Five-Year Programmatic Environmental Assessment and 404 (b)(1) Analysis

Humboldt Harbor and Bay Operations and Maintenance Dredging (FY 2012- FY 2016)

Humboldt Bay, Humboldt County, California

U.S. Army Corps of Engineers
San Francisco District

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ACRONYMS AND ABBREVIATIONS

ADCP	Acoustic Doppler Current Profiler
BA	Biological Assessment
BMPS	Best Management Practices
CEQ	Council on Environmental Quality
CY	Cubic Yards
DB	Decibels
DBA	A-Weighted Decibel
DO	Dissolved Oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ERDC	United States Army Engineer Research and Development Center
ESA	Endangered Species Act
FONSI	Finding Of No Significant Impact
HBDS	Humboldt Bay Disposal Site
HOODS	Humboldt Open Ocean Disposal Site
IODS	Interim Offshore Disposal Site
M	Meters
MDL	Method Detection Limit
MLLW	Mean Lowest Low Water
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRL	Method Reporting Limit
NDS	Nearshore Disposal Site
NEPA	National Environmental Policy Act
NM	Nautical Miles
NRHP	National Register of Historic Places
OBS	Optical Backscatter Sensor
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
SAP	Sampling and Analysis Plan
SHPO	State Historic Preservation Office
TPA	Target Placement Area
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
WRDA	Water Resources Development Act

1.0 Proposed Project

1.1 Introduction

This environmental assessment (EA) is written in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C 4321 *et seq*), as amended, the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508), U.S. Army Corps of Engineers (USACE) Planning Regulations (ER 200-2-2) and Section 404 of the Clean Water Act (33 U.S.C. 1344). It presents an assessment of the potential impacts associated with the annual operations and maintenance dredging of Humboldt Harbor and Bay and reasonable alternatives to this proposed action.

This section provides a brief description and history of the proposed action, action area, and proposed action objectives.

1.2 Project History

Humboldt Bay has been maintained for shipping commerce since 1881 when the interior channels were first constructed, providing safe navigation within the bay. The first attempt at stabilizing the entrance to Humboldt Bay occurred in 1889, resulting in the construction of twin jetties north and south of what is now called the Bar and Entrance Channel. Since then, there have been periodic changes to Humboldt Harbor and Bay in an attempt to provide for safe navigation for ocean-going vessels of many sizes (Table 1). Humboldt Bay is also a harbor of refuge with a U.S. Coast Guard presence that must be supported.

Table 1 General Chronology of Humboldt Bay Use and Improvements

Date	Description
1806	First recorded chart of Humboldt Bay (Bay of the Indians) by the Wiyot Indians.
1849	Humboldt Bay rediscovered and named Trinity Bay.
1850	Renamed Humboldt Bay.
1853	First marker buoys used for the Bay.
1856	Light tower construction completed on North Spit.
1871	Studies for navigation improvements begin.
1881	600 vessels per year using the Bay.
1881	Brush and plank jetties constructed, but destroyed the following winter.
1881	First USACE project authorized, the Eureka Channel is dredged.
1881	Arcata, Samoa, and Hookton Channels dredged for the first time.
1883	First survey for a low water jetty on the South Spit.
1884	South Jetty authorized.
1887	Training wall was shown on South Spit Jetty plans.
1888	Dual jetties authorized.
1889	South Jetty construction commences (brush and stone construction).
1891	North Jetty construction commences.
1894	North Jetty built out to Bend 420; South Jetty built out to Bend 230.
1896	Bar Channel enlarged to 25 feet deep and 100 feet wide.
1900	Initial jetty construction completed—8,000 feet long, 5 to 10 feet above MLLW.

Table 1 General Chronology of Humboldt Bay Use and Improvements

Date	Description
1911-1917	Jetties damaged and repaired and raised from original elevation of 10 to 12 feet MLLW to a reconstructed height of +18 feet above MLLW.
1939	Dual rubble-mound jetties completed.
1939	Entrance Channel completed—30 feet deep and 500 feet wide.
1939	Eureka, Samoa, Arcata, and Fields Landing Channels initial construction completed.
1954	Entrance Channel deepening completed—40 feet deep.
1954	Eureka and Samoa Channels deepening (30 feet) completed and North Bay Channel initial construction completed.
1959	Engineering and design study; repair North and South jetties.
1960-1963	Repair jetty damage of winter 1957-1958.
1964-1965	Extreme damaged to jetties, 100-ton blocks washed away.
1966-1967	Repair and maintenance on North and South jetties.
1969	Jetty repair study and model conducted by the USACE Engineering Research and Design Center (ERDC) in Vicksburg, Mississippi.
1971	Humboldt Bay Bridge completed, connecting the North Spit with Eureka.
1971-1973	Heads of both jetties completely destroyed. Dolosse placed on jetties.
1977	USACE names jetties a historical engineering landmark.
1999	Bar and Entrance Channel deepened to 48 feet MLLW and segments of the interior channels to 38 MLLW.
1999	Deepening of Samoa Turning Basin to 38 feet MLLW.

1.3 Project Location

Humboldt Harbor and Bay is located in Humboldt County on the coast of Northern California (Figure 1), approximately 225 nautical miles north of San Francisco and approximately 156 nautical miles south of Coos Bay, Oregon. Humboldt Bay is the only harbor between San Francisco and Coos Bay with deep-draft channels large enough to permit the passage of large commercial ocean-going vessels. It is the second largest coastal estuary in California.

Humboldt Bay lies in a narrow coastal plain surrounded by rolling terraces, steep mountains, and narrow valleys typical of the coastal ranges in the region. Much of the forested area consists of coastal redwoods and Douglas fir. Eureka, the largest city on the north coast of California and the seat of Humboldt County, and its neighbor, Arcata, are the two largest cities bordering the Bay. Eureka, which is approximately five miles east of the entrance to the Bay, is accessible from the water by the North Bay and Eureka channels. Arcata, which is approximately seven miles north of Eureka, was once accessible from the Bay by the Arcata Channel; however, this channel is no longer in use.

Humboldt Bay is a naturally land-locked estuary composed of two large bays, the relatively shallow South Bay to the south and the larger Arcata Bay to the north. A long, narrow thalweg and a small bay, the Entrance Bay, connect the South and Arcata bays and also provide an outlet to the Pacific Ocean. Humboldt Bay is separated from the Pacific Ocean by a sand spit that is incised by two large armored rubble-mound jetties, the North and South jetties. These man-made rubble-mound jetties, constructed by USACE, are approximately 2,000 feet apart and provide a stable, entrance to Humboldt Harbor.

The Bay extends north and south for a distance of approximately 14 miles, covering 26.5 square miles at high tide and approximately 7.8 square miles at low tide.

Figure 1: Proposed Project Location-Regional

1.4 Project Description

USACE proposes to continue annual operation and maintenance (O&M) dredging activities at Humboldt Harbor and Bay from Fiscal Year 2012 through FY 2016, including beneficial use of dredged material for placement at a nearshore demonstration site to alleviate erosion along the North Spit (Figure 2).

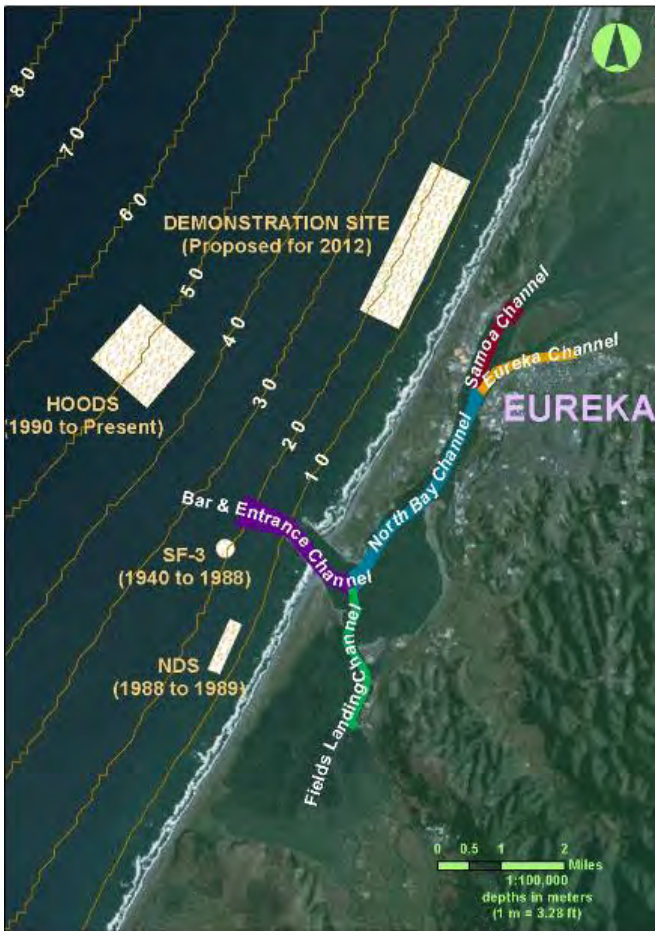

Figure 2: Proposed Action Area Including Proposed, Current, and Past Placement Sites

1.4.1 Bar and Entrance Channel

The Bar and Entrance Channel is approximately 8,500 feet long and 500 to 1,600 feet wide, with a Congressionally-authorized depth of 48 feet Mean Lower Low Water (MLLW) and an allowable overdepth of two feet. Annual maintenance dredging of the Bar and Entrance Channel is performed by USACE hopper dredges: *Essayons* (primarily) and *Yaquina* (occasionally), from mid-March through May for approximately 32 days. On average, 1,082,000 cubic yards (CY) of primarily-clean sand is removed during a dredging episode. Historically, all suitable dredged material has been placed at the Humboldt Open Ocean Disposal Site (HOODS); however, the Humboldt Bay Demonstration Site (HBDS) is being analyzed as a viable beneficial-use option for all sandy-dredged material for this five-year dredge cycle. According to 2010 grain size analysis, this channel consists of greater than 88 percent sand, and as such, is eligible to be placed at the HBDS.

1.4.2 Interior Channel Maintenance Dredging

Annual maintenance dredging of the North Bay, Eureka, Samoa, and Field's Landing channels is conducted by the USACE hopper dredge, *Yaquina*. Generally, dredging of the interior channels takes approximately 30 days in March and April. Dredged volumes from the interior channels tend to be lower than those from the Bar and Entrance Channel because the Samoa, Fields Landing, and, to a greater extent, Eureka channels only need to be "spot dredged" to maintain

their prescribed depths. The term “spot-dredging” indicates dredged material is not evenly distributed and the entire channel would not be dredged. Each interior channel is described in detail below.

The North Bay Channel is 18,500 feet long and 400 feet wide, with a project depth of 38 feet MLLW, plus one foot of allowable overdepth. To maintain its authorized depth, an average of 89,000 CY of material is removed annually from the channel. According to a 2010 grain-size analysis, dredged material from this area is at least 98 percent sand, making it eligible to be placed at the HBDS.

The Eureka Channel is 9,700 feet long and 400 feet wide, with an authorized depth of 35 feet MLLW for 3,000 feet of length and 26 feet MLLW for the remaining 6,700 feet. One foot of overdepth is allowed throughout the channel. To maintain its authorized depth, an average of 24,000 CY of material is removed annually from the channel. According to a 2010 grain size analysis, the dredged material is less than 80 percent sand, so it canbe placed at HOODS

The Samoa Channel is 8,100 feet long and 400 feet wide, with a project depth of 38 feet MLLW, plus one foot of allowable overdepth. The channel also consists of a turning basin 1,000 feet wide by 1,000 feet long, with an authorized depth of 38 feet MLLW and one foot of allowable overdepth. To maintain its authorized depth, an average of 24,000 CY of material is removed annually from the channel and turning basin. According to a 2010 grain size analysis, the dredged material is approximately 80 percent sand, making it eligible for placement at the HBDS.

The Field’s Landing Channel is 12,000 feet long and 300 feet wide, with a 800-foot-long, 600-foot-wide turning basin. To maintain its authorized depth of 26 feet MLLW, plus one foot of allowable overdepth, an average of 6,000 CY of material is removed annually from the channel and turning basin. According to a 2010 grain size analysis, the dredged material is approximately 88 percent sand, making it eligible to be placed at the HBDS.

1.5 Purpose and Need for the Proposed Action

1.5.1 Need

The need for the proposed action arises out of the fact that without annual maintenance dredging, all of the federal navigation channels into and within Humboldt Bay eventually would shoal to the point that the safe, efficient passage of commercial deep-draft vessels to the port would not be possible. This situation would discourage shippers from using Humboldt Bay for commerce because it would require additional vessel trips to accommodate “light-loaded” vessels, resulting in increased transportation costs, decreased vessel safety, maneuvering problems, and pollution. This would subsequently have a long-term adverse impact on the local economy of Humboldt County and on National Economic Development. In addition, the use of the harbor for refuge during storms and the operation of US Coast Guard ships based in the Bay would be compromised. Finally, ship groundings caused by unmaintained deep-draft channels could result in oil and fuel spills.

Furthermore, the Humboldt Shoreline Monitoring Program (HSMP), which began in 1990 to monitor the effects of removing sandy material from the Eureka littoral cell and placing it at HOODS, identified a general sediment-transport trend of seaward movement and accretion of the

beach along the South Spit and shoreward movement and erosion of the beach on the North Spit. The HSMP surveys are restricted to the Eureka Cell, extending the length of the spits (approximately seven miles south of the South Jetty and seven miles north of the North Jetty).

1.5.2 Purpose

The purpose of the proposed action as represented by measureable objectives is required to address each specific need as stated above.

- To maintain the Congressionally-authorized depths of the federal navigation channels within Humboldt Harbor and Bay through annual maintenance dredging.
- To implement a nearshore demonstration site and beneficially use suitable dredged sediment to alleviate erosion along the North Spit in FY 2012 running through FY 2014. After the FY 2014 dredged material placement, USACE will evaluate the demonstration project to determine if future placement of dredged material is warranted.

1.6 Basic and Overall Project Purpose

Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (Clean Water Act) requires USACE to analyze its activities that involve placement of dredged or fill material into waters of the United States (33 USC 1344). For non-water-dependent projects, the guidelines prohibit discharges of dredged or fill material into waters of the United States if a practicable alternative to the proposed project exists that would have less adverse impacts on the aquatic ecosystem, including wetlands, and does not have other significant environmental consequences (40 Code of Federal Regulations [CFR] 230 [a]).

- Basic Project Purpose - The basic project purpose for the proposed action is to maintain the Congressionally-authorized depths of the federal navigation channels within Humboldt Harbor and Bay and allow for beneficial use of all or portions of this material at a nearshore demonstration site to alleviate the effects of erosive wave actions along the North Spit. The proposed project is considered a water-dependent activity.
- Overall Project Purpose – The overall project purpose is to allow for the continued safe passage of commerce vessels by maintaining the Humboldt Bar, Entrance, and Interior Channels of the Humboldt Bay at the Congressionally-authorized depths of 26, 35, 38, and 48 feet MLLW and placing all suitable dredged material within the HBDS. Material determined to be unsuitable for nearshore beneficial use that meets the standards and criteria for offshore disposal will be placed at the HOODS.

1.7 Study Authority

Under the Water Resources Development Act (WRDA) of 1999, Pub. L. No. 106-53, 113 Stat. 269, 273, USACE is authorized to deepen Humboldt Harbor and Bay to accommodate the upcoming generation of deep-draft ships. Improvements to and maintenance dredging of the federal project has been accomplished pursuant to the following authorities: River and Harbor Act of 1910, Pub. L. No. 61-264, 36 Stat. 630, 661; Rivers and Harbors Appropriations Act of 1917, Pub. L. No. 65-37, 40 Stat. 250, 259; Rivers and Harbors Act of 1927, Pub. L. No. 69-560, 44 Stat. 1010, 1014; Rivers and Harbors Act of 1930, Pub. L. No. 71-520, 46 Stat. 918, 931; Rivers and Harbors Act of 1945, Pub. L. No. 75-14, 59 Stat. 10, 21; Rivers and Harbors Act of

1962, Pub. L. No. 87-874, 76 Stat 1173, 1176; and Water Resources Development Act of 1986, Pub. L. No. 99-662, § 202, 100 Stat. 4082, 4092.

2.0 Scope of Analysis

The scope of project analysis is limited in time and space by the reasonably foreseeable direct, indirect, and cumulative impacts of the proposed action. The scope of this analysis is generally (1) the water column and substrate in and adjacent to the federal navigation channels in Humboldt Bay, (2) the water column and substrate at HOODS in the Pacific Ocean, and (3) the water column and substrate at the HBDS in the Pacific Ocean. For several environmental parameters such as air quality, the scope of analysis extends beyond the immediate vicinity of the proposed project.

