach content analyses were: surf smelt, shiner perch, speckled sanddab, sand lance, English sole, American shad, and sand sole.

The dominant benthic invertebrates found in Half Moon Bay surveys were ribbon worms (*Nemertea* indet.), followed by other marine worms (polychaetes and other annelids). These generally live within the sediment and are generally more suited as a food sources for shorebirds and bottom fish, rather than for salmonids. Juvenile salmonids are known to feed on crustaceans such as harpacticoids, or Corophium sp., that are generally found living at the sediment-water interface. Crustaceans were the next most abundant organisms in Half Moon Bay, but at much lower numbers in comparison to the ribbon worms and polychaetes.

Overall, the SAIC report opined that January benthic invertebrate production was relatively low, which would be expected during the winter months in an area subject to constant storm activity.

Juvenile Chinook salmon stomach data indicated that generally they were feeding on organisms in the water column (pelagic) and not benthic organisms. This is consistent with previous sampling efforts in Grays Harbor and elsewhere, which indicate that 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 (Buechner et al. 1981, Simenstad et al. 1982).

Based on benthic survey data, limited numbers of benthic and epibenthic prey resources (including harpacticoid copepods and *Eohaustorius* spp.) for juvenile salmon were present and

available to salmon, but were not fed upon given the size class of salmon present. By far the dominant organism in juvenile Chinook stomach samples was the adult *Jassa* spp., although adult dipterans, crab zoea, and Cirripedia (barnacle) parts were also were also found. *Jassa* is a tube-building amphipod, and known fouling organism, that inhabits flotsam (e.g. kelp and driftwood), pilings, and boat hulls. As they were not found in any of the Half Moon Bay benthic samples, it is probable that they were consumed by juvenile salmon during their outmigration along the docks, pilings, hulls, and riprap at Westport, and possibly in the riprap habitat at the far west end of Half Moon Bay. The second most abundant organisms in the salmon stomachs were adult dipterans, which are extremely rare in benthic data so were considered a water column food source. The third most abundant organisms were brachyuran (crab) zoea. These are vertical migrators and were likely consumed in the water column. The vegetative seeds found in abundance in one salmon stomach were likely floaters and consumed at the water surface.

English sole stomach sample data indicated these flatfish were feeding predominately on juvenile polychaetes (Family Spionidae and Opheliidae). Polychaetes from these families were found in the June benthic surveys in limited numbers, primarily at mid to lower intertidal elevations. This suggests that English sole were feeding on polychaetes derived from these elevations in Half Moon Bay.

Stomach content analyses of surf smelt, sand lance and American shad indicated that these fishes were feeding in the water column, predominately on adult calanoid copepods, but also on crab zoea, barnacle nauplii, and pelagic fish eggs.

6.1.6. Shorebirds

In general, Grays Harbor is a major shorebird staging area, and a critical part of the Pacific Coast shorebird migration in the spring. Herman and Bulger (1981) identified the types of habitats in Grays Harbor that are of primary importance to shorebirds and the extent to which different substrates are used by various species. Small sandpipers, dowitchers, and knots forage on mudflats with a high silt content, while plovers generally prefer sandier substrates. Turnstones usually forage among cobble and rock, a substrate type that occurs only locally in Grays Harbor.

As little has been documented about shorebird usage at Half Moon Bay, in September, 2004 the Corps contracted with an independent consultant to: (1) conduct a literature search/review for shorebird usage of Grays Harbor (2) review relevant studies that identify impacts to shorebirds based on habitat modifications, and (3) prepare a detailed study design that will provide a framework for the Corps to conduct detailed shorebird surveys of Half Moon Bay from November, 2004 through the early Summer, 2005.

