Draft
Environmental Assessment
and FONSI

Humboldt Harbor and Bay Operations and Maintenance Dredging (FY 2021-25)

Humboldt Bay, Humboldt County, California

U.S. Army Corps of Engineers
San Francisco District

March 2021

Table of Contents

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

ADCP	Acoustic Doppler Current Profiler
BA	Biological Assessment
BMP's	Best Management Practices
BO	Biological Opinion
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CY	cubic yards
DB	Decibels
DBA	A-Weighted Decibel
DO	Dissolved Oxygen
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
ERDC	United States Army Engineer Research and Development Center
ESA	Endangered Species Act
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
ft	feet
HOODS	Humboldt Open Ocean Disposal Site
HSMP	Humboldt Shoreline Monitoring Program
m	meters
MCY	Millions of cubic yards
MDL	Method Detection Limit
MLLW	Mean Lowest Low Water
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRL	Method Reporting Limit
N/A	Not Applicable
NDS	Nearshore Disposal Site
NEPA	National Environmental Policy Act
nm	nautical miles
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
OBS	Optical Backscatter Sensor
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
ppb	parts per billion
SAP	Sampling and Analysis Plan
SHPO	State Historic Preservation Office
SONCC	Southern Oregon/ Northern California Coast
TPA	Target Placement Area (subset of the HBDS)
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WRDA	Water Resources Development Act

This page intentionally left blank.

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) and U.S. Army Corps of Engineers (USACE) Planning Regulations (ER 200-2-2). 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 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.

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 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 approximately 14 miles, covering 26.5 square miles at high tide and approximately 7.8 square miles at low tide.

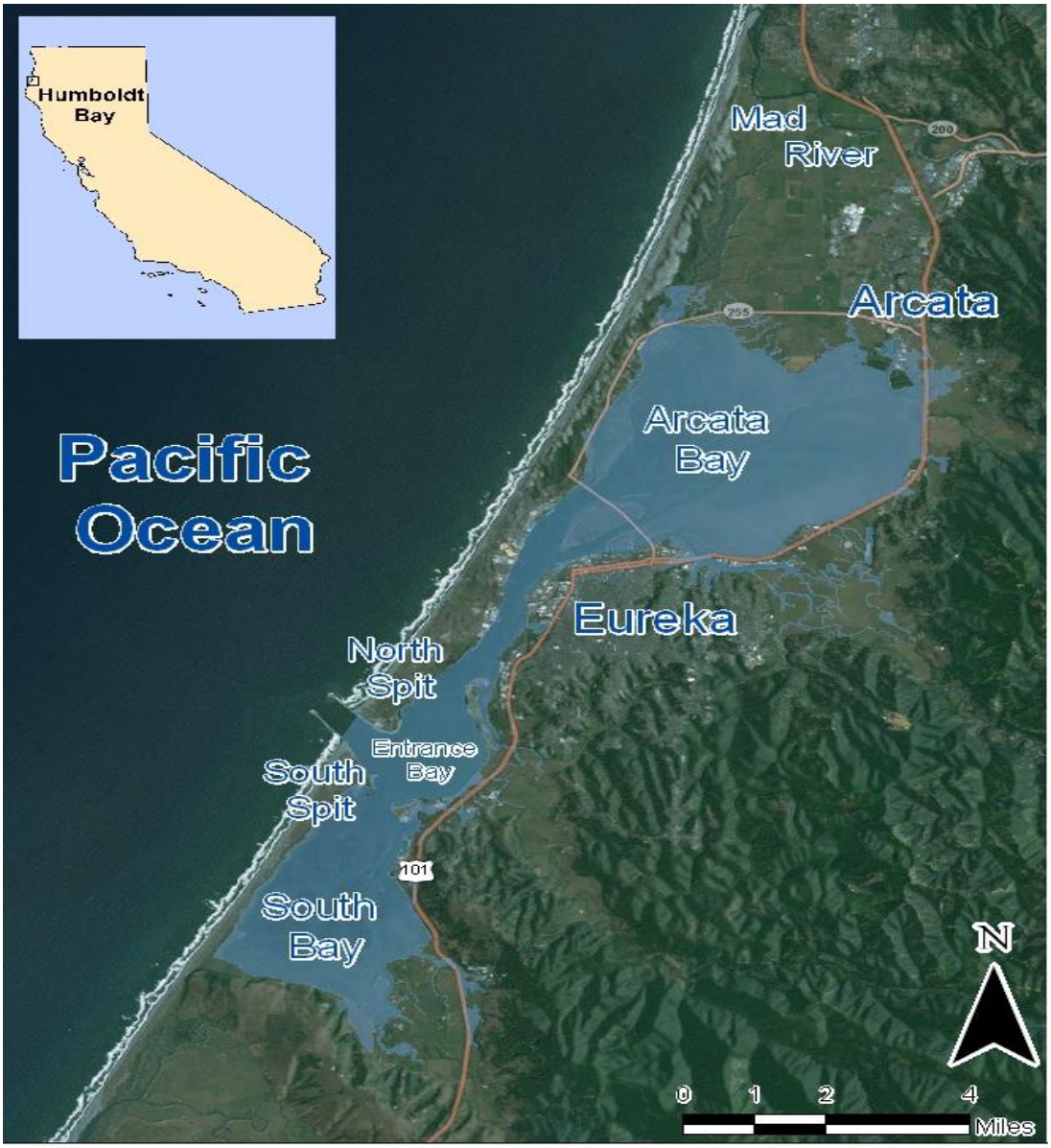


Figure 1. Proposed Project Location—Regional Perspective

1.4 Project Description

USACE proposes to continue annual operation and maintenance (O&M) dredging activities at Humboldt Harbor and Bay from fiscal year (FY) 2021-25, including placement at Humboldt Open Ocean Disposal Site.

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 three feet (two feet paid plus one foot unpaid) [**Table 2**]. Annual maintenance of the Bar and Entrance Channel is performed by the USACE hopper dredge *Essayons* (primarily), the *Yaquina* (occasionally), or with contracted hopper dredges, from mid-March through May for approximately 32 days. Over the past decade, on average, 954,464 cubic yards (CY) of primarily clean sand has been annually removed (**Table 3**). Over the next 5 years (FY2021-25), up to a maximum of 2,000,000 cubic yards (CY) is expected to be dredged annually from this channel Historically, the dredged material has been placed at the Humboldt Open Ocean Disposal Site (HOODS). According to the most recent grain-size analysis, conducted in 2021, sediment from this channel is greater than 97 percent sand. As such, it is suitable for continued disposal at HOODS, which beginning in 2021 has been expanded by the USEPA (USEPA 2020).

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. To maintain their authorized depths, twice in the last decade the interior channels were dredged with an average volume of 17,566 cubic yards (**Table 3**).

The North Bay Channel is 18,500 feet long and 400 feet wide, with a project depth of 38 feet MLLW, plus two feet of allowable overdepth (one foot paid plus one foot unpaid). According to the most recent grain-size analysis, conducted in 2021, sediment from this channel is greater than 94 percent sand, and is therefore suitable for disposal at HOODS.

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. Two feet of overdepth (one foot paid plus one foot unpaid) is allowed throughout the channel. According to a 2016 chemistry and grain size analysis, sediment from this area is clean and a little less than 80 percent sand, so it can be placed at HOODS. The USACE currently is conducting grain-size analysis from this channel.

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 plus two feet of allowable overdepth (one foot paid plus one foot unpaid). According to the most recent grain-size analysis, conducted in 2021, the sediment from this channel and basin are greater than 90 percent sand, except for one composite sample that was 73.5% sand. It is therefore suitable for disposal at HOODS.

The Field's Landing Channel is 12,000 feet long and 300 feet wide, with a 800-foot-long, 600-foot-wide turning basin with an authorized depth of 26 feet MLLW, plus two feet of allowable overdepth (one foot paid plus one foot unpaid). According to a 2016 chemistry and grain size analysis, the sediment from this area is clean and approximately 88 percent sand. It is therefore suitable for disposal at HOODS. The USACE currently is conducting grain-size analysis from this channel.

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 U.S. 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.

1.5.2 Purpose

The purpose of the proposed action is to maintain the congressionally authorized depths of the federal navigation channels within Humboldt Harbor and Bay, and continued operation of the U.S. Coast Guard and use of the of the harbor for refuge during storms, through annual maintenance dredging.

1.6 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 C.F.R. § 230 (a).

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. This will allow for continued safe passage of commerce vessels by maintaining the Humboldt Bar and Entrance channel as well as the several interior Humboldt channels at the congressionally authorized depths of 26, 35, 38, and 48 feet MLLW.

Disposal of the dredged material would take place at HOODS. Potentially, placement (beneficial use) of sandy dredged material at a nearshore sand placement site (NSPS) to alleviate the effects of erosive wave actions along the North Spit could occur once a demonstration site is created. However, establishment of an NSPS would first need to be analyzed under a separate NEPA document and process, which would likely take at least 5 years. Material determined to be unsuitable or infeasible for nearshore beneficial use that meets the standards and criteria for open ocean disposal would be placed at 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, and (2) the water column and substrate at HOODS 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 two alternatives are analyzed in this Environmental Assessment, namely the Proposed Action and No Action alternatives. The purpose of this section is to describe the Proposed Action and No Action alternatives, as well as summarize alternatives considered but eliminated from further study..

3.1 Proposed Action (Preferred Alternative)

The proposed action involves the annual maintenance dredging of the bar, entrance and North Bay, Eureka, Samoa, and Field's Landing channels and associated turning basins located in Humboldt Harbor and Bay for the FY2021-25 timeframe. **Table 2** provides an overview of the congressionally authorized depths, widths, and lengths of the navigation channels. **Table 3** shows recent dredging volumes from the proposed project area, and **Table 4** lists planned dredging activities at Humboldt during FY2021-25. Based on recent dredging history (**Table 3**), up to a maximum of 2,000,000 cubic yards (CY) are expected to be dredged annually from the Bar and Entrance channel and the various interior channels during FY2021-25 using the USACE hopper dredges *Essayons* and *Yaquina*, or with contracted hopper dredges.

Depending on the result of sediment characterization, material dredged from Humboldt Bay's navigation channels between 2021 and 2025 would be placed at the permanently designated disposal site, HOODS. The HOODS was first used as a disposal site for the sediment from Humboldt Harbor and Bay in September of 1990. Beginning in 2021, HOODS will have an expanded footprint as described below.

Table 2. Humboldt Harbor and Bay Navigation Channel Dimensions

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. Humboldt Harbor and Bay Channels – Recent Dredging Volumes

Fiscal Year	Bar and Entrance Channel	*Interior Channels (CY)	Total Volume (CY)
2011	1,165,398	154,881	1,320,279
2012	1,182,620	---	1,182,620

2013	674,928	---	674,928
2014	432,490	---	432,490
2015	715,296	---	715,296
2016	1,588,906	20,777	1,609,683
2017	1,115,051	---	1,115,051
2018	759,625	---	759,625
2019	1,181,388	---	1,181,388
2020	1,047,669	110,834	1,158,503
Annual Average	**986,337**	**28,649**	**1,014,986**

*Includes the North Bay, Samoa, Eureka, and Field's Landing Channels.
n/a = not available.

Table 4. FY 2021-25 Planned Dredging Activities

Year	Dredge Dates/ Dredge	Number of days dredging	Maximum Volumes	Placement Site(s)	Dredged Channels
2021	Mid-March—>end of Sept. (*Essayons*, *Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	HOODS	Bar and Entrance Channel and/or Interior Channels
2022	Mid-March—>end of Sept. (*Essayons*, *Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	HOODS	Bar and Entrance Channel and/or Interior Channels
2023	Mid-March—>end of Sept. (*Essayons*, *Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	HOODS	Bar and Entrance Channel and/or Interior Channels
2024	Mid-March—>end of Sept. (*Essayons*, *Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	HOODS	Bar and Entrance Channel and/or Interior Channels
2025	Mid-March—>end of Sept. (*Essayons*, *Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	HOODS	Bar and Entrance Channel and/or Interior Channels

3.1.1 *ORIGINAL* Humboldt Open Ocean Disposal Site (HOODS) – *1990-2020*

In August 1995, the United States Environmental Protection Agency (USEPA), Region IX, released a final Environmental Impact Statement entitled *Designation of an Ocean Dredged Material Disposal Site off Humboldt Bay, California*. The USEPA's final rule on designating HOODS[1] under Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) was published in the Federal Register on September 28, 1995 (60 Fed. Reg. 50,108). The site designation became effective on October 30, 1995 for a period of 50 years. Pursuant to § 228.5(a) of the MPRSA regulations, 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.

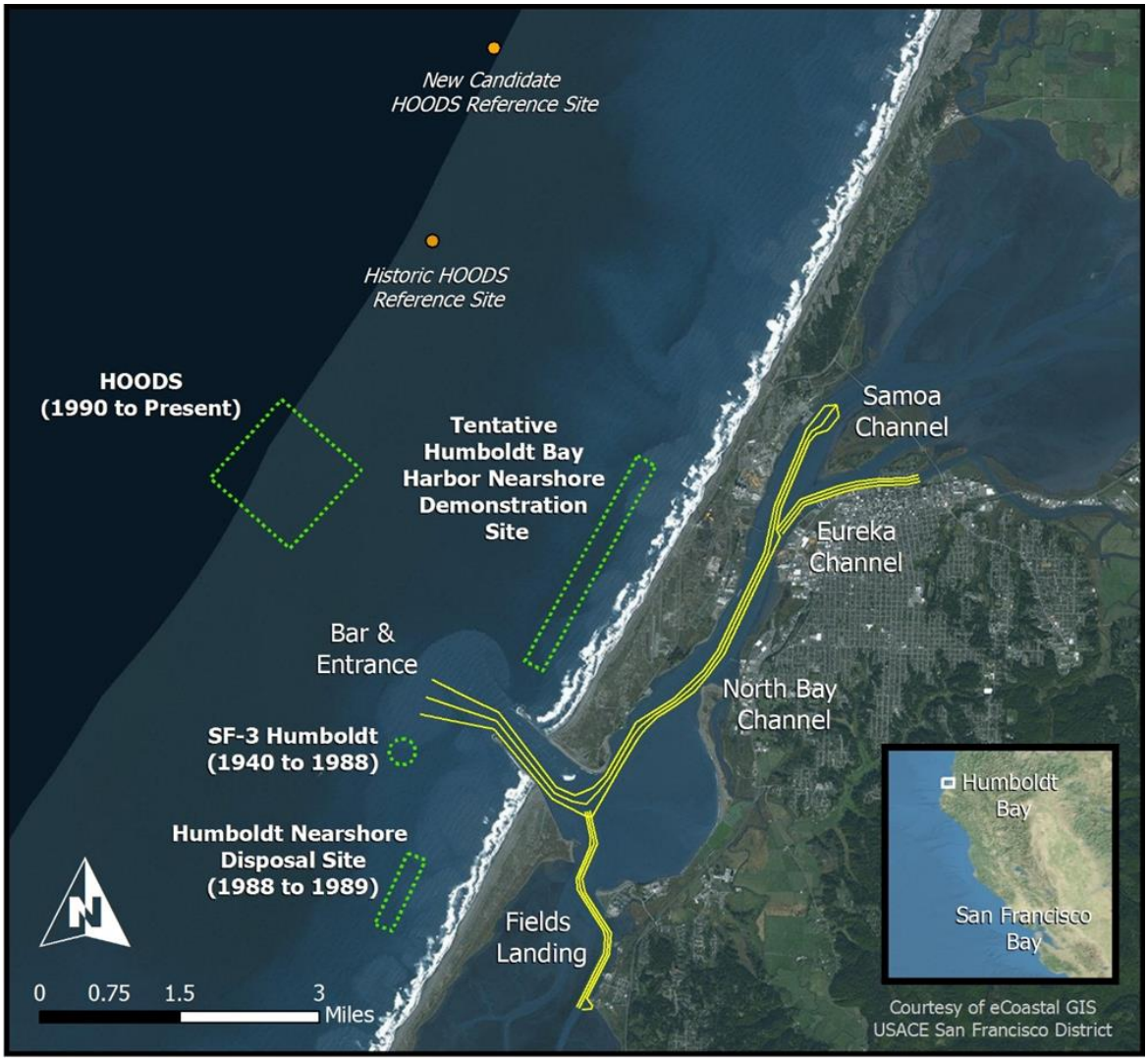


Figure 2. Federal Navigation Channels & Placement Sites in Vicinity of Humboldt Bay.

[1] 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 USEPA authority to designate sites where ocean dumping may be permitted.

The original HOODS is in the Pacific Ocean, approximately three nautical miles (nm) west of the entrance to Humboldt Bay (**Figure 2**). It is one square nautical mile (nm^2) in size with depths ranging from 160 to 180 feet (49 to 55 meters). It is divided into four quadrants ("quads"), each containing nine cells (**Figure 3**). The placement of dredged material from Humboldt Bay navigation channels involves alternating the placement within the various cells, while preventing excessive mounding. Annual bathymetry surveys allow for USACE, in consultation with USEPA, to determine where mounding occurs and limit placement of dredged material within these mounding cells.