3.0 Proposed Action and Alternatives

To satisfy the requirements of NEPA and provide the basis for the required 404(b)(1) alternatives analysis, a total of three alternatives are analyzed in this Environmental Assessment including the Proposed Action and No Action alternatives.

The purpose of this section is to provide information regarding the availability of the least environmentally-damaging, practicable alternatives to the proposed project that are analyzed in detail in the EA and to summarize the analysis regarding those alternatives that may be considered practicable after preliminary stages of screening. USACE is responsible for making the formal determination of compliance with the 404 (b)(1) guidelines. This alternatives analysis for the proposed project and other available data will provide input to facilitate this decision.

3.1 Proposed Action (Preferred Alternative)

The proposed action involves the annual maintenance dredging of the bar,entranceand North Bay, Eureka, Samoa, and Field's Landing channels and associated turning basins located in Humboldt Harbor and Bay for the FY 2012 - FY 2016 timeframe. Approximately 1,230,000 cubic yards are expected to be dredged annually from the Bar and Entrance channels and interior channels from FY 2012 - FY 2016 using USACE hopper dredges *Essayons* and *Yaquina*. Table 2 provides an overview of the Congressionally-authorized depths, widths, and lengths of the aforementioned navigation channels. Table 3 shows recent dredging volumes from the proposed project area.

Depending on the result of sediment characterization, material dredged from Humboldt Bay's navigation channels would be placed at either or both of the permanently-designated disposal site, HOODS, and at the proposed HBDS.

Table 2 Humboldt Harbor and Bay Navigation Channels				
Navigation Channel	**Depth[1] (feet MLLW)**	**Width (feet)**	**Length (feet)**	**Allowable Overdraft[2] (feet)**
Bar and Entrance Channels	48	500 to 1,600	8,500	2 (+1)
North Bay Channel	38	400	18,500	1 (+1)
Samoa Channel	38	400	8,100	1 (+1)
Samoa Turning Basin	38	1,000	1,000	1 (+1)
Eureka Channel	35	400	9,700	1 (+1)
Field's Landing Channel	26	300	12,000	1 (+1)
Field's Landing Turning Basin	26	600	800	1 (+1)

[1] Depth is measured in feet below Mean Lowest Low Water (MLLW), defined as the average level of the lower of the two daily low tides.
[2] USACE National guidance requires that environmental documentation analyze the potential effects of potential dredging outside the authorized dimensions; including characterization of sediments.

Table 3 Recent Dredging Volumes: Humboldt Harbor Channel			
Fiscal Year	**Bar and Entrance Channel**	***Interior Channels (CY)**	**Total Volume (CY)**
2001	1,128,681	158,474	1,287,155
2002	1,007,158	197,052	1,204,210
2003	1,504,757	289,798	1,794,555
2004	1,177,706	190,570	1,368,276
2005	918,722	211,751	1,130,473
2006	978,274	197,310	1,175,584
2007	1,101,125	173,697	1,274,822
2008	1,094,392	217,266	1,311,658
2009	955,224	107,512	1,062,737
2010	553,278	--	553,278
2011	1,165,398	154,881	1,320,279
Annual Average	**1,053,155**	**172,573**	**1,225,729**

*Includes the North Bay, Samoa, Eureka, and Field's Landing Channels.

3.1.1 HOODS

The offshore sediment placement site, HOODS, is located in the Pacific Ocean approximately three nautical miles (nm) west of the entrance to Humboldt Bay. HOODS is one square nautical mile (nm^2) in size and is located between the 160-foot (ft) and 180-ft (49 and 55 meters) depth contours (Figures 2 and 3). HOODS is positioned within the coordinates:

40° 47' 38.000" N, 124° 17' 13.000" W
40° 48' 17.000" N, 124° 18' 13.000" W
40° 49' 3.000" N, 124° 17' 22.000" W
40° 48' 24.000" N, 124° 16' 22.000" W

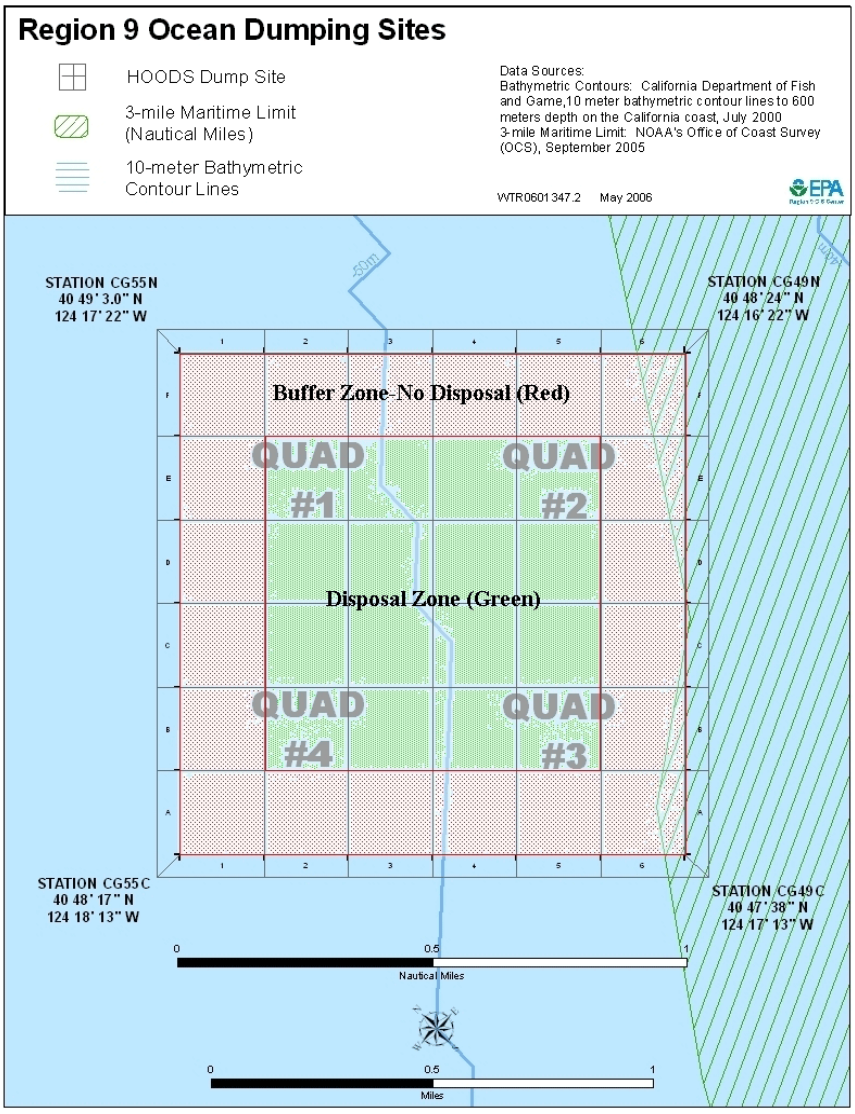

Figure 3: Humboldt Open Ocean Disposal Site[1]

In August 1995, the United States Environmental Protection Agency (EPA), Region IX, released a final Environmental Impact Statement entitled *Designation of an Ocean Dredged Material Disposal Site off Humboldt Bay, California*. The EPA's final rule on designating HOODS[2] under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) was published in the Federal Register on September 28, 1995 (60 FR 50108). The site designation became effective on October 30, 1995 for a period of 50 years. Pursuant to Part 228.5(a) of the MPRSA, HOODS was designated as an open-ocean placement site because it is located in deep water away from productive fishery areas and in an area that was already being used for sediment placement from the annual maintenance dredging of Humboldt Bay.

[1] Dredging and Sediment Management, Humboldt Open Ocean Dredged Site (HOODS), http://www.epa.gov/region9/water/dredging/hoods/index.html, Accessed October 24, 2011.

[2] Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended (33 U.S.C 1401 *et. seq.*) gives the Administrator of the EPA authority to designate sites where ocean dumping may be permitted.

Determination of sediment suitability for placement of dredged material at HOODS is conducted according to the testing requirements set forth in the MPRSA and the Clean Water Act. According to the provisions of these acts, only material deemed suitable for unconfined aquatic disposal can be placed at HOODS. Normally, if the dredged material contains less than 80 percent sand, chemical and biological analyses to determine environmental acceptability are conducted. The EPA sets standards and provides special conditions for placement of dredged material, and it is the responsibility of USACE to meet the EPA's requirements. Currently, USACE conducts annual bathymetry surveys of HOODS following dredging episodes to determine if the site remains non-dispersive. USACE also provides chemical and bioassay analyses of the sediment, according to the specifications of the *Evaluation of Dredged Material Proposed for Open Ocean Disposal* (EPA, 1995). HOODS was first used as a placement site in September 1990. Since then, approximately 22,000,000 CY of dredged material have been placed there.

3.1.2 Humboldt Bay Demonstration Site

The HBDS is located approximately 3.5 mi north of the entrance to Humboldt Bay, and its center is approximately 1.3 mi offshore of the vegetated dune line on the North Spit (Figure 2). The water depth at the HBDS ranges from approximately 33 to 82 ft (10 to 25 m). The site is approximately 5.45 mi long by 1.29 mi wide. It is positioned within the following coordinates:

40° 48' 45.467" N, 124° 12' 41.501" W
40° 49' 14.012" N, 124° 14' 1.750" W
40° 53' 31.573" N, 124° 11' 22.878" W
40° 53' 2.998" N, 124° 10' 2.560" W

Based on the *California of Department of Fish and Game Marine Map Decision Support for Marine Spatial Planning Output*, the ocean bottom at the proposed demonstration site is completely covered by sand.

Within the larger proposed demonstration site, a smaller target placement area (TPA) has been selected as the preferred area for dredged material placement because it is the closest area to both the Bar and Entrance Channel and the shore that can accommodate the maximum 1,500,000 CY of annually-dredged sand (Figure 4). The dimensions of the TPA are 2.73 mi by 0.64 mi, and it is located within the following coordinates:

40° 48' 45.467" N, 124° 12' 41.501" W
40° 49' 0.555" N, 124° 13' 23.911" W
40° 51' 2.283" N, 124° 12' 8.852" W
40° 50' 47.188" N, 124° 11' 26.425" W

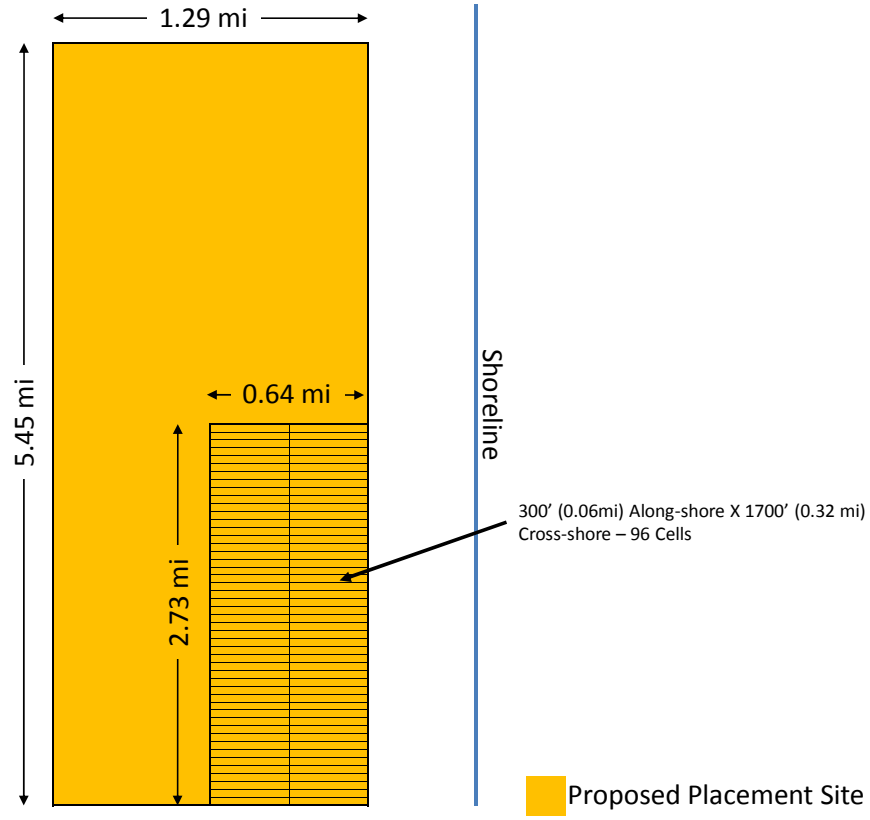

Figure 4: Humboldt Bay Demonstration Site Target Placement Area

The target placement area is divided into cells for material placement. For a dredged-sand volume of 1,500,000 CY, the *Essayons* will make approximately 300 trips to the demonstration site, traverse each cell three times, and create mounds with an estimated total thickness of between 0.9-1.2 ft. On average, the *Essayons* holds a median dredge-material volume of approximately 5,200 CY in one large compartment (120feet long and 48 feet wide) in its hull. The dredged material is dropped from the vessel through 12 doors (each one is 10 feet long by 8.7 feet wide) located along the ship's hull. The doors are positioned in two rows of six with one row along the starboard side and the other row along the port side of the vessel. The doors open simultaneously, and the total placement duration is approximately 15 to 30 minutes. As the sand falls through the water column, it spreads out creating a mound whose height can be regulated by the ship operator (Figure 5).

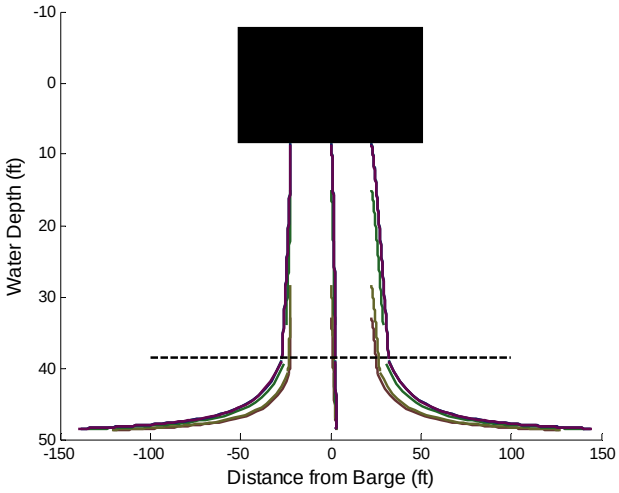

Figure 5: Dredge Material Placement Trajectory[3]

The dashed line represents the collapse zone, or where the material begins to interact with the bed. The block box represents the dredging vessel.

Because of the incident waves and strong tidal currents commonly found in the area, the HBDS was chosen to transport sand shoreward of the littoral zone and towards the beach to alleviate erosion. Conceptually, sand placed at the HBDS during the spring and early summer - a time of smaller, accretionary waves - would provide a buffer to beach erosion the following winter, a time of larger, erosive waves. This low-impact form of shoreline protection may ultimately help mitigate shoreline erosion of the North Spit.

In 2010, USACE conducted a coastal engineering analysis to provide information characterizing the physical coastal processes occurring in the vicinity of Humboldt Bay to aid decision makers in evaluating dredged material management placement alternatives (Coastal Engineering, 2010). According to the Appendix, the mean tidal range within the project area is 4.9 ft and maximum tidal range is 6.2 ft. The Coastal Data Information Program (CDIP) Monitoring and Prediction System (MOPS) wave data indicated wave approach is from the northwest with seasonal variability of wave height and period. Mean wave height measured from the National Data Buoy Center (NDBC) Station 46022, 17 nm west-southwest of Eureka, was 7.9 ft between 2004 and 2009. Tidal currents measured by the National Oceanic and Atmospheric Administration (NOAA) near the midpoint of the Humboldt Bay inlet were as large as 6.1 feet per second (fps) and 4.7 fps during ebb and flood tide, respectively. The average alongshore sediment transport potential based on MOPS wave data suggested southward transport in summer, spring, and autumn and northward transport in winter, with small net annual transport that could either be northward or southward depending on the year's wave climate.

Wave conditions were also evaluated to determine if sediment movement would occur in nearshore areas (i.e., 50 to 82 ft water depth) where dredged material placement would likely be a beneficial use alternative. The analysis indicated mobilization of the placed sediment would occur when waves were larger than 6.6 ft in height and peak periods were 10 to 12 seconds (s).