Corps wildlife biologists conducted cursory shorebird surveys during October 2004, documenting species composition, habitat usage, and behaviors. During these surveys, no shorebirds were observed using the project area. Birds that were observed using the area were a variety of gulls, brown pelicans, cormorants, common loons, and crows. Numerous beachcombers, surfers, and people with dogs roamed often and freely around the project site. This intense human usage of the project area is likely limiting shorebird use of the site. After the spring migration of 2005 observations, a final contractor report will be prepared for the Corps

and should be available to the public in early summer, 2005. The report is expected to provide additional information on which to predict impacts on project area bird populations resulting from any future interim breach fill actions.

7. EVALUATION OF PROJECT EFFECTS ON LISTED SPECIES

A list of species protected under the Endangered Species Act that potentially occur in the project vicinity was obtained from USFWS in June 2003 (FWS REF: 1-3-03-SP-1489). Phone conversations with USFWS in September 2004 confirmed that the same species list is still relevant for additional projects in Half Moon Bay. The direct and indirect effects of the proposed project on each of these species are evaluated below.

7.1 Bull Trout

Bull trout (*Salvelinus confluentus*) do not appear to spawn in the Chehalis River basin, and probably originate from spawning populations of native char in the Quinault or Queets rivers, both located more than 60 miles north of the lower Chehalis River/Grays Harbor (Jeanes et al. 2003).

Bull trout movement in response to developmental and seasonal habitat requirements make their movements difficult to predict both temporally and spatially. Based on research in the Skagit Basin (Kraemer 1994), sub-adult bull trout migrate downstream to the estuary in the spring (April-June), and then spend the summer in marine habitats. During the late summer and early fall, these fish move back to the lower 35 to 40 kilometers of the Skagit and its tributaries. Adult fish leave tidal areas in late May, June, and early July to begin their spawning migrations. After spending the winter in the river the fish return to marine habitats, some as early as late February. The distribution of char in the marine waters is hypothesized as correlated to the nearshore distribution of baitfish (Kraemer 1994).

Previous to a 2001-2004 study conducted by R2 Resource Consultants (Jeanes et al. 2003), little information was available concerning the status of bull trout in the Chehalis River/Grays Harbor system. Most historical data is from juvenile salmonid survival studies that incidentally captured native char in beach seine surveys, or anecdotal accounts from sport fishermen. Fifteen historical native char captures were documented within the Chehalis River basin from 1966 through 2000 (Table 1) (Jeanes, 2004). R2 captured fifteen native char during their 2001-2004 survey periods (Table 2). Please see Figure 3 for the locations of these captures.

The results of the R2 study are consistent with historical native char captures and indicate that native char are present in the lower Chehalis River beginning in early March and continuing through mid-July. A substantial body of evidence indicates that bull trout are least likely to be present in the lower Chehalis River/Grays Harbor from mid-July through the end of February, substantiating the USFWS bull trout closure period for marine waters from March 1 to July 15.

Beach Seine surveys in 1999 and 2004 have documented a presence of adult bull trout forage species in Half Moon Bay including surf smelt, sandlance, Pacific Herring, anchovy, and

juvenile salmonids. However, no native char were captured in either of seining efforts in Half Moon Bay.

The Corps contracted with R2 Resource Consultants to place acoustic tags on bull trout captured during their Chehalis sampling efforts in 2003/2004. Eight fish have been captured and tagged. Placing a hydrophone in Half Moon Bay was considered, however, initial surveys of the Bay did not result in a suitable location that would provide accurate hydroacoustic data and allow for safe hydrophone maintenance (Jeanes, 2004). Therefore, a fixed hydrophone was placed in a suitable location near Pt. Chehalis[3].

[3] Data from this hydrophone is not currently available but preliminary data is expected in December of 2004.

Table 2. Source, location, and date of historical native char captures (N=15) in the lower Chehalis River/Grays Harbor Federal Navigation Channel, WA, 1966-2000.