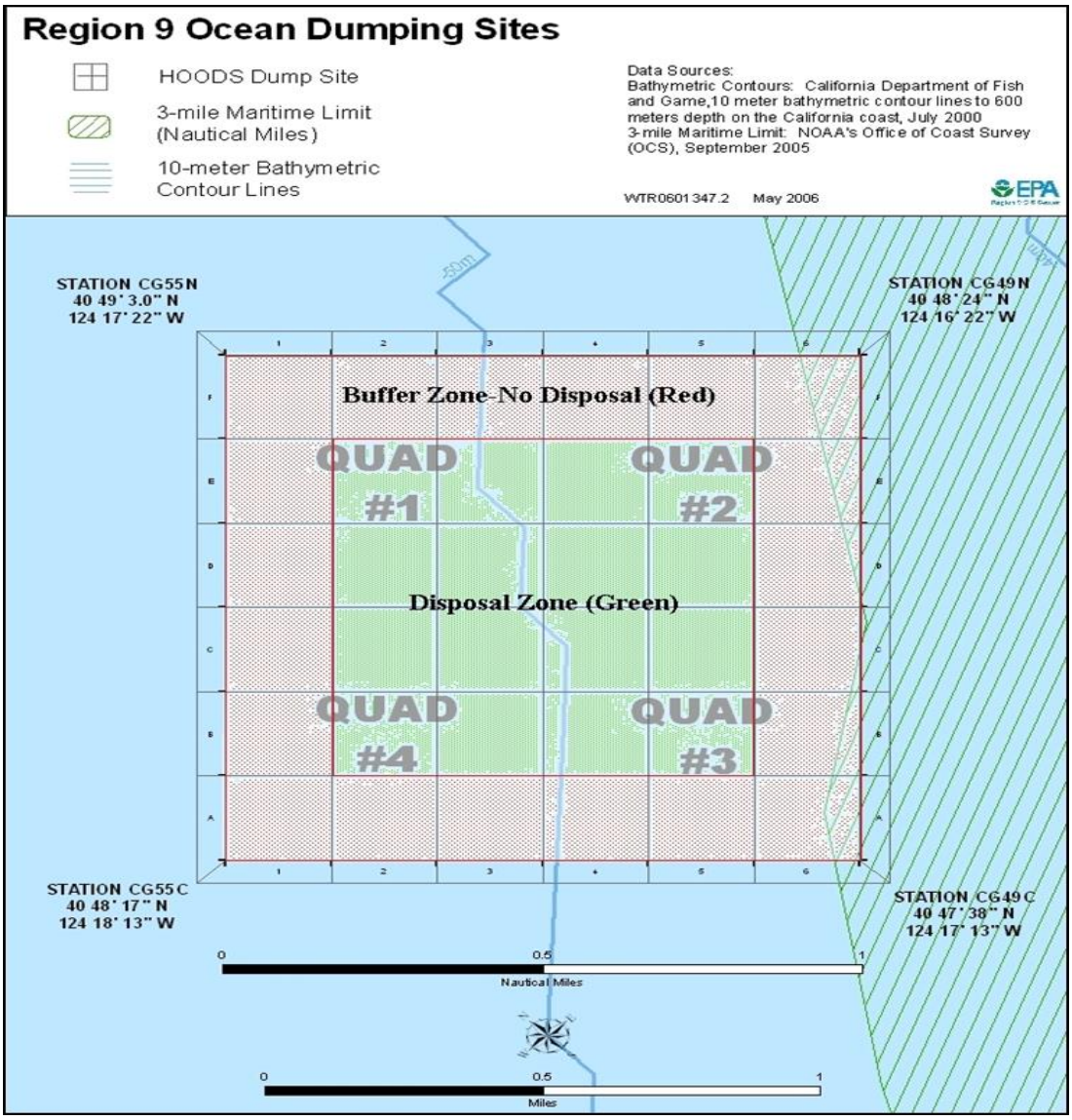
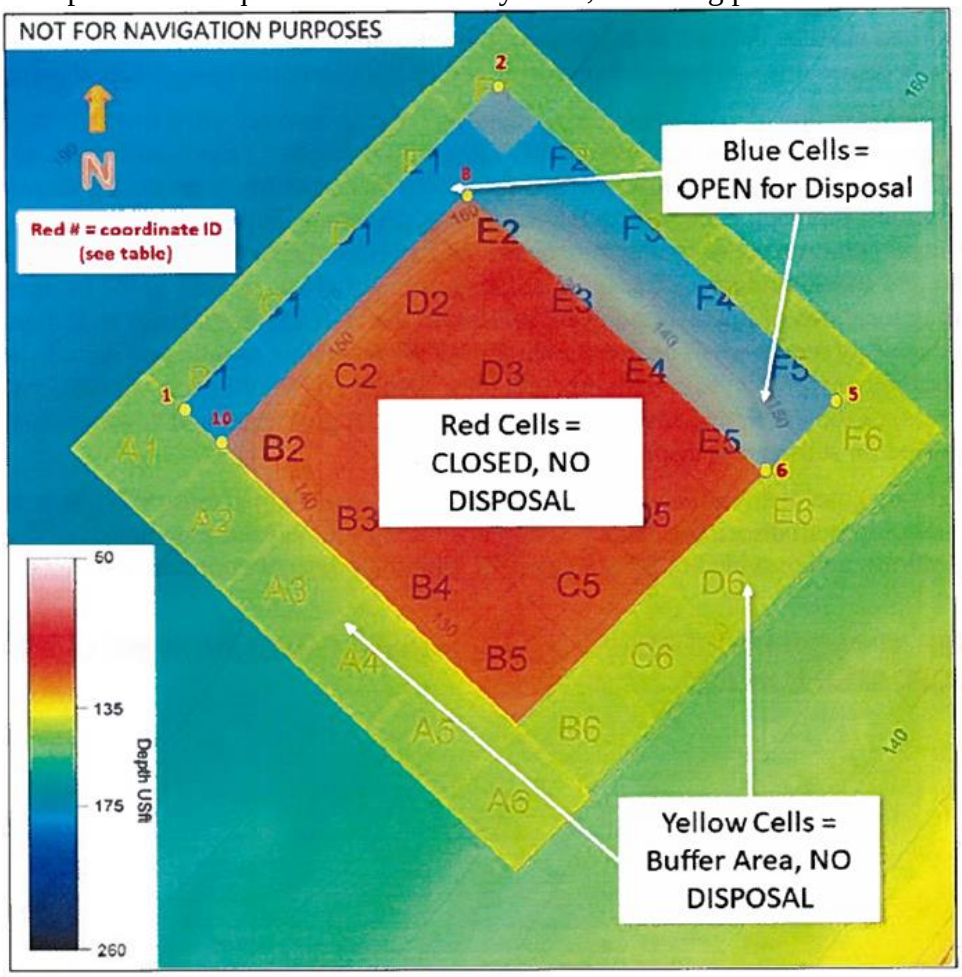


Figure 3. Humboldt Open Ocean Disposal Site—Original Quads (May 2006)

Historically, in order to form a buffer zone, sediment was not placed in the 20 perimeter cells of HOODS (note pink cells, **Figure 3**). However, starting in May 2015, only certain disposal cells within the overall HOODS site were used for disposal (especially for sand) due to mounding of previously disposed materials (exceeding 130 feet, MLLW). Currently, all disposal must take

place over the northwest and northeast slopes of the existing mound. **Figure 4** shows the new, more restrictive placement requirements since May 2015, including portions of some buffer cells.



Humboldt Open Ocean Disposal Site (HOODS) map, showing individual disposal cells that are open for vs closed to disposal in 2020. Underlying bathymetry is from 2014 survey.

Figure 4. Humboldt Open Ocean Disposal Site—2020 Placement Quads

Because the majority of sediment disposed at HOODS since 1995 has been sand that stays in place after disposal in these water depths, this approach resulted in a symmetrical mound, with a surface elevation averaging approximately 130 feet deep, covering all of the internal cells. As interior disposal cells reached (and in some cases slightly exceeded) the 130-foot depth target overtime, USEPA closed those cells to further disposal and restricted ongoing disposal to fewer and fewer cells. By 2020, disposal was only allowed in the inner portions of the buffer zone cells on the north and west sides of the site, along the slopes of the mound (**Figure 4**). This ensured that incremental growth of the mound would only occur in the directions that USEPA proposed expanding the site footprint. Buffer zone cells on the south and east sides of the site remained off-limits for disposal because USEPA did not anticipate allowing disposal to the south (closer to the Humboldt Bay entrance channel) or to the east (inside the 3-mile limit, which are also State waters).

3.1.2 *EXPANDED* Humboldt Open Ocean Disposal Site – *2021-25 Disposal*

The USEPA, which is primarily responsible for ocean disposal under Section 102 of the Ocean Dumping Act, is significantly expanding the HOODS disposal footprint. The expansion takes effect on March 19, 2021 (Brian Ross, USEPA, pers. comm. March 19, 2021).

The expanded HOODS overlaps with the original site (superseding the original boundary) and extends an additional 1 nm to the north and west (**Figure 5**). It covers 4 square nm and is in water depths ranging from approximately 150 to 210 feet (MLLW). **Table 5** provides the outer corner coordinates of the expanded site. The effective total capacity of the site will increase from the original 25 MCY to over 100 MCY (i.e., allowing for 75 MCY of additional disposal to occur), before mounding to -130 feet MLLW could again occur across the entire site. So, if today's disposal practices were to continue unchanged (i.e., if on average 1 MCY of dredged sand per year were to continue being placed at HOODS indefinitely), the site would reach capacity again in about 75 years. However, the effective life of the expanded site could be much longer than 75 years if nearshore placement of sand for beach or littoral system support were to begin at some point in the future (as shown in **Figure 5**). In that event, disposal of finer sediment would continue in the expanded HOODS footprint, but it could be managed in such a way that little or no additional long-term mounding would occur at all.

Table 5. Expanded HOODS corner coordinates and centroid (NAD 83).

Alternative 1 (Proposed): Expand by 1 nmi to North and West				
Corner	***Latitude***	***Longitude***	***Centroid Lat.***	***Centroid Long.***
North	40° 50' 18" N	124° 18' 01" W	40° 48' 56" N	124° 17' 32" W
East	40° 49' 16" N	124° 15' 46" W		
South	40° 47' 33" N	124° 17' 05" W		
West	40° 48' 34" N	124° 19' 18" W		

The expanded HOODS is also divided into quadrants and cells (**Figure 6**). Each quadrant is 1 square nm (the size of the original HOODS) and each is divided into 36 square cells that are approximately 1,000 feet by 1,000 feet in size. The mound in the original HOODS occupies Quadrant 1 of the expanded site and will remain closed to ongoing disposal. The outermost cells of the expanded site will also continue to serve as a buffer zone closed to disposal. The 75 remaining cells in Quadrants 2, 3, and 4 are available to be specified in permits for disposal. However, initially only the 39 cells nearest the mound will be used, with the other 36 cells reserved for possible future use if needed (**Figures 6, 7**).

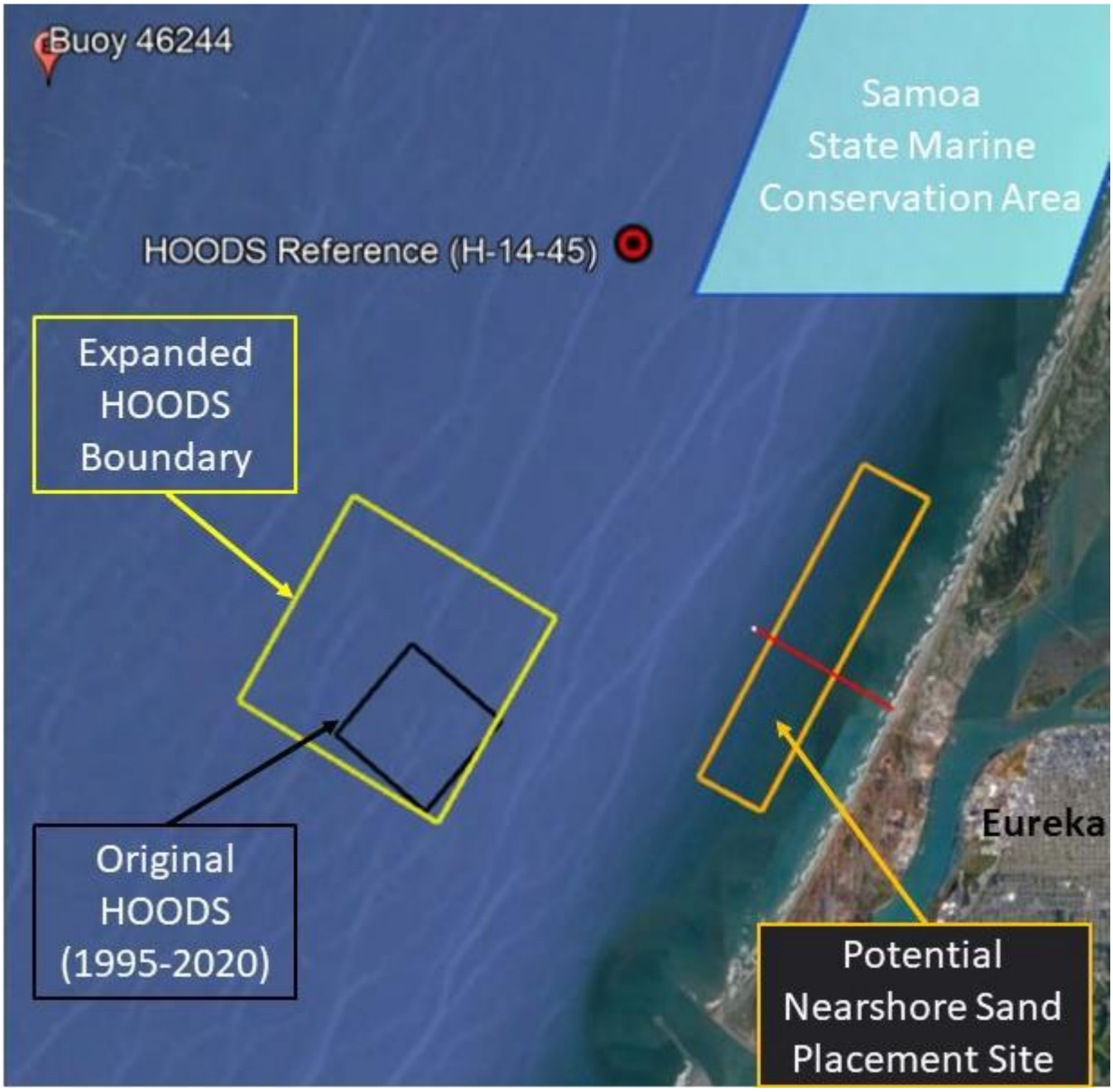


Figure 5. Expanded HOODS—Beginning 2021. Showing location in relation to the original HOODS, the new HOODS reference site, the Samoa State Marine Conservation Area, the potential future Nearshore Sand Placement Site (NSPS), and the city of Eureka, California.

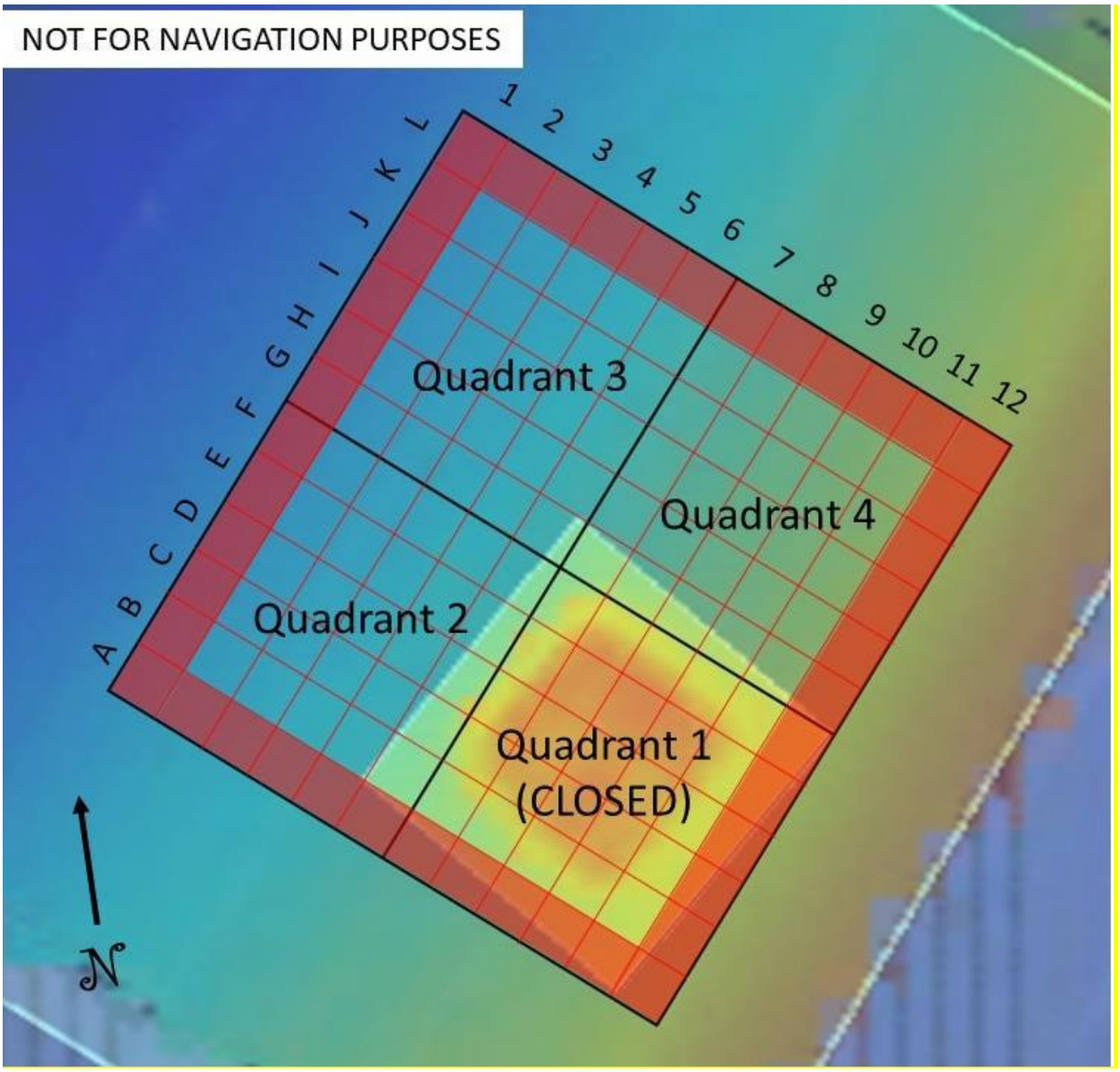


Figure 6. Map showing the overall layout of quadrants and disposal cells in the expanded HOODS, beginning in 2021. Quadrant 1 includes the original HOODS, which is closed to further disposal. The outermost cells of the expanded site (red shading) comprise a buffer zone that is also closed to disposal. Allowable disposal cells will be specified on a project-specific basis.

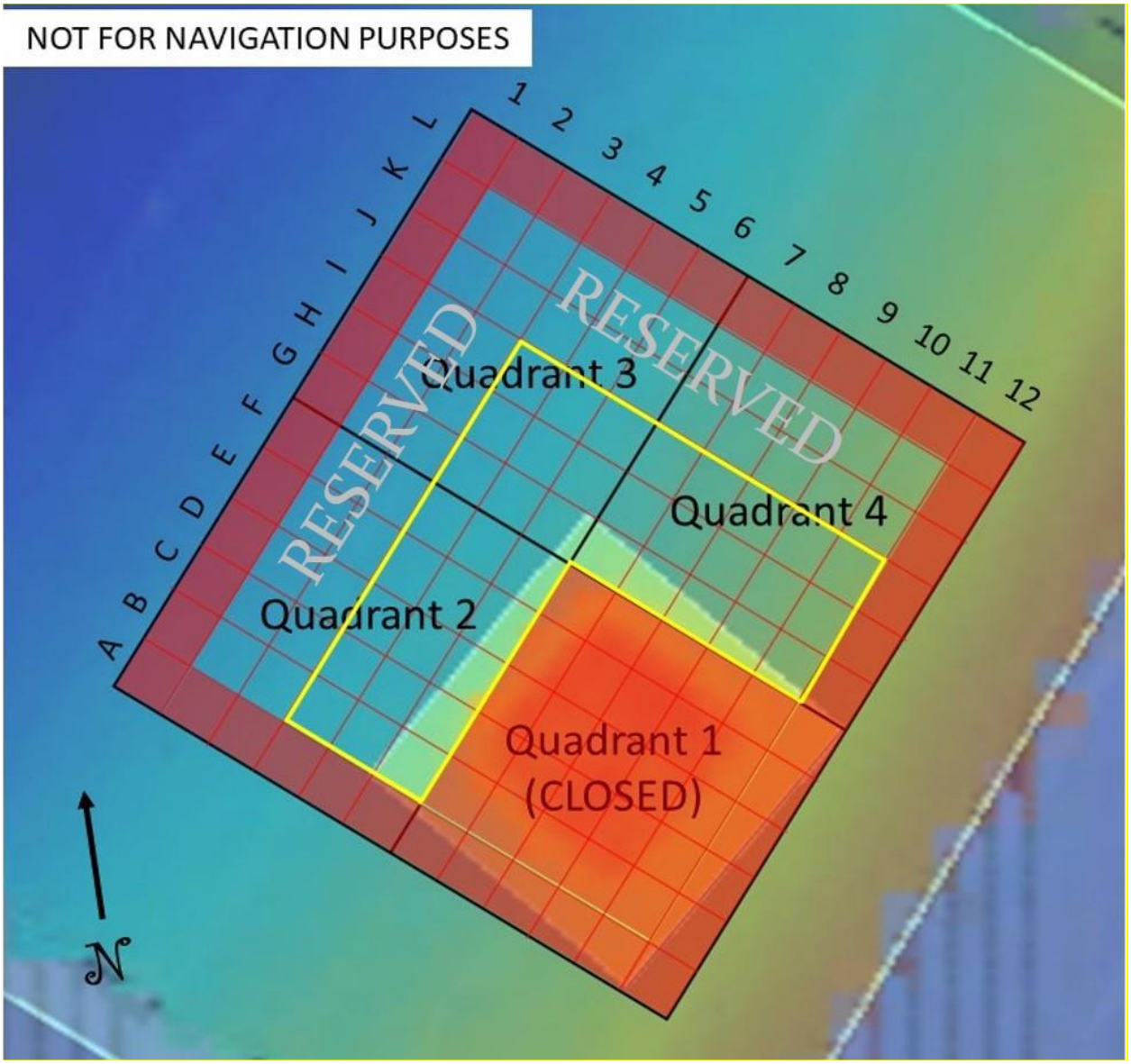


Figure 7. Map showing the layout of Reserved vs Available (yellow box) disposal cells in the expanded HOODS, beginning in 2021. Disposals will occur over the slopes of the existing mound, slowly growing it to the north and west over time while leaving the remainder of the site undisturbed for as long as possible. USEPA will specify allowable disposal cells on a project-specific basis.

