

Final Environmental Assessment

Fiscal Years 2007-2011 Maintenance Dredging and Disposal Grays Harbor and Chehalis River Navigation Project Grays Harbor County, Washington

October 2006



**US Army Corps
of Engineers®**
Seattle District

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Responsible Agency: The responsible agency for this maintenance work is the U.S. Army Corps of Engineers, Seattle District.

Abstract: In accordance with the National Environmental Policy Act (NEPA), this document evaluates the impacts of five years of continued maintenance of the Grays Harbor and Chehalis River Navigation Channel. Between October 2006 and October 2011, an estimated 2.5 million cubic yards of sediment will be dredged annually from this deep draft Federal channel. Disposal of this material will occur at six existing disposal sites, including three open water sites, two nearshore nourishment sites, and one direct beach nourishment site.

Since the proposed action is one for which previous environmental impact statements (EIS) and environmental assessments (EA) have been prepared, this EA is tiered from the parent documents in accordance with 40 CFR 1502.20. As a result, this EA does not repeat evaluations presented in previous NEPA documents but rather incorporates discussions from previous NEPA documents by reference and concentrates on new issues specific to these subsequent actions.

THE OFFICIAL COMMENT PERIOD ON THIS EA ENDED ON AUGUST 26, 2006.

This document is available through the Seattle District website, <http://www.nws.usace.army.mil>

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TABLE OF CONTENTS

1.	INTRODUCTION.....	1
2.	LOCATION.....	1
3.	BACKGROUND	1
4.	PURPOSE AND NEED	2
5.	AUTHORITY	4
6.	PROPOSED ACTION.....	4
6.1	DREDGING.....	4
6.2	DISPOSAL	8
6.3	MITIGATION MEASURES INCORPORATED INTO THE MAINTENANCE DREDGING PROGRAM	11
6.4	DUNGENESS CRAB MITIGATION PLOT MAINTENANCE	12
7.	ALTERNATIVES	13
7.1	DREDGING.....	13
7.2	DISPOSAL	14
8.	STATUS OF PROGRAM COMPLIANCE WITH MITIGATION AGREEMENTS.....	14
8.1	DUNGENESS CRAB MITIGATION STRATEGY AGREEMENT	14
8.2	POINT CHEHALIS REVETMENT EXTENSION MITIGATION AGREEMENT	16
8.3	SALMON MITIGATION.....	17
9.	EXISTING ENVIRONMENT AND IMPACTS OF THE PROPOSED ACTIONS.....	18
9.1	SEDIMENT QUALITY	18
9.2	THREATENED AND ENDANGERED SPECIES	19
9.3	BIOLOGICAL RESOURCES	21
9.4	EROSION AND MIGRATION OF WHITCOMB FLATS	23
10.	CUMULATIVE IMPACTS.....	24
11.	OTHER CORPS STUDIES AND ACTIVITIES RELATED TO GRAYS HARBOR.....	25
11.1	GRAYS HARBOR LONG TERM MANAGEMENT STUDY.....	25
11.2	NAVIGATION IMPROVEMENT PROJECT PHASE II.....	26
11.3	WHITCOMB FLATS SECTION 111 STUDY	27
12.	ENVIRONMENTAL COMPLIANCE.....	27
12.1	NATIONAL ENVIRONMENTAL POLICY ACT.....	27
12.2	ENDANGERED SPECIES ACT	27
12.3	CLEAN WATER ACT	27
12.4	COASTAL ZONE MANAGEMENT ACT.....	28
12.5	MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT	28
12.6	NATIONAL HISTORIC PRESERVATION ACT	28
12.7	MAGNUSON FISHERY CONSERVATION AND MANAGEMENT ACT.....	29
12.8	CLEAN AIR ACT	29
12.9	EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE.....	29
13.	UNAVOIDABLE ADVERSE EFFECTS.....	30
14.	CONCLUSION.....	30
15.	REFERENCES	30

TABLES AND FIGURES

Figure 1. Location and Vicinity Map.....	3
Figure 2. Grays Harbor Navigation Channel Reaches and Disposal Sites	6
Table 1. FY07-11 Maintenance Dredging Program by Reach.....	7
Table 2. Point Chehalis Revetment Extension Mitigation Agreement – Summary of Predicted vs. Actual Placement Volumes (1999-2006)	17
Table 3. Endangered Species Potentially Occurring in the Project Vicinity and Effect Determinations.....	20

APPENDICES

Appendix A. Finding of No Significant Impact (FONSI)
Appendix B. Comment Letters
Appendix C. Corps Responses to Comment Letters
Appendix D. Biological Evaluation
Appendix E. Agency Approval Letters
Appendix F. Public Notice and 404(b)(1) Evaluation
Appendix G. Coastal Zone Consistency

1. INTRODUCTION

Pursuant to the National Environmental Policy Act (NEPA), this Environmental Assessment evaluates the impacts of five years of continued maintenance of the Grays Harbor and Chehalis River Navigation Channel. Between October 2006 and October 2011, an estimated 2.5 million cubic yards of sediment will be dredged annually from this deep draft Federal channel. Disposal of this material will occur at six existing disposal sites, including three open water sites, two nearshore nourishment sites, and one direct beach nourishment site.

2. LOCATION

The Grays Harbor navigation channel provides shipping access between the Pacific Ocean and Cosmopolis on the Chehalis River, Grays Harbor County, Washington (T17N, R10 W, Sections 9, 10, 11, 12, 13 and T17N R9W Sections 8, 9, and 10). Please see Figure 1.

3. BACKGROUND

The 23.5 mile long Grays Harbor navigation channel is dredged annually by the U.S. Army Corps of Engineers, Seattle District (Corps) in order to maintain authorized project depths. Without annual maintenance dredging, shoaling would reduce the ability of larger ships to enter and leave the inner harbor safely under full load or low tide conditions, thereby impacting the economy of Grays Harbor county.

The Grays Harbor and Chehalis River Navigation Project consists of the Federal navigation channel, the North Jetty, the South Jetty, and the Point Chehalis revetment. Historical information on these structures, as well as descriptions of recent modifications and maintenance work, has been described in several Corps documents. The following documents are incorporated here by reference:

- Grays Harbor and Chehalis River Navigation Project, Operation and Maintenance Environmental Impact Statement (EIS), dated June 1975
- Long Range Maintenance Dredging Program for the Grays Harbor and Chehalis River Navigation Project, Operation and Maintenance Environmental Impact Statement Supplement (EISS) No. 2, dated October 1980
- Grays Harbor, Chehalis and Hoquiam Rivers, Washington Channel Improvements for Navigation Interim Feasibility Report and Final EIS, dated September 1982
- Grays Harbor, Washington, Navigation Improvement Project Final EISS, dated February 1989
- Grays Harbor, Washington, Navigation Improvement Project Operations and Maintenance Final Environmental Assessment, 1989 Sediment Collection and Testing Program, dated February 1990
- Dredged Material Evaluation Procedures and Disposal Site Manual, dated June 1995
- [Revised Crab Mitigation Strategy Agreement Evaluation Report and Environmental Assessment](#), dated September 1998

- Point Chehalis Revetment Extension and Half Moon Bay Inter-Agency Mitigation Agreement, dated October 1998
- [Fiscal Years 2001-2006 Maintenance Dredging and Disposal, Grays Harbor and Chehalis River Navigation Project Final Environmental Assessment](#), dated April 2001
- [South Jetty Breach Fill Final Environmental Assessment](#), dated April 2002
- [South Jetty Breach Fill Maintenance Final Environmental Assessment](#), dated February 2004
- [South Jetty Breach Fill Maintenance Final Supplemental Environmental Assessment](#), dated December 2004
- [South Jetty Breach Fill Maintenance Final Supplement to the Final Supplemental Environmental Assessment](#), dated November 2005
- [Fiscal Year 2006 Maintenance Dredging and Disposal, Grays Harbor and Chehalis River Navigation Project Final Supplemental Environmental Assessment](#), dated December 2005
- [Grays Harbor Crab Mitigation Program Oyster Spat Placement Environmental Assessment and Biological Evaluation](#), dated March 2006

These documents are available for review at the Seattle District office. Electronic copies of several of these documents are available on the Seattle District's web site, <http://www.nws.usace.army.mil> (follow links to Environmental Resources Section, Environmental Documents page).

The Council on Environmental Quality's NEPA regulations encourage agencies to tier their environmental impact statements in order to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (40 CFR 1502.20). Since the proposed action is a recurring maintenance activity for which environmental impact statements (EIS) and EAs have been prepared, this EA is tiered from these previous NEPA documents. As a result, this EA does not repeat evaluations presented in previous NEPA documents but rather incorporates discussions from these documents by reference and concentrates on new issues specific to future maintenance dredging and disposal activities.

4. PURPOSE AND NEED

The Port of Grays Harbor utilizes the federally authorized navigation channel to provide sea-going vessels with commercial access to the cities of Aberdeen, Hoquiam, and Cosmopolis. The local economy in the area is historically tied to forest products that are shipped to domestic and international markets. More recently, the Port of Grays Harbor has improved rail access and terminal facilities for grain exports and other break bulk cargo. Without annual maintenance dredging, shoaling would lead to a shallower channel that would reduce the ability of large ships to enter and leave Grays Harbor safely. The purpose of channel maintenance dredging is to maintain the efficiency and safety of deep-draft water transportation in Grays Harbor.