[3] San Francisco Final Dredged Material Management Plan, Humboldt Bay, California, October 2011 (Not to Scale)

3.2 No Action Alternative

To comply with NEPA, USACE is required to consider the effects of taking no federal action on the deep-draft channels within the North Bay, Eureka, Samoa, Field's Landing and Bar and Entrance channels in Humboldt Bay. The no action alternative defines the "without project condition." Without proper maintenance dredging, the channels would become inadequate in providing safe, efficient passage for commercial deep-draft vessels to the port. This situation would discourage shippers from using Humboldt Bay for commerce, since it requires additional vessel trips to accommodate "light-loaded" vessels, resulting in increased transportation costs, decreased vessel safety, and maneuvering problems. This would have a long-term adverse impact on the local economy and onNED. In addition, use of the bay as a port of refuge could be curtailed, and ship groundings caused by improperly maintained deep-draft channels could result in adverse ecological repercussions (i.e., oil and fuel spills).

3.3 Alternative A: Maintenance Dredging With Placement at HOODS

Alternative A would be exactly the same as the proposed action alternative (preferred alternative) except that no dredged material would be placed at the HBDS. Under this alternative, no beneficial use of dredged sediment for the ultimate purpose of alleviating beach erosion would occur, and the current rate of shoreline erosion, 8.9 ft/yr (USGS, 2006), along the North Spit might continue.

Per 404(b)(1) analysis requirements, Table 4 presents direct, indirect, permanent, and temporary impacts to waters of the United States and wetlands of each alternative considered.

Table 4 Summary of Impacts to Waters of the U.S. and Wetlands

Alternative	Non-Wetland Waters of the U.S. (Acres)				Wetlands (Acres)			
	Permanent		Temporary		Permanent		Temporary	
	Direct*	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
Proposed Action	**654.84**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Alternative A	**0****	**0**	**0**	**0**	**0**	**0**	**0**	**0**

*The direct impact acreage was calculated based on 1,000,000-1,500,000 cubic yards of dredged material to be placed under each alternative.

** HOODS, an open water area beyond 3-nautical miles of the shoreline, 741 acres in size, is located outside of jurisdictional waters of the United States and therefore is not subject to 404(b)(1) analysis.

3.4 Alternatives Considered and Eliminated

A range of actions were considered but eliminated as potential alternative measures for the proposed project. These actions included:

- Maintenance Dredging with Placement at In-Bay Beneficial-Use Sites and the HOODS;
- Maintenance Dredging with Placement Directly on the Beach and at the HOODS; and
- Historical Placement Alternatives (Superbowl Site, SF-3, and Nearshore Disposal Site).

The first alternative above was eliminated from further analysis because USACE dredges currently do not have the capability to pump dredged material to upland sites, making this alternative infeasible. However, if USACE dredges are retrofitted with "direct pump-off"

equipment, future in Humboldt Bay could become a feasible placement alternative. For now, this alternative will not be considered because it is not operationally feasible.

The second alternative was eliminated from further analysis because USACE dredges currently do not have the capability to pump dredged material to an upland or beach site, making this alternative infeasible. In the future, it is possible that this could become an option if USACE dredges are retrofitted with "direct pump-off" equipment, and this alternative would be considered further. For now, this alternative will not be considered because it is not operationally feasible.

Neither of the aforementioned alternatives would accomplish the project purpose of beneficially using dredged material to alleviate erosion along the North Spit, so both alternatives were eliminated from consideration.

The third alternative was eliminated from further analysis for the following reasons:

The Superbowl Site was previously considered for the placement of approximately 26,000 CY of dredged material associated with the Humboldt Harbor and Bay Navigation Improvement Project (Humboldt Deepening Project). The "Superbowl Site" is an approximately 60-acre site located on the North Spit adjacent to the Old Eureka Airport/Samoa Drag strip. This site was used as a dredged material placement site during the North Bay Channel Improvement Project of 1978-1979. The initial permit from the California Coastal Commission (CCC) required revegetation of the site, but that requirement was later rescinded when the site was determined to be needed for an upland dredged material placement site and future borrow site for small improvement projects. After using the "Superbowl Site" in 1979, a valuable freshwater marsh developed in the lower northern end of the site, and now this site supports many waterfowl species during the rainy season. The entire site is surrounded by a levee and is located within a depression in the coastal dune habitat. The "Superbowl Site" was eliminated as a potential beach placement site because pipeline dredges are incapable of achieving the 50-foot project depth. Furthermore, the site became cost prohibitive, HOODS became available, and concerns were raised for the Menzie's wallflower (*Erysium menziesii*) from pipeline placement on the Samoa Dunes. In addition, it is now a valuable seasonal wetland habitat for waterfowl.

SF-3 was used as an interim placement site. Its use for the placement of dredged material dates back to the 1940s. Hydro-surveys conducted in 1984 showed the average depth at the site to be approximately 55 ft MLLW. However, between 1984 and 1988, the average depth decreased to approximately 40 ft MLLW. SF-3 is susceptible to navigation hazards for commercial fishing and recreational boats because of breaking waves in the area. Because of the mounding of dredged material at SF-3 and subsequent concern about the navigational safety at the site, disposal at SF-3 has only occurred once since 1988. The commercial fishing community strongly opposes the continued use of SF-3 because of the aforementioned shoaling and navigational concerns.

The Nearshore Disposal Site (NDS) was used in 1988 and 1989 when USACE placed sand from the Bar and Entrance Channel and North Bay channels there. The NDS is located between the 50-ft MLLW and 60-ft MLLW contours near the South Spit. The intent of placing sand at the

NDS was to alleviate the navigation problems associated with SF-3 and to keep the material in the littoral cell.

Concerns were raised about the suitability of the NDS as a placement site. The Humboldt Fisherman's Marketing Association and the Commercial Fishermen's Wives of Humboldt voiced strong objection to the use of the site because of adverse impacts to navigational safety near the southern approach to Humboldt Bay. Both groups were concerned that placed sediment migrates to the north and shoals in the area between SF-3 and the end of the South Jetty creating hazardous navigation conditions. In addition, local fishermen, private citizens, and the California Department of Fish and Game expressed concerns regarding adverse impacts to commercial fishery resources in the nearshore area. Because of all of these concerns, NDS was not considered further as a viable placement site for maintenance material.

4.0 Impact Assessment

This section provides an assessment of potential impacts of the preferred alternative as well as Alternative A. Potential impacts are evaluated in relation to the no action alternative. If an environmental factor is considered not applicable (N/A) to the preferred alternative or Alternative A, the factor is followed by N/A.

Water

(X) Quality - temperature, salinity patterns, and other parameters: Studies have shown placement of dredged material from hydraulic dredges into the water column does not cause significant short- or long-term changes in salinity, temperature, or pH. (USACE 1976a, USACE 1976b). Dredging and placement operations could degrade water quality on a localized and temporary basis but not over the long-term or bay-wide. Dissolved Oxygen (DO) levels would be temporarily reduced during overflow, generally on the order of one to two milligrams per liter from ambient levels (Phipps, et. al., 1992). Reduction in DO would be confined to the immediate area of dredging and would be temporary in nature (persisting for a few minutes to one hour). This potential reduction of DO is not expected to degrade water quality to the extent that aquatic resources would be significantly affected. Ambient conditions are shortly regained following settlement of the suspended sediment (USACE 1998).

As such, potential adverse effects to water quality are expected to be less than significant under both the preferred alternative and Alternative A.

Under the no action alternative, none of the federal channels within the proposed action area would be dredged, resulting in no temporary project-related water-quality impacts.

(X) Turbidity, suspended particulates: Turbidity is related to clarity of water. Factors affecting turbidity include suspended sediment, shape, size, refractive index, color, and absorption spectra of particles. Increased turbidity levels can affect flora and fauna by blocking sun penetration, injuring fish gills and interfering with prey/predator recognition or egg/larvae development.

Temporary increase in turbidity within the proposed action area would occur under both the preferred alternative and Alternative A as a result of overflow, propeller wash, and dredged material placement activities.

As the hopper dredge begins to overflow, sediment/water slurry is shunted through the overflow valve into the water column producing a plume of increased turbid water. The amount of time hopper overflow persists coupled with the type of sediment being dredged can determine the potential adverse effects to water quality. Overflow is done to maximize economic loading of hopper dredges, especially when dredging material consists of more muddy material, because sandy material settles quickly, and an economic load can be quickly obtained.

Overflow generally begins approximately 20 to 40 minutes following the onset of pumping, depending on sediment characteristics. The overflow plume generally persists for approximately 15 to 60 minutes following cessation of overflow activities. As such, it appears that increased turbidities would remain in the water column a limited amount of time in any one area. Additionally, water quality would have an opportunity to recover to ambient conditions because the dredge spends approximately 20 to 230 minutes turning, traveling to the placement site, disposing its dredged material, or traveling to the next area to be dredged (USACE, 2011).

During the 2002 to 2003 shipyard repairs of the *Essayons*, devices called anti-turbidity valves were added its overflow weirs. The purpose of the valves is to reduce the environmental impact caused by the dredging process. Once the hopper is filled with water and sediment, and as the water from the hopper falls into the weirs, it takes a lot of air down into the overflow tubes with it. The air becomes entrained with the material that did not settle out while in the hopper. The anti-turbidity valves are butterfly-type valves that restrict the volume of water that can pass through the overflow tube. It causes the water level to back up the tube over the top of the weir. Instead of the water falling uncontrolled down into the overflow tube, the top half of the overflow tube and the weir become filled with water, allowing the water runs down the side of the overflow tube more evenly, without drawing in large amounts of air. These devices greatly reduce the amount of turbidity in the water around the dredge during dredging operations by reducing the amount of air that is entrained in the overflow mixture.

In Humboldt Bay, the nearshore turbidity tends to be higher than turbidity in the water column in the deeper channels. In Eureka Channel, turbidity (1) generally ranges from approximately 10 to 20 nephelometric turbidity units (NTU); (2) increases naturally during ebbing tides, with temporary increases to 30 NTU, likely related to the nearshore bathymetry (Anderson 1980, Shaughnessy and Williamson 2005); and (3) rarely reaches or exceeds 200 NTU. However, higher peaks of turbidity in the nearshore, ranging from 50 to 250 NTU, have been generated during precipitation-related events between March and May (Center for Integrative Coastal Observation, Research and Education (CICORE 2005).

In May 2005, ambient turbidity in the upper 7.5 m of the water column in the Samoa Channel ranged from 5 to 22 NTU (Dickerson *et al*. 2005); the North Bay Channel ranged from 2 to 7 NTU (Dickerson *et al*. 2005). Between March 25 and May 19, 2005, ambient turbidities recorded in the Bar and Entrance channels ranged from 8 to 16 NTU.

In May of 2005, the Engineer Research and Development Center (ERDC) of the U.S. Army Corps of Engineers conducted a study to monitor overflow plumes created during hopper dredging of Humboldt Bay's interior channels. Dredging operations were conducted by the hopper dredge, *Yaquina*, which does not have anti-turbidity valves. The objectives of this study were to characterize the spatial extents and temporal dynamics of overflow plumes typical of maintenance dredging operations in Humboldt Bay.

Acoustic Doppler Current Profiler (ADCP) and Optical Backscatter Sensor (OBS) surveys were used to characterize the spatial extent and relative intensities of overflow plumes in the North Bay and Samoa channels and the Samoa Turning Basin (Table 5). Existing sediments in both channels consisted primarily of fine sands with small fractions of silts. Most of supernatant slurry discharged through the overflow tub and shunted through the bottom hull of the dredge falling rapidly through the water column to the channel basin. Overall, the overflow plumes monitored appeared to be a well-defined, short-duration phenomenon. In addition, the overflow plumes in the two channels behaved similar in spatial dimensions (approximately 200 meters by 200 meters); however, the measured turbidities and decay rates of the overflow plumes differed, owing to the differences in sediment composition of the particular area.

Table 5 Overflow Plume Turbidity- *Yaquina*

Water Depths	Measured Turbidity
North Bay Channel	
< 3.5 meters	6 NTU
7.5 meters	12 NTU
10 meters	12 NTU
Samoa Channel	
< 3.5 meters	100 NTU
7.5 meters	100 NTU
10 meters	150 NTU
NTU = Nephelometric Turbidity Units	

As shown, measured turbidity of the overflow plumes in the North Bay Channel was similar to ambient turbidity concentrations even though temporary increases were evident. This is primarily because of the composition of the sediments in the North Bay Channel, which is 96.2 percent coarse-grained sand. Measured turbidity of the overflow plume in the Samoa Channel was considerably greater than those of the North Bay Channel. This is because of the increase of fine-grained sand and silts within the Samoa Channel. Further, from all the surveyed areas, the overflow plume decayed within 15 to 60 minutes of activities, at which point, turbidity levels returned to ambient levels. The Bar and Entrance Channel has greater than 88 percent sand content, so it can be assumed that turbidity levels would mimic or be less than those of the sandier interior channels before and during dredging activities, some of which may be because of the anti-turbidity valve, and no dredge over-flow period.

HOODS-According to the results of the *A Dispersion Analysis of the Humboldt Bay, California Interim Offshore Disposal Site* (Scheffner, 1990) sediment dispersion study conducted at HOODS, following one hour after disposal, fine-grained suspended sediment plumes (composed of 75 percent silt clay and 25 percent fine sand) measured 0.00005 parts per billion (ppb) and silt/clay measured 0.001 ppb above ambient conditions (Scheffner, 1990). These results indicate dredged material rapidly disperses and settles within the boundaries of the HOODS following its release from the hopper bin. Additionally, relatively low ambient currents exist in the vicinity of

the disposal site (i.e., velocities of approximately 25 centimeters per second at the surface, 20 centimeters per second at mid-depths, and 15 centimeters per second near to bottom depths limit the dispersal of the sediments (Scheffner, 1990)). Suspended sediment tests for coarse sediments, defined as 93 percent sand and 7 percent silt/clay, showed that all sediment was settled within the first 100 seconds following disposal, and no sediment remained in suspension.

As previously discussed, HOODS is a non-dispersive disposal site. Material placed at HOODS rapidly settles to the bottom, leaving little or no suspension of sediments for subsequent transport into sensitive areas.

No site-specific data for the HBDS currently exists; however, all material placed at the HBDS would consist of sand, so turbidity levels during material placement should more or less mimic turbidity levels of areas from where that material is removed, and the material placed here should settle in less than 100 seconds. Any increase in turbidity because of the placement of dredged material at the HBDS would be temporary as discussed above, and the site would quickly return to ambient conditions.

Increases in turbidity within the action area under both the preferred alternative and Alternative A would be temporary and minor in nature, returning to ambient conditions shortly after proposed action activities have ceased. Further, the *Essayons* is equipped with anti-turbidity valves, which greatly reduce the amount of turbidity created during dredging activities. Thus, any turbidity-related effects would be less than significant.

Under the no action alternative, none of the federal channels within the proposed action area would be dredged, resulting in no increases in proposed action area turbidity levels over existing conditions. As such, no impacts are anticipated.

(X) Substrate: Under both the preferred alternative and Alternative A, the substrate of the proposed action area would be affected because the Bar and Entrance, North Bay, Eureka, Samoa and Field's Landing channels, would be deepened to the Congressionally-authorized depths listed in Table 1.

Both the proposed project and Alternative A would result in changes in bottom topography of the Bar and Entrance and Interior channels of Humboldt Bay. The bay's navigation channels have been dredged for the past 125 years (Table 1); consequently, the substrate within the federal navigation channels is disturbed on an annual basis by dredging activities. In between annual dredging events, the substrate within those channels undergoes large changes because of sediment flux due to large quantities of sediment moving naturally downstream from the Mad, Eel, and Little rivers to the Bay. This sediment flux throughout the action area necessitates annual dredging activities. Dredging depths have remained the same since 1999, and no new depths are anticipated over the next five years. Since the substrate within the federal navigation channels are dredged annually, subject to large sediment flux throughout the year, and no new depths are proposed for the next five years, less than significant impacts to the substrate underlying the Bar, Entrance, and Interior channels are anticipated.

Changes to the bottom topography of HOODS were evaluated as part of the *Final Environmental Impact Statement (EIS) for Designation of an Ocean Dredged Material Disposal*

Site off Humboldt Bay, California, July 1995, where HOODS was determined to be the environmentally-preferred site for dredged material placement.

In addition to the location of the HOODS being outside known fishing areas and fish habitat (40 CFR 228, FRL-5304-8), HOODS was chosen because of the diversity of the bottom substrate, which ranges from very fine sand to sandy silt along its eastern boundary (160 feet MLLW) to silty sands and some clay along its western boundary (180 feet MLLW). This variability in bottom substrate within HOODS allows for placed sediment types (i.e., sand, sandy-silt) to be matched with existing sediment types at HOODS, adding to its stability and non-dispersive nature. Generally, physical impacts are minimized when sediment types are matched, and dredged material is disposed according to the matching sediments. Further, placement techniques for dredged material are determined by the EPA so as not to create significant mounding in any one place at HOODS. Both the *Essayons* and *Yaquina* would be subject to these requirements when placing material at HOODS. Because of the fact that the EPA has already analyzed the effects of dredged material placement on HOODS' substrate in the aforementioned EIS and found it to be the most environmentally-preferred site, and given that the proposed action would be subject to EPA placement requirements, less than significant impacts are expected.