For individual projects, a subset of disposal cells will be specified in each USEPA ocean disposal concurrence, to manage future mounding. In any year, ongoing disposal will be limited to occurring over the northern and western slopes of the existing mound. As the mound slowly expands laterally in these directions, specified allowable disposal cells will be shifted outward as well, so that the mound does not increase in height (i.e., so that it does not become shallower than the minimum target depth of -130 feet MLLW). Furthermore, no disposal will be allowed in the buffer cells around the edges of the site, or in the 36 interior cells marked as "RESERVED" in **Figure 7**. Use of the "RESERVED" cells will only be considered in the future when the mound is again nearing capacity in the available cells. At that time, a revision will be issued with an opportunity for public comment.

The original HOODS footprint will be off-limits to further disposal. USEPA anticipates directing USACE to the following cells in the new expansion area for spring 2021 dredging purposes, as shown in **Figure 7**: A6, B6, C6, D6, E6, F6, G6, G7, G8, G9, G10, and G11.

3.1.3 *FUTURE POTENTIAL* Nearshore Sand Placement Site (NSPS)

Although monitoring at HOODS has confirmed that there have been no adverse impacts from offshore disposal, neither does offshore disposal provide any direct environmental benefits. Sand placed at HOODS is in water too deep, and too far offshore, for normal seasonal transport processes to move it into the active littoral sand transport zone. Placing sand at HOODS therefore is considered "disposal," as opposed to "beneficial use."

An obvious potential alternative to ocean disposal of clean sand at HOODS would be to place it at a much shallower, nearshore site to nourish the littoral system. Shallow-water placement of clean sand happens at many locations in California, elsewhere on the west coast, and nationwide. Such placement can help buffer against coastal erosion and the effects of sea level rise.[2]

As described in the recent USEPA EA on HOODS expansion (USEPA 2020), a nearshore sand placement site (NSPS) would extend the operational life of HOODS by reducing the amount of sand disposal (and therefore mounding) occurring there, and at the same time provide a beneficial use which could help inhibit coastal erosion. If such a site is ultimately shown (via monitored demonstration placements) to have no significant environmental impacts, USEPA and USACE could formally establish it for ongoing use**.** Establishing such a site would involve a separate NEPA analysis and public comment process (under 40 CFR 230.80) The recommended location (USEPA 2020) is aligned parallel to the sand spit just north of the Humboldt Bay Bar and Entrance (**Figure 2**). Should a demonstration site be established during the 2021-2025 period USACE would evaluate shifting placement to that site under a separate NEPA analysis and compliance at that time.

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,

[2] 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. For the purposes of this monitoring program, the Eureka Cell was defined as extending the length of the spits, which is approximately seven miles south of the South Jetty and seven miles north of the North Jetty. A final report on the HSMP was completed in 2018 and is included for reference in Appendix D.

decreased vessel safety, and maneuvering problems. This would have a long-term adverse impact on the local economy and on NED. 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 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 a nearshore sand placement site (NSPS);
- Maintenance dredging with placement at an upland site within the Humboldt Bay region;
- Maintenance dredging with placement directly onto the beach; and
- Historical Placement Alternatives (Superbowl Site, SF-3, and Nearshore Disposal Site).

The first alternative above was eliminated from further analysis because a nearshore sand placement site is not available, and therefore it is not feasible. This alternative will be reconsidered if a suitable nearshore site becomes available.

The second alternative above was eliminated from further analysis because a suitable upland site within the Humboldt Bay region is not available, and therefore is not feasible. This alternative will be reconsidered if a suitable upland site becomes available.

The third alternative was eliminated from further analysis because a suitable beach site (beneficial use) within the Humboldt Bay region is not available, and therefore is not feasible. This alternative will be reconsidered if a suitable beach site becomes available.

The fourth 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 Menzies’s wallflower (*Erysium menziesii*) from pipeline placement on the Samoa Dunes.

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 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.

3.4 Sediment Suitability for Disposal at HOODS

Based on decades of dredging experience, sediment dredged from the Humboldt Bar and Entrance channel, and from all the interior channels, is predominantly (80-98%) clean sand that is clearly suitable for disposal at HOODS. The USACE is currently sampling and testing sediment from these channels, as it does roughly every 5 years (last done in 2016). Available 2021 grain size analysis results for material from the Bar and Entrance Channel is described in section 1.4.1 and for that from the interior channels is described in section 1.4.2. This testing has shown the material is again predominately clean sand. According to the contractor's latest schedule testing results and a draft report will be completed by April 30, 2021.

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 USEPA sets standards and provides special conditions for placement of dredged material, and it is the responsibility of USACE to meet the USEPA'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 (testing conducted every five years for those channels that have historically contained sediments consisting predominantly of sand to confirm that the sand and

gravel content is greater than 80%), according to the specifications of the *Evaluation of Dredged Material Proposed for Open Ocean Disposal* (USEPA, 1995).

HOODS was first used as a placement site in September 1990. Since then, on average some 1 MCY of dredged material per year have been placed there, roughly equaling 30 MCY total since 1990.

4.0 Impact Assessment

This section provides an assessment of potential impacts of the proposed action (preferred alternative). 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, the factor is followed by N/A.

(X) Water Quality - temperature, salinity patterns, and other parameters:
The proposed annual maintenance dredging of Humboldt Bay's navigation channels would effectively maintain the status quo of the surrounding marine environment as dredging occurs in Humboldt Bay on an annual basis and any impacts to the marine environment would be localized and temporary. 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 bay-wide or over the long term.

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 the proposed action.

The expanded HOODS is an open water area beyond the 3-nautical miles limit from the shoreline. It is located outside of jurisdictional waters of the United States and therefore this action is not subject to section 401 of the Clean Water Act.

Additionally, the expanded HOODS, an open water area largely beyond the 3-nautical miles limit of the shoreline, is 4 square nm in area. It is located outside of jurisdictional waters of the United States and therefore this action is not subject to 404(b)(1) analysis.

Under the no action alternative, none of the 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 the preferred alternative 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 to 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 to run 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 Channel 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 6**). 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 6. Overflow Plumes in the North Bay and Samoa Channel (Measured)

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 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 86 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.

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.

Increases in turbidity within the action area under the proposed action using government or contracted hopper dredges with and without anti-turbidity valves 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 would be anticipated.

(X) Substrate: Under the proposed action, 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 2**.

The proposed action would result in changes in bottom topography of the Bar and Entrance and Interior channels of Humboldt Bay. However, each year these channels receive large quantities of sediment moving naturally downstream from the Mad, Eel, and Little rivers to the Bay. This annual increase in sediment is what necessitates the dredging in order to maintain channel depths. Consequently, the channels have been dredged for the past 130 years (**Table 1**). Dredging depths have remained the same since 1999, and no new depths are anticipated. Since the system is dynamic in its natural state, less than significant impacts to the substrate are expected from dredging.

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), 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 USEPA so as not to create significant mounding in any one place at HOODS. The *Essayons* and *Yaquina*, as well as the contracted hopper dredges would be subject to these requirements when placing material at HOODS. Because of the fact that the USEPA 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 USEPA placement requirements, less than significant impacts are expected.

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 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 proposed action.

( ) 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).

HOODS is identified as a non-dispersive disposal site based on the findings that relatively low ambient currents prevail in the vicinity. HOODS has been used as a disposal site since 1990. 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 the proposed action.

Under the no action alternative, no dredging would occur, and mixing zones within the proposed action area would continue in their current state. Thus, no impacts would be 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.

The Humboldt Shoreline Monitoring Program (HSMP) began in 1990 to monitor the effects of removing sandy material from the Eureka littoral cell and placing it at HOODS and 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). According to the HSMP, both processes are occurring along the shoreline of Humboldt Bay. 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 reoccurred in the fall of 1992, 1995, 1998, 2001, 2005, 2011, 2015, 2016, 2018 and 2019. 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 8**).

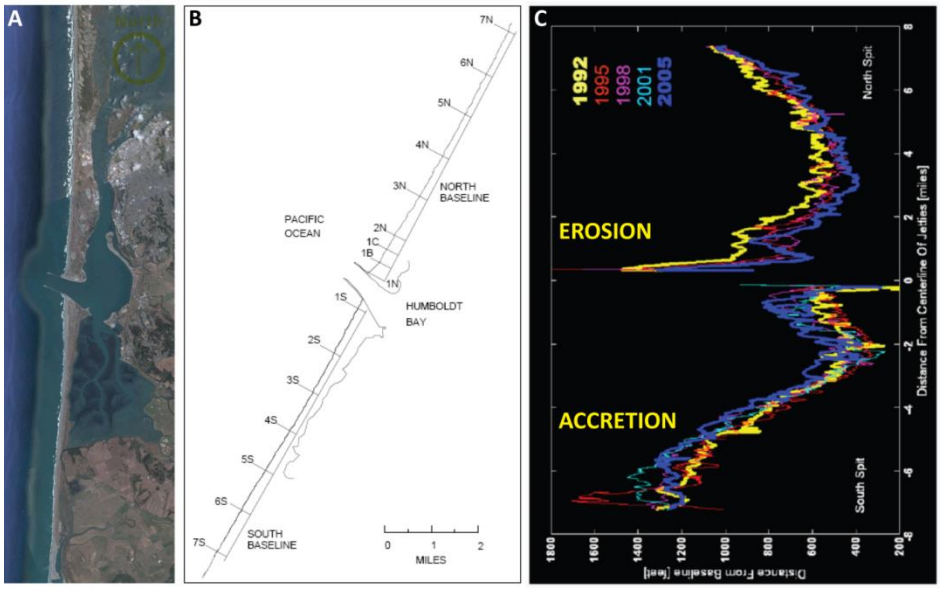


Figure 8. Changes to Humboldt shoreline from 1992 to 2005 on the South spit and North spit. A: Aerial photograph of Humboldt Bay with the jetties in the center. B: The monitoring stations for the 1992 through 2005 beach surveys. C: Survey results.

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 largely 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 phenomenon 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 proposed action.

Under the no action alternative, material would continue to be placed at HOODS, erosion along the north spit would continue unabated and the beneficial impacts experienced under the proposed action would not be realized. Consequently, implementation of the no action alternative would result in less than significant impacts with respect to shoreline erosion.

( ) **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), plankton, 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. The USACE conducted a fish survey by trawling five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a, b). Trawls were conducted approximately twice per month from March through October of each year. A total of 5,986 juvenile and 166 adult Dungeness crab were collected in 2019, whereas 1,454 juveniles and 92 adults were collected in 2020. Crab capture locations (i.e., inside vs. outside of the federal channels) differed between the two years. Specifically, juveniles were collected about equally inside and outside of the channels in 2019, and adults were collected more often inside the channels. Results in 2020 were much more similar to the statements of Emmett et al. (1991) and Williams (2006) described above, with greater than 70% of both juveniles and adults collected outside the channels.

Invertebrates in the federal channels of Humboldt Bay may be entrained by the hopper dredge draghead and removed from the bay. However, recolonization of dredged areas is likely due to the localized and temporary nature of the dredging activities.

Detrimental effects of dredged material placement on benthos include direct burial of invertebrates. Placement of dredged material in the nearshore environment 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. 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.

Impacts to the existing benthic community at HOODS 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 1990.

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, impacts are expected to be less than significant.

Under the no action alternative, the proposed action would not 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 in the ocean near Humboldt Bay include pelagic (i.e., open water) species such as Northern Anchovy (*Engraulis mordax*) and Pacific Herring (*Clupea harengus pallasi*); species that inhabit rocky areas and kelp forests such as Black rockfish (*Scorpaenidae melanops*), Blue Rockfish (*Scorpaenidae mystinus*), Bocaccio (*Scorpaenidae paucispinis*), Brown Rockfish (*Scorpaenidae auricultus*), Copper Rockfish (*Scorpaenidae caurinus)*, Grass Rockfish (*Scorpaenidae rastrelliger*), Vermilion Rockfish (*Scorpaenidae miniatus)*, Lingcod (*Ophiodon elongatus)*, Kelp Greenling (*Hexagrammos decagrammus)*, and Cabezon (*Scorpaenichthys marmoratus*); flatfish such as Butter Sole (*Isopsetta isolepis*), Dover Sole (*Microstomus pacificus*), English Sole (*Parophrys vetulus*), Sand Sole (*Psettichthys melanostictus*),Starry Flounder (*Platichthys stellatus*), and Pacific Sanddab (*Citharichthys sordidus*); and sharks and rays including Leopard Shark (*Triakis semifasciata*), School Shark (*Galeorhinus galeus*), Spiny Dogfish (*Squalus acanthias*), and Big Skate (*Raja binoculata)*. Within Humboldt Bay, Novotny et al. (2020a, b) collected a total of 18,667 fish from 42 different species in 2019, and 5,083 fish from 44 different species in 2020. Northern anchovy comprised the largest percentage of trawl catches in both years. In 2019, Northern Anchovy, Shiner Surfperch (*Cymatogaster aggregata*), Night Smelt (*Spirinchus starksi*), and English Sole made up 90% of the total catch. In 2020, Northern Anchovy and Night Smelt (*Spirinchus starksi*) made up one third of the total fish catch, and Pacific Herring, Spotfin Surfperch (*Hyperprosopon anale*), Shiner Surfperch, English Sole (*Parophrys vetulus*), Pacific Sand Lance (*Ammodytes hexapterus*), and Pacific Sanddab all consisted of at least 5% of the total catch.

Anadromous species that migrate between freshwater and saltwater environments through Humboldt Bay, many of which are listed as threatened or endangered under the Endangered Species Act (ESA), include Southern Oregon/Northern California Coast (SONCC) Coho Salmon *(Oncorhynchus kisutch)*, California Coastal (CC) Chinook salmon (O. tshawytscha), Northern California (NC) Steelhead (*O. mykiss)*, Southern DPS of North American Green Sturgeon (*Acipenser medirostris)*, and Longfin smelt (*Spirinchus thaleichthys*). Novotny et al. (2020a, b) captured one green sturgeon and one longfin smelt (both in October 2020) over their March-October sampling period in 2019 and 2020. The estuarine Tidewater Goby (*Eucyclogobius newberryi)* also occurs in Humboldt Bay.

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 four square miles) 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 HOODS would be finer grained and generally consisting of more than 80 per cent 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 and can detect and avoid dredge dragheads reducing the likelihood of entrainment. Larger-bodied species and life stages often are strong swimmers capable of avoiding the dragheads. In San Francisco Bay, northern anchovy is the species entrained most often by the hopper dredge *Essayons* (e.g., Novotny et al. 2019). This seems likely to be the case in Humboldt Bay as well based on their high relative abundance as indicated by the work of Novotny et al. 2020a, b).

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 HOODS 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).*

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

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, which are located primarily along the Atlantic coast of Florida, North Carolina, South Carolina, and Georgia.

As these marine reptile species are uncommon in and around the action area, no impacts under the proposed action or no action alternative 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 proposed action 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, adverse impacts from the proposed project are expected to be minimal. Also, impacts from the no action alternative would not be 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 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 planktonic and zooplankton communities.

Implementation of the proposed action would result in less than significant impacts to planktic communities as the turbidity created at the 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, adverse impacts would not be 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, and 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) regulations (50 C.F.R. § 600.920(e)(3)), USACE prepared a Programmatic BA and EFH Analysis, *Humboldt Bay and Harbor Maintenance Dredging (*FY 2021-25*), 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 2021-25). The Biological Assessment is attached in appendix A.

Based on the finding of the Programmatic BA/EFH, USACE, San Francisco District, has determined that the proposed action is 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 7**.

Table 7. 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 expected 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 (BO) issued for the Humboldt Harbor and Bay Operations and Maintenance Dredging (2016-2020) 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."

USACE believes that the assumptions made in the BO are conservative 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, the proposed action would not 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, 2006 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 unlikely to be 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, regular trawling from March through October conducted by USACE at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b) captured only one immature green sturgeon (total length = 964 mm) in the federal channels in October 2020. Also, 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 the preferred alternative would adversely affect this species. Therefore, less than significant impacts are 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:
Project impacts to feeding marbled murrelet are expected to be insignificant because similar habitat is widely available along other areas of the Humboldt County coast. Disturbance from project activities and impacts to fish and benthic food organisms in the project area will be minor, temporary, and localized. The project area is part of an active harbor, hence disturbance from boat traffic is common. Feeding birds are expected to simply avoid the project area and activities and feed in nearby areas. Additionally, USFWS has stated in a previous ESA consultation for this project that marbled murrelet is "uncommon in the vicinity of the proposed project" and that eelgrass habitats [important to murrelet prey fish species] are "not likely to be found in the deeper interior channels that have ongoing annual dredging."

Based on the effects analysis above, we are requesting your written concurrence with our determination that the proposed project *may affect, but is not likely to adversely affect* the marbled murrelet (see Appendix A for a copy of the letter initiating consultation with USFWS).

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, the proposed action would not 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
Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 et. seq.: 50 C.F.R. Part 600) requires that federal agencies prepare an Essential Fish Habitat (EFH) analysis when a federal action reduces the quality or quantity of EFH Pursuant to this, USACE prepared and submitted a *Programmatic Biological Assessment (BA) and Essential Fish Habitat (EFH) Analysis, Humboldt Bay and Harbor Maintenance Dredging (2012-2017), Humboldt, California*, dated November 2011. On November 2, 2015, the USACE provided NMFS with an electronic copy of an addendum to the 2011 BA/EFH assessment to cover the years 2016-2020. USACE will submit an EFH assessment evaluating the effects of the proposed maintenance dredging activities in Humboldt Bay to NMFS in March 2021. Few changes are expected from the previous ESA/EFH consultation completed in 2016.

The proposed project area is within the EFH for Pacific groundfish, Pacific salmon, and coastal pelagic Fisheries Management Plans (FMP).

Essential Fish Habitat Conservation Recommendations that are listed in the Biological Opinion issued for O&M dredging at Humboldt Harbor and Bay from 2016 through 2020 state:

"1. The Corps should limit the duration of overflow to the extent practicable during each dredge cycle.

2. The Corps should provide NMFS with graphs showing the cumulative increase in volume of sediment in the hopper over the entire time of pumping, clearly indicating when overflow starts and stops, for each dredge cycle at each channel location in the Interior Channels (Samoa, Eureka, North

Bay, and Fields Landing) and in the Bar and Entrance Channels. This information will validate NMFS' general assumption of the duration of overflow at each location in this consultation, because specific information could not be provided by the Corps.