Char No.	Source	Location	Year	Date	Comments
1	Deschamps & Wright (1970)	Cow Point	1966	27 April	5 lb. male
2	Tokar (1970)	Cow Point	1968	3 May	
3	Tokar (1970)	Cow Point	1968	17 May	
4	Tokar (1970)	Cow Point	1968	28 May	
5	Brix (1974)	Moon Island	1973	4 March	
6	Brix (1974)	Oakville	1973	19 March	~RM 47
7	Brix et al. (1974)	Moon Island	1974	20 May	
8	Brix et al. (1974)	Moon Island	1974	1 July	
9	Brix et al. (1974)	Moon Island	1974	14 July	
10	Brix (1981)	Moon Island	1977	18 March	
11	Brix (1981)	Moon Island	1977	2 May	
12	Brix (1981)	Moon Island	1977	15 June	
13	Simenstad & Eggers (1981)	Cow Point	1981	March	440 mm
14	Simenstad & Eggers (1981)	Cow Point	1981	March	550 mm
15	Simenstad et al. (2001)	Cosmopolis	2000	April	~ RM 6 slough

Table 3. Date, site name, fork length (mm), and age of native char captured (N=15) during beach seine surveys conducted in the lower Chehalis River/Grays Harbor Federal Navigation Channel, WA, 2001-2004.

Char No.	Capture Date	Site No.	Site Name	Strata	Fork Length (mm)	Age
16	7 March 2002	6	Weyerhaeuser	Day	242	3+
17	7 March 2002	11	Bird Island	Day	326	3+
18	8 March 2002	5	Lakeside Ind.	Night	224	3+
19	8 March 2002	11	Bird Island	Night	296	3+
20	15 March 2002	7	Top Foods	Night	231	3+
21	15 March 2002	9	Chip Mill	Night	372	4+
22	15 March 2002	7	Top Foods	Night	388	4+
23	19 June 2002	11	Bird Island	Night	520	6+
24	14 April 2003	3	Big Stump	Night	405	
25	19 February 2004	11	Bird Island	Night	475	
26	19 February 2004	9	Chip Mill	Night	327	
27	19 February 2004	7	Top Foods	Night	363	
28	4 March 2004	5	Lakeside Ind.	Day	340	
29	4 March 2004	5	Lakeside Ind.	Day	382	
30	25 March 2004	5	Lakeside Ind.	Day	320	