Figure 1. Location and Vicinity Map

5. AUTHORITY

The original Grays Harbor navigation channel was authorized by Congress in the Rivers and Harbors Act of 1896. The Grays Harbor and Chehalis River Navigation Project and regular Department of the Army maintenance dredging were authorized by the Rivers and Harbor Act of 1935, and modified in 1945 and 1954. In 1990, widening and deepening of the navigation channel began as part of the Grays Harbor Navigation Improvement Project, which was authorized by Section 202 of the Water Resources Development Act of 1986 (Public Law 99-662) in November 1986. Copies of authorizing documents are on file at the Seattle District Office.

6. PROPOSED ACTION

The proposed action consists of continuing the established maintenance dredging and disposal program for the Grays Harbor and Chehalis River Navigation Project. The proposed action includes several mitigation measures to avoid, minimize, and compensate for project impacts. The three elements of the maintenance program addressed in this document are: dredging, disposal, and Dungeness crab (*Cancer magister*) mitigation plot maintenance.

The Port of Grays Harbor performs annual maintenance dredging of their marine terminal facilities, generally with the same contractor clamshell dredge used by the Corps for inner harbor maintenance. This ancillary work by the Port is not evaluated in this document.

6.1 Dredging

The Grays Harbor Navigation Channel has been divided into nine discrete reaches based upon physical characteristics and dredging requirements. Please see Figure 2 for the locations of these reaches, and Table 1 for a summary of volume, channel dimension, disposal site, and timing information specific to individual reaches.

The five “*inner harbor*” reaches—South Aberdeen, Cow Point, Hoquiam, North Channel, and Inner Crossover—are dredged using contractor clamshell dredges. Two turning basins within the inner harbor are also dredged: the Elliott Slough Turning Basin in the South Aberdeen Reach, and the Cow Point Turning Basin in Cow Point Reach. Dredging occurs during the fall and winter months, due to the need to remove shoals resulting from high river flows and the need to avoid dredging during salmonid migrations in the spring and early summer. Approximately 1.5 million cubic yards are dredged annually from the inner harbor reaches and turning basins.

The four “*outer harbor*” reaches—Outer Crossover, South, Entrance/Point Chehalis, and Bar Channel—are dredged in the spring with hydraulic (or hopper) dredges. Hopper dredges are better suited for use in the more exposed outer harbor because clamshell equipment requires two barges moored together, and this can be a hazard in choppy seas. The Government hopper dredges *Essaysons* and *Yaquina* have annual assignments to Grays Harbor to perform outer harbor maintenance dredging. During years when pump-off capabilities are required for disposal at the upland Half Moon Bay direct beach nourishment site, a contractor hopper dredge is used for a portion of the outer harbor work (see Section 6.2.4). Dredging occurs during the spring, due to favorable weather/wave conditions and in order to reduce impacts to the Dungeness crab

fishery. Approximately 1 million cubic yards are dredged annually from the outer harbor reaches.

A typical channel cross section can be found on Figure 2. The side slopes of the navigation channel vary throughout the Harbor. Slopes progressively steepen toward the mouth of the Chehalis, since finer substrates are more cohesive and can therefore maintain a steeper slope. Representative slopes range from 1V:3H in the South Aberdeen, Cow Point, and Hoquiam reaches, to 1V:5H in the North, Crossover, and inner portion of the South Reach channels, to 1V:10H in the outer portion of South Reach, Entrance, and Bar reaches.

The typical channel cross section in Figure 2 illustrates the total dredging prism, which includes the authorized project depth, advanced maintenance depth, the paid allowable depth, and non-pay dredging. The *authorized channel dimensions* are the depth and width of the navigation channel authorized by Congress to be constructed and maintained by the Corps. *Advanced maintenance* is dredging to a specified depth and/or width beyond the authorized channel dimensions in critical and fast-shoaling areas. Advanced maintenance allows the Corps to avoid frequent re-dredging, and ensures the reliability and least overall cost of maintaining projects to authorized dimensions. Since there is inherent imprecision in a typical maintenance dredging process, the Corps also allows for a *paid allowable overdepth*. Most of the Grays Harbor channel has a 2' overdepth tolerance; this means that material removed from within this tolerance is eligible for payment under a dredging contract. *Non-pay dredging* occurs when a dredge removes material outside of the allowable overdepth tolerance. Non-pay dredging may occur in varying magnitude as a result of variations in the substrate, incidental removal of submerged obstructions, or wind and wave conditions.

The volumes presented in Table 1 include both advance maintenance and allowable overdepth quantities. These volume estimates are based upon several years of actual volumes removed from the Grays Harbor channel during maintenance dredging. The depths presented in Table 1 are authorized depths, which do not include the additional depth required for advanced maintenance and allowable overdepth.

Figure 2. Grays Harbor Navigation Channel Reaches and Disposal Sites

Table 1. FY07-11 Maintenance Dredging Program by Reach

REACH	VOLUME (CUBIC YARDS)	SEDIMENT TYPE	DREDGE TYPE	CHANNEL DIMENSIONS ¹	DISPOSAL AREA(S)	WORK CLOSURES	WORK SCHEDULED
S. Aberdeen	55,000 annually	silt / sand	clamshell	-32' MLLW 200-300' wide	South Jetty or Point Chehalis ²	15 Feb to 15 July	16 July to 14 Feb
Elliott Slough Turning Basin	60,000 biennially	silt / sand	clamshell	-32' MLLW 350-550' wide	South Jetty or Point Chehalis ²	15 Feb to 15 July	16 July to 14 Feb
Cow Point	750,000 annually	sandy silt	clamshell	-36' MLLW 350-550' wide	South Jetty or Point Chehalis ²	15 Feb to 15 July	16 July to 14 Feb
Cow Point Turning Basin	200,000 annually	sandy silt	clamshell	-36' MLLW 350-950' wide	South Jetty or Point Chehalis ²	15 Feb to 15 July	16 July to 14 Feb
Hoquiam	150,000 annually	sandy silt	clamshell	-36' MLLW 350' wide	South Jetty or Point Chehalis ²	15 Feb to 15 July	16 July to 14 Feb
North Channel	150,000 annually	silty sand	clamshell	-36' MLLW 350' wide	Point Chehalis	None	August to 14 Feb
Inner Crossover	200,000 annually	silty sand	clamshell	-36' MLLW 350-450' wide	Point Chehalis	None	August to 14 Feb
Outer Crossover	200,000 annually	silty sand	hopper ³	-36' MLLW 350' wide	Point Chehalis	No hopper after 31 May	April and May
South Reach	400,000 annually	sand	hopper ³	-36' MLLW 350-450' wide	Point Chehalis or Half Moon Bay	No hopper after 30 June	April to June
Entrance/ Point Chehalis	400,000 annually	sand	hopper	-40' to -46' MLLW 600-900' wide	South Jetty or Half Moon Bay or Point Chehalis	No hopper after 31 May	April and May
Bar Channel	250,000 as needed	sand	hopper	-46' MLLW 900' wide	South Beach or South Jetty or 3.9 mile ocean site	No hopper after 31 May	April and May

¹ Depths shown are authorized depths and do not include 2' advanced maintenance or 2' overdepth tolerance. Exceptions: South Aberdeen Reach has 0' advance maintenance and 1' overdepth tolerance. Elliott Slough Turning Basin has 3' advance maintenance for half of the channel (inside bend). Widths shown are those of the channel bottom, and do not include extra width at channel bends.

² Adverse weather/wave relief site.

³ Clamshell required after May 31 (Outer Crossover) and June 30 (South Reach).

6.2 Disposal

Disposal of maintenance dredged material occurs only at approved, designated disposal sites. Two Washington Department of Natural Resources (DNR) public, multi-user unconfined open water dredged material disposal sites are located directly adjacent to the navigation channel. The Pt. Chehalis and South Jetty sites are located on state-owned aquatic lands, and are managed by DNR. One Environmental Protection Agency (EPA) designated ocean disposal site, Southwest (3.9 mile), is located adjacent to the bar channel. In addition, material dredged from the sandy outer reaches of the channel is periodically used for both direct beach and nearshore nourishment at Half Moon Bay, and nearshore nourishment at South Beach. See Figure 2 for the location of these sites, which are discussed individually below.

The channel sediments have been tested and approved for unconfined open water disposal under the guidelines of the Dredged Material Management Program (DMMP) administered by the Corps, EPA, Washington Department of Ecology (Ecology), and DNR. Additional sampling and analysis of inner harbor sediments occurs on a regular basis, as specified in the June 1995 *Dredged Material Evaluation Procedures and Disposal Site Management Manual for Grays Harbor and Willapa Bay* (see Section 8.1).

Materials dredged from the inner harbor reaches are primarily fine grain suspended/bedload material from tributary streams and rivers. Inner harbor material is disposed at the South Jetty site, and at the Point Chehalis site during adverse weather/wave conditions or if the South Jetty site is full. Materials dredged from the outer harbor reaches are marine sands deposited by tidal action, and silty sand/sandy silt redistributed within the estuary by wind and wave action. Some outer harbor material is disposed at three “beneficial use” sites, including the Half Moon Bay nearshore nourishment site, Half Moon Bay direct beach nourishment site, and the South Beach nearshore nourishment site.