3. For each dredging episode in Humboldt Bay, for each of the 5 years, copies of the daily dredge logs of the Yaquina and the Essayons should be provided to the following contact by the end of each calendar year: Jeff Jahn, South Coast Branch Supervisor, National Marine Fisheries Service, 1655 Heindon Road, Arcata, California 95521.

4. The Corps should work with NMFS to develop a surveying and monitoring plan by the end of 2017, using methodology developed for such determinations in other estuaries of the Pacific Northwest, to determine the extent of entrainment of prey species (e.g. Dungeness crab, Northern anchovy, Pacific sardine, Pacific Herring) by the Yaquina and Essayons in Humboldt Bay, and implement the plan prior to the end of 2019. If the results of the monitoring demonstrate a potential high level of entrainment, the Corps should develop a mitigation plan to minimize and mitigate for the loss of prey species, and work with NMFS to develop a schedule for implementation of the plan prior to 2019 dredging episode."

The USACE will work with NMFS to implement the conservation recommendations to minimize any potential impacts to EFH. The implementation of the FSMP which was conducted in 2019 and 2020, and will be repeated in 2021, is intended to fulfill conservation recommendation #4.

The USACE made the determination that implementation of the proposed action and the no action alternative would result in no impacts to EFH as HOODS is outside of the 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 adjoining 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 marbled 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 the proposed action would result in temporary and minor effects to the marbled murrelet during foraging activities. The USACE had determined that these effects are not likely to be adverse and has submitted an informal consultation request to the USFWS for concurrence (Appendix A).

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 C.F.R. § 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, no new depths are required, and disposal will be at an approved disposal site (HOODS).

Air emissions associated with the proposed project may be generated during sediment removal and transit to and from the placement site. These emissions would consist of minor amounts of dredge exhaust fumes; therefore, it is anticipated that the project will not significantly add to the ambient levels of dust or vehicular exhaust in the area.

The California Air Resources Board (CARB) enacted the Commercial Harbor Craft Regulation in January 2009 in order to accelerate the reductions of emissions of diesel particulate matter (PM) and oxides of nitrogen (NO_x) from commercial harbor craft operating in California Regulated Waters.

The *Essayon's* and *Yaquina's* engines meet Tier II level standards as defined by CARB.

The *Essayons* makes use of:

- Two, Tier II, C-280-12 Diesel Main Propulsion Engines.
- Three, Tier II, C-3512 Ship Service Generator Engines; and
- Two, Tier II, C-280 Diesel Dredge Pump Engines.

The *Yaquina* makes use of:

- Two, Tier II, MTU 8V4000 M60 Main Propulsion Engines; and
- Two, Tier II, MTU 12V2000 P8 Ship Service Generator Engines.

The *Yaquina's* dredge pumps were replaced in 2012 with two, Tier, II MTU 12v 2000 P12 engines.

The Tier II engines recently installed on the *Essayons* and *Yaquina* will greatly reduce NO_x (nitrous oxide) emissions. They also allow the use of low sulfur oxide diesel fuel, resulting in a reduction in SO_x (sulfur oxide) emissions. New electronic governors will reduce the amount of visible particulate matter released into the atmosphere while making more efficient use of fuel.

The Portland District recently applied for, and received approval to operate, the engines installed on the dredges *Essayons* and *Yaquina* under CARB's statewide Portable Equipment Registration Program (PERP). PERP registration allows portable engines, including marine engines, to operate in California while providing minimal notification to the local air quality management districts.

Due to installation of CARB-compliant Tier II engines on both the *Essayons* and *Yaquina*, as well as contracted hopper dredges, and the limited duration of annual dredging episodes, no significant air quality impacts are anticipated under the proposed action.

Under the no action alternative, ambient air quality conditions would persist, and no impacts would be anticipated.

(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. Please see **Table 8** below for the present multi-year sampling and testing schedule for Humboldt covering the years 2019-2025.

Table 8. Humboldt Harbor and Bay Sediment Testing Cycles

	2019	***2020***	***2021***	***2022***	***2023***	***2024***	***2025***
Channels > 80% sand	Tier I	Physical Testing Only	Tier I	Tier I	Tier I	Tier I	Physical Testing Only
Channels < 80% sand	Tier I	Physical & Chemical Testing	Tier I	Tier I	Tier I	Tier I	Tier III Physical, Chemical, Biological

- Evaluation of dredged material proposed for discharge in waters of the U.S.—Testing Manual (USEPA/USACE 1998), also known as the Inland Testing Manual or ITM, is the guidance manual for evaluating the suitability of dredged material for unconfined aquatic inland disposal.
- Evaluation of dredged material proposed for ocean disposal—Testing Manual (USEPA/USACE 1991), also known as the Ocean Testing Manual, OTM, or Green Book, is the guidance manual for evaluating the suitability of dredged material for ocean disposal.

UPDATE BASED ON 2021 SAMPLING & TESTING RESULTS:
Based on decades of dredging experience, sediment dredged from the Humboldt Bar & Entrance channel, and from all the interior channels, is predominantly (80-98%) clean sand that is clearly suitable for disposal at HOODS. The USACE is currently sampling and testing sediment from these channels, as it does roughly every 5 years (last done in 2016). According to the contractor's latest schedule, sample collection was completed February 16. Available grain size analysis on material from the Bar and Entrance Channel is described in section 1.4.1 and for that from the interior channels is described in section 1.4.2. This testing has shown the material is again predominately clean sand. i Testing results with a draft sampling and analysis report will be completed by April 30, 2021.

Based on the grain size analysis results for 2021, and the full results of the 2016 sampling and analysis undertaken within the proposed action area, no impacts are anticipated because of the implementation of the proposed action.

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

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, there are no existing mineral resources within the proposed action area, so neither the proposed action nor no action alternatives 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 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 dredging activities until they have ceased. Any disturbance to aquatic species would persist for no longer than four to eight weeks a year. Further, the dredges do not emit a uniform level of noise throughout the entire dredging cycle (i.e. placement at HOODS, turning), so exposure to aquatic species would

not be for the entire four to eight week dredging event. As such, less than significant impacts under the proposed action are expected.

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

(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, surfing, windsurfing, and fishing by displacing them from areas of the federal navigation channels and HOODS 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 eight weeks); further the aforementioned activities do not take place during the night, so only daytime displacement of recreation 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 eight week-a-year dredging event. As such, potential effects to recreation resulting from annual dredging under the proposed action 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, there would be no impacts.

( ) 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 ship traffic levels and the recorded 125-year history of dredging activities at the Bar and Entrance Channel, and associated channels. This project would have long-term beneficial navigation impacts for commercial deep-draft vessels. Project impacts are 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 viewshed 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 annual maintenance dredging under the proposed action 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.

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.

During dredged material disposal activities, the vessel's broadside could be exposed to strong waves, which could result in a navigation hazard. The *Essayons* and *Yaquina*, as well as contracted hopper dredges, 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 HOODS if sea conditions are too dangerous during a particular dredging Cycle. As such, less than significant impacts are anticipated.

Under the no action alternative, groundings of ships could cause major public health and safety issues. Thus, the no action alternative could potentially cause significant impacts to health and safety.

(X) Hazardous and toxic materials: Under the proposed action, 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 in Appendix F. 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 the proposed action.

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: "Cultural resources" describes several different types of properties: prehistoric and historic archaeological sites; architectural properties such as buildings, bridges, and infrastructure; and resources of importance to Native American Tribes (traditional cultural properties and sacred sites). There are two types of cultural resources that generally may be of interest for operations and maintenance dredging actions:

(a) archaeological sites from prehistoric Native American settlements that may be situated on the shoreline or submerged on the continental shelf; and (b) abandoned historic vessels that have sunk offshore and historic shoreline structures associated with the early 20th maritime industry.

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies to take into account the effects of a proposed undertaking on properties that have been determined to be eligible for listing or are listed in the National Register of Historic Places (National Register). A historic property refers to cultural resources (e.g., land-based prehistoric or historical sites, maritime historic resources, including shipwrecks, buildings and structures on the shore or in the water, and cultural artifacts) that are 50 or more years old, possess integrity, and meet the criteria of the National Register found at 36 C.F.R. § 60.4. Additionally, the Abandoned Shipwreck Act (43) U.S.C. §§ 2101–06, *et seq*.) protects shipwrecks found in state waters.

USACE has defined the horizontal and vertical limits of the Proposed Action area for the proposed Humboldt Bay and Harbor federal dredging action above (see Table 2 above). The horizontal limits of the Proposed Action consist of the areas encompassed by the federal Channels and Bay which will undergo dredging excavation to the maximum depth below surface and within which activities such as anchor placement may occur. Also included in the Proposed Action area is the HOODS dredged material placement site.

USACE has established policy and procedures for conducting underwater surveys for maintenance dredging and disposal activities (Dredging Guidance Letter No. 89-01, USACE, March 13, 1989). USACE is directed to make a reasonable and good faith effort to identify submerged archaeological resources that may be affected by project implementation. Typically, the review of project documents and research of historical records and other sources is sufficient to determine the potential for submerged resources to be present and whether there would likely be an effect. The policy states that underwater surveys to identify historical archaeological sites (e.g., shipwrecks or other sunken maritime artifacts) are not required within the boundaries of previously dredged channels or previously used disposal areas unless USACE determines that there is a good reason to believe such resources exist and that they would be altered or destroyed as a result of project implementation.

The investigation for this project consisted of reviewing the environmental documents from previous dredging projects, reviewing the archaeological survey reports and site records generated by USACE, consulting with maritime archaeologists and historians in the 1980’s and 2019 for jetty repair projects in Humboldt Bay and information on shipwrecks. Currently available information indicates that the western end of the Bar and Entrance Channels contains one magnetic anomaly that may represent debris that resulted from a shipwreck, objects lost from a vessel, or during initial construction of the North Jetty. However, USACE’s previous environmental reports and project documents over the past twenty years have identified no historic properties or submerged cultural resources in the proposed action area which will undergo dredging excavation during dredging operations at Humboldt Bay.

It has been generally accepted that the initial construction of the federal channel and the repeated maintenance dredging of the area alter the seafloor to a point that submerged cultural

resources, if present prior to the Proposed Action, would be previously removed or destroyed. Maintenance dredging associated with the Proposed Action would be confined to the removal of sediments in the federal channels that have accumulated since the last dredging effort. Sediments deposited since the previous dredging activities would not contain *in situ* archaeological resources. Based upon the greatly modified conditions of the existing channels from previous dredging actions, it is reasonable to conclude that there are no historic properties within the federal channels. By its nature, the Proposed Action has no potential to affect historic resources. Thus, per 36 C.F.R. § 800.3(a)(1), USACE has no further obligations under Section 106 of the NHPA.

Dredged material transport would not involve sediment disturbance and would therefore not disturb submerged cultural resources. The material dredged as part of the Proposed Action would be placed at the existing HOODS placement site on top of previously placed dredged material. Therefore, placement activities would not result in impacts to cultural resources including unique archaeological resources, because the underlying native deposits would not be disturbed. Moreover, the Proposed Action would not include any demolition of existing structures nor introduce elements that could affect the historic setting of the built environment. Therefore, there would be no effects to historic properties.

By its nature, the Proposed Action has no potential to affect historic resources. Thus, per 36 C.F.R. § 800.3(a)(1), USACE has no further obligations under Section 106 of the NHPA.

The following measures would only be implemented in the extremely unlikely event of an inadvertent discovery during dredging. If an inadvertent discovery is made, USACE would immediately halt all ground-disturbing or depositional activities within the area of the find. A USACE archaeologist or other qualified archaeologist would then ascertain the nature of the discovery in consultation with State Historic Preservation Office (SHPO), determine its significance, and eligibility for listing in the National Register, and provide management recommendations pursuant to 36 C.F.R. §800.13.

If an inadvertent discovery contains human remains, USACE would immediately halt all ground-disturbing or depositional activities within the area of the find and an area reasonably suspected to overlie adjacent remains and contact the USACE archaeologist as soon as possible that same day. Following Cal. Pub. Res. Code § 7050.5, the coroner of the county in which the human remains are discovered will inspect the remains. If the Coroner determines that the remains are of Native American descent, they shall contact within 24 hours the Native American Heritage Commission (NAHC). Upon notification by a county coroner, the NAHC shall notify the most likely descendant (MLD) pursuant to Cal. Pub. Res. Code § 5097.98 regarding the discovery of the Native American human remains. Within 48 hours of notification by the NAHC, the MLD shall inspect the site of the discovery of Native American human remains and recommend appropriate treatment and or disposition, with dignity, the human remains and any associated burial material and funerary objects in consultation with MLD, SHPO and participating agencies.

The No Action Alternative would not cause disturbance to sediments in the Federal Channels and would not result in dredge material transport or placement. Therefore, the No Action Alternative would result in no effects to cultural 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, there will be no impacts.

Under the no action alternative, the proposed action would not be implemented thereby resulting in no impacts.

( ) 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, the proposed action would result in improved socioeconomic impacts when compared with the no action alternative.

Under the no action alternative there would be no dredging; therefore, shoaling would continue unabated, eventually preventing fully loaded commercial vessels from entering Humboldt Bay and thus adversely impacting 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 and HOODS, less than significant impacts are anticipated under the proposed action. 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.

During the time when dredging activities are taking place (mid-March through late September), the Dungeness crab population would have moved towards the shore to mate (USEPA, 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, there is no impact to the commercial fishing industry from the proposed action.

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

(X) Environmental justice: Environmental justice considerations in and around Humboldt Bay would remain unchanged under both the proposed action and the no action alternative, thus resulting in no adverse impacts there.

(X) Growth inducing impacts- community growth, regional growth: The proposed action 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 proposed action and the no action alternative. No impacts are anticipated.

(X) Conflict with land use plans, policies or controls: The proposed action 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 the proposed action would be an irreversible commitment of resources, but one that would be extremely limited and minor. Thus, there would be no impacts.

With the no action alternative, there would be no dredging and consequently no change in the irreversible commitment of resources. Thus, there would be no impacts.

( ) 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. Currently underway is a major jetty repair project, for both the north and south jetties. The project involves placing up to 2000 newly quarried stones, 15-20 tons each, along the sides and top of the two jetties, and re-grouting the existing concrete walkway where necessary.

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: Fisherman's Channel Dredging and Beneficial Reuse Pilot Project, Chevron Eureka Terminal Dock Seismic Retrofit, Humboldt Bay Mariculture Pre-Permitting Project, City of Eureka and Harbor District dredging and ocean/beach disposal, Humboldt Bay Regional Invasive

Spartina Eradication Project, Schneider and California Redwood Docks Dredging and Samoa Lagoons disposal, U.S. Coast Guard Station Humboldt Bay Maintenance Dredging, Harbor District and City of Eureka Marina ocean/beach disposal, and Harbor District, City and private dock owner's annual maintenance.

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 channel, 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 have been occurring for approximately 125 years and are not expected to significantly affect existing conditions. With consideration of the historic actions which occurred at the site and these foreseeable future actions, the proposed 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, regional, and nation-wide community.

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 between mid-March through the end of September. The local context would involve any other known, constructed, in progress, or planned projects occurring in the Humboldt Bay region (i.e. Fisherman's Channel Dredging and Beneficial Reuse Pilot Project, Chevron Eureka Terminal Dock Seismic Retrofit, Humboldt Bay Mariculture Pre-Permitting Project, City of Eureka and Harbor District dredging and ocean/beach disposal, Humboldt Bay Regional Invasive *Spartina* Eradication Project, Schneider and California Redwood Docks Dredging and Samoa Lagoons disposal, U.S. Coast Guard Station Humboldt Bay Maintenance Dredging, Harbor District and City of Eureka Marina ocean/beach disposal, and Harbor District, City and private dock owners annual maintenance, and maintenance dredging of the Eureka Marina and Woodley Island Marina which occurs approximately every 8 years.

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 detailed discussion of indirect and cumulative impacts of the proposed action. 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 8 weeks in any given year. These impacts would occur within the federal navigation channels as well as at the HOODS during a dredging episode (conservatively, dredging episodes last no longer than 8 weeks). 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 or cumulative impacts are determined to be not significant.

USACE periodically (every five years) 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 the currently ongoing 2021 testing results, there are no expected adverse indirect or cumulative impacts to sediment quality from the proposed action.

The USEPA 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. The USEPA's designation process has thoroughly considered the indirect and cumulative effects of use of this site. Through an annual determination of sediment suitability, both USEPA 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 with respect to water quality or other physical parameters over the life of the proposed action 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 like 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 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 affect 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 action with respect to biological resources are 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 9: Summary of Environmental Compliance	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 Draft EA has been prepared in compliance with NEPA, CEQ, and USACE Planning regulations. All agency and public comments will be considered and evaluated. A Finding of No Significant Impact (FONSI) will be signed if applicable 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 Fed. Reg. 26,961, (1977)	Clean Water Act jurisdiction applies to the waters of the U.S., including those of the territorial sea [33 U.S.C. § 1344 and 33 U.S.C. § 1362(7)]. The territorial sea is defined as extending seaward a distance of three miles [33 U.S.C. § 1362(8)]. The Ocean Dumping Act (ODA) covers jurisdiction beyond three miles. There is no authority requiring the federal government to seek 401 Water Quality Certification in ODA jurisdiction. Additionally, because it is located outside of jurisdictional waters of the United States, this action is not subject to 404(b)(1) analysis. 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	A one-year, Negative Determination (ND) for the proposed action in 2021 was submitted to the California Coastal Commission in March 2021.

Endangered Species Act as amended (16 USC § 1531 *et seq*)	Informal consultation for the proposed action was submitted to the USFWS for ESA-listed species under their purview in March 2021. The USACE submitted a Biological assessment to the NMFS for species under their purview in March 2021.
Magnuson-Stevens Fishery Conservation and Management Act - Fishery Conservation Amendments of 1996, (16 USC § 1801 *et seq*) – Essential Fish Habitat (EFH)	USACE submitted an EFH assessment evaluating the effects of the proposed maintenance dredging activities in Humboldt Bay to NMFS in March 2021. Few changes are expected from the previous ESA/EFH consultation completed in 2016.
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.
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 USEPA 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	There are no known historic properties within the project area. By its nature, the Proposed Action has no potential to affect historic resources. Maintenance dredging would be confined to the removal of sediments in the federal channels that have accumulated since the last dredging effort. USACE has dtermind there is no potential to effect cultural resources.
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)*	N/A
Abandoned Shipwreck Act of 1987, (43 USC § 2101 *et seq*)	None occur within the proposed action area.
Submerged Lands Act, (Public Law 82-3167; 43 USC § 1301 *et seq*)	The California State Lands Commission will receive a copy of this EA in compliance with the Submerged Lands Act.

7.0 Agencies Consulted and Public Notification

The following federal and State agencies were notified of the availability of this Environmental Assessment (EA) for review and comment. A *Public Notice of Availability* of the EA will be provided to other interested agencies, groups, and individuals.

A. Federal agencies:
- U.S. Environmental Protection Agency (USEPA, Region 9)
- U.S. Fish and Wildlife Service (USFWS), Arcata Office
- National Marine Fisheries Service (NMFS), Arcata Office
- U.S. Coast Guard (USCG). Humboldt Search and Rescue Station

B. State agencies:
- California Coastal Commission (CCC)
- California Department of Fish and Wildlife (CDFW), Northern Region Office
- California State Historic Preservation Officer (SHPO)
- California State Lands Commission (CSLC)
- North Coast Regional Water Quality Control Board (NCRWQCB)
- North Coast Unified Air Quality Management District (NCUAQMD), Eureka Office

8.0 Determinations and Statement of Findings

A Finding of No Significant Impact (FONSI) will be made, if appropriate, after agency and individual comments are received during the public comment period and incorporated into this EA. The Draft FONSI is included with this document (Appendix B).