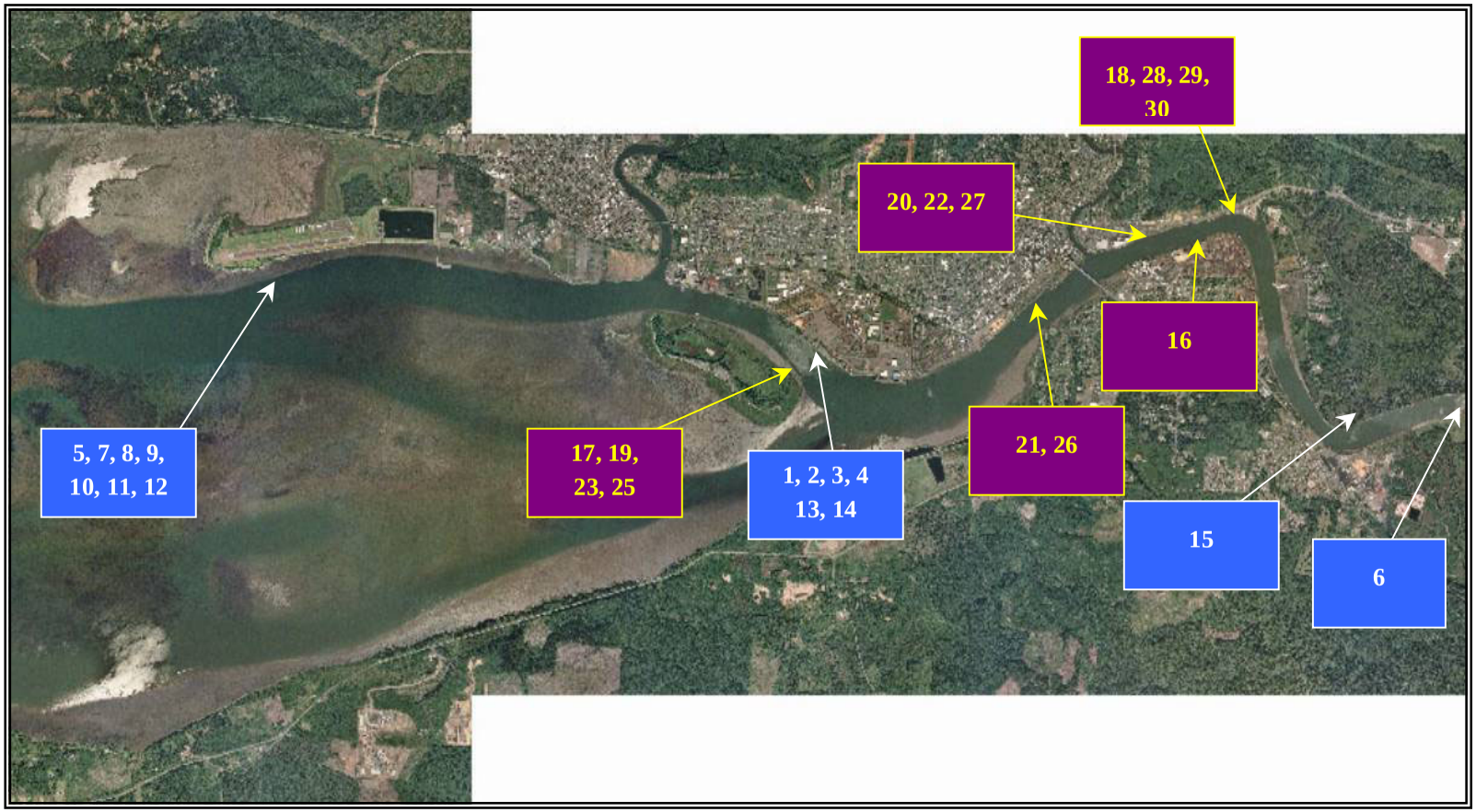

Figure 4. The location of 30 (15 historic and 15 R2) native char captures during beach seine surveys conducted in the Lower Chehalis River/ Grays Harbor Federal Navigation Channel, WA, 1996-2004. Numbers represent the identification number designated to individual char captured, as listed in Tables 2 and 3.

Effects of the Proposed Action

Given the time of year that the proposed action would be scheduled to occur, it is unlikely that any adult bull trout would be present in the action area. Adult fish would be expected to have begun their spawning migrations. Sub-adult fish could be present, but unpublished data from an on-going acoustic telemetry study in northern Puget Sound indicate that it would be unlikely for a large number of sub-adult fish to be present in the action area (Fred Goetz, fish biologist, Seattle District Corps, personal communication). In that study, between late August and early November no tagged sub-adult bull trout have been detected at river mouths. The first detections occurred in mid November after the first large rainfall over those four months. A small number of migrating sub-adult fish could be present in the action area while traveling to a riverine over wintering area, but during the fall months would not be expected to hold and feed in an area subject to high wave energy (Fred Goetz, fish biologist, Seattle District Corps, personal communication). It would be extremely unlikely for any fish in the project area to be directly injured by construction activities, which will occur out of the water.

A variety of forage fish species have been found in Half Moon Bay including surf smelt, sand lance, anchovy, and herring (Jeanes, 1999,2004). These forage fish species are all potential prey items for bull trout. No known in-depth forage fish spawning surveys have been conducted in Half Moon Bay and the status of its shorelines as forage fish spawning habitat is unknown; although surf smelt are known to spawn on the beaches south of the South Jetty (Penttila, 2004). The Corps plans to initiate a forage fish spawning survey in the fall of 2004 utilizing protocols developed by the Washington Department of Fish and Wildlife to document the presence of sandlance and surf smelt spawning activity in Half Moon Bay.

The placement of sand on the existing sandy beach may temporarily interrupt forage fish spawning in the project area. Given the relatively small area impacted, neither direct construction impacts nor the long-term physical habitat alteration are expected to reduce the numbers of forage fish available as bull trout prey in outer Grays Harbor.