The determination of which disposal site will be used during the course of maintenance dredging is based on a number of factors, including:

- the depth of each disposal area and the Half Moon Bay direct beach nourishment site, as surveyed annually;
- weather and wave conditions at the time of disposal;
- presence of commercial crab pots in a disposal site and/or access lane; and
- results of pre-disposal Dungeness crab surveys.

Dredged material is transported to disposal sites by either a bottom dump hopper dredge or by a tugboat and bottom-dump (or split-hull) barge. These vessels generally have the ability to transport between 800 and 6,000 cubic yards of material each trip. The number of barge discharges per day is typically between three and five, but this number varies depending on the extent of the dredging activity ongoing at the time.

A hydraulic pipeline is utilized for disposal at the upland Half Moon Bay direct beach nourishment site. A contractor hopper dredge full of sand docks at an existing rock dock at Firecracker Point, where a crane barge outfitted with an injection pump and jet adds water to the sediment in the hopper dredge bin. The hopper dredge offloads the resulting slurry of sand and water to a hydraulic booster pump on the crane barge. The booster pumps the slurry to an onshore pipeline landing for the across-town transport of material in a temporary plastic pipeline. The slurry of sand and water is discharged to the area in front of the buried revetment. A sand berm/perimeter dike separates the discharge area from Half Moon Bay. The slurry water temporarily ponds in the disposal site, and is conveyed via effluent pipe into Grays Harbor at the exposed rock revetment near Groin A. The sandy dredged materials quickly dewater and a dozer at the point of discharge grades the sand uniformly over the disposal area.

The six existing disposal sites are described individually below.

6.2.1 Point Chehalis Open Water Disposal Site

The depth of this site varies between –50 to –80' MLLW.¹ It is a dispersive site subject to high wave energy and strong, predominately westward, currents. The irregular bottom consists of fine to medium sized sand grains of marine origin. Historically, this site has been extremely deep. Charts that predate jetty construction show depths of –100' MLLW in this area. Over 35 million cubic yards of dredged material have been placed in this area since 1977, at an average rate of 1.7 million cy/year. Annual survey records indicate that approximately 75% of material disposed at this site erodes during the dredging period, and that another 15% erodes during the following winter. Bathymetric surveys indicate that most of this eroded material moves seaward along the South Jetty. Disposal at this location reduces erosion near the Pt. Chehalis revetment and groins. The Point Chehalis site is the most heavily used disposal site in Grays Harbor.

6.2.2 South Jetty Open Water Disposal Site

The depth of this site varies between –40 to –60' MLLW. This area is subject to fast tidal currents, predominately westward, that sweep along the jetty toe. The site is considered dispersive, with seaward erosion of disposed material generally occurring rapidly. However, in recent years some material has begun to mound in portions of the site. This accretion is being closely monitored so that disposal activities do not cause navigation concerns. The irregular bottom consists of fine to medium sized sand grains of marine origin. Placement of dredged material at this site is necessary to prevent scour and undermining of the South Jetty's toe. This site is the preferred disposal area for inner harbor materials, although when the South Jetty site is full or weather/wave conditions are hazardous then inner harbor materials are disposed at the Point Chehalis site.

6.2.3 Southwest (3.9 mile) Open Water Disposal Site

The depth of this ocean disposal site varies between –100 and –120' MLLW. This site was designated to minimize impacts to Dungeness crabs during the construction phase of the widening and deepening project. This site is not used often because little material is dredged

¹ The southern (landward) portion of the designated disposal site includes areas less than 40 feet deep. However, the shallow portion of the site is located near the Point Chehalis revetment groins. These groins are a navigation hazard for dredging equipment that draws at least 30 feet, so the southern portion of the disposal site is not used. Disposal occurs in the deeper northern portion of the disposal site.

from the Bar Channel. Also, material disposed at this site is unavailable for longshore transport (i.e., unable feed beaches to the north) so disposal at the South Beach nearshore nourishment site is preferred.

6.2.4 Half Moon Bay Nearshore Nourishment and Direct Beach Nourishment Sites

The purpose of these two disposal sites is to maintain a stable beach profile west of the Point Chehalis revetment extension constructed in 1998-1999 and to ensure that the armor stone toe of the revetment extension is not exposed. Sandy material from the outer harbor is placed on the Point Chehalis revetment extension (direct nourishment) and in the bay as close to shore as possible (nearshore nourishment), in accordance with the October 1998 *Point Chehalis Revetment Extension Project Inter-Agency Mitigation Agreement*. Obtaining suitable sand through the annual maintenance dredging process, and depositing this material through the direct beach and nearshore placement processes, are essential to compliance with the stable beach slope and revetment toe burial requirements of the mitigation agreement.

The direct beach nourishment site is used to help ensure compliance with the beach profile and revetment toe burial obligations of the revetment extension. Material is disposed in the direct beach nourishment site when the erosive processes and borrow activities have generated sufficient capacity to accommodate disposal of an annual episode of maintenance material dredged from the outer harbor, particularly the Entrance and South Reaches. The direct beach nourishment site is located above the mean higher high water datum (+9 MLLW at this location), but sand from the site erodes into Half Moon Bay during storm events. Approximately 135,000 cubic yards of material was disposed at this site in 2002.² It is expected that this disposal site will be used once during the 5-year term of this EA.

The nearshore nourishment site is used for disposal as bathymetric conditions permit (i.e., when the bay is deep enough for the bottom dump barge to navigate). Since spring 2002, the bay has been deep enough to allow dredge access for disposal. Approximately 1.2 million cubic yards of material has been placed in this site since spring 2002.

6.2.5 South Beach Nearshore Nourishment Site

The purpose of disposal at this site is to slow erosion on the south side of the South Jetty. Sandy material from the Bar Channel is placed as close to shore as possible, generally between -35' and -40' MLLW. This location extends the residence time of dredged material in the littoral system while avoiding productive crabbing areas. Over 735,000 cubic yards has of material has been placed in this site since spring 2002.

² Periodically, sand that has been deposited and accumulated at the direct beach nourishment site beyond that quantity necessary to functionally contribute to the stable beach profile and revetment toe burial requirements is transported via truck to the western and/or southwestern shoreline of Half Moon Bay in order to maintain the South Jetty breach fill. An incidental effect of maintaining the South Jetty breach fill by the transportation of excess sand from the direct beach nourishment site is the protective barrier that the sand spit connecting the South Jetty forms for the eastern shore of Half Moon Bay and the revetment extension toe.

6.3 *Mitigation Measures Incorporated into the Maintenance Dredging Program*

During the formulation of the existing maintenance dredging program, much care was taken to reduce environmental impacts. Several impact avoidance, minimization, and compensation measures have been incorporated into the maintenance program, including:

- To avoid impacts to bull trout and out-migrating juvenile salmon, the Corps does not dredge the South Aberdeen Reach, Cow Point Reach, Hoquiam Reach, and turning basins between February 15 and July 15. No timing restrictions related to salmonids apply downstream of Hoquiam Reach. The estuary is wider downstream of Hoquiam Reach, so a smaller proportion of the migratory pathway is affected by sediment plumes. Also, the relative distance between dredging activities and the shallow subtidal habitat where juvenile foraging occurs is greater.
- To reduce entrainment of fish, shrimp, and crabs, the inner harbor reaches are dredged using a clamshell dredge.
- To reduce entrainment of Dungeness crabs, no hopper dredging occurs in outer harbor reaches during periods of peak crab abundance.
- Water quality monitoring occurs during inner harbor dredging when flow of the Chehalis River drops below 1,000 cubic feet per second at Hoquiam, as reported by the U.S. Geological Survey. The Corps notifies Ecology if dissolved oxygen (DO) levels fall below 5 mg/L. Dredging is ceased immediately if DO measurements fall below 4 mg/L.
- To avoid significant impacts to Dungeness crab and marine fishes, trawl surveys occur in the Half Moon Bay nearshore disposal site prior to any disposal activities. In accordance with Washington Department of Fish and Wildlife (WDFW) guidance, disposal does not occur if crab densities exceed 750 per hectare, if 25% of the crab 100 millimeters or larger are soft, if a large increase in newly settled young-of-the-year crab is encountered, or if any species of rockfish, flatfish, or lingcod is unusually abundant.
- Disposal at the Half Moon Bay nearshore disposal site and the South Beach disposal site is coordinated with commercial crab fisherman to reduce the potential for damage to crab pots.
- Disposal at the Half Moon Bay direct beach nourishment site is restricted to above +9' MLLW (the mean higher high water line at this location), pursuant to the *Point Chehalis Revetment Extension Mitigation Agreement*.
- To compensate for the loss of Dungeness crabs to the commercial fishery, the Corps places oyster shell on intertidal mudflats in order to improve survival rates for young-of-the-year crabs (see Section 6.4 and 8.1).

In addition, ballast management plans have been developed for the Government hopper dredges operated by the U.S. Army Corps of Engineers, Portland District. These dredges, the *Essaysons* and *Yaquina*, have annual assignments to Grays Harbor. They use both water and partial loads of sand as ballast. The management plans were written to ensure that operation of the dredges complies with Federal and State ballast management laws and regulations.