9.0 References

Anderson, F. E. 1980. The variation in suspended sediment and water properties in the floodwater front traversing the tidal flat. Estuaries 3(1):28-37.

Antrim, L.D., and B.D. Gruendell. 1998. Effects of Sand Accumulation on Juvenile Flatfish and Soft-Shelled Dungeness Crab. PNNL-1202. Prepared by the Battelle Marine Sciences Laboratory, Sequim, Washington, for the U.S. Army Corps of Engineers, Portland District, Portland, Oregon. 22 pp.

Beamesderfer, R.C.P. and M.A.H. Webb. 2002 Green sturgeon status review information. S.P. Cramer and Associates, Gresham, Oregon, U.S

Boyd, Milton J. 2002. Non-indigenous Marine Species of Humboldt Bay, California: A Report to the California Department of Fish and Game. Available at:
http://www.humboldtbay.org/conservation/exoticspecies/non_indigenous_marine_boyd_etal_2002.pdf.

California Department of Fish and Game. 2011. Commercial Ocean Fishing, Retrieved July 21, 2011 from
http://www.dfg.ca.gov/marine/fishing.asp

CICORE, 2005. Center for Integrative Coastal Observation, Research, and Education, Humboldt State University.
http://cicore.humboldt.edu/?content=data_tbr_entrance&menu=menu2

Costa SL, 1982 Changes in channel sediment characteristics 1974 and 1980, Humboldt Bay, CA.

Coastal Engineering, 2010, Coastal Engineering Appendix to the Dredged Material Management Plan for Humboldt Bay, CA. Prepared by USACE San Francisco District, September 2010.

CSMW, 2011. Review of Sediment Management Impacts and Issues Relevant to Protection of California Coastal Biota. Volume I, Biological Impacts Analysis.

Dickerson, C., D. Clarke, and K. Reine. 2005. Monitoring hopper dredge overflow plumes in Humboldt Bay, California. Submitted to the U.S. Army Corps of Engineers, San Francisco District. San Francisco, California. 68 p

Environmental Protection Agency, 1995. Draft Environmental Impact Statement, Designation of an Ocean Dredged Material Disposal Site off Humboldt Bay, California. March 1995

Greene C R 1987. Characteristics of oil industry dredge and drilling sounds in the Beaufort Sea. *Journal of the Acoustical Society of America*82,1315-1324.

Hoover, R. M., and R. H. Keith. 1996. Noise control for buildings and manufacturing plants. Hoover and Keith, Inc. Houston, TX

Korschgen, C.E., L.S. George, and W.L. Green, 1985. Disturbance of Diving Ducks by Boaters on a Migrational Staging Area. Wildl. Soc. Bull. 13: 290-296.

NMFS 2007, Biological Opinion, Section 7 Endangered Species Act Consultation, Humboldt Harbor and Bay Federal Navigation Channel, Annual Maintenance Dredging (2007-2011). File 2003/02253

Novotny, S., L. Hornung, and S. Willis. 2019. Fish entrainment monitoring report, 2019 dredging of the Pinole Shoal channel conducted by the U.S. Army Corps of Engineers' Hopper Dredge *Essayons*. November 2019. 48 pages plus appendices.

Novotny, S., J. Staton, R. Reed, and E. Campbell. 2020a. Benthic fish and invertebrate trawl surveys of sub-tidal habitat reaches inside and outside of the federally maintained Humboldt Bay navigation channels – 2019. January 2020. Report prepared for the U.S. Army Corps of Engineers. 44 pages plus appendices.

Novotny, S., J. Staton, R. Reed, and E. Campbell. 2020b. Benthic fish and invertebrate trawl surveys of sub-tidal habitat reaches inside and outside of the federally maintained Humboldt Bay navigation channels – 2020. December 2020. Report prepared for the U.S. Army Corps of Engineers. 44 pages plus appendices.

O'Connor, J., 1991. Evaluation of Turbidity and Turbidity-Related Effects on the Biota of the San Francisco Bay-Delta Estuary. Submitted to U.S. Army Corps of Engineers, San Francisco District

Pearson, W.H., N.P. Kohn, and J.R. Skalski. 2006. Entrainment of Dungeness Crabs in the Desdemona Shoals Reach of the Lower Columbia River Navigation Channel. PNNL-16139. Prepared for the U.S. Army Corps of Engineers, Portland District, by Pacific Northwest National Laboratory, Marine Sciences Laboratory, Sequim, Washington.

Pearson, W.H., M.C. Miller, G.D. Williams, N.P. Kohn, J.R. Skalski. 2006b. Preliminary Assessment of Potential Impacts to Dungeness Crabs from Disposal of Dredged Materials from the Columbia River. PNNL-15477. Prepared for the U.S. Army Corps of Engineers, Portland District, by Pacific Northwest National Laboratory, Marine Sciences Laboratory, Sequim, Washington.

Phipps, J.B. et al. 1992, Holocene sedimentary framework of Grays Harbor Basin, Washington, USA: SEPM Special Publication No. 48, Society for Sedimentary Geology, p. 273-285.

Reine, K. and D. Clarke. 1998. Entrainment by hydraulic dredges – A review of potential impacts. Technical Note DOER-E1. U.S. Army Corps of Engineers Environmental Laboratory, Vicksburg, MS.

Review of Sediment Management Impacts and Issues and Issues Relevant to Protection of California Coastal Biota, Volume I: Biological Impact Analysis, SAIC, 2010.

Rumrill, Steven S. and Victoria K. Poulton. 2004. Ecological Role and Potential Impacts of Mulluscan Shellfish Culture in the Estuarine Environment of Humboldt Bay, CA. Oregon Department of Lands, South Slough National Estuary Research Reserve and Estuarine and Coastal Science Laboratory.
Available at: http://www.humboldtbay.org/harbordistrict/documents/other/Shellfish%20Culture%20Impact.pdf.

Photo Science Geospatial Solutions. 2007. Benthic Habitat Data Inventory and Collection, Humboldt Bay, California. Available at: http://www.csc.noaa.gov/id/Humboldt_Bay_Data_Inventory_Final_Delivered_March19.pdf.

Scheffner, Norman W. (USACE). October 1990. *A Dispersion Analysis of the Humboldt Bay, California Interim Offshore Disposal Site.*

Shaughnessy, F. and K. Williamson. 2005. Patterns and potential drivers of turbidity in Humboldt Bay, California. Poster at "A regional perspective to restoring physical and ecological processes in Humboldt Bay," March 14-15, 2005. Humboldt State University, Arcata, California.

Sherk, J.A., J.M. O'Connor, and D.A. Newman, 1975. Effects of suspended and deposited sediment on estuarine environments. Estuarine Research, 2: 541-558.

Strong, C.S., 2005. Marine Birds of the Near Shore Waters of Clatsop Spit: An Assessment of Composition, Abundance, and Potential Effects from Dredge Spoil Deposition Adjacent to the South Jetty of the Columbia River. Prepared for Institute for Natural Resources, Oregon State University.

Sugarman, P.C., Pearson, W.H. & Woodruff, D.L. (1983). Salinity detection and associated behaviour in the Dungeness crab, Cancer magister. Estuaries 6, 380–386

USACE. 1976a. Dredge Disposal Study, San Francisco Bay and Estuary, Appendix C, Water Column.

USACE. 1976b. Dredge Disposal Study, San Francisco Bay and Bay/Estuary: Appendix I, Pollutant Availability Study.

USACE and Humboldt Bay Harbor, Recreation and Conservation District, April 1995. Final environmental impact statement/environmental impact report. Humboldt Harbor and Bay Deepening Navigation Project.

USACE, 2006, Programmatic Five-Year Environmental Assessment, Humboldt Harbor and Bay Operations and Maintenance Dredging

USACE, 2005, Biological Assessment and Essential Fish Habitat Analysis, Humboldt Bay and Harbor Maintenance Dredging Humboldt, California

USACE, 2005, Addendum Biological Assessment and Essential Fish Habitat Analysis, Humboldt Bay and Harbor Maintenance Dredging Humboldt, California

USACE, 2006, Second Addendum Biological Assessment and Essential Fish Habitat Analysis, Humboldt Bay and Harbor Maintenance Dredging Humboldt, California

USACE, 2011, Portland District, Overflow records for Essayons and Yaquina 2007-2011.

USEPA, 1995, *Evaluation of Dredged Material Proposed for Open Ocean Disposal*.

USEPA, 2020, *Final Evaluation and Environmental Assessment for Expansion of the Existing Humboldt Open Ocean Disposal Site (HOODS) Offshore of Eureka, California*, 137 pp.

USGS, 2010. Mineral Resources Data System. Online Spatial Data. [web application]. Retrieved July 21, 2011 from http://tin.er.usgs.gov/mrds/

Vavrinec, J., W.H. Pearson, N.P. Kohn, J.R. Skalski, C. Lee, K.D. Hall, B.A. Romano, M.C. Miller, and T.P. Khangaonkar. January 2007. Laboratory Assessment of Potential Impacts to Dungeness Crabs from Disposal of Dredged Material from the Columbia River. Prepared for the U.S. Army Corps of Engineers, Portland District, by the Pacific Northwest National Laboratory, Richland WA.

Wainwright, T. C., D. A. Armstrong, P. A. Dinnel, J. M. Orensanz, and K. A. McGraw. 1992. Predicting effects of dredging on a crab population: an equivalent adult loss approach. Fishery Bulletin 90:171-182.

Williamson, K. J. 2006. Relationships between eelgrass (Zostera marina) habitat characteristics and juvenile Dungeness crab (Cancer magister) and other invertebrates in southern Humboldt Bay, California, USA. Master Thesis, Humboldt State University, 66 pp.

ER 200-2-2, United States Army Corps of Engineers, Procedures for Implementing NEPA, March 1988.

16 USC §1536(c), Interagency Cooperation, Biological Assessment, December 1973.

36 CFR §800, Protection of Historic Properties. July 2008

40 CFR §1500-1508, CEQ's Regulations Implementing NEPA. May 1977

40 CFR §228, Ocean Dumping, Designation of Site. September 1995

42 USC §4321 et seq., National Environmental Policy Act. January 1970

50 CFR §600.920(e)(3), EFH Assessments, Mandatory Contents. Revised October 2010

60 FR §50108, Environmental Protection Agency. Ocean Dumping; Designation of Site. Final Rule. September 28, 1995.

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102

March 19, 2021

CESPN-PME-N

MEMORANDUM FOR RECORD

PROJECT: Humboldt Harbor & Bay

SUBJECT: 2021 Maintenance Dredging - WQC Jurisdiction and Requirements

Clean Water Act jurisdiction applies to the waters of the U.S., including those of the territorial sea [33 U.S.C. § 1344 and 33 U.S.C. § 1362(7)]. The territorial sea is defined as extending seaward a distance of three miles [33 U.S.C. § 1362(8)]. The Ocean Dumping Act (ODA) covers jurisdiction beyond three miles. As outlined in 33 C.F.R. § 336.2(c), there is a question as to whether state 401 Water Quality Certification applies to the territorial sea, but as a matter of comity, the U.S. Army Corps of Engineers, San Francisco District (USACE) has agreed to participate in the 401 process, but reserves the right to challenge jurisdiction should USACE disagree with any state terms. There is no authority requiring the federal government to seek 401 Water Quality Certification in ODA jurisdiction. The regulations, specifically 33 C.F.R. § 336.1(c)(10), direct District Engineers not to seek state permits or licenses unless authorized to do so by a Congressional waiver of Federal sovereign immunity, such as the Clean Water Act § 401 and § 404(t).

As for Rivers and Harbors Act, Section 10 (33 U.S.C. § 401), USACE does not give permits to itself, and therefore no § 401 Certification hook exists.

BEACH.TESSA.EVE.1385598781

Digitally signed by BEACH.TESSA.EVE.1385598781
Date: 2021.03.22 14:50:38 -07'00'

Dr. Tessa E. Beach
Chief, Environmental Section

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102

March 17, 2021

Environmental Navigation and Operations Section

Mr. John Ainsworth, Executive Director
Attn: John Weber, Federal Consistency Manager
California Coastal Commission (CCC)
45 Fremont Street, Suite 2000
San Francisco, California 94105

Subject: Negative Determination for 2021 Maintenance Dredging of Federal Navigation Channels at Humboldt Harbor and Bay

Dear Mr. Ainsworth:

Pursuant to Section 307c(1) of the Federal Coastal Zone Management Act of 1972, as amended, the United States Army Corps of Engineers, San Francisco District (USACE) has evaluated the 2021 Humboldt Bay and Harbor annual Operation and Maintenance (O&M) dredging event with placement at the Humboldt Open Ocean Disposal Site (HOODS), and has determined it does not require a Consistency Determination (CD). According to 15 CFR §930.5, a Negative Determination (ND) can be submitted for an activity "which is the same as or is similar to activities for which consistency determinations have been prepared in the past."

The proposed project is substantially similar to the 2019 and 2020 O&M dredging operations, concurred with by the California Coastal Commission (CCC) on February 14, 2019 (CD-0005-18) and February 10, 2020 (ND-3200-19), respectively. The Commission's concurrence with CD-0005-18 included the condition that USACE continue with the implementation of its Fish Surveying and Monitoring Plan (FSMP) for at least one additional year. An update on the monitoring is included as a part of this ND as well as discussion of select biological resources. Also, final reports of the 2019 and 2020 fish survey and monitoring results are enclosed.

1.0 PROJECT DESCRIPTION

The complex of federal channels in the Humboldt Bay vicinity is shown in Figure 1. The proposed action will focus on dredging of the Bar and Entrance Channel by the USACE hopper dredge *Essayons*, with potentially additional work performed by the USACE *Yaquina*, and/or the Regional Hopper Contact.

Under current funding, it is anticipated that between 1.2-1.5 million cubic yards (MCY) of sediment will be removed from the Bar and Entrance, with a maximum of 2.0 MCY if additional funding becomes available. While work is not anticipated for any of the interior channels at this time, work on the interior channels may be included in the episode if additional resources are available or if resources are diverted to the channels.

The initial and primary 2021 episode is slated for May with the *Essayons*. The timing of additional work is to be determined and may well occur in separate episodes over the summer or fall and require no

more than eight weeks total. The Sponsor may request that we divert some funding and effort to some portion of the interior channels. If the request is made, the USACE would certainly try to accommodate it. The final determination, based on need, funding and schedule availability of the dredge plants, probably won't be made until after the *Essayons* completes the initial dredging and the condition of the channels are re-assessed in late May.

Table 1 provides an overview of the congressionally authorized depths, widths, and lengths of Humboldt Bay's federal navigation channels. The North Bay, Samoa, Eureka, and Fields Landing Channels, and associated turning basins, are part of the interior channel complex (Figure 1).

Material dredged in 2021 from Humboldt Harbor and Bay's navigation channels will be placed at the newly expanded, Section 102 disposal site, HOODS, formerly known as the Interim Offshore Disposal Site (IODS). The HOODS was first used as a disposal site for sediment from Humboldt Harbor and Bay in September of 1990. See Section 1.3 for greater discussion of the original HOODS and newly expanded HOODS.

1.1 Bar and Entrance Channel

Annual maintenance dredging of the Bar and Entrance Channel is performed by the USACE's hopper dredge, the *Essayons*, or by a contracted hopper dredge with similar specifications possibly in combination with the *Yaquina*, a smaller USACE hopper dredge. For 2021 dredging, both the *Essayons* and *Yaquina* are currently in dry dock, so their final schedules and availability cannot be determined at this time. To maintain the congressionally authorized depth of 48 feet MLLW, up to 2,000,000 cubic yards may need to be dredged from this channel annually. The sediments of the Bar and Entrance Channel primarily are composed of clean sand; the latest analytical results from the 2016 sampling and analysis report revealed that the sediment composition was 0-4 percent gravel, 86-97 percent sand, 1.1-10 percent silt, and 1.0-3.8 percent clay. The USACE is conducting a 2021 grain size analysis on material in the channel and initial results will be available mid-March 2021, while the written sampling and analysis report will follow in late April 2021.

1.2 Interior Channels

Annual maintenance dredging of the North Bay, Eureka, Samoa, and Fields Landing channels is conducted by the USACE's hopper dredges, the *Yaquina* or the *Essayons*, or a contracted hopper dredge with similar specifications. If excessive shoaling has occurred, the shallower-draft *Yaquina* may need to dredge first. To maintain the Congressionally authorized depths of 26 to 38 feet MLLW of the interior channels, up to 800,000 cubic yards of sand and sandy-silt material may need to be dredged.

Generally, the interior channels require longer pumping times than the Bar and Entrance Channel. This primarily is because of the increased sandy-silts, silts, and fines that comprise the sediments of the interior channels. However, similar to the Bar and Entrance Channel, sediments of the North Bay Channel primarily are composed of sand; the latest analytical results from the 2016 sampling and analysis report revealed that the sediment composition was 0-2 percent gravel, 95-98 percent sand, 1.1-2.6 percent silt, and 0.9-1.9 percent clay. As noted above, The USACE is conducting 2021 sampling and analysis on material in these channels and initial results will be available mid-March 2021, while the written sampling and analysis report will follow in late April 2021.

1.3 Humboldt Open Ocean Disposal Site (HOODS)

The HOODS was first used as a disposal site for the sediment from Humboldt Harbor and Bay in September of 1990. Beginning in 2021, HOODS will have an expanded footprint as described below.

Original Hoods:

The original HOODS occupies an area of approximately three-square kilometers with depths ranging from 160 to 180 feet. It is divided into four quadrants (quads), each containing nine cells (Figure 2). The placement of dredged material from Humboldt Bay navigation channels involves alternating the placement within the various cells, while preventing excessive mounding. Annual bathymetry surveys allow for USACE, in consultation with the United States Environmental Protection Agency (USEPA, or EPA for short), to determine where mounding occurs and limit placement of dredged material within these mounding cells.