Placement of sand on the beach may temporarily reduce the populations of benthic invertebrates in the project footprint and is likely to result in a shift in species composition as well. However, this impact is also to be expected of short duration and mimics the natural processes currently seen in Half Moon Bay as intense erosion is periodically causing sand to slough off the dune and bury the upper intertidal zone.

Since bull trout are unlikely to be in the project area during the time construction would be scheduled to occur and effects to the bull trout prey base are expected to be discountable, the project **may affect, but is not likely to adversely affect** bull trout.

7.2 Brown Pelican

The California brown pelican (*Pelecanus occidentalis*) is present in Grays Harbor during the summer, fall, and winter. Large flocks are often seen flying above the harbor inlet, with smaller numbers seen loafing on the Westport marina breakwater. Important prey items are small

surface-schooling marine fishes, particularly northern anchovies and Pacific sardines. Pelicans have been seen foraging in Half Moon Bay.

Effects of the Proposed Action

Noise associated with the operation of heavy machinery may result in localized, temporary disruption to pelicans foraging in the action area. Since brown pelicans are a highly mobile species that range over large areas to forage, this direct impact is not expected to be significant. Potential indirect effects are also expected to be insignificant. No perching spots or roosting areas would be disturbed by the project. The proposed action is not expected to alter the abundance or distribution of forage fish in outer Grays Harbor so impacts to the pelican prey base are expected to be discountable. The proposed project **may affect, but is not likely to adversely affect** the brown pelican.

7.3 Western Snowy Plover

The Western snowy plover (*Charadrius alexandrius nivosus*) nests at three sites in Washington: Leadbetter Point, Midway Beach, and Damon Point/Oyhut Wildlife Area (USFWS 2001, WDFW 1995, Richardson et al., 2000). The Damon Point site is located in the Grays Harbor inlet, approximately 2 miles north of the project site across the mouth of Grays Harbor from Half Moon Bay, and has been designated as critical habitat by USFWS. The Midway Beach nesting area is located approximately 7 miles south of the project site.

Historically, the Westport area supported plover nesting. Between 1915 and 1968, low numbers of breeding plovers were recorded at a sand spit on the eastern shore of Point Chehalis, between the Westport marina and airport (WDFW 1995). A single nest, poorly documented, was reported there in 1983 (WDFW, unpublished data, as cited in USFWS 2001). No other quantitative information on abundance or nesting is available for this site, which has now eroded significantly. Regular visits between 1994 and 1998 revealed no plovers (WDFW, unpublished data, as cited by USFWS 2001).

Snowy plovers occasionally winter in southern coastal Washington, but most winter south of Bodega Bay, California. The wintering season extends from November 1 to February 28. Small numbers of plovers occur at two locations on the Washington coast. The main wintering site is Leadbetter Point, where USFWS estimates that between 0 and 28 birds are present each year; the estimate for the second site, Midway Beach, is fewer than 8 birds per year (USFWS 2001).

Snowy plovers forage on invertebrates in the wet sand and surf-cast macroalgae of the intertidal zone, in sandy areas above high tide, on salt pans, dredge spoil sites, and along the edges of salt marshes and salt ponds.

Effects of the Proposed Action

High human and dog usage of Westhaven State Park, combined with the dramatic shoreline retreat seen in recent years, makes the shoreline of Half Moon Bay unsuitable for plover nesting. Foraging plovers may utilize the shoreline within the Westhaven State Park action area during the early portion of the construction window for the proposed project (September-October), but

would be expected to occur only in wintering sites south of the action area during the later portion of the construction window (November-February).

The increased noise and activity levels associated with construction operations would be expected to temporarily displace any plovers that might be foraging in the project area. This impact should not result in injury considering the quantity of higher-quality foraging habitat available to the north and south of Point Chehalis. Since noise disturbance and prey availability impacts are expected to be insignificant, the proposed project **may affect, but is not likely to adversely affect** the Western snowy plover. The project will have **no effect** on designated critical habitat for this species.