Modeling has shown that the HBDS can accommodate 1,500,000 CY of dredged material annually and placing sand at the HBDS would be effective in alleviating erosion along the shore of the North Spit. Further, material placed at the HBDS would only be mounded to approximately one foot in height. The physical characteristics of the dredged material would closely match that at the HBDS and consist of sandy material. Changes in substrate at the HBDS would result in beneficial impacts because the HBDS is a nearshore beach nourishment site. Because of the existing sediment flux at the HBDS and its vicinity, changes to the substrate are not considered significant.

Under the no action alternative, the substrates of the navigation channels would not be dredged, leading to navigation hazards as shoaling increases. Dredged material would not be placed at the HBDS, so sand that enters the Bay would not be returned to the nearshore. Dredged material would not be placed at HOODS, effectively resulting in no further changes at HOODS. Thus, implementation of the no action alternative would result in the elimination of the aforementioned beneficial impacts that come with the preferred alternative and Alternative A.

( ) Currents, circulation or drainage patterns: N/A

(X) Mixing zone: Mixing zones are important considerations during discharge activities as concentration of contaminants in this zone may exceed water quality standards.
A mixing zone is defined as a limited area in a water body where ambient concentrations may exceed acute or chronic surface water quality standards. A mixing zone is a consideration under the Clean Water Act, where increases in constituent levels are allowed in the mixing zone as defined under the regulatory requirements defined by the states. With respect to the dredged material from Humboldt O&M dredging, the material is determined to be free of constituents of concern because of the sandy nature of this material. Temporary increase in turbidity during the discharge activities on the order of a few minutes, however, would occur.

Prior to the preparation of the *Humboldt Harbor and Bay (Deepening) Project Final Environmental Impact Statement/Report* (USACE, April 1995), a sediment dispersion analysis for HOODS was conducted. The analysis of the site consisted of a short-term and a long-term investigation. The short-term analysis represented the initial minutes to hours immediately following the disposal operation and analyzed the potential impacts of the actual disposal activities on the local environment. The long-term analysis investigated the long-term stability of the disposal site once dredged material was disposed of and a disposal mound mass created. Loss of material from the disposal site would result in a classification of the site as dispersive (USACE, April 1995).

Short-term simulations of the disposal operations further indicated that all sandy sediment settled within the first 100 seconds, and finer grain material settled within 400 seconds following disposal, and no sediment remained in suspension for subsequent transport. Long-term simulation of sediment-mound stability showed that the net long-term effect of local waves and currents on the mound is negligible; however, sediment at HOODS can be moved short distances during peak current activity. The study further concluded that HOODS is non-dispersive (USACE, April 1995).

For the HBDS, the STFATE (Short Term Fate) dredged material disposal model developed by ERDC was utilized to determine exactly how placed material would disperse from the site towards the shore.

To do this, the following modeling assumptions were made:

- Dredged material is nearly all sand.
- 1 foot per second (fps) ambient current was selected as a conservative magnitude during placement.
- It is assumed that each placement load delivered to the nearshore placement site will have a volume of 5,200 CY.
- Material will be placed perpendicular to shore at an operating speed of 1 knot.

Model simulations predicted that the placement footprint of a single dredge load/cell would be 300 ft in the longshore direction and 1,700 ft in the cross-shore direction, and the predicted mean and maximum mound thickness are 0.3 and 1.2 ft, respectively. However, it is expected that the placement mound will disperse quickly, in less than 100 seconds. As a result of the aforementioned model simulation for the HBDS, it appears that the *Essayons* will traverse the entire conceptual layout three times or until dredging operations are complete. Traversing each dredge cell three times will yield an estimated dredge mound thickness of 0.9 ft (10.4 in). As such, a larger dredged placement volume (~1,500,000 CY), will result in a footprint estimated to be 3,400 ft in the cross-shore, 14,400 ft in the longshore, and have a mound thickness of 0.9 ft. The location for the HBDS was determined to be dispersive because modeling indicated sediment mobilization would occur with wave heights greater than 6.6 ft and peak periods of 10 to 12 seconds.

As was previously mentioned, HOODS is a non-dispersive disposal site based on the findings that relatively low ambient currents prevail in the vicinity, while the HBDS is a dispersive site. Though HOODS has been used as a disposal site since 1995, the HBDS has never been used.

Based on the physical nature of the dredged material, the concentration of constituents in the mixing zone is not expected to exceed acute or chronic water quality standards because of implementation of either the preferred alternative or Alternative A.

Under the no action alternative neither of the alternatives would be implemented, and the mixing zones within the proposed action area would continue in their current state. Thus, no impacts are anticipated.

(X) Erosion and accretion patterns: Erosion is the wearing away of rocks and other deposits by the action of water or wind. Accretion is the opposite effect, where land is added by deposition of water-borne sediment.

According to the Humboldt Shoreline Monitoring Program (HSMP), both processes are occurring along the shoreline of Humboldt Bay. The HSMP is located within the Eureka Cell and extends approximately seven miles south of the South Jetty and 7 miles north of the North Jetty. Monitoring includes aerial flyover photography of the shoreline and subsequent analysis of the photographs.

USACE-funded monitoring of the Humboldt Shoreline began in the fall of 1990 and reocurred in the fall of 1992, 1995, 1998, 2001, and 2005. Results from the HSMP overflights suggest a general sediment-transport trend of seaward movement and accretion of the beach along the South Spit and shoreward movement and erosion of the beach on the North Spit (Figure 6).

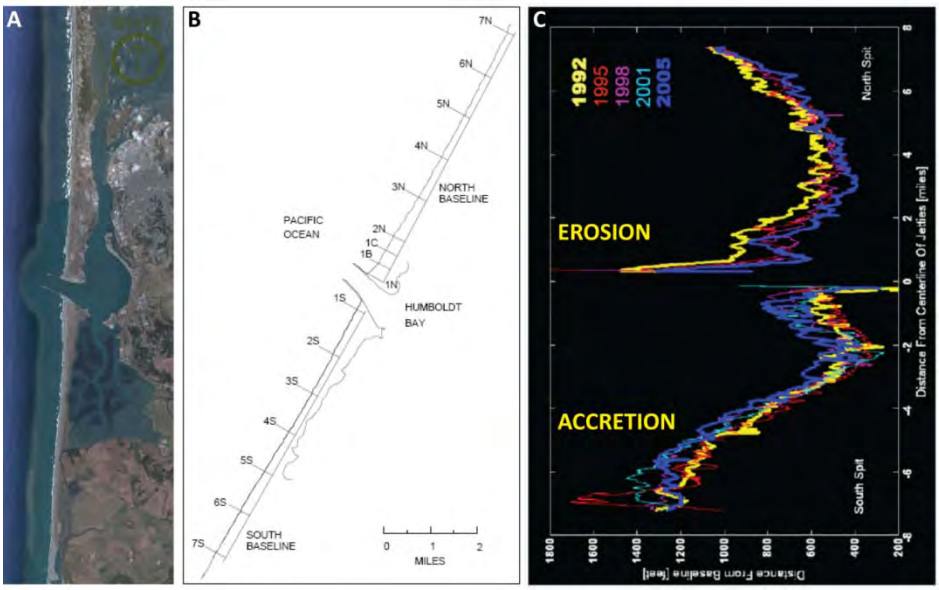

Figure 6: Changes to Humboldt shoreline from 1992 to 2005 on the South spit and North spit. A: Aerial photograph of Humboldt Bay with the jetties in the center. B: The monitoring stations for the 1992 through 2005 beach surveys. C: Survey results.

To alleviate the current trend of erosion along the North Spit, the preferred alternative includes implementation of the HBDS, which is discussed in Section 3.1.2. Under the preferred alternative, placement of dredged material at the HBDS is expected to result in discernible beneficial impacts to alleviate erosion along the north spit shoreline.

Public concerns have been raised regarding shoreline erosion within the bay and the perception that it is being caused by the deepening of the navigation channels and present dredged material disposal practices (Costa, 1982). In Costa, 1982, the concern was raised that the creation of the entrance jetties (i.e. navigation improvements) has contributed to in-bay erosion because of the concentration of wave strength and energy; however, the entrance jetties are issues apart from, and unrelated to annual maintenance dredging within the Bay because they were built from 1889 to 1891.

Proposed placement practices are not expected to have an effect on in-bay erosion because the dredged material being taken from the deepened federal channels to the offshore placement sites is being removed from the channels and should not interfere with sediment transport along the in-bay shorelines.

Notable mechanisms for causing in-bay erosion may include sea level rise, waves, and tidal currents; none of which are significantly increased by deepening the navigation channels. Sea level rise is independent of any deepening, and its cause is global in scope. Likewise, the wave climate at Humboldt is caused by larger scale meteorological events that are independent of the deepening. However, slightly larger waves could enter the bay because of the deepening, but this should be a local phenomena confined to the vicinity of the channels. Tidal currents are primarily controlled by the tidal prism of Humboldt Bay. The tidal prism is the total volume of water that flows into or out of the bay with movement of the tide, excluding any freshwater flow. This tidal prism is independent of the channel (or natural bay) depth and, therefore, the tidal currents are

not significantly affected by channel deepening. The hydraulic efficiency should have a negligible effect on tidal currents (Kraus, 2004).

In-bay erosion that exists in Humboldt Bay may be caused by natural processes (wind-wave generation within the bay and sea level rise). Thus, no impacts are anticipated under the preferred alternative.

Under Alternative A and the no action alternative, the HBDS would not be implemented, material would continued to be placed at HOODS, erosion along the north spit would continue unabated and the beneficial impacts experienced under the preferred alternative would not be realized. Consequently, implementation of Alternative A and the no action alternative would result in less than significant impacts.

( ) **Aquifer recharge:** N/A

( ) **Base flow:** N/A

( ) **Water supplies, conservation:** N/A

(X) **Aquatic Habitat and Organisms:** The proposed action area is located within Humboldt Bay and the Pacific Ocean. The open-water habitat along the Humboldt coast provides habitat to benthos (bottom-dwelling organisms), planktons, fish, birds, marine mammals, and aquatic plants.

Benthic Community: Data from studies conducted around Humboldt Bay indicate that benthic communities in the action area consist of polychaetes (*Polydora pygidialis*, *Streblospio benedicti*; syllidae: *Sphaerosyllis californiensis*), cumaceans (*Eudorella pacifica*), tanaids (*Leptochelia savignyi*), gammarid amphipods (*Paracorophium* sp.), copepods, oligochaetes, and nematodes (Rumrill and Poulton, 2004). A 2002 nonnative species study conducted in Humboldt Bay revealed 24 species of polychaetes, 20 species of amphipods, and 8 species of bryozoa, all nonnative, were found in Humboldt Bay (Boyd, 2002). Other benthic species in Humboldt Bay include clam and oyster beds, some of which are farmed (Photo Science, 2007).

Juvenile Dungeness crab are abundant in Humboldt Bay, but adults rarely are found there (Emmett el al., 1991, as cited in Williams 2006). Williamson (2006) used minnow traps to collect juvenile crabs in South Bay and found that crabs were more abundant in areas with greater eelgrass shoot density and in habitat close to the channel.

Detrimental effects of dredged material placement on benthos include direct burial of invertebrates. Placement of dredged material in the nearshore environment (i.e. the HBDS) may cause periodic disturbance to these organisms, however, the nearshore environment along the Humboldt Coast is a dynamic and high-energy environment that experiences rapid sediment flux. Furthermore, the design of the HBDS took into effect benthic species such as Dungeness crab. It was determined that if placement of material within the TPA of the HBDS was limited to a thickness of approximately one foot or below, within the vertical migration capabilities of the crab, that they would be able to escape burial without significantly high mortality rates (Pearson et al., 2006). Factors that influence the mortality rates of entrained crabs include dredge type,

disposal method, season, crab size, and crab condition (molt-related softness of shell; Reine and Clarke 1998). Causes of death include physical trauma, burial or crushing under sediment, and disposal into a confined disposal facility (Wainwright et al. 1992). Hydraulic dredge mortality rates increase along with increasing crab size ranging from 5% mortality for 7-10 mm crabs up to 86% mortality for >75 mm crabs. Because juvenile crab are more common and abundant within the area, mortality because of burial would not be as high as if a significant number of adult crabs occurred in the area.

Further, the Bay's navigation channels have been dredged for the past 125 years and continue to be dredged annually, thus creating baseline conditions for in-channel benthic infauna that are regularly disturbed. As such, benthic infauna within the navigation channels are subjected to frequent disturbance, both anthropogenic and natural, including annual dredging, deep-draft shipping activity, and large-scale sediment movement.

While placement operations at the HBDS will cause burial of the less mobile benthic community, the impact of those operations will be episodic and short term. The benthic community is expected to re-colonize within three months to three years after disposal (CSMW, 2011). Because the material placed at the HBDS is clean sand, most of it will settle out quickly without creating a significant turbidity plume. Impacts are considered regionally insignificant because of the relatively small area of the placement site compared to the total area comprising the existing aquatic species communities.

Impacts to the existing benthic community at HOODS, on the other hand, generally are less than those of the navigation channels because like most deep-ocean disposal sites, HOODS is characterized by a high rate of natural disturbance, and these were considerations for site designation. Further, HOODS has been used for dredged material placement since 1995.

Based on the temporary nature and relatively small footprint (approximately one-quarter square mile), as well as the annual nature of the maintenance dredging over the past 125 years, potential effects to benthic species resulting from the maintenance dredging of the Bay's navigation channels and the disposal of dredged material at HOODS or the HBDS impacts are expected to be less than significant under both alternatives.

Under the no action alternative, neither alternative would be implemented resulting in the continuation of existing benthic organism conditions within the proposed action area. Thus, no impacts are anticipated.

Fish Community: Fish species which occur within the vicinity of Humboldt Bay include Northern Anchovy (*Engraulis mordax*), Pacific Herring (*Clupea harengus pallasi*), Black rockfish (*Scorpaenidae melanops*), Blue Rockfish (*Scorpaenidae mystinus*), Bocaccio (*Scorpaenidae paucispinis*), Brown Rockfish (*Scorpaenidae auricultus*), Copper Rockfish (*Scorpaenidae caurinus),* Rockfish (*Scorpaenidae rastrelliger*), Vermilion Rockfish (*Scorpaenidae miniatus),* Butter Sole (*Isopsetta isolepis*), Dover Sole (*Microstomus pacificus*), English Sole (*Parophrys vetulus*), Sand Sole (*Psettichthys melanostictus*),Starry Flounder (*Platichthys stellatus*),Pacific Sanddab (*Citharichthys sordidus*), Leopard Shark (*Triakis semifasciata*), Shark (*Galeorhinus zyopterus*), Spiny Dogfish (*Squalus acanthias*), Big Skate (*Raja binoculata),*(*Ophiodon elongatus),* Greenling (*Hexagrammos decagrammus),*Cabezon

(*Scorpaenichthys marmoratus*), California Coastal ESU Chinook salmon (*Onchorhynchus tshawytscha*), Southern Oregon/Northern California ESU Coho Salmon *(Oncorhynchus kisutch)* Northern California (NC) Steelhead (*Oncorhynchus mykiss),* Southern DPS Green Sturgeon (*Acipenser medirostris),* Tidewater Goby (*Eucyclogobius newberryi),* Southern Oregon-Northern California Coastal (SONCC) Coho Salmon ESU *(Oncorhynchus kisutch),* and California Coastal (CC) Chinook Salmon ESU *(Oncorhynchus tshawytscha).*

Fish occurring in the proposed placement areas could be temporarily disturbed by increased turbidities that could affect DO levels in the water column, decreased visibility for foraging activities, and impaired oxygen exchange because of clogged or lacerated gills; these impacts would be greatest on fish eggs, larvae, and juveniles. Increased turbidity responsible for the above-mentioned impacts would be localized (encompassing an area no greater than one-quarter square mile) and temporary in nature. Moreover, many of the fish species are highly mobile and adept to avoid plumes of sediment (O'Conner 1991; USACE 1998).

Material placed at the HBDS would be greater than 80 percent sand and placed in a thin layer ranging from 0.9-1.2 feet in thickness. Sandy material placed at the HBDS would settle in less than 100 seconds, and turbidity in the immediate vicinity would return to normal shortly after. As such, the effect to fish species at the HBDS would be minimal.

Material placed at HOODS could be finer grained and generally consisting of less than 80 percent sand. Fine-grain material would settle approximately 400 seconds after release from the dredger, and turbidity levels would return to normal shortly after, thus limiting the aforementioned effects on fish species.