Offshore ballast water exchange is required for dredges traveling to Grays Harbor from the Columbia River, Coos Bay, San Francisco Bay, Humboldt Bay, Alaska, and Hawaii. Exchange

of ballast water occurs at least 50 nautical miles off shore. Sand ballast is dredged from the ocean entrance of the departing location and disposed at the most seaward point of the arriving project's approved ocean disposal site. For the Grays Harbor project this is the Southwest Disposal Site located 3.9 miles off shore.

Other specific mitigation measures included in these plans include:

- Two of the dredge *Yaquina's* ballast tanks are filled with potable water at its yearly dry-docking. The intent to hold this ballast all year, if possible.
- Sand ballast is carried only when sea conditions are such that not carrying it would adversely affect the handling of the vessel and endanger the crew.
- Sand ballast will consist of material that has been determined to meet all criteria for unconfined open water disposal in accordance with the provisions of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended and the Testing Manual for Evaluation of Dredged Material Proposed for Ocean Disposal (EPA Publication 503/8-91/001).
- Before departing from a disposal site for the last time, the hopper and vessel piping is flushed with at least one full load of water to ensure all remaining sediments are washed from the vessel.
- Records of ballast management are reported to the Coast Guard and Washington State, and maintained for a period of no less than 2 years.

When contractor dredges are used, contract specifications will require compliance with the Washington Ballast Water Management Act (RCW 77.120) and Federal ballast water management regulations (33 CFR 151.2000 *et seq.*). Best management practices for ballast management and equipment cleaning prior to arrival/departure will also be reviewed during pre-construction safety meetings. Clamshell dredges consist of a tug boat and two barges, one for the clamshell derrick and the other a bottom-dump barge for storage and transport of the dredged material. Tug boats have displacement hulls and do not carry ballast. The barges are towed with no people on board, so ballast is generally not necessary.

Potential impacts of continued maintenance dredging and disposal operations will be reduced and/or avoided through implementation of the mitigation measures described above. Due to these measures, impacts associated with continued maintenance dredging are not expected to be significant.

6.4 Dungeness Crab Mitigation Plot Maintenance

In accordance with the 1989 *Navigation Improvement Project Final EISS* and the 1998 *Revised Crab Mitigation Strategy Agreement*, the proposed action includes up to two placements of oyster shell on the existing Dungeness crab mitigation plots shown on Figure 2. Periodic placement of shell is required to maintain functional crab habitat, which is lost annually to shell siltation and settling. See Section 8.1 for a more detailed description of the Grays Harbor crab mitigation program.

The South Channel mitigation plots are approximately 45 acres in size, and new shell will be placed only as overlay on these existing plots. Plot maintenance generally occurs every 3 years, depending on percent cover of shell within the plots and annual crab production rates. Placement occurs in the spring, prior to the settlement of larval crabs. Shell is obtained from local oyster growers, and may come from several sources depending on the quantity placed. If shell is obtained from outside Grays Harbor, the supplier is required to have a valid shellfish transfer permit from WDFW. This permit requires the shell to be aged in an upland location to ensure that incidental transport of undesirable species will not occur.

Prior to shell placement, Corps biologists survey the plots for eelgrass. The location of all eelgrass patches are provided to the contractor, and marked with stakes visible from the water surface at high tide to ensure that the shell placement does not occur on eelgrass beds.

Up to 15,000 cubic yards of shell may be discharged on the plots during each of the two placements proposed. Shell coverage rates average about 800 cubic yards per acre. Areas targeted for placement are determined by considering past crab production, percentage shell cover, existing tidal elevation, and percentage eelgrass cover. Placement occurs at high tide, from a barge above the plots. No barge grounding occurs since shell is placed at high tide. Contractors have used a clamshell bucket or conveyor system to get the shell onto the plots. Generally, this work takes less than two weeks.

7. ALTERNATIVES

7.1 *Dredging*

7.1.1 No Action

Under this alternative, the Corps would not dredge the Grays Harbor Navigation Channel. Shoaling would impede navigation from the Pacific Ocean to the head of the channel at Cosmopolis, Washington. The ability of ships to enter and leave the Port of Grays Harbor safely under full load or during low tide conditions would be restricted. A reduction in shipping of forest products to domestic and international markets would result in serious impacts to the economy of Grays Harbor County. Local companies would have to either ship limited quantities, ship only during higher tides, or ship material from a different port. The no action alternative does not meet the project purpose and need.

7.1.2 Reduced Dredging

Much care has been taken during the formulation of the proposed project to reduce dredging amounts to the very least possible. The quantity of material proposed to be dredged from the Grays Harbor channel during the next five years is the minimum amount necessary to accomplish project purposes. Delaying dredging for just one maintenance cycle would effectively preclude 50% of harbor shipping. There is no practicable alternative for reducing annual dredging requirements that would meet the project objectives presented in the Navigation Improvement Project EIS.

7.2 Disposal

7.2.1 Upland Disposal

Upland disposal sites were used in the past, but all existing upland sites in reasonable proximity to Grays Harbor have been filled to capacity and no new sites have been designated. Substantial cost and logistical constraints preclude use of upland sites not in close proximity to the harbor. Large expanses of undeveloped lands adjacent to Grays Harbor are typically a mixture of beach dune complex and wetlands which have important value as fish and wildlife habitat. Use of these areas is not considered a less environmentally damaging alternative to open water disposal. Disposal of outer harbor material in upland sites would also permanently remove clean sands from the sediment-starved Washington coast (i.e., making these sands unavailable for longshore transport to feed area beaches).

7.2.2 Wetland Disposal

Extensive intertidal wetland acreage in the inner Harbor was filled using dredged material, creating much of downtown Aberdeen and Hoquiam. It is now recognized that intertidal wetlands provide many important functions, which would be lost as a result of dredged material disposal. The use of open-water disposal and nearshore/beach nourishment sites is now considered to have less ecological impact than wetland disposal.

8. STATUS OF PROGRAM COMPLIANCE WITH MITIGATION AGREEMENTS

This section provides an update on the status of Corps compliance with mitigation agreements associated with the construction of the navigation improvement project, and construction of the Point Chehalis revetment extension.

8.1 Dungeness Crab Mitigation Strategy Agreement

Grays Harbor serves as a nursery ground for young Dungeness crabs, which eventually emigrate to the Pacific Ocean and enter an important commercial fishery. Hopper dredges entrain and kill a substantial number of crabs, and may disrupt crab habitat through removal of food and benthic debris that provide shelter for young crabs. The Corps addresses the loss of crabs attributable to the Navigation Improvement Project (NIP) authorized in 1986 through both impact avoidance and replacement measures. As mentioned in Section 6.3, dredging is scheduled to occur during periods outside peaks in crab abundance, and a program has been implemented to replace adult Dungeness crabs lost to the commercial fishery by increasing the survival of juvenile crabs. Shortly after construction of the wider and deeper channel in 1990, the Corps began placing oyster shell on tidal flats to enhance the survival of young Dungeness crabs following their metamorphosis from planktonic stages. Larval crab settle in the oyster shell plots, which provide cover and food, then 2 to 3 months later leave the intertidal flat for subtidal waters at a size that can survive most predation pressures.

Dungeness crab losses attributable to dredging are estimated using a Dredge Impact Model (DIM) developed by researchers at the University of Washington (Armstrong et al. 1987, Wainwright et al. 1992). The DIM predicts the number of crabs of various age classes (2+ and 0+) entrained and killed by dredges, then uses that prediction to forecast losses to the fishery and sets target production goals to mitigate for those losses. Dredging quantities, dates, and locations

are entered into the model each year in order to develop estimates of annual crab impacts and production goals.

Dungeness crab production on the mitigation plots is estimated through the input of crab density and shell cover data obtained from sampling trips each summer into a production model developed by researchers at the University of Washington (Armstrong et al. 1995, Visser and Armstrong 1998). Additional information on the sampling methodology and production model is available in the annual crab production reports available on the Seattle District's web site, <http://www.nws.usace.army.mil> (follow links to Environmental Resources Section, Monitoring and Technical Studies page). The output of the model is the number of J4 equivalent crabs (fourth molt after settlement) produced by the oyster shell plots over the course of one summer. This production number is then compared to the annual production goal output of the DIM in order to determine Corps compliance with crab mitigation requirements.

Mitigation requirements for NIP construction impacts have been met, and the construction mitigation account was closed out in 2002. The 1998 *Revised Crab Mitigation Strategy Agreement* required placement of 20 hectares of shell over a two-year period in order to produce the balance of crabs needed to mitigate for construction impacts. Since production rates were higher than the average rate for the two years after placement, an additional placement of 10 hectares was not required. Crab production rates were higher than the anticipated average rates because of an apparent recruitment failure of the yellow shore crab (*Hemigrapsus oregonensis*), which competes with Dungeness crab for the shell habitat (Visser et al. 2004).

Mitigation requirements for incremental maintenance impacts are ongoing. Since the last programmatic EA in 2001, the Corps has placed over 23,000 cubic yards of shell on the existing mitigation plots. Placement occurred in 2003 and 2006. The Corps also placed live oyster spat in 2006 to research the feasibility of establishing a self-sustaining source of oyster shell on the shell mitigation sites. The Corps will continue the shell mitigation program as long as the NIP wider and deeper portions of the channel are maintained.