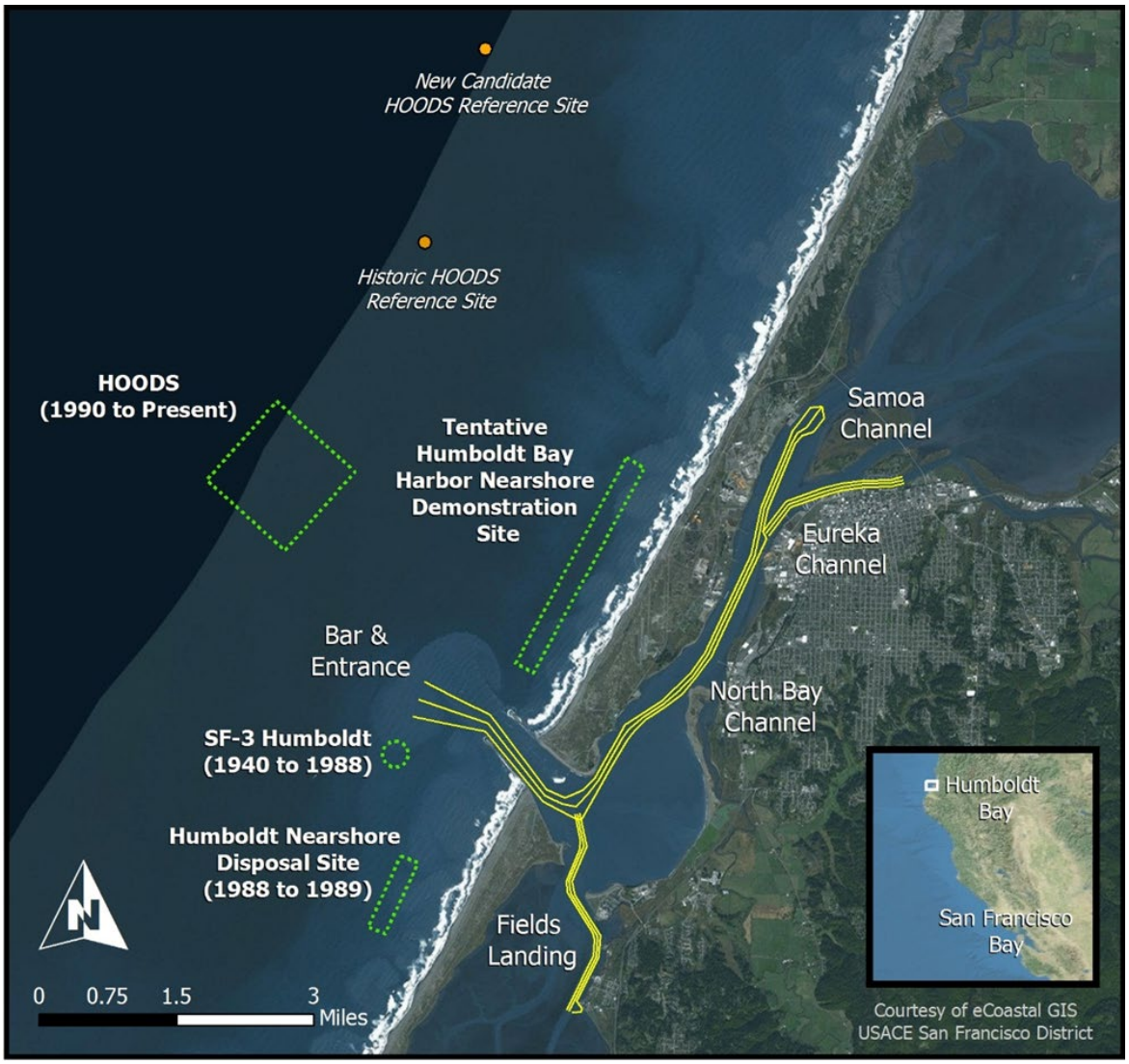


Figure 1. Federal navigation channels in the vicinity of Humboldt Bay are shown, as well as past, current, and tentative placement sites.

Table 1. Congressionally authorized depths, widths, and lengths of the federal navigation channels to be possibly dredged in calendar years 2021-25.

Navigation Channel[1]	Channel Stationing	Depth[2] feet (MLLW)	Width (feet)	Length (feet)	Allowable Overdraft[3] (feet)
Bar and Entrance Channel	0+00 – 136+00	48	500 to 1,600	8,500	2 (+1) [4]
North Bay Channel	136+00 – 309+00	38	400	18,500	1 (+1)
Samoa Channel	309+00 – 392+46	38	400	8,100	1 (+1)
Samoa Turning Basin		38	1,000	1,000	1 (+1)
Eureka Channel (Outer)	0+00 – 21+00	35	400	3,000	1 (+1)
Eureka Channel (Inner)	21+00 – 89+70	26	400	6,700	1 (+1)
Fields Landing Channel	8+00 – 124+35	26	300	12,000	1 (+1)
Fields Landing Turning Ba		26	600	800	1 (+1)

[1] Currently, only the Bar and Entrance Channel will be dredged in 2021.
[2] Depth is measured in feet below Mean Lower Low Water (MLLW), defined as the average level the lower of the two daily low tides.
[3] USACE Headquarters guidance requires that environmental documentation analyze the potential effects of potential dredging outside the authorized dimensions, including characterization of sediments. The upper overdepth category is paid and contains the upper two feet of the Bar and Entrance Channel and the upper one foot of the rest of the channels. The lower overdepth category unpaid and contains a single lower foot in all of the channels within Humboldt Harbor and Bay.
[4] The upper overdepth for the Bar and Entrance Channel includes the upper two feet of overdepth. Thus, the total volume includes three feet of overdepth.

Historically, in order to form a buffer zone, sediment was not placed in the 20 perimeter cells of HOODS (Figure 2). However, starting in May 2015, only certain disposal cells within the overall HOODS site were allowed to be used for disposal (especially for sand) due to mounding of previously disposed materials. Currently, all disposal must take place over the northwest and northeast slopes of the existing mound. Figure 3 shows the new, more restrictive placement requirements since May 2015, including portions of some buffer cells.

The original HOODS was a square site, extending from 3-4 nautical miles (nmi) offshore and covering 1 square nmi (Figure 1). It was divided into quadrants and cells (Figure 2) to facilitate management of individual disposal events so that mounding would not substantially exceed the target depth of 130 feet mean lower-low water (MLLW). The outermost cells constituted a no-disposal buffer zone, to help ensure that most of the dredged material discharged would settle on the seafloor within the site boundaries.

Because the majority of sediment disposed at HOODS since 1995 has been sand that stays in place after disposal in these water depths, this approach resulted in a symmetrical mound, with a surface elevation averaging approximately 130 feet deep, covering all of the internal cells (Figure 3).

As interior disposal cells reached (and in some cases slightly exceeded) the 130-foot depth target overtime, EPA closed those cells to further disposal and restricted ongoing disposal to fewer

and fewer cells. By 2020, disposal was only allowed in the inner portions of the buffer zone cells on the north and west sides of the site, along the slopes of the mound (Figure 3). This ensured that incremental growth of the mound would only occur in the directions that EPA proposed expanding the site footprint. Buffer zone cells on the south and east sides of the site remained off-limits for disposal because EPA did not anticipate allowing disposal to the south (closer to the Humboldt Bay entrance channel) or to the east (inside the 3-mile limit, which are also State waters).

The USEPA, which is primarily responsible for ocean disposal under Section 102 of the Ocean Dumping Act, is significantly expanding the HOODS disposal footprint. The expansion is now expected to be in effect by spring 2021 (Brian Ross, USEPA, pers. comm. December 12, 2019).

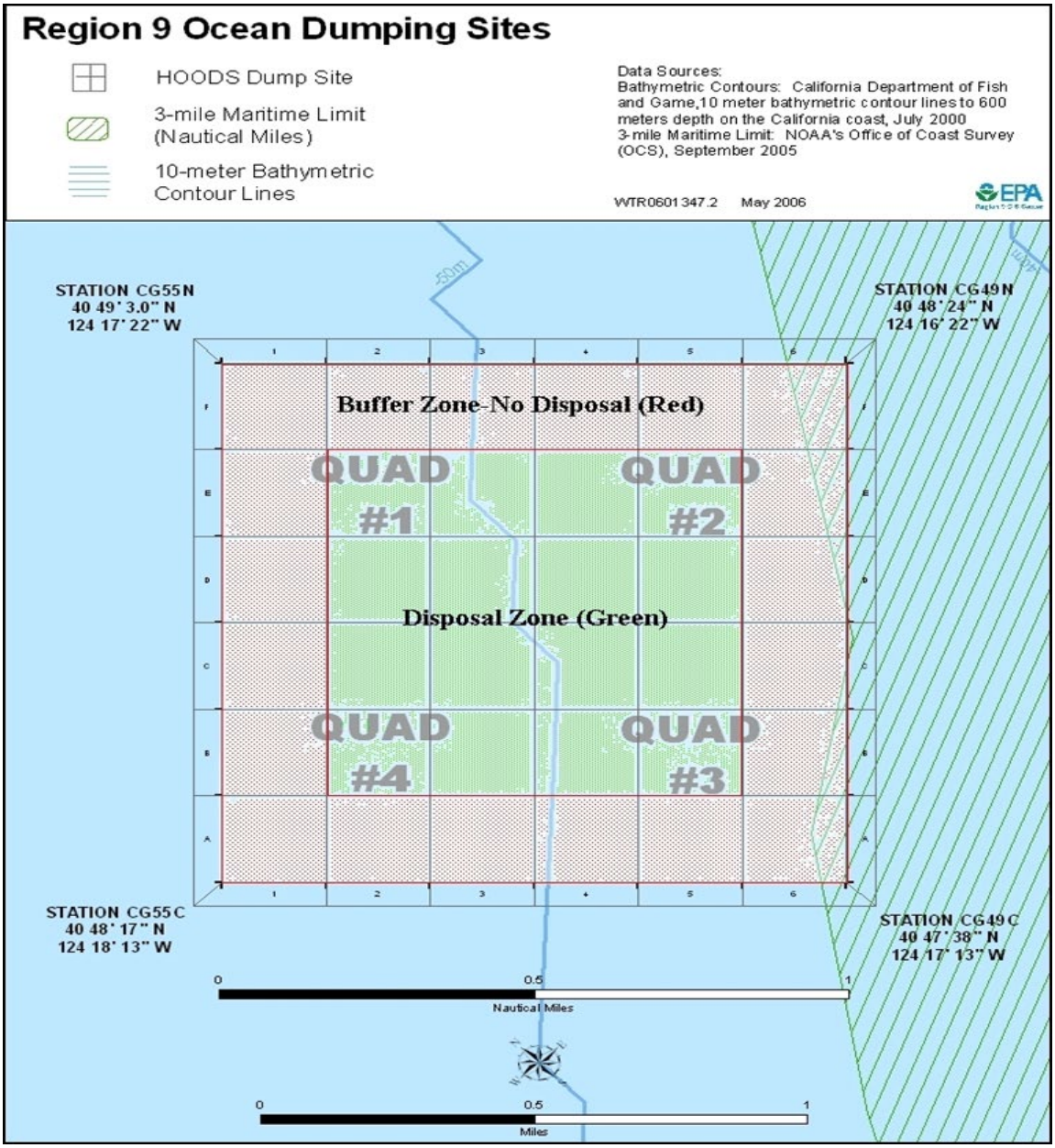
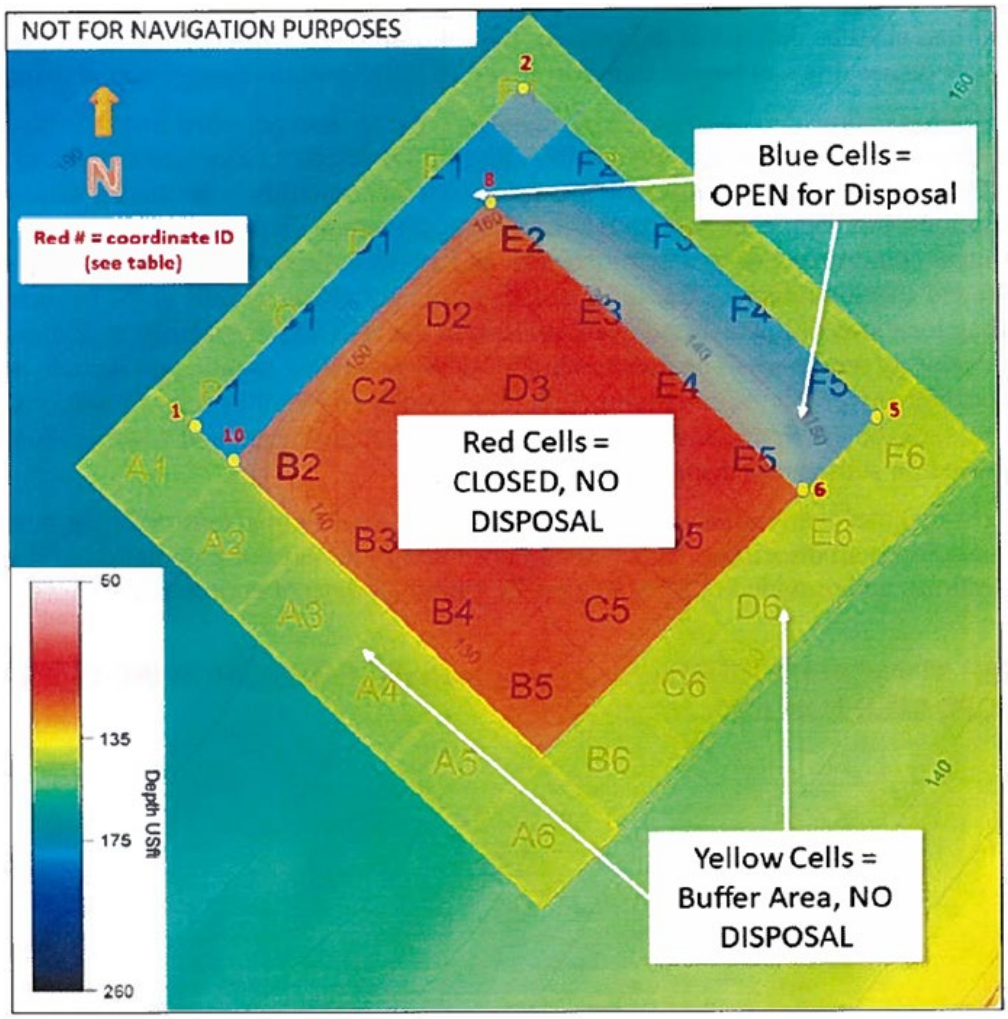


Figure 2. Humboldt Open Ocean Disposal Site—Original Quads (May 2006)



Humboldt Open Ocean Disposal Site (HOODS) map, showing individual disposal cells that are open for vs closed to disposal in 2020. Underlying bathymetry is from 2014 survey.

Figure 3. Humboldt Open Ocean Disposal Site—2020 Placement Quads

Expanded HOODS:

The expanded HOODS overlaps with the original site (superseding the original boundary) and extends an additional 1 nmi to the north and west (Figure 4). It covers 4 square nmi and is in water depths ranging from approximately 150 to 210 feet. Table 2 provides the outer corner coordinates of the expanded site. The effective total capacity of the site will increase from the original 25 MCY to over 100 MCY (i.e., allowing for 75 MCY of additional disposal to occur), before mounding to -130 feet could again occur across the entire site. So, if today's disposal practices were to continue unchanged (i.e., if on average 1 MCY of dredged sand per year were to continue being placed at HOODS indefinitely), the site would reach capacity again in about 75 years. However, the effective life of the expanded site could be much longer than 75 years if nearshore placement of sand for beach or littoral system support were to begin at some point in the future (as shown in Figure 4). In that event, disposal of finer sediment would continue in the expanded HOODS footprint, but it could be managed in such a way that little or no additional long-term mounding would occur at all.

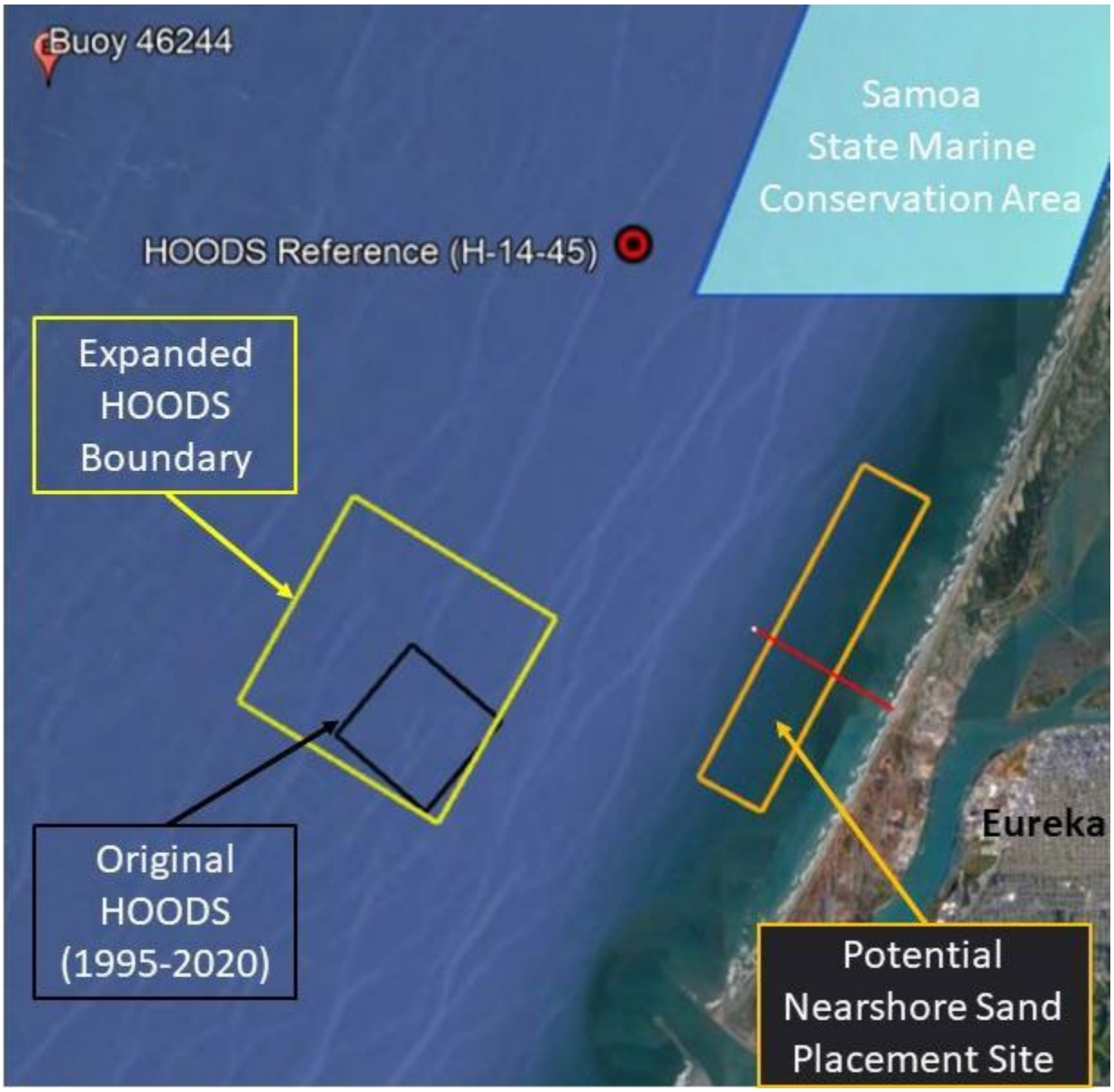


Figure 4. Expanded HOODS, beginning 2021. Showing location in relation to the original HOODS, the new HOODS reference site, the Samoa State Marine Conservation Area, the potential future Nearshore Sand Placement Site (NSPS), and the city of Eureka, California.

Table 2. Expanded HOODS corner coordinates and centroid (NAD 83).

Alternative 1 (Proposed): Expand by 1 nmi to North and West				
Corner	***Latitude***	***Longitude***	***Centroid Lat.***	***Centroid Long.***
North	40° 50' 18" N	124° 18' 01" W		
East	40° 49' 16" N	124° 15' 46" W	40° 48' 56" N	124° 17' 32" W
South	40° 47' 33" N	124° 17' 05" W		
West	40° 48' 34" N	124° 19' 18" W		

The expanded HOODS is also divided into quadrants and cells (Figure 6). Each quadrant is 1 square nmi (the size of the original HOODS) and each is divided into 36 square cells that are approximately 1,000 feet by 1,000 feet in size. The mound in the original HOODS occupies Quadrant 1 of the expanded site and will remain closed to ongoing disposal. The outermost cells of the expanded site will also continue to serve as a buffer zone closed to disposal. The 75 remaining cells in Quadrants 2, 3, and 4 are available to be specified in permits for disposal. However, initially only the 39 cells nearest the mound will be used, with the other 36 reserved for possible future use if needed (Figures 5, 6).