Fish species are sometimes entrained, or sucked up by the dragheads along with the sediment slurry during dredging activities. Many fish species, however, are equipped with sensory apparatus that can detect and avoid dredge dragheads reducing the potential impact.

Based on the localized and temporary nature of both direct (i.e., entrainment) and indirect (i.e., effects resulting from increased turbidity) to fish species, as well as the ability of many fish species to avoid dredging activities, potential effects on fish species resulting from annual maintenance dredging of Humboldt Bay is expected to be less than significant under both alternatives.

Under the no action alternative, the proposed action would not occur and dredged material would not be placed at either HOODS or the HBDS and the aforementioned effects to fish species would not be realized. As such, no impacts are anticipated.

Marine Reptile Community: Marine reptiles which could occur in the vicinity of Humboldt Bay include Loggerhead turtle (*Caretta caretta),* Green Turtle *Chelonia mydas (incl. agassizi),* Leatherback Turtle *(Dermochelys coriacea),* ridley sea turtle *(Lepidochelys olivacea).*

Loggerheads are capable of living in a variety of environments, such as in brackish waters of coastal lagoons and river mouths, but most records are of juveniles traveling far off the coast of California. During the winter, they may remain dormant, buried in the mud at the bottom of sounds, bays, and estuaries. The major nesting beaches are located in the southeastern United

States, primarily along the Atlantic coast of Florida, North Carolina, South Carolina, and Georgia.

The Green, Leatherback and Ridley Sea Turtle could occur within and around Humboldt Bay, but it would be extremely uncommon, owing to a preference of the colder and deeper water found in the open ocean.

As these marine reptile species are uncommon in and around the action area, no impacts under the preferred, alternative A or no action alternatives are expected.

Marine Mammals: The Steller's sea lion (*Eumetopias jubatus*), is commonly seen in the ocean around Humboldt Bay, and sometimes in the Bay, and its tributaries and sloughs. In addition, it is known to breed at Sugarloaf Rock near Point St. George. The Sugarloaf rookery is one of only two major rookeries south of Alaska and in 1981, accounted for nearly 30 percent of Steller sea lion births in California; however, these numbers have been declining over the past two decades, and numbers at Sugarloaf are currently much lower. Castle Rock, located north of Humboldt Bay, is a major haul out site where Steller's sea lions are known to occur. Steller's sea lions are accustomed to finding other areas to forage when sea-going traffic approaches. In addition, they are extremely mobile and routinely avoid human activities. As such impacts from the preferred, alternative A or no action alternatives are expected to be minimal.

The Sei whale (*Balaenoptera borealis),* Blue whale *(Balaenoptera musculus),* Fin whale *(Balaenoptera physalus),* Humpback whale (*Megaptera novaengliae),* and the Sperm whale *(Physeter macrocephalus)* could occur off the coast of Humboldt but it would be uncommon if they occurred within any portion of the action area, as they are generally found in deeper ocean waters. As such impacts from the proposed project are expected to be minimal. Thus, impacts from the preferred, alternative A or no action alternatives are not expected.

Planktonic Communities: The open waters off Humboldt Bay are part of the California current region, typified by biological components from a variety of marine and biotic provinces. Plankton biomass and species composition in the Humboldt Bay region are influenced by the southerly flowing California current and the Davidson current that flows northward in the winter.

Annual maintenance dredging of Humboldt Bay's navigation channels would result in temporary and localized impacts to phytoplankton and zooplankton species as a result of increased suspended particulates, attenuation of light penetration, and reduced dissolved oxygen concentrations. Phytoplankton obtain energy through the process of photosynthesis and must therefore live in the well-lit photic zone of a water body.

Placement of dredged material at the HBDS and HOODS would temporarily reduce light penetration into the photic layer of the action area resulting in a temporary reduction in primary feed productivity, of the Bay's phytoplankton community. Zooplankton may experience a temporary clogging of gills and feeding appendages, which could reduce growth, survival, and zooplankton biomass. Additionally, increased turbidity may interfere with the respiratory mechanisms of both planktic and zooplankton communities. Since only sandy material will be placed at the HBDS, the effects on planktic communities would be less than those experienced at

HOODS where finer grain material is placed, as sandier material settles quicker through the water column than finer grain material, resulting in lower levels of turbidity.

Implementation of the preferred alternative as well as alternative A would result in less than significant impacts to planktic communities as the turbidity created at both the HBDS and HOODS during placement activities would be temporary and would return to ambient conditions shortly afterwards. Furthermore, the action area is characterized by a dynamic ocean current and sediment transport system which exposes existing planktic communities to already turbid waters.

Under the no action alternative planktic communities would not be exposed to increased levels of turbidity and as such no impacts are expected.

(X) Special aquatic sites (wetlands, mudflats, coral reefs, pool and riffle areas, shallows, sanctuaries and refuges, other): The proposed action area is not located within any special aquatic site. Thus, no impacts are anticipated.

Implementation of the no action alternative would be inconsequential to special aquatic sites as the proposed action area is not located within any, as such, no impacts are anticipated.

(X) Endangered or Threatened Species, Critical Habitat, and Essential Fish Habitat: Pursuant to Section 7 of the Endangered Species Act (ESA) (16 U.S.C. 1536(c)), as well as the Magnuson-Stevens Fisher Conservation and Management Act (MSFCMA) (50 C.F.R. §600.920(e)(3)), USACE prepared a Programmatic BA and EFH Analysis, *Humboldt Bay and Harbor Maintenance Dredging (FY 2012- FY 2016), Humboldt California*, to assess potential effects of the proposed annual maintenance dredging on proposed and listed species and habitat protected under these federal statutes for a period of five years (FY 2012- FY 2016).

Based on the finding of the Programmatic BA/EFH, USACE, San Francisco District, has determined that both the preferred alternative and Alternative A are not likely to adversely affect listed species (with the exception of coho and Chinook salmon), species proposed for listing, or their designated critical habitat occurring within the project area for the species listed in Table 6.

Table 6 Special Status Species Not Affected by Proposed Project			
Scientific Name	Common Name	Status	Rationale
Haliotis cracherodii	Black Abalone	(E)	No suitable habitat occurs within the action area
Acipenser mediristris	Southern DPS Green Sturgeon	(T, CH)	Not present in the action area during dredging episodes. No occurrence within bay before June or after October
Eucyclogobius newberryi	Tidewater Goby	(E, CH)	Only found at the northeastern shore of Arcata Bay, and not located within the action area
Oncorhynchus mykiss	Northern California Steelhead	(T, CH)	NC steelhead adults would likely enter Humboldt Bay to begin their spawning migration in October or later (Busby et al. 1996)
Caretta caretta	Loggerhead Sea Turtle	(T),	Unlikely to occur within action area
Chelonia mydas	Green Sea Turtle	(T)	Unlikely to occur within action area
Dermochelys coriacea	Leatherback Sea Turtle	(E, CH)	Unlikely to occur within action area
Lepidochelys olivacea	Olive Ridley Sea Turtle	(T)	No suitable habitat present within action area
Balaenoptera Borealis	Sei whale	(E)	Unlikely to occur within action area
Baleonopter musculus	Blue Whale	(E)	Unlikely to occur within action area
Baleonoptera physalus	fin whale	(E)	Unlikely to occur within action area
Eumetopias jubatus	Stellar's sea lion	(T, CH)	There will be no effect on this species or CH as Steller's sea lion are accustomed to finding other areas to forage when sea-going traffic approaches. In addition, they are extremely mobile and routinely avoid human activities.
Megaptera novaengliae	humpback whale	(E)	Unlikely to occur within action area
Physeter macrocephalus	sperm whale	(E)	Unlikely to occur within action area
Brachyramphus marmoratus	Marbled Murrelet	(T, CH)	Humboldt Harbor and Bay experiences a rather high frequency of sea-going vessels all year round, as such marbled murrelets in the area are accustomed to finding other areas to forage and roost when sea-going traffic approaches. Action area occupies relatively small fraction of available foraging area.
Charadrius alexandrines	Western Snowy Plover	(T, CH)	Snowy plovers primarily nest and roost on land (i.e., intertidal beaches, foredunes, and the mouth of the Mad River), and feeds in mudflats and intertidal zones. These areas would not be impacted as a result of the proposed maintenance dredging project. Moreover, this species is migrates to summer nesting grounds in March
Phoebastris albatrus	Short-tailed Albatross	(E)	The short-tailed albatross has been rarely observed along the Pacific coast of North America from December to July
Strix occidentalis caurina	Northern Spotted Owl	(T, CH)	This species does not occur within the action area
Synthliboramphus hypoleucus	Xantus's Murrelet	(C)	Unlikely that species occurs within the action area.
Coccyzus americanus	Western Yellow-billed Cuckoo	(C)	No suitable habitat present

Status codes: (E) Federally listed as Endangered, (T) federally listed as Threatened, (C) Species Candidate for Federal Listing, (CH) Critical Habitat (Proposed or Final) is designated

However, species protected under the ESA which may be adversely affected by the proposed project are further described below.

Juvenile SONCC coho and CC Chinook Salmon: The Biological Opinion issued for the previous five-year Programmatic Environment Assessment for Humboldt Bay (2005-2011) dredging activities stated:

"NMFS expects that each year, approximately 0.7 percent of the total population of juvenile SONCC coho salmon and 1.2 percent of the total population of juvenile CC Chinook salmon will experience bird predation in Humboldt Bay during overflow dredging of the daylight dredge Cycles. In addition, NMFS expects that each year, 0.8 percent of the total population of juvenile SONCC coho salmon and 0.7 percent of the total population of juvenile CC Chinook salmon will likely experience (1) reduced foraging success during overflow dredging from March through May as a result of reduced prey availability because of reduced visibility in the water column

because of suspension of sediments, (2) decreased reactive distance to detect prey and reduced success of prey capture, and (3) traveling greater distance either inside or outside of the SSC plume, depending on location, to locate prey patches than if prey were accessible."

As the proposed action is almost identical to the previous one, the only difference being the inclusion of the HBDS, the impacts to juvenile SONCC Coho and CC Chinook Salmon would most likely be the same. However, USACE believes that the assumptions made in the BO are conservative at best and given the avoidance mechanism and mobility of the fish and the large area of habitat available to these species relative to the size of the proposed action area, neither the preferred alternative or Alternative A would have significant adverse effects on these species, implementation of MM-BIO-1 would reduce impacts on juvenile SONCC coho and CC Chinook salmon to a less than significant level.

MM-BIO-1: Limit the duration of overflow to the extent practicable during each dredge Cycle.

Southern DPS Green Sturgeon: In September of 2005, NMFS Santa Cruz Office installed a curtain array of 3 VEMCO® VR2/W (VR2) acoustic receivers across the entrance channel of Humboldt Bay with the intention of further understanding tagged green sturgeon movements throughout the bay. The data set included acoustic telemetry data collected in Humboldt Harbor for nine green sturgeon between June and October of that year. The sturgeon were mostly sub-adults; length range 109 – 177cm. The receivers remained in place from September 2005-February 2006. During this timeframe, green sturgeon were not detected entering Humboldt Bay. However, on May 26, 2006, the acoustic receivers were re-deployed and green sturgeon were detected entering the bay. The results of this re-deployment are discussed below in the transient and resident fish in Humboldt Bay sections below.

The difference between transient and resident fish is the number of times that particular fish was detected by the deployed sensors.

On August 4 and 18, 2006, two VR2 receivers were placed in North Humboldt Bay. One was placed near Bird Island, and the other to the northeast, in the central part of the North Bay.

Transient Southern DPS Green Sturgeon within Humboldt Bay-Sturgeon 111 (177cm) was detected once on June 6 at the Entrance Channel. Sturgeon 1008 (150cm) was detected once on September 22 and once again on September 23 at the Entrance Channel. Sturgeon 1127 (133cm) was detected once on August 24 in the Entrance Channel. Sturgeon 1187 (136cm) was detected once on June 18 and once on July 1. Sturgeon 1187 is the only fish detected in the Entrance during the month of July.

Resident Southern DPS Green Sturgeon within Humboldt Bay- Sturgeon 907 (144cm) was detected four times at the Entrance Channel between June 23 and June 27. This fish was next detected in the North Bay 13 times between August 18 and August 24. The fish was last detected once at the Entrance Channel on August 24. Sturgeon 989 (109cm) was detected once at the Entrance Channel on June 22. This fish was then detected 67 times at the North Bay receivers between August 19 and September 14. Sturgeon 1072 (136cm) was detected once on August 17 and once on August 18 at the Entrance Channel. This fish moved to North Bay on August 18. With the exception of two days, this fish was detected once every day (63 detections) at the

North Bay receivers between August 18 and October 17. This fish was last detected at the Entrance Channel on October 18. Sturgeon 918 (150cm) was first detected once at the Entrance Channel on September 9. The fish moved to the North Bay and was, with the exception of seven days, detected at least once a day (62 detections) between September 10 and October 12. On October 12 the fish moved back to the Entrance Channel. Between October 12 and October 18 this fish was detected ten times. On October 15, the fish was detected once in North Bay, afterwards, it returned to the Entrance Channel. Sturgeon 1138 (114cm) was detected seven times at the Entrance Channel between 12 and 15 June. It was not detected during the month of July. The fish returned to the Entrance Channel in August. There were 11 detections of this fish between August 4 and August 8. Between August 8 and August 11 seven detections were split between the Entrance Channel and North Bay. There were no further detections of this fish until October 6. The fish was detected three times at the Entrance Channel between October 6 and October 8. The fish moved to North Bay on October 9. It remained in North Bay until October 12. On October 12, it was last detected at the Entrance Channel.

Southern DPS Green Sturgeon Acoustic Telemetry Conclusions-The recent Federal Recovery Outline, Green Sturgeon, Southern DPS, December 2010, cites two scientific papers, (one published, the other in press) that conclude, “Fish [green sturgeon] congregate in coastal bays and estuaries of Washington, Oregon, and California during summer and fall”.

The two government hopper dredges *Essayons* and *Yaquina* dredge the channels for about 25 days during the months of April and May. In June, both dredges relocate to dredge the Federal channels in San Francisco Bay and elsewhere. The small data set from 2006 and the conclusions of the two scientific papers gives an indication that green sturgeon are not present while the dredges are working in Humboldt Harbor, and thus no impacts are anticipated under any alternative.

According to Beamsesderfer and Webb, 2002, juvenile green sturgeon spend 1-4 years in fresh and estuarine waters before dispersal to saltwater. As such there is a higher probability of entrainment, disorientation, predation and exposure to stirred-up sediment which may have elevated levels of constituents of concern for juvenile green sturgeon because of dredging activities within Humboldt Bay. However, given the size of habitat within Humboldt Bay available to juvenile green sturgeon year-round, compared to the size of the federal navigation channels, and given that juvenile green sturgeon are highly mobile, and that dredging activities occur for a limited time period annually in Humboldt Bay, it is not likely that either the preferred alternative or Alternative A would adversely affect this species. Therefore there is less than significant impacts anticipated to this species and its critical habitat.
Under the no action alternative dredging activities would not occur and no impacts to juvenile green sturgeon would be anticipated.

Marbled Murrelet: Placement of dredged material at the Humboldt Bay Demonstration Site (HBDS) may temporarily affect the marbled murrelet during foraging activities for 4 to 6 weeks from mid March-May, annually, as this is when dredging activities normally occur at Humboldt Bay

Prey species for the marbled murrelet which occur at the HBDS include the sand lance, northern anchovy, herring, osmerids and sea perch. These species may be affected by the placement of dredged material at the HBDS, because of localized increases in turbidity.

Only sandy material can be placed at the HBDS as it is a beach nourishment site. Grain size analysis indicates that material placed at the HBDS would come from the Bar and Entrance channel, North Bay Channel, Samoa Channel and Field's Landing Channel, as they are made up of almost entirely sandy material.

By nature sandy material quickly settles through the water column in comparison to its silt and clay counterparts. To determine the settling rate for sand, the STFATE (Short Term Fate) dredged material disposal model developed by ERDC was used.

Results of the STFATE shows that careful due diligence was performed to determine the most effective way to place material at the HBDS, while minimizing mound thickness as not to bury species beyond their vertical migration capabilities. Further, as sand settles within the boundaries of the HBDS within 100 seconds of release from the hopper dredge, impacts to prey species of the marbled murrelet in the water column would be minimal and temporary (see below).