Through 2004, 87% of the cumulative production goal for incremental maintenance had been met. Field sampling during June-August 2005 demonstrated that a total of 1.97 million J4 crabs were produced during the summer of 2005 (Visser, in prep.). This brings the cumulative production of J4 crabs from 1990 through 2005 to approximately 18.13 million crabs. Sampling for the 2006 season is currently underway.

Another component of the 1998 *Revised Crab Mitigation Strategy Agreement* was to collect crab population data in the Bar, Entrance, and South Reaches in order to better understand seasonal abundance of crab and determine if modification of dredge schedules is needed. The trawl data collected between 1996 and 1999 indicate that during April and May (when dredging occurs), adult crab densities in South Reach were higher than previously thought. Adult densities were lower in June, so the Corps coordinated with the crab agreement signatory agencies for an extension of the dredging window for South Reach (to June 30). Since the dredging window for the other outer harbor reaches remains April through May, it is difficult to schedule dredging in South Reach during June. However, whenever dredge schedules allow, the Corps will try to delay the dredging of South Reach until June. The new density information from these trawl

efforts has been incorporated into the DIM, so additional adult mortality is compensated for when adult impacts cannot be reduced through a dredging delay.

The proposed dredging and shell placement is consistent with the September 1998 *Revised Crab Mitigation Strategy Agreement*.

8.2 Point Chehalis Revetment Extension Mitigation Agreement

Between November 1998 and March 1999, the existing Point Chehalis revetment was extended 1,900 feet southward. The purpose of the project was to protect the Half Moon Bay shoreline from erosion, to protect public facilities landward of the shoreline, and to prevent tidal flooding in Westport. The revetment was constructed considerably landward of the foredune and beach face to reduce the environmental impacts of the project. An artificial dune was constructed waterward of the revetment to bury the structure.

The October 1998 *Point Chehalis Revetment Extension Mitigation Agreement* required periodic beach nourishment waterward of the revetment to maintain a stable beach profile (approximately 1V:60H) and to ensure that the toe of the revetment extension (at elevation +4 feet MLLW) is not exposed. The agreement also required the placement of dredged material in Half Moon Bay to facilitate a stable beach profile, so that renourishment of the upper beach can occur entirely above the mean higher high water contour (+9 feet MLLW). An anticipated schedule for these placements, based upon erosion trends at the time of the agreement, was developed as part of the mitigation agreement.

The beach and nearshore nourishment requirements of the Point Chehalis revetment extension mitigation agreement have been incorporated into the Grays Harbor maintenance dredging and disposal program. The Half Moon Bay direct beach and nearshore disposal sites described in Section 6.2.4 correspond to the beach nourishment placement sites specified in the mitigation agreement. Table 2 summarizes the predicted and actual sand placement volumes between 1999 and 2006.

While nearshore sand placement has exceeded expected volume levels, actual direct beach nourishment placement volumes are lower than those predicted in the agreement. The direct beach nourishment disposal site has a limited capacity for sand because of its physical dimensions. To remain compliant with the mitigation agreement and avoid nearshore and wetland impacts, disposal cannot occur waterward of the +9' MLLW contour or on the back slope of the revetment. As a result of these physical limitations, the disposal site has a capacity of approximately 150,000 cubic yards. Since sand is not eroding from the site as quickly as anticipated when the agreement was signed in 1998, there is not enough space to put the quantity of dredged material estimated in the placement schedule. There is currently about 80,000 cubic yards of sand in the disposal site. The next refill will occur when there is the capacity to place 100,000 cubic yards in the site, as it is not cost-efficient to contract for dredging and transportation of volumes smaller than 100,000 cubic yards via a specialty dredge with pump-off capabilities, vice the Government hopper dredge that is customarily used. It is expected that the direct beach nourishment disposal site will be used once during the five-year term of this EA. If erosion rates remain similar to those experienced during the past few years, the next refill will likely occur in 2008 or 2009.

**Table 2. Point Chehalis Revetment Extension Mitigation Agreement –
Summary of Predicted vs. Actual Placement Volumes (1999-2006)**

DISPOSAL YEAR	DIRECT PREDICTED (CUBIC YARDS)	DIRECT ACTUAL (CUBIC YARDS)	NEARSHORE PREDICTED (CUBIC YARDS)	NEARSHORE ACTUAL (CUBIC YARDS)
1999 (1)	0	180,000	300,000	228,470
2000 (2)	0	0	250,000	0
2001 (3)	460,000	-135,000 ¹	0	0
2002 (4)	0	135,700	220,000	378,440
2003 (5)	0	0	210,000	329,100
2004 (6)	0	-52,330 ¹	0	289,650
2005 (7)	190,000	0	0	102,180
2006 (8)	0	0	180,000	129,900
TOTAL	650,000	128,370	1,160,000	1,457,745

¹ Quantities removed for South Jetty breach fill maintenance. In 2004, material was moved in February (29,550 cy) and December (22,780 cy).

Continuation of routine maintenance dredging is essential to ensure the Corps' future compliance with the two seminal objectives of the mitigation agreement. The toe of the revetment extension has remained buried and the beach slope has achieved a stable profile due to past placement of dredged material in the Half Moon Bay nearshore and direct beach nourishment sites. Although re-charging of the 20,000 cubic yard sand stockpile landward of the northern segment of the revetment extension has not been necessary since the time of initial construction, the proposed action will provide the opportunity for replenishing that stockpile should its contents be depleted through rapid response to circumstances requiring re-burial of the revetment extension toe.

The proposed action will enable the Corps to remain compliant with beach nourishment obligations under the mitigation agreement.

8.3 Salmon Mitigation

When the Grays Harbor channel was widened as part of the navigation improvement project, approximately 1.8 acres of shallow subtidal habitat important to migrating juvenile salmon was lost. To mitigate for this loss, the Corps constructed an estuarine slough near the mouth of the Chehalis River in 1990. The slough is approximately 1,200 feet long and provides approximately 4 acres of intertidal and shallow subtidal habitat. The objective of creating this

habitat was to provide and maintain ecological functions of natural estuarine sloughs in the region, with particular emphasis on provision of estuarine habitat for juvenile salmonids.

The design of the created slough was based upon Ann's Slough, a natural slough adjacent to the mitigation site. Ann's Slough provides a reference, or control site, to monitor the effectiveness of the created slough in providing the habitat functions lost when the channel was deepened, as well as salmon usage of the area. The Corps has been monitoring the created slough and Ann's Slough for an array of indicators of fish and wildlife functionality; extensive field data collection occurred in 1992, 1995, and 2000 (Simenstad et al. 2001).

The monitoring obligations for this mitigation project have been completed. The final monitoring report indicates that ecological performance of the created slough has matured over the near decade of monitoring and assessment (Simenstad et al. 2001). Increasing similarity between the created slough and Ann's Slough has been documented since 1991.

By 1995, fish community composition and densities were not qualitatively different between the two sloughs. In general, prey resources of juvenile salmon are comparable between the two sloughs, especially in the case of fallout insects. However, the benthic community still demonstrates somewhat lower total density and different composition in the created slough relative to the reference slough. Although the geomorphic structure of the created slough is still distinctly different from the reference slough, it appears to be progressing toward a more natural geomorphic form through the process of sediment accretion and accumulation of large woody debris (LWD).

9. EXISTING ENVIRONMENT AND IMPACTS OF THE PROPOSED ACTIONS

Extensive information on the existing environment of Grays Harbor and impacts of annual maintenance dredging/disposal has been provided in previous environmental documentation. Only new and updated information is included in this brief assessment.

9.1 Sediment Quality

Sediments to be removed from the Grays Harbor channel have been tested and approved for open water disposal under the guidelines of the Dredged Material Management Program (DMMP) administered by the Corps, Environmental Protection Agency (EPA), Ecology, and DNR. The requirements for determining that Grays Harbor dredged materials are clean enough for unconfined, open-water disposal are documented in the 1995 *Dredged Material Evaluation Procedures and Disposal Site Management Manual, Grays Harbor and Willapa Bay, Washington* (the GHDMEP).

The GHDMEP specifies a six-year "frequency" guideline during which sampling and testing of the entire channel must be completed. Alternating portions of the navigation channel (Inner Crossover to Hoquiam, and Cow Point to South Aberdeen Reaches) are characterized every other year. Coarse-grained sands found at the Bar, Entrance, and South Reaches meet no-test guidelines for high-energy areas under the Marine Protection, Research, and Sanctuaries Act. The total dredging prism (including the authorized project depth, advanced maintenance depth, the paid allowable depth, and a contingency for non-pay dredging) is characterized.

Two rounds of sampling and sediment characterization have occurred since preparation of the last programmatic EA in 2001. In June 2002, 600,000 cubic yards material from the Inner Crossover to Hoquiam Reaches was sampled, then analyzed and determined to be suitable for open water disposal. The most recent sampling took place in June 2004, and resulted in the characterization of approximately 900,000 cubic yards of sediment from the Cow Point, Aberdeen, and South Aberdeen Reaches. All data³ supported the finding that proposed dredged material is suitable for open-water disposal (Anchor Environmental 2004).