7.4 Marbled Murrelet

Speich and Wahl (1995) found that marbled murrelets (*Brachyramphus marmoratus*) are generally present in Grays Harbor during the fall, winter, and spring, and are rarely seen in August and September. The highest numbers of murrelets occurred in habitats closer to shore, generally in the Grays Harbor channel out to the 50-meter depth contour.

Effects of the Proposed Action

Noise associated with the operation of heavy machinery may result in localized, temporary disruption to murrelets foraging in the action area. USFWS guidance suggests that noise above ambient levels is considered to potentially disturb marbled murrelets when it occurs within 0.25 mile of suitable foraging habitat (USFWS 1996). Construction machinery will operate adjacent to suitable foraging habitat, but associated effects will be in a localized area with respect to this species' foraging range. Marbled murrelets are relatively opportunistic foragers; they have 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 maintenance activities and if they are disturbed while foraging, they would likely move without significant injury.

No nesting areas would be disturbed by the project. As discussed in Sections 4.5 and 5.1, the proposed action is not expected to alter the abundance or distribution of forage fish in outer Grays Harbor so impacts to the murrelet prey base are expected to be discountable.

Since noise disturbance and prey availability impacts are expected to be insignificant, the proposed project **may affect, but is not likely to adversely affect** the marbled murrelet. The project will have **no effect** on designated critical habitat for this species.

7.5 Bald Eagle

Grays Harbor provides important bald eagle (*Haliaeetus leucocephalus*) winter foraging habitat, and USFWS has indicated that wintering bald eagles do occur in the vicinity of the proposed project. Anadromous fish returning to spawn, waterfowl, and shorebirds are the primary prey items in the estuary. Eagles tend to congregate near the mouths of the Humptulips, Elk, Johns,

and Hoquiam rivers, and near Newskah and Charley creeks. No nesting areas or communal night roosts occur in or directly adjacent to the action area.

Effects of the Proposed Action

Bald eagles in the vicinity of construction activities may be disturbed by the noise associated with operation of heavy machinery. They will likely avoid the immediate construction zone and shift foraging activities to adjacent areas. This shift should not be problematic because construction activities would not occur near any preferred foraging areas. Displacement would be localized and temporary, and thus is not expected to result in significant injury. Availability of prey will not be affected. The proposed project **may affect, but is not likely to adversely affect** the bald eagle.

7.6 Oregon Silverspot Butterfly

The Oregon silverspot butterfly (*Speyeria zerene hippolyta*) occupies three types of grassland habitats: marine terrace and coastal headland "salt spray" meadows, stabilized ocean dunes, and montane grasslands. Each of these habitat types must provide two key resources, caterpillar host plants and adult nectar sources. The violet (*Viola adunca*) that caterpillars require for their development is a member of disturbance-oriented meadow communities. These meadow habitats historically have been maintained in an early successional state due to periodic fires, which prevent trees and shrubs from overshadowing low ground cover plants. As development has made such periodic fires undesirable, they have been prevented, and meadow communities have gradually become forest. Invasive species such as European beach grass (*Ammophila arenaria*) and Scot's broom (*Cytisus scoparius*) are also known to crowd out plants that the butterflies depend upon.

The Westport area was historically the northern extent of the Oregon silverspot butterfly's range, but the species has been extirpated (USFWS 2001). The closest population is on Long Beach peninsula in Pacific County, which has been designated as a habitat conservation area. Rehabilitation of habitat is occurring on Long Beach, but the recovery plan did not recommend similar efforts in Westport.

Effects of the Proposed Action

The proposed project would not disturb or prevent the establishment of meadow communities within the action area. The project will have **no effect** on the Oregon silverspot butterfly.

7.7 Marine Mammals and Sea Turtles

Several marine mammal and sea turtle species protected by the Endangered Species Act potentially occur in Grays Harbor and surrounding waters, including: Steller sea lion (*Eumetopias jubatus*), humpback whale (*Megaptera novaeangliae*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), Sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*).