According to *"Review of Sediment Management Impacts and Issues and Issues Relevant to Protection of California Coastal Biota, Volume I: Biological Impact Analysis"* prepared for the California Coastal Sediment Management Workshop, prepared by Science Applications International Corporation in August 2011, with regards to the marbled murrelet:

Flushing of seabirds and sea ducks by vessels or other offshore equipment would be expected to last a few minutes or at most a few hours. Flushed birds would be expected to resume foraging or resting within a few minutes of settling on the water after being flushed, but may not return to the original area for several hours. Some species may avoid the dredging or pumping area for the duration of the project (Strong 2005, Korschgen et al. 1985).

And;

If seabirds avoided foraging within a turbidity plume, they would be expected to return to foraging in the area when the plume subsided (Strong 2005, Korschgen et al. 1985).

And with regards to their prey species:

There is some evidence suggesting that small, schooling water column fishes may avoid turbid discharges. Northern anchovy were observed to move away from the discharge area in response to sediment disposal at the Alcatraz Dredged Material Disposal Site in San Francisco Bay, but returned to the site within an hour or two after the disposal event (O'Conner 1991). Sherk et al. (1975) classified bay anchovy as sensitive to turbidity.

In conclusion, the placement of material at the HBDS would only affect one particular cell (0.06 x 0.32 miles or 0.01 square miles) at any given moment as described above and not the entire TPA or the HBDS all at once. As such the likelihood of adversely impacting a particular marbled murrelet which is found 1-3 individuals per square mile is extremely low. Any reduction in foraging opportunities for the marbled murrelet as a result of localized increases in turbidity

would be extremely short-lived as described above (i.e. 100 seconds). With respect to the marbled murrelet's prey species, low levels of increased turbidity may cause these schooling fish to avoid the particular cell where material is being placed. However, there would be significant remaining area at the HBDS, as the entire site is 6.75 square miles in size, which would not disturbed by placement activities in other cells, to be available for the marbled murrelet to forage in water free of project-induced turbidity.

Based on the aforementioned rationale, less than significant impacts to the Marbled Murrelet are anticipated under the preferred alternative.

As the Marbled Murrelet does not forage in the vicinity of HOODS, no impacts under Alternative A are anticipated.

Based on the analysis summarized above, USACE has determined the impacts to all federally-listed species and designated critical habitat, including those proposed, to be less than significant. Under the no action alternative neither of the alternatives would be implemented, and as a result, no impacts to endangered or threatened species and their designated critical habitat over existing conditions would be anticipated.

Essential Fish Habitat

The proposed project area is within the Essential Fish Habitat (EFH) for Pacific groundfish, Pacific salmon, and coastal pelagic Fisheries Management plans (FMP). An Essential Fish Habitat (EFH) consultation with the National Marine Service (NMFS) for the proposed action was initiated in October 2011. This consultation included all aspects of the proposed action including placement at HOODS and the HBDS as well as dredging material from the federal navigations channels in Humboldt Bay. The USACE made the determination that the proposed action may adversely affect EFH in the action area through localized increases in turbidity and entrainment. Furthermore, the proposed action may adversely affect EFH by removing prey items during dredging activities. However, adverse effects from the proposed action are expected to be minimal and temporary because of the nature of O&M dredging activities. Implementation of Alternative A and the no action alternative would result in no impacts to EFH as HOODS is outside of the aforementioned FMPs and the no action alternative would permit existing EFH conditions to continue.

Terrestrial Habitat and Associated Organisms

The proposed action area occurs within Humboldt Bay and the Pacific Ocean. As such, no terrestrial habitat is found with the proposed action area.

(X) Habitat: The proposed action area does not contain any terrestrial habitat, and as such no direct or indirect impacts to terrestrial habitat are anticipated under any alternative. However, the Marbled Murrelet *(Brachyrampus marmoratus)*, forages within the action area and could be impacted by the proposed project for this reason. However, as the foraging areas for the marbles murrelet are frequented by sea-vessel traffic all year, the marbled murrelet is accustomed to foraging for food in other locations away from sea traffic. As such implementation of either

alternative would result in temporary and minor impacts to the marbled murrelet during foraging activities.

Terrestrial habitat and organisms would continue in their current state under the no action alternative and no impacts are anticipated.

(X) Air Quality: In accordance with 40 Code of Federal Regulations (CFR) §51.853(c)(2)(ix), USACE has determined the proposed action is exempt from the requirement to prepare a conformity determination with the State Implementation Plan under the Clean Air Act because the proposed project consists of maintenance dredging of a federal navigation channel.

(X) Contaminants in dredge or fill material: As part of the requirements for dredge material placement at the HOODS, the proposed dredged material must be analyzed for placement suitability at this site. This includes chemical and biological analyses to determine environmental acceptability. Because the HBDS would only receive material with greater than 80 percent sand content, the material would only have to be analyzed for grain size. Material with more than 80 percent sand is considered free of chemical constituents of concern.

Between March 15 and 19, 2010, sediment samples were collected by ADH Environmental from within six distinct dredge areas along the Humboldt Harbor Channel, and from a single offshore reference site. The reference site sample is taken near HOODS and is important when comparing chemistry results. Material which is similar to current and historical results for the reference site sample is deemed acceptable for placement at HOODS.

With several minor exceptions, all bulk sediment chemistry concentrations in the Humboldt Harbor Channel composite sediments were similar to current and historical concentrations that have been detected at the HOODS reference site. For those constituents (cadmium, copper, lead, mercury, and selenium) detected in the Eureka Inner Channel sediments at higher concentrations, the levels were low compared to the reference site sample; mercury was higher than the current 2010 HOODS reference site result but lower than the historically highest concentration.

Based on the relatively low constituent concentrations and similarity to the HOODS reference site sediments, materials from the three Humboldt Harbor Channel composite areas (Eureka Inner Channel, Eureka Outer Channel, and Fields Landing Channel and Turning Basin) were suitable for open-ocean disposal at HOODS.

Ultimately, it is the EPA's decision whether material can be placed at HOODS, and EPA has historically deemed placement of material with analytes concentrations within the ranges of current and historical reference site concentrations suitable for placement at HOODS

Only dredged material with greater than 80 percent sand, which by nature is expected to be free of constituents of concern, would be placed at the HBDS.

Based on the results of the 2010 sampling and analysis undertaken within the proposed action area, no impacts are anticipated because of the implementation of the preferred alternative and Alternative.

Under the no action alternative no dredging activities would take place and as such the issue of constituents of concern in dredge material becomes inconsequential. Any concentrations of constituents of concern that currently exist in this material would remain in its current location and not be disturbed. Thus, no impacts are anticipated.

(X) Mineral resources: According to the USGS Mineral Resources Data System (MRDS) there are no existing mineral resources within proposed action area, and therefore neither the preferred alternative, Alternative A, nor the no action alternative would have any impact on mineral resources (USGS, 2011).

(X) Noise: Noise levels are typically measured in decibels (dB) units related to the apparent loudness of sound. An A-weighted decibel (dBA) approximates the response of the human ear to sounds of various frequencies. On this scale, the normal range of human hearing extends from about 3 to 140 dBA, with speech normally occurring between 60 and 65 dBA. A 10 dBA increase in the level of a continuous noise is generally perceived as a doubling of loudness, whereas a 3 dBA increase is just noticeable to humans. Generally, noise levels decrease by 6 dBA with each doubling of distance from the source of the noise, assuming there are no barriers.

Environmental noise levels fluctuate over time, as such, averaged noise levels in dBA are often used to characterize the acoustic environment at a given location. The average noise intensity over a given time is the energy equivalent noise level (L_{eq}). The day-night equivalent noise level (L_{dn}) is a 24-hour $L_{eq,}$ which is derived by adding a 10 dBA "penalty" to noise levels measured between 10 P.M. and 7 A.M. The community noise equivalent level incorporates an additional 5 dBA penalty to sound levels measured between 7 P.M. and 10 P.M. These 'penalties' account for the greater sensitivity of people to high noise levels at night.

Noise guidelines and standards developed by federal, State, and local agencies applicable to the proposed maintenance dredging are the California Office of Noise and Control standards and the noise elements of Humboldt County's General Plan.

The area around Humboldt Bay is primarily devoted to commercial shipping and fishing, lumber-related industry, and some residential and open space. Ambient noise levels generally result from commercial and industrial facilities, maritime traffic, and natural sources.

Noise sources associated with the proposed maintenance dredging include the use of dredge equipment. A hopper dredge with essentially the same size, power output, and dredging in depths similar to those found within the action area, have peak noise levels during operation of 131 dB (Greene, 1987) As a general rule, sounds from point sources dissipate at a rate of 6 dB per doubling of distance (Hoover et al, 1996). Further, strong winds, which are common all year round within the action area, would result in additional sound dissipation of 1 dB per 1,000 feet (Hoover et al, 1996).

Dredging activities would result in minor, temporary increases in noise levels because of the operation of dredge equipment. The combination of distance and wind intensity would help dissipate noise levels to humans to tolerable levels. Minor noise increases are expected when placing material at the HBDS and HOODS compared to when the dredgers are removing

material from the navigation channels as it is a quieter activity than suctioning sediment from the federal navigation channels. Noise from dredging activities may also disturb aquatic species in the immediate vicinity. It is thought that these species would avoid the areas of the dredging activities until they have ceased. Any disturbance to aquatic species would persist for no longer than four to six weeks a year. Further, the dredges do not emit a uniform level of noise throughout the entire dredging Cycle (i.e. placement at the HBDS/HOODS, turning), so exposure to aquatic species would not be for the entire four to six week dredging event. As such, less than significant impacts under the preferred alternative and Alternative A are expected.

Under the no action alternative, there would be no change to existing background noise levels. Thus, no impacts are expected.

(X) Recreation (boating, fisheries, other): The majority of recreational uses center on fish, wildlife, and aesthetic values. Recreational opportunities include: hiking, wildlife viewing, boating and kayaking, windsurfing, fishing and sport fishing, waterfowl hunting, and clamming.

Dredging activities may affect recreationists utilizing the bay for boating, kayaking, windsurfing, and fishing by displacing them from the areas of the federal navigation channels, HOODS and the HBDS during their recreational activities. However, the immediate area of impact would be small compared to the areas of the Bay that could be used for recreation and would be temporary in nature (i.e. four to six weeks); further the aforementioned activities do not take place during the night, so only daytime displacement of recreations would occur. As such, it is expected that recreationists would avoid dredging activities and seek out areas away from dredging zones for the four to six week a year dredging event. As such, potential effects to recreation resulting from annual dredging under both the preferred alternative and Alternative A are expected to be less than significant.

Under the no action alternative there would be no change in recreation opportunities at or around Humboldt Bay. Thus, no impacts are expected.

( ) Land use classification: N/A

( ) Transportation and traffic: N/A

(X) Navigation: During dredging activities, there are no expected conflicts with safe navigation activities in the project area. This is based on the ship traffic levels and the recorded 125-year history of dredging activities at Bar and Entrance Channel, and associated channels. This project would have long-term beneficial navigation impacts for commercial deep-draft vessels. Project impacts are considered to be beneficial and less than significant.

( ) Prime and unique farmland: N/A

(X) Aesthetics/visual impact: The aesthetics of the Humboldt Bay region are of particular importance to the area. Humboldt County is a haven for outdoor recreation. The Bay is surrounded by coastal redwood forests, rocky coastlines, sandy beaches, and estuaries. The number of visitors to the Humboldt Bay area is continually increasing and paramount to the local economy.

Dredging of the Bay's navigation channels has the potential to minimally disrupt those enjoying the view shed surrounding the bay; however, deep draft commercial and fishing vessels are a common site in the Humboldt Bay region. As such, potential effects to aesthetics resulting from the annual maintenance dredging under the preferred alternative and Alternative A are expected to be less than significant.

Under the no action alternative, the existing aesthetic and visual characteristic of the area would remain the same. Thus, no impacts are expected.

( ) Public facilities, utilities and services: N/A

(X) Public health and safety: The proposed action would create a safer navigation condition throughout Humboldt Bay, minimizing the risk of ship groundings and subsequent fuel release and other hazardous materials into the natural environment. Thus, the proposed action would result in a beneficial impact.

Further, a potential concern for these hopper dredges is when they are routed to the HBDS and their broadsides are exposed to waves and swells, creating the potential for capsizing. As the captains and crews of these vessels have significant experience in this and other maritime environments, navigation and working under conditions which would put the crew, vessel as well as the public's safety in jeopardy, would not be undertaken. Thus, no impacts are anticipated.

Under the preferred alternative, the dredge vessel would be rerouted to the HBDS for material placement activities. During these activities the vessel's broadside could be exposed to strong waves, which could result in a navigation hazard. Both the *Essayons* and *Yaquina* are operated by a highly-experienced crew who understand the limitations of the vessels and its proper operation under a host of conditions. Crews would be inclined to operate their respective vessel in the safest, most efficient manner possible. This would include not placing material at the HBDS or HOODS if sea conditions are too dangerous during a particular dredging Cycle. As such, less than significant impacts are anticipated.

(X) Hazardous and toxic materials: Under both the preferred alternative and Alternative A, hazardous or toxic material such as diesel fuel, lubricants, and solvents could be used during dredge and maintenance activities. The handling, transport, and disposal of such materials would be of limited nature, but nonetheless would be guided by Best Management Practices (BMPs), which are listed below. In the event of any spillage to sediment or surface water bodies, a site specific Spill Control Plan will be adhered to, and containment clean-up activities would be implemented, among other activities identified in the Spill Control Plan. Thus, no impacts are expected under both the preferred alternative and Alternative A.

Under the no action alternative, no increase in the amount of hazardous and toxic material would be used or handled within the proposed action area over existing conditions. Thus, no impacts are expected.

( ) Energy consumption or generation: N/A

(X) Cultural and historical resources: The implementing regulations of Section 106 of the National Historic Preservation Act (36 C.F.R. Part 800) outline the requirements of federal agencies to assess a project's effects on historic and cultural resources listed or eligible for listing in the National Register of Historic Places. Impacts to such cultural resources are considered significant if the characteristics defining the eligibility of the resource would be: physically damaged or altered, isolated from its historic content, or if project elements were introduced that are out of character with the significant property or setting.

Currently available information from the marine archaeology survey of the Bay's navigation channels indicates that the western end of the Bar and Entrance contains a magnetic anomaly that may represent the remains of a shipwreck, discarded objects from a vessel, or debris lost from the construction of the North Jetty. Additionally, there may be shipwreck remains located in the vicinity of the HOODS. However, no adverse effects have resulted to this magnetic anomaly or the potential shipwreck at the HOODS during years of maintenance dredging and are not expected to occur in the future. As such, potential effects to historic and cultural resources are expected to be less than significant under both the preferred alternative and Alternative A. However, in the event that such resources are uncovered, work activities will cease until the State Historic Preservation Office (SHPO) determines its significance and National Register of Historic Places (NRHP) eligibility.

Under the no action alternative, proposed action area conditions as they pertain to cultural and historical resources would remain unchanged. Thus, no impacts are expected to cultural or historic resources.

(X) Historic monuments, parks, national seashores, wild and scenic rivers, wilderness area, research sites, etc: The proposed action area does not lie within the boundaries of any historic monument, parks, national seashores, wild or scenic rivers, wilderness area or research site. Thus, no impacts are anticipated.

Under the no action alternative, neither alternative would be implemented resulting in no impacts to the Humboldt Bay National Wildlife Refuge.

( ) Archaeological sites: N/A

(X) Socio-economic: Annual maintenance dredging in the proposed action area is imperative to the economy of Humboldt County. Without dredging, the channels would eventually shoal thereby generating unsafe navigation conditions for deep draft ocean-going vessels. As the channels continue to shoal, deep draft vessels would be required to light-load prior to entering the bay causing excessive financial burdens to vessel operators. Moreover, many deep draft vessels would not be able to enter or exit the Bay because of draft restrictions and the potential for ship groundings would increase, thus creating the potential for severe environmental and economic consequences. Based on the importance of annual maintenance dredging of Humboldt Bay's navigation channels, neither the preferred alternative nor Alternative A would result in adverse socioeconomic impacts. Thus, no impacts are anticipated.

Under the no action alternative, neither alternative would be implemented resulting in negative socioeconomic impacts at the local and regional levels as shoaling in the channels would increase effectively prohibiting fully loaded commercial vessel from entering Humboldt Bay and thereby affecting the local economy.

Commercial Fisheries: Humboldt Bay supports a commercial fishing industry for Dungeness crab, salmon, albacore, Pacific herring, leopard shark. Surf perch, oyster, English sole, Dover sole, Pacific sanddab, rockfish, starry flounder, and California halibut to name a few. In general, dredging activities may temporarily affect commercial fishing species through entrainment, disorientation, predation, and exposure to stirred-up sediment, which may have elevated levels of constituents of concern. However, given the vast habitat available to all commercially fished species in and around Humboldt Bay compared to the area occupied by the federal navigation channels, the HBDS, and HOODS, less than significant impacts are anticipated under both the preferred alternative and Alternative A. No impacts are anticipated under the no action alternative.