The next round of sampling will occur prior to dredging in the fall of 2006, and will initiate the third 6-year cycle of GHDMEP sampling and testing first implemented in 1994. An suitability determination documenting this characterization is expected before the end of calendar year 2006.

9.2 Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed and proposed threatened or endangered species. Several species listed as either threatened or endangered are potentially found in Grays Harbor (Table 3).

Several changes in ESA designations have occurred since preparation of the last programmatic EA in 2001. The Aleutian Canada goose (*Branta canadensis leucopareia*) was de-listed, the Southwest Washington/Columbia River cutthroat trout (*Salmo clarki clarki*) was determined to be not warranted for listing, and critical habitat was designated for Coastal/Puget Sound bull trout (*Salvelinus confluentus*). Two new species occurring in and outside Grays Harbor have been listed. The Southern Resident Killer Whale (*Orcinus orca*) was listed as endangered, and the Southern Green Sturgeon (*Acipenser medirostris*) was listed as threatened.

The Corps has prepared a programmatic biological evaluation (PBE) to evaluate the impacts of the proposed actions on species and habitats protected under the ESA (Appendix D). The Corps submitted the PBE and initiated consultation with the U.S Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) in August 2006. The Corps' effect determinations are summarized in Table 3.

³ One *Neanthes* bioassay could not be interpreted due to quality control issues with the organism. The Dredged Material Management Unit (DMMU) in question was re-sampled in October 2004 and the bioassay rerun. The second sample passed all DMMP performance criteria, confirming that the sediments were suitable for open water disposal (Anchor Environmental 2005).

**Table 3. Endangered Species Potentially Occurring
in the Project Vicinity and Effect Determinations**

SPECIES	LISTING STATUS	EFFECT DETERMINATION	CRITICAL HABITAT DETERMINATION
Coastal/Puget Sound Bull Trout <i>Salvelinus confluentus</i>	threatened	not likely to adversely effect	not likely to adversely effect
Western Snowy Plover <i>Charadrius alexandrius nivosus</i>	threatened	not likely to adversely effect	not likely to adversely effect
Brown Pelican <i>Pelecanus occidentalis californicus</i>	endangered	not likely to adversely effect	—
Marbled Murrelet <i>Brachyramphus marmoratus</i>	threatened	not likely to adversely effect	no effect
Bald Eagle <i>Haliaeetus leucocephalus</i>	threatened	not likely to adversely effect	—
Southern Resident Killer Whale <i>Orcinus orca</i>	endangered	not likely to adversely effect	no effect
Southern Green Sturgeon <i>Acipenser medirostris</i>	threatened	not likely to adversely effect	—
Eastern Stock Steller Sea Lion <i>Eumetopias jubatus</i>	threatened	not likely to adversely effect	no effect
Humpback Whale <i>Megaptera novaeangliae</i>	endangered	not likely to adversely effect	—
Blue Whale <i>Balaenoptera musculus</i>	endangered	no effect	—
Fin Whale <i>Balaenoptera physalus</i>	endangered	no effect	—
Sei Whale <i>Balaenoptera borealis</i>	endangered	no effect	—
Sperm Whale <i>Physeter macrocephalus</i>	endangered	no effect	—
Leatherback Sea Turtle <i>Dermochelys coriacea</i>	endangered	no effect	no effect
Loggerhead Sea Turtle <i>Caretta caretta</i>	threatened	no effect	no effect
Mexican Nesting Green Sea Turtle <i>Chelonia mydas</i>	endangered	no effect	no effect
Mexican Nesting Olive Ridley Sea Turtle <i>Lepidochelys olivacea</i>	endangered	no effect	no effect

9.3 *Biological Resources*

Several Corps studies and monitoring efforts involving the biological resources of Grays Harbor have been completed since preparation of the last programmatic EA in 2001. The studies include:

- a multi-year bull trout sampling effort in the lower Chehalis River to confirm that USFWS work windows are protective of this threatened species (R2 Resource Consultants 2006);
- surveys of fish utilization of Half Moon Bay (R2 Resource Consultants 2005);
- benthic invertebrate sampling in Half Moon Bay and South Beach, and an analysis of stomach contents of fish obtained as part of the Half Moon Bay fish surveys (SAIC 2005);
- monitoring of dune grass plantings on the South Jetty breach fill (Corps 2005);
- a literature review and development of a study design for shorebird use assessments in the vicinity of the South Jetty (Raedeke Associates 2005);
- an assessment of shorebird use of terrestrial habitats adjacent to Half Moon Bay (Corps 2006); and
- sand lance spawning surveys in Half Moon Bay (Molenaar 2005).

Electronic copies of all of these reports are available on the Seattle District's web site, <http://www.nws.usace.army.mil> (follow links to Environmental Resources Section, Monitoring and Technical Studies page).

The 1999 listing of bull trout as a threatened species altered the dredging schedule for the lower Chehalis River. The dredging closure period protective of migrating juvenile salmon was extended by two months, between February 15 – March 15 and June 15 – July 15. USFWS requested that the Corps undertake a literature review and three year sampling effort of the affected reaches to establish patterns of bull trout use during these two months of the year. The purpose of this effort was to substantiate the then new USFWS work window for bull trout in order to ensure the new window was fully protective of this species. Fish biologists from R2 Resources sampled 12 sites in 2001, 2002, 2003, and 2004 (R2 Resources 2006). Acoustic tags were implanted in the bull trout captured in 2004, so additional data was collected in 2005. The results of the literature review and sampling effort indicate that bull trout are present in the lower Chehalis River beginning in mid- to late February and continuing through mid-July. The tagged fish appeared to display a preference for the mainstem reach of the Chehalis River between the Elliott Slough Turning Basin and Cow Point Reach. No tagged fish were detected at a fixed receiver station in Half Moon Bay. The USFWS work window does appear to correspond with the portion of the year when bull trout are least likely to be present in the inner harbor dredging area. This new information confirms that by dredging during the window designated by USFWS, the Corps avoids adverse effects to bull trout. Therefore, impacts of the proposed action on this ESA-protected species are expected to be insignificant.

The purpose of recent sampling efforts in Half Moon Bay was to begin defining existing environmental conditions, specifically nearshore fish and benthic invertebrate assemblages, for the Grays Harbor Long Term Management Study (see Section 11.1). The R2 (2005) fish survey

work indicates that fish and crab assemblages along the Half Moon Bay shoreline are diverse and numerous throughout the summer months. From late June through August, juvenile Chinook salmon and juvenile/adult surf smelt were the most numerous and consistent inhabitant of the Bay. Species diversity and overall fish density was greater during the summer months than during the spring months, as compared to previous beach seine work (R2 Resources 1999).

The SAIC (2005) benthic survey work indicates that the highest abundance and number of invertebrate taxa occurred at the subtidal sample stations (-4, -8, and -12' MLLW). The -12 stations were located within the Half Moon Bay nearshore nourishment disposal site, and the June samples were taken less than two months after disposal of almost 290,000 cubic yards of dredged material in the site. A shift in dominant taxa at the -12 stations was noted in the June samples as compared to the samples taken the previous January. The June samples were dominated by the polychaete *Saccocirrus* sp., while the January samples were dominated by nemerteans. *Saccocirrus* was not found in the January samples, but nemerteans were present in June as subdominant species. In both the January and June samples, juvenile organisms dominated the samples and a small number of adult organisms were found. This data supports conclusions made in previous NEPA documents that areas disturbed by navigation maintenance activities recolonize quickly.

SAIC (2005) also analyzed the stomach contents of fish captured as part of the R2 (2006) seining effort. Species collected for stomach content analysis included Chinook salmon, surf smelt, sandlance, American shad, shiner perch, English sole, speckled sanddab, and sand sole. With the exception of the flatfish, there was little overlap between the stomach contents of fish captured in Half Moon Bay and benthic organisms present there. English sole appeared to be feeding on benthic polychaetes derived from mid to lower tidal elevations in Half Moon Bay. A discussion on what the results of these sampling efforts describe regarding food web relationships and the effects of sand placement in upper intertidal areas of Half Moon Bay can be found in the 2004 *South Jetty Breach Fill Maintenance Final Supplemental EA*.

As part of the Corps' 2002 effort to plant American dunegrass on the South Jetty breach fill, experimental plots were created to evaluate different methods for establishing vegetation. The 60,000 grass culms planted on the 3 acre breach fill and these experimental plots have been monitored since 2002 (Corps 2005). Plant survival rates on the experimental plots averaged 91%, and were highest when the dunegrass was planted in clusters. Sand deposition was also accelerated under the clustered planting treatment. Plant survival rates for the larger planting area are comparable to the survival rates on the experimental plots. Volunteer (unplanted) dune species, including European searocket, beach pea, seashore lupine, northern dune tansy, and European beachgrass, were also noted in the planting area.

Assessments of shorebird use of the South Jetty, South Beach, and Half Moon Bay shoreline were conducted to define existing environmental conditions for the Grays Harbor Long Term Management Study (Raedeke 2005, Corps 2006). Brown pelicans were observed and noted during the year-long survey; since this species is protected under the ESA, this data is being considered during preparation of the PBE for the maintenance program.

Between December 2004 and April 2005, WDFW fishery biologists conducted twice monthly sand lance spawning surveys along the Half Moon Bay shoreline. No eggs were found, and WDFW concluded that the study area was not suitable spawning habitat because wave energy was too high (Molenaar 2005).