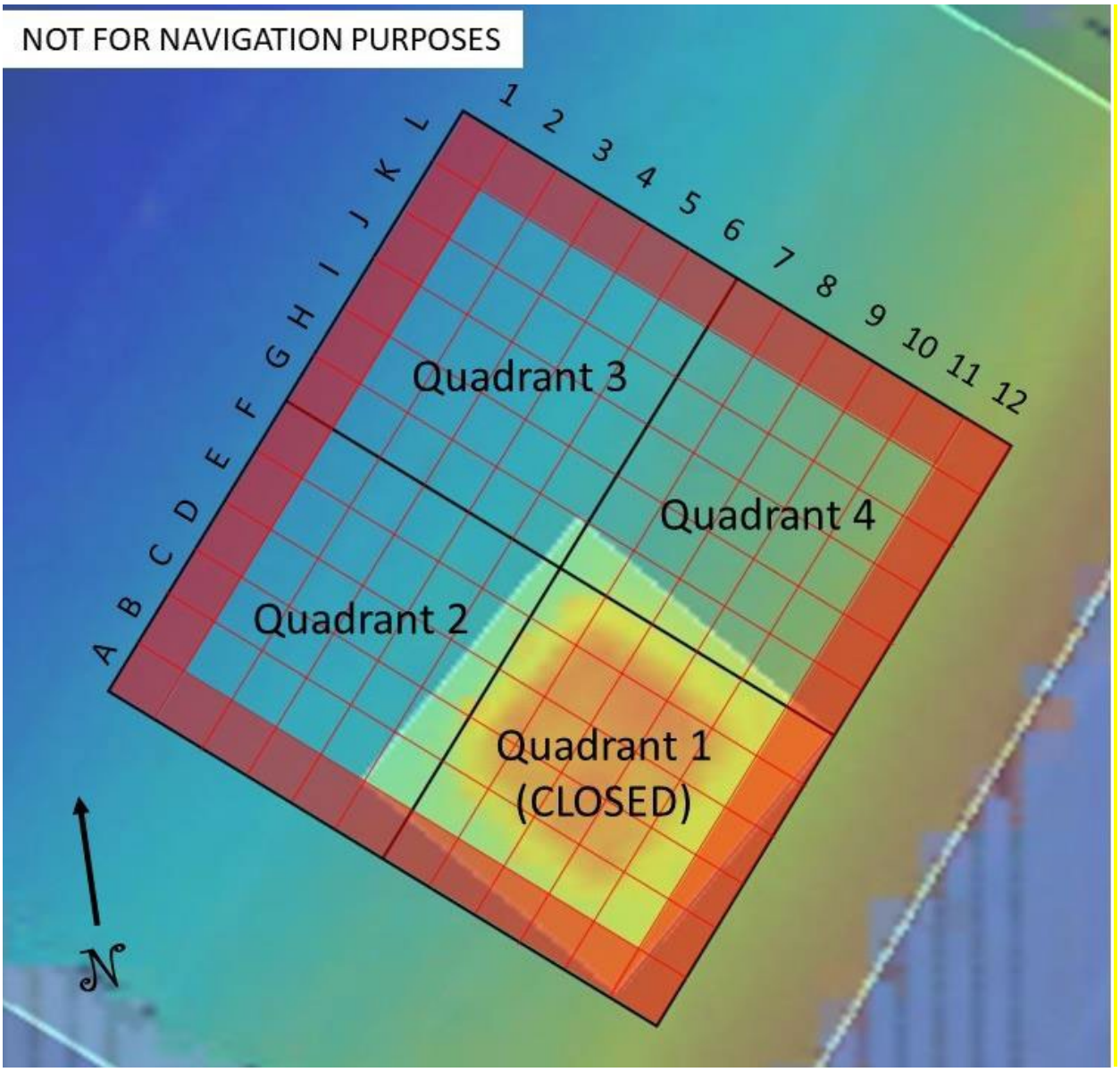


Figure 5. Map showing the overall layout of quadrants and disposal cells in the expanded HOODS, beginning in 2021. Quadrant 1 includes the original HOODS, which is closed to further disposal. The outermost cells of the expanded site (red shading) comprise a buffer zone that is also closed to disposal. Allowable disposal cells will be specified on a project-specific basis.

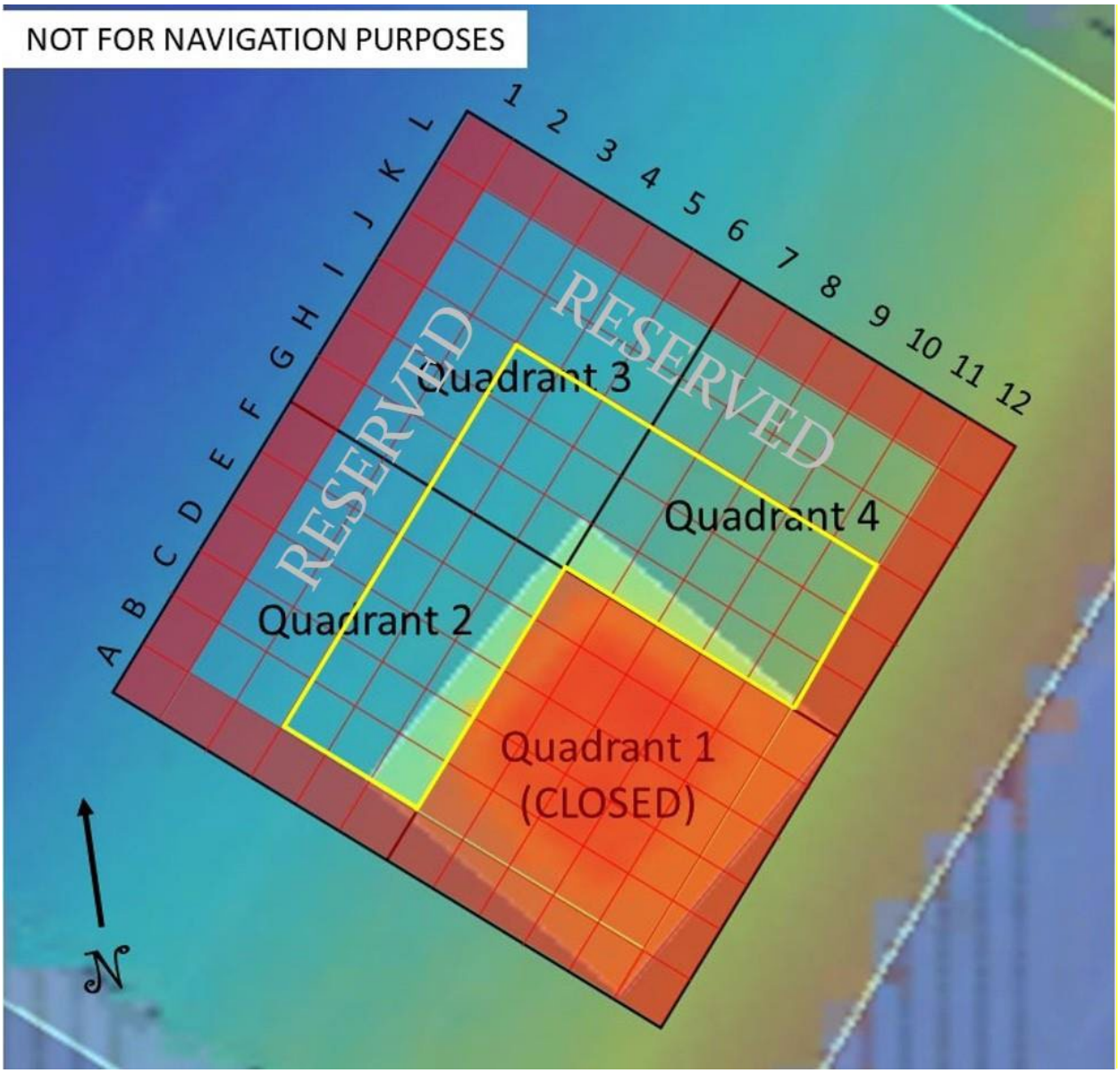


Figure 6. Map showing the layout of Reserved vs Available (yellow box) disposal cells in the expanded HOODS, beginning in 2021. Disposals will occur over the slopes of the existing mound, slowly growing it to the north and west over time while leaving the remainder of the site undisturbed for as long as possible. EPA will specify allowable disposal cells on a project-specific basis.

For individual projects, a subset of disposal cells will be specified in each EPA ocean disposal concurrence, to manage future mounding. In any year, ongoing disposal will be limited to occurring over the northern and western slopes of the existing mound. As the mound slowly expands laterally in these directions, specified allowable disposal cells will be shifted outward as well, so that the mound does not increase in height (i.e., so that it does not become shallower than the minimum target depth of -130 feet MLLW). Furthermore, no disposal will be allowed in the buffer cells around the edges of the site, or in the 36 interior cells marked as "RESERVED" in Figure 6. Use of the "RESERVED" cells will only be considered in the future when the mound is again nearing capacity in the available cells. At that time, a revision will be issued with an opportunity for public comment.

The original HOODS footprint will be off-limits to further disposal. EPA anticipates directing USACE to the following cells in the new expansion area for spring 2021 dredging purposes as shown in Figure 6: A6, B6, C6, D6, E6, F6, G6, G7, G8, G9, G10, and G11.

1.4 Sediment Suitability for Disposal at HOODS

Based on decades of dredging experience, sediment dredged from the Humboldt Bar & Entrance channel, and from all the interior channels, is predominantly (80-98%) clean sand that is clearly suitable for disposal at HOODS. The USACE is currently sampling and testing sediment from these channels, as it does roughly every 5 years (last done in 2016). According to the contractor's latest schedule, first sample collection was completed February 16; testing results with a draft sampling and analysis report will be completed by April 30, 2021.

2.0 PREVIOUS CONSISTENCY AND NEGATIVE DETERMINATIONS

- Previous USACE CDs and NDs for Maintenance Dredging in Humboldt Harbor and Bay involving disposal at HOODS include the following: ND-3200-19, CD-0005-18, CD-0005-17, CD-0002-17, ND-0007-16, ND-0019-15, ND-004-14, ND-022-13, ND-002-12, CD-017-06 (2008-2011 maintenance dredging), ND-007-07 (FY2007 maintenance dredging), ND-016-06, ND-029-05, ND-035-05 (2005 spring maintenance dredging), CD-005-04 (2004 spring maintenance dredging), ND-43-04 (2004, modified CD-045-98), CD-045-98 (Five-Year Blanket CD for calendar years 1999 thru 2003), ND-024-98, ND-021-98, ND-128-97, ND-017-97, ND-091-96, ND-017-96, ND-061-95, ND-010-95, CD-064-94, CD-005-94, CD-048-93, CD-001-93, CD-089-92, ND-077-92, ND-018-92, CD-021-91, CD-001-91, CD-031-90.
- Authorizations prior to mid-1990 were for disposal at SF-3 (located one mile offshore) and/or a nearshore site as follows: CD-003-90 (SF-3), CD-026-89 (nearshore, south spit), CD-045-88 (nearshore, south spit), CD-031-88 (SF-3), CD-019-88 (SF-3), CD-021-87 (SF-3), CD-005-87 (SF-3), and CD-018-85 (SF-3). SF-3 was designated as an interim site, and its designation expired in December 1988.
- Consistency Determination CD-111-94, for Corps Harbor Deepening Project in Humboldt Bay.
- Consistency Determination CD-072-95, Environmental Protection Agency (USEPA) designation of offshore (HOODS) disposal site.

3.0 CALIFORNIA COASTAL ACT (CCA), ARTICLE 4, MARINE ENVIRONMENT (SECTIONS 30230 THRU 30237)

Article 4 of the California Coastal Act (CCA) requires that marine resources be maintained, enhanced, and, where feasible, restored and that special protection be given to areas and species of special biological or economic significance. It further requires that uses of marine environments be such that habitat function, biological productivity, healthy species populations, and fishing and recreational interests of coastal waters are maintained for long-term commercial, recreational, scientific, and educational purposes and that marine resources are protected against the spillage of crude oil, gas, petroleum products, and hazardous substances.

The proposed 2021 maintenance dredging of Humboldt Harbor and Bay's navigation channels would result in effects to the local marine environment that have been occurring since 1881, when the first dredging episode at Humboldt Bay occurred. Any impacts to the marine environment, as the project is currently planned, would be limited to the Bar and Entrance Channel only, and last up to a maximum of eight weeks. Impacts of the proposed project on select biological resources are discussed below.

A condition of our most recent Consistency Determinations (e.g., CD-0005-18, CD-0005-17, and CD-0002-17) was a commitment by USACE to develop and implement, in cooperation with National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and Commission staff, an FSMP to help us understand the impact of entrainment on fish species by USACE dredging operations in Humboldt Bay. A status update on this FSMP requirement follows.

3.1 Humboldt Fish Surveying and Monitoring Plan (FSMP) **2021 Update**

The final Humboldt FSMP was submitted to the CCC, NMFS, and CDFW on February 12, 2019, and has been implemented for two seasons, i.e. April-October 2019, and March-October 2020. The final reports for 2019 and 2020 activities (DR Reed & Associates, Inc. 2020a, b) are attached to this ND. The focus of the work is to provide insight on the relative population-level effects of hopper dredge entrainment on species of interest to the resource agencies such as longfin smelt (*Spirinchus thaleichthys*), northern anchovy (*Engraulis mordax*), and Dungeness crab (*Metacarcinus magister*). Consequently, the sample design carefully considered selection of paired locations inside and outside of the federal channels. Sites were not selected randomly but were selected to represent five varied reaches of the navigation channel, each paired with nearby locations outside of the channel containing similar bottom type, typically sand-dominated (i.e., 10 total sites). Surveys were conducted by trawling along the bottom. Trawl event frequency averaged two per month. Results were substantially different between 2019 and 2020. As reported in ND-3200-19, in 2019 the contractor successfully completed 130 individual bottom trawls over 13 trawling events between the months of April and October 2019. A grand total of 18,654 fish were caught from 42 different species. The number of fish caught per event ranged from 174 during event 3 to 3,951 fish caught during event 11. Fish species richness ranged from 11 different species during event 11 to 23 species during events 5 and 9. The top four most abundant species in the surveys, northern anchovy (64.6%), shiner surfperch (*Cymatogaster aggregata*, 15.3%), night smelt (*Spirinchus starksi*, 6.0%), and English sole (*Parophrys vetulus*, 4.5%), made up 90% of the total catch for all events and sites combined. Pacific sanddab (*Citharichthys sordidus*), spotfin surfperch (*Hyperprosopon anale*), and Pacific sand lance (*Ammodytes hexapterus*) were the only other species that made up over one percent of the total catch. Twenty different species had a total count of less than 10, making up less than 0.01% of total catch. The contractor did not encounter, during any survey, any federally-listed threatened or endangered species such as Southern Oregon/Northern California Coastal

(SONCC) coho salmon (*Oncorhynchus kisutch*), California Coastal (CC) Chinook salmon (*O. tshawytscha*), or green sturgeon (*Acipenser medirostris*); or longfin smelt, which is listed as threatened under the California Endangered Species Act. A total of 6,181 Dungeness crab (i.e., 5,986 juveniles, 166 adults, and 29 larvae) were captured. When all sites were pooled, 3,038 Dungeness crab were captured inside the channel and 3,143 outside the channel.

In 2020, catch per unit effort (CPUE) was much lower for total fish caught compared to 2019. The contractor successfully completed 137 individual bottom trawls over 14 trawling events between the months of March and October 2020, capturing a grand total of 5,083 fish representing 44 different species. The number of fish caught per event ranged from 92 during event 1 to 1,004 fish caught during event 14. Fish species richness ranged from 7 different species during event 11 to 2 species during event 10. Like 2019, northern anchovy was the most abundant species in the 2020 survey. However, it comprised only 17.7% of the total catch which was much less than in 2019. Consequently, an additional 13 species each made up over 1% of the catch, and include the following: night smelt (15.9%), Pacific herring (*Clupea pallasii*, 9.6%), spotfin surfperch (9.5%), shiner surfperch (8.9%), English sole 8.0%), Pacific sand lance (6.5%), Pacific sanddab (5.9%), Pacific staghorn sculpin (*Leptocottus armatus*, 4.4%), bay pipefish (*Syngnathus leptorhynchus*, 2.5%), lingcod (*Ophiodon elongatus*, 2.2%), walleye surfperch (*Hyperprosopon argenteum*, 2.0%), white surfperch (*Phanerodon furcatus*, 1.4%), and post-larval smelt (*Osmerid* spp., 1.1%). During the final trawling event in October 2020, one green sturgeon (*Acipenser medirostris*) and one longfin smelt were captured. These species are listed as threatened under the federal Endangered Species Act (ESA) and California ESA, respectively. A total of 1,546 Dungeness crab (i.e., 1,454 juveniles and 92 adults) were captured. Like northern anchovy, abundance of Dungeness crab in 2020 was much smaller compared to 2021. When all sites were pooled, 447 Dungeness crab were captured inside the channel and 1,099 outside the channel.

In 2019, analyses of data pooled over all sites did not detect significant differences in the number of fish or Dungeness crab captured (i.e., catch per unit effort) inside vs. outside the federal channels with the exception of shiner surfperch which were more abundant in the federal channels. In 2020, similar analyses found significant differences only for the flatfish guild and Dungeness crab, both of which were more abundant outside of the federal channels. However, in 2020 for key species (i.e., northern anchovy, Pacific herring, Pacific sand lance, and night smelt), the majority of individuals were caught during a small number of trawls. The USACE has discussed the 2020 report and results with the resource agencies. Due to the differences between 2019 and 2020 results, the study will be repeated for a third year in FY2021. Additionally, eDNA samples will be collected in 2021 to complement the trawl data. The USACE intends for the trawling portion of the study to go no more than three years.

3.2 Compliance with Section 30230-30231—Marine Resources, Maintenance, Biological Productivity and Water Quality

The proposed action area is located within Humboldt Harbor and Bay and the Pacific Ocean. The vicinity in and around Humboldt Harbor and Bay consists of many types of habitats that provide roosting, breeding, and foraging grounds for many species of plants, benthos (bottom-dwelling organisms), planktons, fishes, mammals, and birds. Portions of the South Bay and Arcata Bay were preserved as the Humboldt Bay National Wildlife Refuge, primarily for migratory bird habitat. Arcata Bay, to the north, has six islands, including: Indian (Gunther), Woodley, and Daby islands located in the southwest corner; and Bird, Sand, and Little Sand islands located closer to the north end of the Bay. Both the South and Arcata Bays consist of extensive mudflats interlaced with drainage channels. During low tide, more than half of these two Bays' surfaces are exposed mudflats. Beyond the reach of the mudflats are salt-marsh

wetlands and lowlands that were once marshy extensions of the Bay. Since the 1880s, nearly 90 percent of the original salt marsh areas have been diked, drained, and filled for agricultural and grazing uses. Other wetland habitats within the Humboldt Bay vicinity include brackish marsh and woody freshwater marshes.