Dungeness crab-Dungeness crab in one of the most commercially-important species that occur at Humboldt Bay and warrants further impact analysis.

Dredging and dredged material placement activities within the proposed action area has the potential to affect the commercial Dungeness crab fishing industry by removing crab from the action area through entrainment and/or by killing them during dredged material placement at the HBDS.

With respect to the federal navigation channels, juvenile Dungeness crab may become entrained in the dredge drag heads, as they may be present in these areas during dredging episodes. Despite being entrained, it has been shown that significant portions of entrained crab do not die during entrainment *(approximately 40-95 percent of entrained crab, depending on time of year, crab size, age and dredge vessel type, Wainwright et al., 1992).*

The loss of juvenile crab would be minor to the commercial fishing industry as juveniles are not to be commercially fished as they would not have met the commercial legal requirements for size (i.e. 6.25 inches measured across the back). However, though juvenile crab cannot be legally fished in any particular year, the loss of juveniles may take away from the commercial fishing industry in future years, though it is difficult to determine the precise nature of individual juvenile crab survival. As such, less than significant impacts to the commercial crab fishing industry are anticipated under the preferred alternative and Alternative A, due dredging activities in the federal channels in Humboldt Bay.

In the situation where a particular crab survives entrainment in the federal navigation channel, it would eventually be transferred to the HBDS or HOODS where it would be released from the dredger along with the dredged material. It is possible that any crab which survives entrainment could be buried and killed during placement activities. According to Vavrinec et al., 2007, *crab burial experiments showed that survival from burial increases as burial depth decreases and survival increased as crab size increased.* As burial mounds at the HBDS would range from 0.9-1.2 feet, it may be difficult for the anything other that 2+ crab to escape burial and not suffocate (Vavrinec, 2007). However, Dungeness crab may be able to avoid burial all together. According

to Antrim and Gruendell 1998 and Pearson et al. 2006b "*Dungeness crabs may be able to avoid some of the deleterious effects of the disposal event through behavioral or physical mechanisms…that crabs may be able to "ride" the surge current to safety or are buoyed above the relatively more dense sediment slurry, thereby avoiding burial."* As such, it is possible that a percentage of crab may escape burial at the HBDS while a percentage of crabs may not, though it is difficult to determine the percent survival at the project site. As such less than significant impacts are anticipated because of placement of material at the HBDS under both the preferred alternative and alternative A. No impacts are anticipated under the no action alternative as no placement at the HBDS would occur.

With respect to HOODS, during the time when dredging activities are taking place (mid-march through mid-May), the Dungeness crab population would have moved towards the shore to mate (EPA, 1995). Specifically, the 1995 HOODS EIS states "*Adult male and female Dungeness crabs move into shallow sandy areas to mate between March and July…"* As Dungeness crab is not present at HOODS during placement activities, no impact to the commercial fish industry because of placement at HOODS is anticipated under the preferred alternative or Alternative A.

Under the no action alternative, no dredging would take place, and no crab entrainment or burial would occur as a result of dredging and placement activities. Thus, no impacts are anticipated to the commercial fishing industry under the no action alternative.

(X) Environmental justice: The environmental justice conditions in and around Humboldt Bay would remain unchanged under the preferred alternative, Alternative A and the no action alternative. No impacts are anticipated.

(X) Growth inducing impacts- community growth, regional growth: The preferred alternative would not contribute to any growth inducing impacts. Community and regional growth in Humboldt County and in the Humboldt Bay area would remain unchanged under the preferred alternative, Alternative A and the no action alternative. No impacts are anticipated.

(X) Conflict with land use plans, policies or controls: The preferred alternative, Alternative A and the no action alternative would not conflict with any land use plans, policies, or controls governing the project site. No impacts are anticipated.

(X) Irreversible changes, irretrievable commitment of resources: The use of fossil fuels and materials for dredging activities associated with both the preferred alternative and Alternative A would be an irretrievable commitment of resources but would be limited and minor. No impacts are anticipated.

Under the no action alternative, there would be no irreversible changes to the proposed project area and no change in the existing irretrievable commitment of resources. No impacts are anticipated.

( ) Other: N/A

(X) Other Cumulative effects not related to the proposed action:

1. Occurred on-site historically: Prior to modern day inhabitants, the Wiyot Indians occupied the areas within and surrounding the Bay. Humboldt Bay has historically been used for fishing, recreational and shipping activities. Humboldt Bay and Harbor have undergone deepening and regular maintenance activities since 1881, when improvements to the interior channels began to provide safe navigation in the Bay (See Table 1). Over the years, numerous improvements to the Bay's infrastructure have taken place such as construction of docks, piers, boat ramps, boat launches, parking lots, roads, jetties, bridges and marinas.

2. Likely to occur within the foreseeable future: In the foreseeable future, activities would likely include maintenance dredging of the Bar and Entrance and Interior Channels of the Bay as well as infrastructure improvement projects around the shoreline area of Humboldt Bay. According to the Humboldt Bay Harbor District, infrastructure improvement projects could consist of: Maintenance Dredge Redwood Terminal Berth 1 and 2, Repairs to Redwood Terminal Berth 1 and 2, Modernize Redwood Marine Terminal, Modernize Fields Landing Marine Terminal, Fields Landing Boat Yard Repairs, Water Trail/Bay Access Implementation Project, Woodley Island Work Dock Completion Project, Aquaculture Expansion and Terminal Project, Recreational Fishing Enhancement-Humboldt Reef Project, Recreational Fishing Enhancement-Shelter Cove Boat Launch Improvement Project, and Historic Shops Complex Renovation.

3. Contextual relationship between the proposed action and (1) and (2) above:
To provide safe navigation and in support of the national, regional, and local economy, the Humboldt Bar and Entrance as well as the interior channels have been maintained at the Congressionally-authorized depths as follows: Bar and Entrance Channels: -48 ft, North Bay Channel:-38 ft., Samoa Channel and Turning Basin:-38 ft., Eureka Channel:-35 ft., and Field's Landing and Turning Basin:-36 ft. Maintenance dredging activities within the proposed action area has been occurring for approximately 125 years and is not expected to significantly affect existing conditions. With consideration to the historic actions which occurred at the site and these foreseeable future actions, the preferred action is not expected to have significant cumulative adverse impacts. The contextual relationship between historical and future activities would result in positive impacts for Humboldt Bay, as well as the local, region, and nation-wide community as well as navigational safety.

5.0 Summary of Indirect and Cumulative Effects from the Proposed Action

Cumulative impacts of the proposed annual maintenance dredging of Humboldt Bay's navigation channels, including disposal activity, would be confined solely to local considerations. Within the local context, maintenance dredging and disposal activity would be conducted during the annual spring (March-May) and, possibly, fall (June-July) episodes, if needed. The local context would involve any other known, constructed, in progress, or planned projects occurring in the Humboldt Bay region (i.e. Maintenance Dredge Redwood Terminal Berth 1 and 2, Repairs to Redwood Terminal Berth 1 and 2, Modernize Redwood Marine Terminal, Modernize Fields Landing Marine Terminal, Fields Landing Boat Yard Repairs, Water Trail/Bay Access Implementation Project, Woodley Island Work Dock Completion Project, Aquaculture Expansion and Terminal Project, Recreational Fishing Enhancement-Humboldt Reef Project, Recreational Fishing Enhancement-Shelter Cove Boat Launch Improvement Project, and

Historic Shops Complex Renovation). In addition to these harbor's recreational and commercial activities and repairs, the federal navigation channels experiences constant disturbance by movement of commercial, including deep draft vessels. It should be noted that annual maintenance dredging of Humboldt Bay's navigation channels has occurred for over 125 years, and the project area is expected to experience this change to maintain the congressionally-authorized depths for the foreseeable future. The nearshore environment of the bay also undergoes continuing flux where factors such as winds, waves, and sediment supply are variable. The natural processes of wind and wave actions are expected to naturally move the sediment and distribute towards the north spit of the harbor. Although this movement would vary from year-to-year, the longer-term trend of sediment movement through the nearshore area would be towards the North Spit, where it is currently experiencing severe erosion.

This EA provides a detailed discussion of indirect and cumulative impacts of the proposed project along with one for Alternative A. Among potential impacts to physical and biological resources are indirect and cumulative impacts to water quality and biological resources.

Cumulative water quality impacts associated with future maintenance dredging of Humboldt Bay's navigation channels would continue to be localized, occupying an area of no greater than one-quarter mile, and temporary lasting no longer than approximately 35 days in any given year. These impacts would occur within the federal navigation channels as well as at the HOODS and the HBDS during a dredging episode (conservatively, dredging episodes last no longer than 35 days). Cumulative impacts on water quality would be primarily related to turbidity and sediment quality. Because of the nature of dredged material (i.e. sand), any potential indirect and cumulative impacts are determined to be not significant.

USACE annually conducts chemical and biological testing of dredged material in accordance with procedures set forth by USEPA and USACE in *Evaluation of Dredged material Proposed for Ocean Disposal Testing Manual* (1991) and as appropriate with the testing requirements set forth by the *Inland Testing Manual* (USEPA/USACE 1998) for evaluation of potential contaminant-related impacts associated with discharge of dredged material in fresh, estuarine, and near-coastal waters. Based on historic and 2010 testing results, there are no expected adverse indirect or cumulative impacts to sediment quality from the preferred alternative and Alternative A.

The EPA has designated HOODS as a permanent ocean disposal site for the last 50 years under Section 102 of the Marine Protection Research and Sanctuaries Act. Material placed at HOODS has been deemed to have acceptable concentrations of constituents of concern, thus no significant cumulative or indirect effects from disposing dredged material at HOODS are expected. Further, HOODS has a total capacity of 50 mcy of which 25 mcy has been used, and the EPA's designation process has thoroughly considered the indirect and cumulative effects of use of this site. Through an annual determination of sediment suitability, both EPA and USACE will ensure constituents of concerns are within the acceptable limits for use of this site. Overall, no cumulative effect arising from the compounded effect of placing material at HOODS on water quality and other physical parameters over the life of the proposed project would occur.

Cumulative and indirect impacts to biological resources associated with annual maintenance dredging within Humboldt Bay are expected to be localized and short-term. Impacts would be

similar to those described in *Section 4.0*. Benthic-locally occurring organisms (in particular benthos) in the immediate vicinity of dredging and placement activities could be temporarily removed or disturbed; however, the community within the navigation channels, the HBDS, and HOODS, is a high-energy environment, and this habitat undergoes continuous flux and has the ability to recover from perturbations. Any disturbance to locally-occurring species may have an effect on the food chain; however, the dredging area is considered small relative to the adjacent coast and the bay. Therefore, cumulative and indirect impacts of the proposed project to biological resources are considered to be minor.

The proposed action coupled with any future development in or around the bay would not lead to cumulative impacts greater than those that currently exist within the proposed action area since effectively foreseeable actions within and around the bay in the future would be consistent with current activities (i.e. annual maintenance dredging).

6.0 Environmental Compliance

Compliance information, supporting letters, and environmental compliance history for this project can be found in Appendix A – Environmental Permits.

Table 7: Summary of Environmental Compliance

Statute	Status of Compliance
National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 *et seq*) Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR 1500-1508) dated July 1986	This EA has been prepared in compliance with NEPA and CEQ regulations. All agency and public comments will be considered and evaluated. If appropriate, a Finding of No Significant Impact (FONSI) will be signed with a conclusion of no significant impacts from this proposed action. A Draft FONSI is provided in Appendix B.
Clean Air Act, as amended (42 USC 7401 *et seq*)	In accordance with 40 CFR § 51.853(c)(2)(ix), the USACE has determined that the proposed agency action is exempt from the requirement to prepare a conformity determination with the State Implementation Plan under the Clean Air Act because the project consists of maintenance dredging, no new depths are required, and disposal would be at approved disposal sites.
Clean Water Act, as amended (33 USC 1251 *et seq*) Rivers and Harbors Act of 1899 (33 USC 403) Executive Order 11990, Protection of Wetlands, (42 FR 26961, 1977)	The USACE is complying with Section 401 of the CWA by applying for water quality certification from the NCRWQCB concurrently with this EA. This document serves as compliance with 404(b)(1) guidelines. Compliance with RHA is accomplished by this EA. No wetlands occur within the proposed project area.
National Oceanic and Atmospheric Administration Federal Consistency Regulation (15 CFR 930) Coastal Zone Management Act of 1972 (16 USC 1451 *et seq*) California Coastal Act of 1976	In accordance with this Act the USACE has determined that the proposed annual maintenance dredging project is consistent to the maximum extent practicable with the CCMP, pursuant to the requirements of the California Coastal Act of 1976, as amended (CCA). However, the USACE is currently in the process of consulting with the Coastal Commission regarding this project.

Endangered Species Act as amended (16 USC 1531 *et seq*)	The USACE, San Francisco District, has prepared a *Programmatic Biological Assessment/Essential Fish Habitat Evaluation for the Maintenance Dredging of Humboldt Harbor and Bay* 2012-2016. The USACE has requested concurrence from NOAA and USFWS regarding the Programmatic BA/EFH Analysis of potential effects to ESA protected species resulting from the implementation of annual maintenance dredging.
Fish and Wildlife Coordination Act (16 USC 661*et seq*)	Coordination with the FWS, NMFS, and State fish and wildlife agencies signifies compliance with the Fish and Wildlife Coordination Act.
Magnuson-Stevens Fishery Conservation and Management Act - Fishery Conservation Amendments of 1996, (16 USC 1801 *et seq*) – Essential Fish Habitat (EFH)	The USACE, San Francisco District, has prepared a *Programmatic Biological Assessment/Essential Fish Habitat Evaluation for the Maintenance Dredging of Humboldt Harbor and Bay* FY 2012- FY 2016. The USACE has requested concurrence from NOAA regarding the Programmatic BA/EFH Analysis of potential effects to EFH resulting from the implementation of annual maintenance dredging.
Migratory Bird Treaty Act (16 USC 703-711)	No impacts to migratory birds are expected from the proposed action.
Marine Mammal Protection Act (16 USC 1361 *et seq)*	No impacts to marine mammals are expected from the proposed action.
National Marine Sanctuaries Act (16 USC 1431 *et seq*)	The proposed action will not take place in or near a national marine sanctuary.
Marine Protection Research and Sanctuaries Act of 1972 (33 USC 1401 *et seq*)	The proposed action will incorporate and adhere to restrictions relating to critical areas on the use of EPA designated HOODS pursuant to section 102(c) of the MPRSA. Further, the proposed action will adhere to the conditions for transportation of dredged material pursuant to section 103 of the MPRSA.
National Historic Preservation Act (16 USC 470 and 36 CFR 800): Protection of Historic Properties	The proposed action will not affect any historical and cultural resources as none occur within the proposed action area.
Executive Order 11593: Protection and Enhancement of the Cultural Environment	See above.
Archaeological and Historic Preservation Act of 1974, (16 USC 469 *et seq*)	See above.
Federal Water Project Recreation Act (16 USC 4601 *et seq)*	A public notice of availability of this EA will be sent to the National Park Service and Office of Statewide Planning, result in compliance with this Act.
Abandoned Shipwreck Act of 1987, (43 USC 2101 *et seq*)	None occur on the site.
Submerged Lands Act, (Public Law 82-3167; 43 USC 1301 *et seq*)	The California State Lands Commission will receive a copy of this EA and have the opportunity to comment on its potential impacts to submerged lands. This would result in compliance with the Submerged Lands Act.

7.0 Agencies Consulted and Public Notification

The following federal, State, and local agencies, and various interested local individuals have been notified of the availability of this Environmental Assessment for review and comment. A complete list of notified agencies can be found in Appendix D. A Public Notice of Availability of the EA will be provided to other interested agencies, groups, and individuals.

A. Federal agencies:
1) U.S. Environmental Protection Agency (USEPA Region 9)
2) U.S. Fish and Wildlife Service (USFWS), Arcata Office
3) National Marine Fisheries Service (NMFS), Arcata Office
4) Advisory Council – Historic Preservation
5) National Park Service (NPS)-Pacific West Region
6) Humboldt National Wildlife Refuge

B. State and local agencies:
1) California Coastal Commission (CCC)
2) California Department of Fish and Game (CDFG), Northern Region Office
3) California State Historic Preservation Officer (SHPO)
4) California State Lands Commission (CSLC)
5) North Coast Regional Water Quality Control Board (NCRWQCB)
6) Humboldt County Planning Division
7) City of Eureka Community Development Department
8) City of Arcata Planning Division

C. Other organizations and individuals
1) Humboldt County Public Library-Eureka Branch
2) Humboldt County Public Library-Arcata Branch

7.1 Summary of Comments

See Appendix I for comments and responses

7.2 Evaluation and Incorporation of Comments

See Appendix I for comments and responses

8.0 Determinations and Statement of Findings

A Finding of No Significant Impact (FONSI) is anticipated (33 CFR Part 325). The FONSI will be prepared after agency and individual comments are incorporated into this Environmental Assessment. A draft FONSI is included with this document (Appendix B).