9.4 Erosion and Migration of Whitcomb Flats

During preparation of the last programmatic EA in 2001, the Corps received several comment letters regarding the loss of prime oyster lands in the vicinity of Whitcomb Flats due to sand movement and high wave energy (see also Section 11.3 of this document). The Corps has acknowledged the role of the navigation project, specifically the jetties, in the changes occurring.

Many highly productive oyster lands in South Bay have been lost due to migration and erosion of Whitcomb Flats. Shifting sands bury oyster beds and/or change the substrate from more productive mud to compacted sand. Exposure to higher wave energy interrupts harrowing (harvest) operations, further affecting production. Several oyster growers have been forced to shift production to marginal areas where growth rates are not as high and oyster quality is low. A number of Washington Department of Natural Resources (DNR) oyster leases have not been renewed or cancelled. DNR has estimated that the changes occurring at Whitcomb Flats are resulting in an annual loss of approximately \$57,000 in lease revenue to the state. Additional losses in revenue are being incurred by private businesses, thereby affecting the local economy.

In response to DNR and oyster grower concerns in 2001, the Port of Grays Harbor commissioned a report to provide additional information on the erosion/migration of Whitcomb Flats and its possible causes. Osborne (2003) conducted an analysis of geomorphic change and inlet processes at and adjacent to Whitcomb Flats.

Whitcomb Flat has migrated steadily eastward in the past 34 years. Osborne (2003) identified several factors contributing to this change, the primary ones being washover and erosion by storm waves, and a reduction in sediment supply. The report linked wave effects on Whitcomb Flats to depth changes in the south side of the inlet. Construction of the jetties was identified as the most significant contributor to deepening of the inlet channel. Another factor evaluated in the report was the southeastward growth of Damon Point. Bathymetric surveys indicate that a large volume of accretion at Damon Point and on the north side of the inlet (formerly Sand Island Reach) has occurred over the past several decades. This accretion has constricted tidal discharge, resulting in a local acceleration of tidal currents, and forced the main body of the current to the south side of the inlet. These conditions have resulted in erosion in the South Reach area just north of Whitcomb Flat. Between 1956 and 2002, scour depths in the South Reach area averaged 20 to 30 feet.

In the late 1970s, the Sand Island Reach of the navigation channel was relocated to the current South Reach alignment. This realignment occurred because the Sand Island Reach was shoaling to the extent that dredge volumes were unmanageable, while the South Reach area was eroding. Because the relocation coincided with a period of southward migration and deepening of the channel, Osborne (2003) determined that it is difficult to distinguish the impacts of the relocation and dredging from the larger scale morphological changes that were occurring in that part of the inlet throat.

Osborne (2003) modeled temporal variation in wave height at Whitcomb Flats between 1955 and 2002, and identified an increase in the height of extreme storm waves over time. There was no significant variation in the wave height time series that correlated with either the channel realignment in the late 1970s or the Navigation Improvement Project completed in 1991. Instead, there was a steady increase in wave height through time. He attributed this change to the general increase in depth of the inlet throat, as well as the shifting of the deepest part of the channel to the south.

Channel relocation, deepening/widening, and maintenance dredging have contributed to the larger scale and longer term system response to the jetties by adding to the overall increase in inlet depth in the South Reach area. However, Corps analysis indicates the local scale changes in depth associated with maintenance dredging are inconsequential in comparison to ongoing larger scale trends in inlet geomorphology. A sediment budget developed by Byrnes and Baker (2003) indicates that maintenance dredging is a minor component of net sediment loss in the Grays Harbor inlet throat. Between 1987 and 2002, the inlet throat sub-area experienced a volume change of -2.33 million cubic yards of sediment annually. Maintenance dredging contributed only 460,000 cubic yards to this net loss per year in this inlet sub-area (Byrnes and Baker 2003).

The Corps has determined that contribution of the proposed action—maintenance dredging—is small enough to be negligible in relation to the increase in wave height experienced at Whitcomb Flats.

10. CUMULATIVE IMPACTS

NEPA requires the evaluation of cumulative impacts to assess the overall effect of a proposed action on resources, ecosystems, or human communities in light of past, present, and reasonably foreseeable future projects. The cumulative impact analysis includes actions by federal, non-federal, and private entities.

The historic habitats of the lower Chehalis River and Grays Harbor have been altered by previous dredging, diking, filling, jetty construction, industrial discharges, and other anthropogenic activities over the past 100 years. These activities have resulted in the loss of wetland and other intertidal habitats, conversion of shallow water habitats to deeper water, erosion and migration of sand islands, and a reduction in water quality. By one estimate, approximately 14,579 acres or 30% of historic intertidal habitats have been lost (NRC 1996). Degradation of ecological function associated with these changes has affected the capacity of these habitats to support fish and wildlife populations. While historic impacts have been detrimental to the natural environment, the cumulative effects of dredging on the human environment support economic use of the area by removing potentially hazardous areas of shoaling.

Some level of annual maintenance dredging has occurred every year since 1910, but no new areas have been dredged and no new disposal sites have been designated since the late 1990s. Up to 1,725 acres are disturbed by the Corps' annual maintenance dredging, with an additional 697 acres disturbed by disposal of this material. This area is equivalent to approximately 12% of

the total acreage of subtidal habitat in the harbor. Only areas previously designated as channel or disposal site are disturbed. Dredged material disposal practices no longer contribute to the conversion of intertidal wetlands to uplands. Though annual maintenance dredging does result in mortality and reduced habitat value for a variety of marine and estuarine species, the continuation of the Corps maintenance dredging program would not result in any new impacts to ecological function given the existing degraded condition of the navigation project area.

Annual maintenance dredging by the Corps is likely to continue for the foreseeable future. In addition, the Port of Grays Harbor conducts maintenance dredging of their marine terminal facilities adjacent to the federal navigation channel. An average of 30,000 cubic yards (maximum of 70,000 cubic yards) is removed annually. Impacts of and regulatory restrictions on Port dredging are similar to those of the Corps dredging program, but the scale of Port dredging activities is much smaller. Construction of other new projects with substantial impacts would likely require mitigation to avoid further significant degradation. Other Corps studies and activities in Grays Harbor are described in Section 11 below. At this time, the outcome of these studies are too uncertain for any specific projects to be considered reasonably foreseeable future actions and included in this analysis.

Cumulative effects on the natural environment are not expected to increase due to the proposed maintenance dredging; rather they are a continuation of the current type and intensity of human use of the navigation project area. Direct impacts associated with the proposed action would occur only in areas previously disturbed by dredging and disposal activities. The mitigation measures implemented to ameliorate negative effects also reduce the cumulative impacts of this project. The human environment is benefited by past, present, and future dredging actions through the safeguarding of navigation within the harbor and the facilitation of commercial and recreational vessel use of the harbor. All dredging in the harbor removes shoaled sediments that would otherwise hinder safe navigation. In light of the past trend of loss, and in the context of past, present, and reasonably foreseeable actions, the continuation of the maintenance dredging program will not result in significant cumulative effects.

11. OTHER CORPS STUDIES AND ACTIVITIES RELATED TO GRAYS HARBOR

11.1 Grays Harbor Long Term Management Study

Features of the Grays Harbor and Chehalis River Navigation Project include the navigation channel, the North and South Jetties, and the Point Chehalis revetment. The Corps' mission is to maintain all of these features in order to provide safe navigation in Grays Harbor. The Seattle District Corps is currently conducting a study, the Grays Harbor Long Term Management Study (LTMS), to identify the most cost-effective and environmentally sound strategy to operate and maintain the federal project in Grays Harbor.

The LTMS is evaluating the implications of the persistent loss of sediment from the Grays Harbor entrance (including North Beach and South Beach), which is expected to continue indefinitely. Without intervention, shoreline erosion near the South Jetty will eventually breach the landmass adjacent to the jetty. The Corps is assessing the threat of such a breach to the Federal Navigation Project and will assess and recommend the most appropriate long-term management strategy for continued maintenance of the channel and other project features. This

strategy may include components that are within existing operations and maintenance program, while other components may require approval from Corps Headquarters and/or modification to the authorized project/project features. Implementation of strategy components will require preparation of a separate NEPA document, and/or inclusion in future maintenance program NEPA documents.

Contingent Interim Actions. Until the LTMS study is concluded and any recommended components are implemented, the Corps will continue to monitor the vicinity of the South Jetty and, in order to preserve the status quo, place material in strategically selected areas of the breach fill as needed to protect against an undue risk of a breach recurring in the vicinity of the South Jetty due to continued erosion. Periodic mechanical rehandling of material from the Half Moon Bay direct beach nourishment site may occur as part of this interim measure if survey data indicates the need for such action. Any contingent interim actions would be conducted as described in the November 2005 *South Jetty Breach Fill Maintenance Final Supplement to the Final Supplemental Environmental Assessment*, or evaluated in separate NEPA document(s).