Steller sea lions may be observed along the Washington coast year round, but they are most abundant during March-April and August-November, and least abundant during breeding season in May-July (Gearin and Jeffries 1996). No breeding rookeries have been identified in Washington waters. Grays Harbor has several documented haul-out areas used regularly by harbor seals, but there is no indication that these sites are used regularly by Steller sea lions (Jeffries et al. 2000). Since neither of the two types of terrestrial habitats utilized by Steller sea lions occur in the project vicinity and the proposed action would occur in a mid- to upper-intertidal location, it is expected to have **no effect** on the Steller sea lion.

With the exception of the humpback whale, the preferred habitat for all of the whale species listed above is the open ocean, not semi-enclosed waters like Grays Harbor. It is extremely unlikely that any would be present in the shallow embayment that is the action area. Brueggeman (1992) found that humpback whales were most abundant in Washington waters between May and September. They were most commonly observed in steep slope waters near the Astoria, Grays, and Nitinat canyons; the Grays Canyon is located approximately 50 miles west of the Grays Harbor inlet. Again, it is very unlikely that a humpback whale would be present in Half Moon Bay, particularly the mid- to upper-intertidal location where the project would occur. The proposed project is expected to have **no effect** on all these whale species given their distributions and high mobility.

Unlike other sea turtles, the leatherback does have some ability to regulate its body temperature and can survive in colder waters. While this species may use oceanic areas off the coast of Washington as foraging grounds during the summer and fall months, aerial surveys indicate that when off the U.S. Pacific coast leatherbacks usually occur in continental slope waters (NMFS and USFWS 1998a). Sightings of the loggerhead sea turtle in the Eastern Pacific are generally confined to the summer months off of southern California (NMFS and USFWS 1998b). The proposed project will have **no effect** on these turtle species.

8. CONCLUSIONS

Below is Table 3 summarizing ESA-protected species potentially occurring in the project area, their listing status, and effect determinations.

Table 4. Determination summary.

Species	Listing Status	Effect Determination
Bull Trout *Salvelinus confluentus*	Threatened	Not likely to adversely affect
Brown Pelican *Pelecanus occidentalis*	Endangered	Not likely to adversely affect
Western Snowy Plover *Charadrius alexandrius nivosus*	Threatened	Not likely to adversely affect
Marbled Murrelet *Brachyramphus marmoratus*	Threatened	Not likely to adversely affect
Bald Eagle *Haliaeetus leucocephalus*	Threatened	Not likely to adversely affect
Oregon Silverspot Butterfly *Speyeria zerene hippolyta*	Threatened	No Effect
Steller Sea Lion *Eumetopias jubatus*	Threatened	No Effect
Humpback Whale *Megaptera novaeangliae*	Endangered	No Effect
Blue Whale *Balaenoptera musculus*	Endangered	No Effect
Fin Whale *Balaenoptera physalus*	Endangered	No Effect
Sei Whale *Balaenoptera borealis*	Endangered	No Effect
Sperm Whale *Physeter macrocephalus*	Endangered	No Effect
Leatherback Sea Turtle *Dermochelys coriacea*	Endangered	No Effect
Loggerhead Sea Turtle *Caretta caretta*	Threatened	No Effect

9. ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act requires Federal agencies to consult with the NOAA-Fisheries regarding actions that may affect Essential Fish Habitat (EFH) for Pacific coast ground fish, coastal pelagic species, and Pacific salmon. The Act defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Descriptions of EFH are provided in Fishery Management Plans produced by the Pacific Fisheries Management Council. Since the interim responsive actions would both involve maintenance sand placement above +9.0 feet, MLLW, in an approximately 2.3 acre area, in order to maintain the status quo of the breach fill area, the Corps has determined if either or both interim actions were implemented, that there would be no effect on Essential Fish Habitat in Half Moon Bay.

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