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APPENDIX A: ENVIRONMENTAL PERMITS

APPENDIX B: DRAFT FINDING OF NO SIGNIFICANT IMPACT

DRAFT
FINDING OF NO SIGNIFICANT IMPACT (FONSI)

(33 CFR Part 230-325)

Humboldt Harbor and Bay Operations and Maintenance Dredging (FY 2012- FY 2016)
Humboldt County, California

1. Action: Maintain the Congressionally-authorized depths of the Federal navigation channels within Humboldt Harbor and Bay through annual maintenance dredging from FY 2012 to FY 2016. Bar and Entrance Channels: 48 ft MLLW, North Bay Channel: 38 ft. MLLW, Samoa Channel and Turning Basin: 38 ft. MLLW, Eureka Channel: 35 ft. MLLW, and Field's Landing and Turning Basin: 36 ft MLLW.

2. Factors Considered: Factors considered for this FONSI were direct, indirect, and cumulative impacts to air and water quality, aquatic and terrestrial habitat, biologic resources, endangered/threatened species, recreation and public facilities/services, noise, aesthetics, land use, hazardous and toxic materials, project area substrate and mixing zones, mineral resources, navigation, socioeconomics, environmental justice, and cultural and historic resources.

3. Conclusion: Based on a review of information incorporated in the Environmental Assessment, including views of the Corps, general public, and resource agencies having special expertise or jurisdiction by law, the Corps concludes the permitted activity would not significantly affect the quality of the human environment. Pursuant to the provisions of the National Environmental Policy Act of 1969, the preparation of an additional Environmental Impact Statement (EIS) will therefore, not be required.

Approved by:

_____ _____

District Commander, P.E., PMP
Lieutenant Colonel, U.S. Army
Commanding

Date

APPENDIX C: SECTION 103 OF THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT CONDITIONS FOR HOODS

The following additional mandatory conditions for disposal operations at hoods are provided pursuant to our authority under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), and the ocean dumping regulations at 40 CFR Part 220-229.

1. All disposal operations at hoods shall be conducted in accordance with the Site Management and Monitoring Plan (SMMP) attached to the site designation Final EIS (July, 1995).

2. Disposal may only occur in the interior cells of the hoods (refer to schematic of the hoods contained in figure 3 of USACE document titled: Environmental Suitability of Sediment from the Humboldt Harbor Channels for Dredging and for Placement at Humboldt Open Ocean Disposal Site (HOODS), March 2011). Specifically, no disposal shall occur in the 20 outermost cells of any quadrant of hoods (i.e., in cells A1 through A6, B1 and B6, C1 and C6, D1 and D6, E1 and E6, and F1 through F6). The outermost cells constitute a buffer zone to help retain most dredged material within the overall boundaries of the hoods.

3. No disposal shall occur in cells C4, D3, and D4, due to mounding from previous years' disposal activities

4. To minimize mounding throughout the HOODS, disposal events shall occur across all authorized cells, depending on material type as discussed in condition 5 below. Dredged material from sequential trips shall not be disposed in the same cell; rather, disposal events shall progress to all authorized cells before returning to a previously used cell.

5. Dredged material comprised of sand (including material from the Bar, Entrance, North Bay, and Samoa Channels) shall be disposed sequentially using all 12 authorized cells. Siltier material is only authorized to be disposed in cells B2, C2, D2, and E2.

6. Disposal vessel position tracking and disposal location data shall be gathered using a DGPS-based system. Disposal trip plots shall be generated for each disposal trip, and provided to the San Francisco District USACE and EPA Region 9 within 2 weeks of completion of disposal operations. These plots must identify the location of each disposal event, with no more than 12 disposal events displayed on any one plot. The electronic vessel tracking and disposal location data files shall also be provided to the San Francisco District USACE and EPA Region 9 within 2 weeks of completion of disposal operations.

7. A post-disposal bathymetric survey of the HOODS, extending at least 200 feet outside the site boundaries, shall be conducted within 60 days of completion of disposal operations, and provided to EPA Region 9. This survey shall at a minimum be consistent in resolution and accuracy to post-disposal surveys from 2004, 2005, 2006, and 2007.

APPENDIX D: AGENCY AND PUBLIC PARTICIPATION

Table 8 Agency and Public Participation

Agency	Date notified
U.S. Environmental Protection Agency-Region IX	Mailing was sent out on January 10, 2012
U.S. Fish and Wildlife Service, Arcata Office	
National Marine Fisheries Service, Arcata Office	
Advisory Council – Historic Preservation	
National Park Service -Pacific West Region	
California Coastal Commission	
California Department of Fish and Game, Northern Region Office	
California State Historic Preservation Officer	
California State Lands Commission	
North Coast Regional Water Quality Control Board	
Humboldt County Planning Division	
City of Eureka Community Development Department	
City of Arcata Planning Division	
Humboldt County Public Library-Eureka Branch	
Humboldt County Public Library- Arcata Branch	

APPENDIX E: SPECIES LISTS

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Listed/Proposed Threatened and Endangered Species for the EUREKA Quad (Candidates Included)

November 21, 2011

Document number: 808653797-174454

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Plants					
		Erysimum menziesii	Menzies' wallflower	E	N
		Layia carnosa	beach layia	E	N
		Lilium occidentale	western lily	E	N
Invertebrates					
	*	*Haliotis cracherodii*	black abalone	E	N
Fish					
	*	*Acipenser medirostris*	green sturgeon	T	Y
		Eucyclogobius newberryi	tidewater goby	E	Y
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
	*	*Oncorhynchus mykiss*	Northern California steelhead	T	Y
	*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
Reptiles					
	*	*Caretta caretta*	loggerhead turtle	T	N
	*	*Chelonia mydas (incl. agassizi)*	green turtle	T	N
	*	*Dermochelys coriacea*	leatherback turtle	E	Y
	*	*Lepidochelys olivacea*	olive (=Pacific) ridley sea turtle	T	N
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Charadrius alexandrinus nivosus	western snowy plover	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Phoebastris albatrus	short-tailed albatross	E	N
		Strix occidentalis caurina	northern spotted owl	T	Y
		Synthliboramphus hypoleucus	Xantus's murrelet	C	N
Mammals					
	*	*Balaenoptera borealis*	sei whale	E	N
	*	*Balaenoptera musculus*	blue whale	E	N
	*	*Balaenoptera physalus*	fin whale	E	N
	*	*Eumetopias jubatus*	Steller (=northern) sea-lion	T	Y
	*	*Megaptera novaengliae*	humpback whale	E	N
	*	*Physeter macrocephalus*	sperm whale	E	N

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Listed/Proposed Threatened and Endangered Species for the FIELDS LANDING Quad (Candidates Included)

November 21, 2011

Document number: 808653797-174354

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Plants					
		Layia carnosa	beach layia	E	N
		Lilium occidentale	western lily	E	N
Invertebrates					
	*	*Haliotis cracherodii*	black abalone	E	N
Fish					
	*	*Acipenser medirostris*	green sturgeon	T	Y
		Eucyclogobius newberryi	tidewater goby	E	Y
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
	*	*Oncorhynchus mykiss*	Northern California steelhead	T	Y
	*	*Oncorhynchus tshawytscha*	CA coastal chinook salmon	T	Y
	*	*Thaleichthys pacificus*	Southern eulachon DPS	T	P
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Charadrius alexandrinus nivosus	western snowy plover	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y

APPENDIX F: BEST MANAGEMENT PRACTICES

- Well-maintained equipment will be used to perform the work, and except in the case of a failure or breakdown, equipment maintenance will be performed off site. Equipment will be inspected daily by the operator for leaks or spills. If leaks or spills are encountered, the source of the leak will be identified, the leak will be cleaned up, and the cleaning materials will be collected and will be properly disposed.
- Fueling of marine-based equipment will occur at designated safe locations either off-site or within the project limits (on-site). Spills will be cleaned up immediately using spill response equipment.
- Offsite fueling will occur at locations covered under the Regional Water Quality Control Boards National Pollutant Discharge Elimination System (NPDES) industrial storm water permit (SIC Code 4493).
- If fueling occurs on-site the following precautions will be required to reduce the potential for spills:
  - Ensure that adequate amounts of oil absorbents and other spill response equipment are easily accessible by boaters and the fueling attendant on the fuel barge (see below);
  - Provide secondary containment (e.g. berm) around the dispensing area, fuel machinery and any oil storage containers to prevent oil spills;
  - When it is safe and effective to do so, the designated fueling areas shall have booms installed prior to initiating fueling activities on or over water. The following specifications shall be used when a boom is deployed prior to fueling activities:
    a. An adequate boom shall be deployed such that it completely surrounds the vessel(s) and facility/terminal dock area directly involved in the fueling activities, or the portion of the vessel and fueling area that provides for maximum containment of any fuel/oil spilled.
    b. The boom positioning shall be checked periodically and adjusted as necessary throughout the duration of the fueling activity, especially during tidal changes and significant wind or wave events.
      - Avoid fueling boats from portable fuel containers;
      - Nozzles should have an automatic shut off feature;
      - Fuel slowly paying attention to the fuel gauge, the audible alarm once nearly full, or for the changes in pitch as it is filling;
      - Keep nozzle vertically upright when mounted in the fueling station to avoid drips;
      - Do not top-off fuel;
      - Leave the tank 5-10% empty to allow fuel to expand and not spill out of the vent;
      - Use an absorbing collar or “donut” pad around the nozzle when fueling to absorb backsplash and any spill;
      - Use oil absorbents to catch fuel drips and spills while transferring the nozzle between the boat and fuel dock;
      - Attach containers to the outside of the air vent to catch spills caused by back pressure build up;
      - Install fuel/air separators in the air vent for a built-in fuel tank or stems of inboard fuel tanks to prevent spills during fueling;
- If fueling occurs on-site, the following practices will be required for responding to spills:
  - Personnel must be trained in the proper use and maintenance of boom and recovery equipment.
  - Maintain an adequate supply of oil/hazardous spill response materials in readily accessible locations on the fuel barge for boaters and staff; including:
    c. Absorbent Boom:
    d. 3 feet of boom per foot of boat
    e. Enough to encircle largest boat in the construction site.
    f. Deployment Boat;
    g. Hydrophobic Mop;
    h. Absorbent blankets and pillows;

i. Non-sparking hand scoops, shovels, and buckets
j. Empty Drums or other containers suitable for holding the recovered oil and oily water;
k. Sand Bags;
l. Miscellaneous Items such as: Rope, Flashlights, Metal Fence Stakes, Straw Bales and weighted spill mats (for covering storm drains);

- All boom and associated equipment, including the equipment used to deploy the boom, must be of the appropriate size and design for the environmental conditions encountered in the fueling area based on the manufacturer's specifications.
- In the event of a spill, immediately stop spill, contain spill from spreading further, collect and remove spilled materials if possible;
- Dispose any used absorbents at oil absorbents collection facilities (which often serve as oil absorbents distribution facilities);
- If a spill occurs, the recovery equipment shall be immediately deployed to capture as much fuel/oil as possible. In addition, any remaining boom onsite shall be deployed to contain the fuel and protect the environment while the fuel/oil spill is being recovered.
- Within one hour of observing a spill, a boom shall be deployed to completely contain the vessel(s) and barge/facility/terminal dock area directly involved in the fueling activity or the area that provides for maximum containment of any fuel/oil spilled.
- Never try to disperse spilled oil in the water using detergents and emulsifiers. Use absorbent booms and pads instead. Follow the Spill Prevention Plan.
- Do not use dispersants to treat the oil spill; it is illegal; and
- Report the spill to the National Response Center 1-800-424-8802

APPENDIX G: PREPARERS

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APPENDIX H: SECTION 404 GUIDELINES SUMMARY EVALUATION

1. Summary of Technical Evaluation Factors (Subparts C-F).

A detailed evaluation is provided in the main body of this report

		N/A	Signif-icant	Not Signif-icant*
a.	Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C) (Sec. 230.20-230.25)			
1)	Substrate			X
2)	Suspended particulates/turbidity			X
3)	Water			X
4)	Current patterns and water circulation	X		
5)	Normal water fluctuations	X		
6)	Salinity gradients	X		
b.	Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (Subpart D)(Sec. 230.30-230.32)			
1)	Threatened and endangered species			X
2)	Fish, crustaceans, mollusks and other aquatic organisms in the food web			X
3)	Other wildlife			X
c.	Potential Impacts on Special Aquatic Sites (Subpart E)(Sec. 230.40-230.45)			
1)	Sanctuaries and refuges			X
2)	Wetlands	X		
3)	Mud flats	X		
4)	Vegetated shallows	X		
5)	Coral reefs	X		
6)	Riffle and pool complexes	X		
d.	Potential Effects on Human Use Characteristics (Subpart F)(Sec 230.50-230.55)			
1)	Municipal and private water supplies	X		
2)	Recreational and commercial fisheries			X
3)	Water-related recreation			X
4)	Aesthetics			X
5)	Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves			X

2. Evaluation and Testing (Subpart G) (Sec. 230.60-230.61)

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

1)	Physical characteristics	X
2)	Hydro-geography in relation to known or anticipated sources of contaminants	
3)	Results from previous testing of the material or similar material in the vicinity of the project	X
4)	Known, significant sources of persistent pesticides from land runoff or percolation	
5)	Spill records for petroleum products or designated hazardous substances (Section 311 of CWA)	
6)	Public records of significant introduction of contaminants from industries, municipalities, or other sources	
7)	Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	
8)	Other sources (specify)	

Source: ADH Environmental (April 2010), Humboldt Harbor Channel 2010Maintanence Dredging Sampling and Analysis Report

b. An evaluation of the appropriate information in 2a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to require constraints. The material meets the testing exclusion criteria.

YES	NO
X	

3. Disposal Site Delineation (Section 230.11(f)).

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

1)	Depth of water at disposal site	X
2)	Current velocity, direction, and variability at the disposal site	X
3)	Degree of turbulence	X
4)	Water column stratification	X
5)	Discharge vessel speed and direction	X
6)	Rate of discharge	X

7)	Dredged material characteristics (constituents, amount, and type of material, settling velocities)	
8)	Number of discharges per unit of time	X
9)	Other factors affecting rates and patterns of mixing (specify)	

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable

YES	NO
X	

4. Actions To Minimize Adverse Effects (Subpart H)(Sec. 230.70-230.77)

All appropriate and practicable steps have been taken through application of recommendation of Section 230.70-230.77 to ensure minimal adverse effects of the proposed discharge.

YES	NO
X	

List actions taken:

a. Dredged material placed at the HBDS will be spread throughout the TPA at a thickness no greater than 0.9 feet. According to modeling, this thickness will allow for the maximum possible dispersion from the HBDS towards the shore located along the North Spit.

b.

c.

5. Factual Determination (Section 230.11).

A review of appropriate information as identified in items 2 - 5 above indicates that there is minimal potential for Short- or long-term environmental effects of the proposed discharge as related to:

a.	Physical substrate (review sections 2a, 3, 4, and 5 above).	YES X	NO
b.	Water circulation, fluctuation, and salinity (review sections 2a, 3, 4, and 5)	YES X	NO
c.	Suspended particulates/turbidity (review sections 2a, 3, 4, and 5).	YES X	NO

d.	Contaminant availability (review sections 2a, 3, and 4)	YES	X	NO	
e.	Aquatic ecosystem structure, function and organisms(review sections 2b and c, 3, and 5)	YES	X	NO	
f.	Proposed disposal site (review sections 2, 4, and 5)	YES	X	NO	
g.	Cumulative effects on the aquatic ecosystem	YES	X	NO	
h.	Secondary effects on the aquatic ecosystem	YES	X	NO	

6. Review of Compliance (Section 230.10(a)-(d))

a.	The discharge represents the least environmentally-damaging practicable alternative, and, if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to or be located in the aquatic ecosystem to fulfill its basic purpose.	X YES	NO
b.	The activity does not appear to: 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally-listed threatened and endangered species or their critical habitat; and 3) violate requirements of any Federally-designated marine sanctuary.	X YES	NO
c.	The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values.	X YES	NO
d.	Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.	X YES	NO

7. Findings of Compliance or Non-Compliance (Sec. 230.12)

The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines. YES X NO

_____ _____

DATE District Commander

APPENDIX I:
RESPONSE TO COMMENTS