Test Dredge. Annual surveys of the navigation channel have shown that the center of the harbor entrance is deepening and may potentially reach the authorized depth of the federal navigation channel. This natural deepening may present an opportunity to realign the current channel and reduce the amount of maintenance dredging. A test dredge is being planned for spring 2007 in order to determine whether the new channel alignment is a feasible alternative as a component of the LTMS. The test dredge will be evaluated in a forthcoming NEPA document. If results of the test dredge indicate that a channel realignment is feasible, any recommended realignment would be evaluated in an LTMS NEPA document and/or future maintenance program NEPA document(s).

11.2 Navigation Improvement Project Phase II

Section 202 of the Water Resources Development Act of 1986 authorized the Grays Harbor Navigation Improvement Project (NIP) and a channel depth of 38 feet. Phase I of the NIP consisted of modifications to 23.5 miles of channel. In 1991, the Corps completed the deepening of 19.7 miles of downstream channel (Bar Channel to Cow Point Reach), and the widening of the Cow Point Turning Basin to 900 feet. In 1999, the Corps completed the deepening of 3.8 miles of upstream channel (South Aberdeen Reach), and the widening of the Cow Point Turning Basin to 950 feet.

The Port of Grays Harbor has requested the Corps pursue the second phase of the NIP to deepen the downstream channel (Cow Point to South Reaches) to the full authorized depth of 38 feet. The Corps is currently working in cooperation with the Port to assess the economic viability of implementing Phase II. If further deepening is found to be economically feasible, then the Corps will proceed with design and environmental evaluations to a prepare a decision document for approval. Preparation of a separate NEPA document would occur concurrent with formulation of any recommended plan.

11.3 Whitcomb Flat Section 111 Study

The Washington Department of Natural Resources (DNR) leases over 2,000 acres of state-owned aquatic lands in Grays Harbor for the purpose of oyster culture. As described in Section 9.4, many prime oyster lands in South Bay have been lost due to migration and erosion of Whitcomb Flat. The changes occurring at Whitcomb Flat are a result, in part, of the installation of the North and South Jetties. The jetties are causing a general deepening of the harbor inlet, as intended.

Section 111 of the Water Resources Development Act of 1968, as amended, gave the Corps the authority to study and implement projects for prevention or mitigation of shore damages attributable to federal navigation projects. Section 111 requires involvement of a local sponsor, a state or local government agency willing to share in the cost of the project and accept responsibility for maintenance requirements.

After completion of the 2001 programmatic EA, DNR requested the Corps initiate a Section 111 study for Whitcomb Flat. A study was initiated, but in 2003 DNR decided not to pursue the study as a local sponsor. In a September 2006 letter, DNR expressed interest in re-initiating the Whitcomb Flat Section 111 study. The Corps is willing, dependant on funding, to re-initiate the study in order to evaluate impacts and develop mitigation measures for Whitcomb Flats.

12. ENVIRONMENTAL COMPLIANCE

12.1 National Environmental Policy Act

This EA, along with the documents listed in Section 3, satisfy the documentation requirements of NEPA. A Finding of No Significant Impact (FONSI) is provided in Appendix A. Letters received during the comment period can be found in Appendix B, and Corps responses are provided in Appendix C.

12.2 Endangered Species Act

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded projects must take into consideration impacts to federally listed or proposed threatened or endangered species. Since the maintenance dredging will affect some listed species, an informal Section 7 consultation is required. The Corps prepared and submitted a PBE for submission to USFWS and NMFS (Appendix D). The Corps' effect determinations can be found in Section 9.2; no significant effects on listed species are anticipated. The Corps received letters from NMFS concurring with the determinations made in the PBE on 2 October 2006 (Appendix E). The Corps received a letter from USFWS concurring with a previously submitted PBE on 3 May 2006 (Appendix E). This one-year approval is valid for inner harbor dredging during fall 2006. A new concurrence letter will be required for any dredging occurring during and after May 2007.

12.3 Clean Water Act

Section 404 of the Clean Water Act authorized a permit program for the disposal of dredged or fill material into waters of the United States, and defined conditions which must be met by

Federal projects before they may make such discharges. The Corps of Engineers retains primary responsibility for this permit program. The Corps does not issue itself a permit under the program it administers, but rather demonstrates compliance with the substantive requirements of the Act through preparation of a 404(b)(1) evaluation.

The Corps has prepared and distributed for public comment a Section 404 public notice. The Corps also prepared a 404(b)(1) evaluation to document findings regarding this project pursuant to Section 404 of the Act as well as Section 10 of the Rivers and Harbors Act of 1899. These documents can be found in Appendix F.

Section 401 of the Act requires federal agencies to comply with state water quality standards. On 9 August 2006, the Washington Department of Ecology amended a previously issued a Water Quality Certification (Order #CENWS-OD-TS-NS-12) by extending the expiration date to 30 June 2007 (Appendix E). The Corps has requested a new order to certify compliance with State water quality standards through September 2011. The Corps will abide by the conditions of the extended Order #CENWS-OD-TS-NS-12 and future Water Quality Certifications to ensure compliance with State water quality standards.

12.4 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program. The Corps has prepared a CZM Consistency Determination for the navigation channel maintenance program (Appendix G). This evaluation established that the proposed work complies with the policies, general conditions, and general activities specified in the approved Grays Harbor County Shoreline Management Master Plan, the City of Westport Shoreline Management Master Plan, and the Grays Harbor Estuary Management Plan. The proposed action is thus considered consistent to the maximum extent practicable with the State of Washington Shoreline Management Program.

12.5 Marine Protection, Research, and Sanctuaries Act

Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) authorizes the EPA to promulgate ocean dumping criteria and designate recommended ocean disposal sites. The Southwest (3.9) site has been designated as an ocean disposal site under Section 102 of the MPRSA.

12.6 National Historic Preservation Act

The National Historic Preservation Act requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. It is the policy of the Corps that historic resources surveys should not be conducted for maintenance dredging and disposal activities proposed within the boundaries of previously constructed navigation channels or previously used disposal areas [33 CFR 336.1(c)(6)]. Since the proposed dredging is confined to the removal of recently deposited

sediments within the previously dredged channel width and depth boundaries, no submerged cultural resources will be affected by the project.

12.7 Magnuson Fishery Conservation and Management Act

The Magnuson Fishery Conservation and Management Act requires Federal agencies to consult with the NMFS regarding actions that may adversely affect Essential Fish Habitat (EFH) for Pacific coast groundfish, coastal pelagic species, and Pacific salmon. An EFH determination was included in the PBE submitted to the NMFS for review. In a letter dated 2 October 2006, NMFS concurred with the Corps effect determination for EFH and concluded that the conservation measures proposed in the PBE are adequate to avoid, minimize, or otherwise offset potential adverse impacts to EFH (Appendix E). \

12.8 Clean Air Act

The Clean Air Act established National Ambient Air Quality Standards (NAAQS) for States to attain or maintain. States are responsible for developing a State Implementation Plan (SIP) for eliminating or reducing the severity and number of violations of the NAAQS. Grays Harbor is not located in a NAAQS non-attainment area.

The Act requires that Federal agencies do not engage in any activity which does not conform to a SIP. Maintenance dredging and disposal activities are specifically excluded from CAA conformity determination requirements because they are expected to result in no emissions increase or an increase in emissions that is clearly *de minimis* [40 CFR 51.853 (c)(1)(ix)].

12.9 Executive Order 12898, Environmental Justice

Executive Order 12898 directs every Federal agency to identify and address disproportionately high and adverse human health or environmental effects of agency programs and activities on minority and low-income populations.

The Quinault Tribe constitutes a distinct, separate community of Native Americans who rely on Treaty-reserved fish for subsistence, economic, and spiritual purposes. The Grays Harbor maintenance dredging program is not expected to result in any disproportionate adverse environmental effects or impacts on the health of tribal members, or other minority/low-income populations. No interference with treaty rights is anticipated. Tribal biologists were involved in the development of the Dungeness crab mitigation agreement, and outer harbor dredging schedules are coordinated with the Quinault crab fishery manager annually to ensure no conflicts with the fishery occur.

The project does not involve the siting of a facility that will discharge pollutants or contaminants. Dredged material is thoroughly tested for a wide variety of contaminants prior to disposal to ensure that the material is suitable for unconfined, open-water disposal. Therefore, no human health effects would occur. Maintenance of the existing navigation project would not negatively affect property values in the area, or socially stigmatize local residents or businesses in any way.

13. UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects of the proposed project include: (1) temporary, localized disruption of navigation by operating dredges and disposal barges; (2) temporary, localized disturbance of fish and wildlife in the vicinity of dredging and disposal operation; (3) mortality of benthic invertebrates and fishes in the path of the dredges and in disposal sites; and (4) temporary, localized water quality degradation associated with turbidity plumes.

Potential impacts of dredging and disposal operations on salmonids, forage fish, and Dungeness crabs will be reduced and/or avoided through implementation of timing restrictions, dredge type restrictions, and pre-disposal trawl surveys. In addition, entrainment impacts to Dungeness crab are being mitigated in accordance with the interagency crab mitigation strategy agreements. Due to these measures, impacts associated with this project to these economically important resources should not be significant.

For reasons discussed in this and previous environmental documents, the Corps has determined that the effects resulting from continued maintenance of the Grays Harbor and Chehalis River Navigation Project are not significant.

14. CONCLUSION

The Corps has determined that the on-going maintenance dredging and disposal program in Grays Harbor and the lower Chehalis River is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement.

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