The proposed annual maintenance dredging of Humboldt Bay's navigation channels would effectively maintain the status quo of the surrounding marine environment as dredging occurs in Humboldt Bay on an annual basis and any impacts to the marine environment would be localized and temporary. Dredging and placement operations could degrade water quality on a localized and temporary basis but not bay-wide or over the long-term. Dissolved oxygen (DO) levels would be temporarily reduced during overflow; however, reduction in DO would be confined to the immediate area of dredging and would be temporary in nature (persisting for a few minutes to two hours, conservatively). 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. 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. Increases in turbidity within the action area would be temporary and minor in nature, returning to ambient conditions shortly after proposed action activities have ceased. During dredging activity, biological productivity would be temporarily diminished as overflow and draghead movement would increase the total suspended sediment load of an approximate one-quarter square mile area of the respective channel being dredged.

Humboldt Bay's federal navigation channels have been dredged since 1881 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.

Increased suspended sediment (i.e. increased turbidity) results in attenuation of light penetration and reduced DO concentrations. As a result, the Bay's planktonic community would experience a temporary reduction in primary feeding productivity, mostly because of the reduction in light penetration. 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 planktonic and zooplankton communities. Because of the temporary nature of the proposed action, any effects to the planktonic community would be short-lived, and the area would return to ambient conditions shortly afterwards.

Again, these impacts would be localized (i.e. one-quarter square mile) and temporary in nature (conservatively, lasting no longer than two hours); as such, it is unlikely that biological productivity would be impacted in such a way that marine populations would suffer. All conservation measures or recommendations for listed species, their critical habitat, and essential fish habitat (EFH) issued by the National Marine Fisheries Service (NMFS) in their biological opinion/EFH conservation recommendations (expected May 2021) will be adhered to during project activities.

3.2.1 Endangered Species Act Protected Species

Wildlife and plant species listed or proposed for listing as Federally threatened or endangered are protected under the Federal Endangered Species Act (ESA) (16 U.S.C. § 1531 et. seq.). The United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's

(NOAA) NMFS provided USACE with a list of endangered and threatened species proposed for listing, and candidate species for the project area in March 2021.

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 will submit a multi-year biological assessment for the years 2021-25 and an EFH assessment evaluating the effects of the proposed maintenance dredging activities in Humboldt Bay to NMFS in March 2021. Few changes are expected from the previous ESA/EFH consultation completed in 2016. Similarly, USACE will request concurrence in March 2021 from USFWS that our determination that the proposed project may affect, but is not likely to adversely affect, the federally threatened marbled murrelet (*Brachyramphus marmoratus*) as occurred in 2017. Recommendations and conservation measures put forth by NMFS will be adhered to in order to minimize any potential impacts to listed species.

3.2.2. Juvenile SONCC Coho and CC Chinook Salmon:

The biological opinion (BO) issued for the previous five-year Programmatic Environment Assessment for Humboldt Bay (2016-2020) 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 due to 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."

Additionally, the Reasonable and Prudent Measures listed in the BO issued for O&M dredging in Humboldt Harbor and Bay from 2016 through 2020 state:

"1. The Corps shall minimize turbidity during overflow dredging.

2. The Corps shall monitor the duration of overflow dredging."

The Terms and Conditions listed in the Biological Opinion issued for O&M dredging at Humboldt Harbor and Bay from 2016 through 2020 state:

"1. The following terms and conditions implement reasonable and prudent measure 1:
The Corps shall limit the duration of overflow to the extent practicable during each dredge cycle.

2. The following terms and conditions implement reasonable and prudent measure 2:
The Corps shall provide NMFS with graphs showing the cumulative increase in volume of sediment in the hopper over the entire time of pumping, clearly indicating when overflow starts and stops, for each dredge cycle at each channel location in the Interior Channels (Samoa, Eureka, North Bay, and Fields Landing) and in the Bar and Entrance Channels.

For each dredging episode in Humboldt Bay, for each of the 5 annual copies of all the graphs and Daily Dredge Record spreadsheets of the Yaquina and the Essayons, or a contractor's dredge shall be provided to the following contact by the end of each calendar year: Jeff Jahn, South Coast Branch Supervisor, National Marine Fisheries Service, 1655 Heindon Road, Arcata, California 95521."

As the proposed action is identical to the previous one, 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 previous BO are highly conservative and given the extremely large area of habitat available to these species relative to the size of the proposed action area, less than significant impacts with mitigation would be anticipated from the proposed project. Implementation of Reasonable and Prudent Measures and Terms and Conditions listed in the Biological Opinion issued for O&M dredging at Humboldt Harbor and Bay from 2016 through 2020 would reduce impacts on juvenile SONCC coho and CC Chinook salmon to a less than significant level.

No SONCC coho or CC Chinook salmon were captured during 2019 and 2020, the first two years of implementation of the FSMP.

3.2.3 Essential Fish Habitat (EFH)

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. §1801 et. seq.: 50 C.F.R. Part 600) requires that federal agencies prepare an EFH analysis when a federal action reduces the quality or quantity of EFH. Pursuant to this, USACE prepared and submitted a *Programmatic Biological Assessment (BA) and Essential Fish Habitat (EFH) Analysis, Humboldt Bay and Harbor Maintenance Dredging (2012-2017), Humboldt, California*, dated November 2011. On November 2, 2015, the USACE provided NMFS with an electronic copy of an addendum to the 2011 BA/EFH assessment to cover the years 2016-2020. USACE will submit an EFH assessment evaluating the effects of the proposed maintenance dredging activities in Humboldt Bay to NMFS in March 2021. Few changes are expected from the previous ESA/EFH consultation completed in 2016.

The proposed project area is within the Essential Fish Habitat (EFH) for Pacific groundfish, Pacific salmon, and coastal pelagic Fisheries Management plans (FMP).

Essential Fish Habitat Conservation Recommendations that are listed in the Biological Opinion issued for O&M dredging at Humboldt Harbor and Bay from 2016 through 2020 state:

"1. The Corps should limit the duration of overflow to the extent practicable during each dredge cycle.

2. The Corps should provide NMFS with graphs showing the cumulative increase in volume of sediment in the hopper over the entire time of pumping, clearly indicating when overflow starts and stops, for each dredge cycle at each channel location in the Interior Channels (Samoa, Eureka, North Bay, and Fields Landing) and in the Bar and Entrance Channels. This information will validate NMFS' general assumption of the duration of overflow at each location in this consultation, because specific information could not be provided by the Corps.

3. For each dredging episode in Humboldt Bay, for each of the 5 years, copies of the daily dredge logs of the Yaquina and the Essayons should be provided to the following contact by the end of each calendar

year: Jeff Jahn, South Coast Branch Supervisor, National Marine Fisheries Service, 1655 Heindon Road, Arcata, California 95521.

4. The Corps should work with NMFS to develop a surveying and monitoring plan by the end of 2017, using methodology developed for such determinations in other estuaries of the Pacific Northwest, to determine the extent of entrainment of prey species (e.g. Dungeness crab, Northern anchovy, Pacific sardine, Pacific Herring) by the Yaquina and Essayons in Humboldt Bay, and implement the plan prior to the end of 2019. If the results of the monitoring demonstrate a potential high level of entrainment, the Corps should develop a mitigation plan to minimize and mitigate for the loss of prey species, and work with NMFS to develop a schedule for implementation of the plan prior to 2019 dredging episode."

As the proposed action is identical to the previous one, EFH conservation measures are expected to be similar. The USACE will work with NMFS to implement the conservation recommendations to minimize any potential impacts to EFH. The implementation of the FSMP which was conducted in 2019 and 2020 and will be repeated in 2021 is intended to fulfill conservation recommendation #4 of the 2016 to 2020 consultation.

4.0 DETERMINATION

Pursuant to the Federal CZMA of 1972, as amended, the USACE has evaluated Humboldt Harbor and Bay's O&M dredging activities for 2021. The proposed project is similar to CD-0005-18 and ND-3200-19 specifically in that a third year of fish monitoring will be conducted to assess the potential impacts of O&M dredging on fish species in Humboldt Bay. An additional task of collecting eDNA samples along with the trawl data has been added to the 2021 fish survey work to add information and make the dataset stronger. Based on the long history of this project being consistent to the maximum extent practicable with the California Coastal Management Program (CCMP) and enforceable policies of Chapter 3 of the California Coastal Act (California Public Resources Code Section 30210 et seq.), and because the proposed dredging activities in calendar year 2021 would not change from previous years, the USACE has determined that the proposed maintenance dredging of Humboldt Bay's federal navigation channels and placement of dredged material at HOODS in calendar year 2021 are consistent with 15 CFR §930.35 and that the project would not adversely affect coastal resources. The USACE requests concurrence from the CCC for this negative determination pursuant to 15 CFR §930.35.

Should you have any questions or concerns, please contact Dr. Mark Wiechmann of my staff at mark.j.wiechmann@usace.army.mil, or at (415) 503-6846.

Sincerely,

BEACH.TESSA.EVE.1385598781

Digitally signed by BEACH.TESSA.EVE.1385598781
Date: 2021.03.17 21:17:49 -07'00'

Dr. Tessa E. Beach
Chief, Environmental Sections

Enclosures

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVE.
SAN FRANCISCO, CA 94102

March 17, 2021

SUBJECT: Humboldt Harbor and Bay 2021 Maintenance Dredging Project

Ms. Jenny Ericson
Acting Field Supervisor
U.S. Fish and Wildlife Service
1655 Heindon Road
Arcata, CA 95521

Dear Ms. Ericson:

Pursuant to Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 50 C.F.R. Part 402), the U.S. Army Corps of Engineers, San Francisco District (USACE) is requesting concurrence from the U.S. Fish and Wildlife Service (USFWS) with our determination that the proposed Humboldt Harbor and Bay, 2021 maintenance dredging project is not likely to adversely affect the threatened marbled murrelet (*Brachyramphus marmoratus*). No designated critical habitat for marbled murrelet occurs in the project area.

Project Description – 2021 Dredging

The complex of federal channels in the Humboldt Bay vicinity is shown in Figure 1. The proposed action will focus on dredging of the Bar and Entrance Channel by the USACE hopper dredge *Essayons*, with potentially additional work performed by the smaller USACE hopper dredge *Yaquina*, and/or by a similar contracted hopper dredge.

For 2021, under current funding, it is anticipated that 1.2-1.5 million cubic yards (MCY) of sediment will be removed from the Bar and Entrance Channel, up to a maximum of 2.0 MCY if additional funding becomes available. No work is anticipated for any of the interior channels at this time.

The initial and primary dredging episode is slated for May with the *Essayons*. The timing of additional work, as yet to be determined, may occur in separate episodes over the summer or fall. Dredging activities may require up to eight weeks total. The sponsor may request that we divert some funding and effort to a portion of the interior channels, although as of now, this appears to be unlikely. If the request is made, the USACE would certainly try to accommodate it. The final determination, based on need, funding and schedule availability of the dredge plants, probably won't be made until after the *Essayons* completes the initial dredging and the condition of the channels is re-assessed in late May.

Table 1 provides an overview of the congressionally authorized depths, widths, and lengths of Humboldt Bay's federal navigation channels. The North Bay, Samoa, Eureka, and Fields Landing Channels, and associated turning basins, are part of the interior channel complex (depicted in Figure 1).

Material dredged in 2021 from Humboldt Harbor and Bay's navigation channels will be placed at the recently expanded, Section 102 (33 U.S.C. 1401 et seq) U.S. Environmental Protection Agency (USEPA, or EPA for short)-designated ocean disposal site, Humboldt Open Ocean Disposal Site (HOODS), formerly known as the Interim Offshore Disposal Site (IODS). The HOODS was first used as a disposal site for sediment from Humboldt Harbor and Bay in September of 1990. Greater discussion of the original HOODS, and of the recently expanded HOODS, is provided below.

Bar and Entrance Channel

Annual maintenance dredging of the Bar and Entrance Channel is performed by the USACE's hopper dredge, the *Essayons*, or by a contracted hopper dredge with similar specifications possibly in combination with the *Yaquina*, a smaller USACE hopper dredge. For 2021 dredging, both the *Essayons* and *Yaquina* are currently in dry dock, so their final schedules and availability cannot be determined at this time. To maintain the congressionally authorized depth of 48 feet mean lower-low water (MLLW), up to 2.0 MCY can be dredged from this channel annually. The sediments of the Bar and Entrance Channel primarily are composed of clean sand; the latest analytical results from the 2016 sampling and analysis report revealed that the sediment composition was 0-4 percent gravel, 86-97 percent sand, 1.1-10 percent silt, and 1.0-3.8 percent clay.

Interior Channels

Annual maintenance dredging of the North Bay, Eureka, Samoa, and Fields Landing channels is conducted by the USACE's hopper dredges, the *Yaquina* or the *Essayons*, or by a contracted hopper dredge with similar specifications. If excessive shoaling has occurred, the shallower-draft *Yaquina* may need to dredge first. To maintain the congressionally authorized depths of 26 to 38 feet (MLLW) of the interior channels, up to 800 thousand cubic yards (TCY) of sand and sandy-silt material may need to be dredged.

Generally, the interior channels require longer pumping times than the Bar and Entrance Channel. This primarily is because of the increased sandy-silts, silts, and fines that comprise the sediments of the interior channels. However, similar to the Bar and Entrance Channel, sediments of the North Bay Channel primarily are composed of sand; the latest analytical results from the 2016 sampling and analysis report revealed that the sediment composition was 0-2 percent gravel, 95-98 percent sand, 1.1-2.6 percent silt, and 0.9-1.9 percent clay.

Humboldt Open Ocean Disposal Site (HOODS)

The HOODS was first used as a disposal site for the sediment from Humboldt Harbor and Bay in September of 1990. Beginning in 2021, HOODS will have an expanded footprint as described below.

Original HOODS

The original HOODS occupies an area of approximately three-square kilometers with depths ranging from 160 to 180 feet. It is divided into four quadrants ("quads"), each containing nine cells

(Figure 2). The placement of dredged material from Humboldt Bay navigation channels involves alternating the placement within the various cells, while preventing excessive mounding. Annual bathymetry surveys allow for USACE, in consultation with the USEPA, to determine where mounding occurs and limit placement of dredged material within these mounding cells.

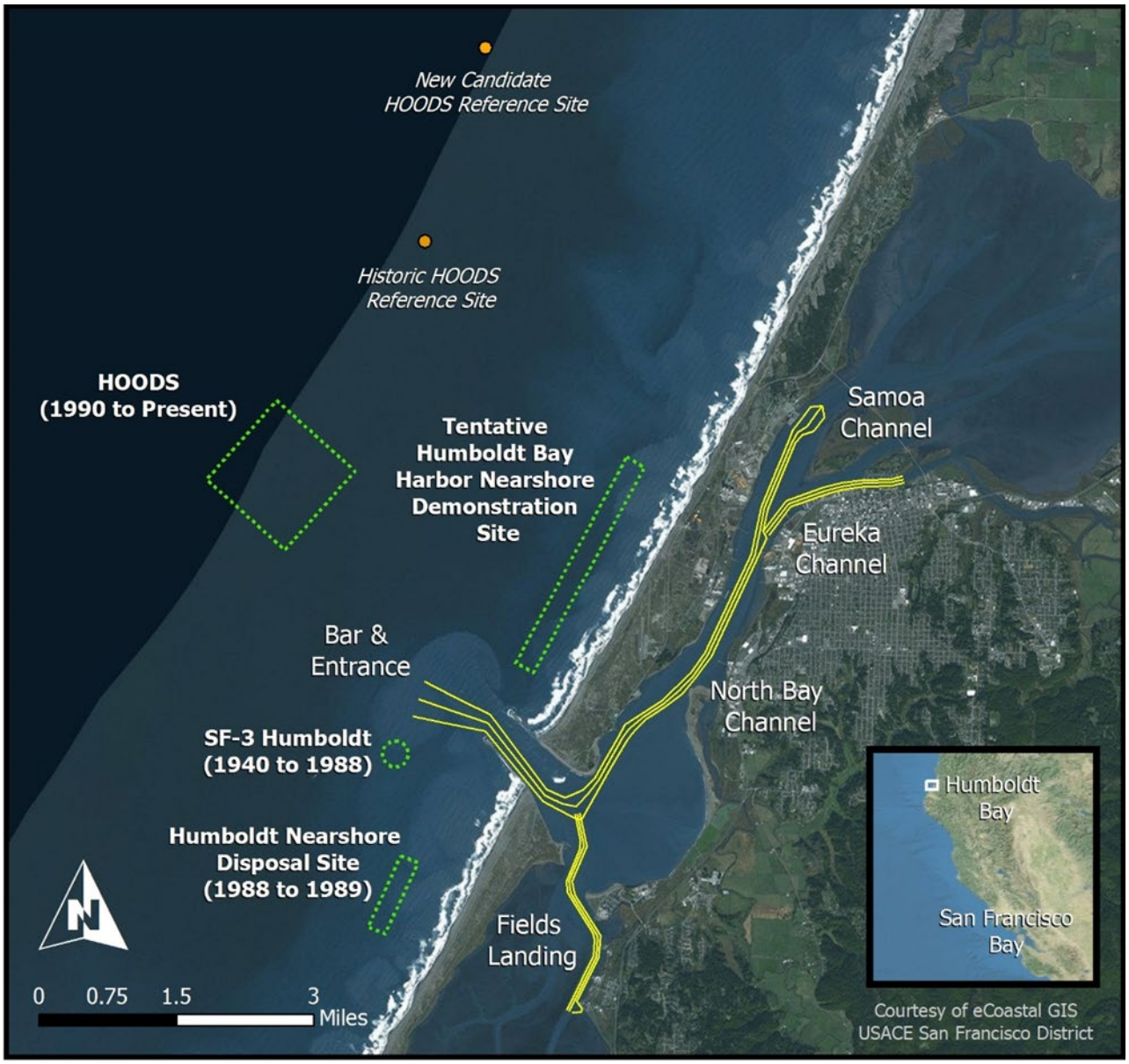


Figure 1. Federal navigation channels in the vicinity of Humboldt Bay are shown, as well as past, current, and tentative placement sites.

Table 1. Congressionally authorized depths, widths, and lengths of the federal navigation channels to be possibly dredged in calendar years 2021-25.

Navigation Channel[1]	Channel Stationing	Depth[2] feet (MLLW)	Width (feet)	Length (feet)	Allowable Overdraft[3] (feet)
Bar and Entrance Channel	0+00 – 136+00	48	500 to 1,600	8,500	2 (+1) [4]
North Bay Channel	136+00 – 309+00	38	400	18,500	1 (+1)
Samoa Channel	309+00 – 392+46	38	400	8,100	1 (+1)
Samoa Turning Basin		38	1,000	1,000	1 (+1)
Eureka Channel (Outer)	0+00 – 21+00	35	400	3,000	1 (+1)
Eureka Channel (Inner)	21+00 – 89+70	26	400	6,700	1 (+1)
Fields Landing Channel	8+00 – 124+35	26	300	12,000	1 (+1)
Fields Landing Turning Basin		26	600	800	1 (+1)

[1] Currently, only the Bar and Entrance Channel will be dredged in 2021.
[2] Depth is measured in feet below Mean Lower Low Water (MLLW), defined as the average level of the lower of the two daily low tides.
[3] USACE Headquarters guidance requires that environmental documentation analyze the potential effects of potential dredging outside the authorized dimensions, including characterization of sediments. The upper overdepth category is paid and contains the upper two feet of the Bar and Entrance Channel and the upper one foot of the rest of the channels. The lower overdepth category is unpaid and contains a single lower foot in all of the channels within Humboldt Harbor and Bay.
[4] The upper overdepth for the Bar and Entrance Channel includes the upper two feet of overdepth. Thus, the total volume includes three feet of overdepth.

Historically, in order to form a buffer zone, sediment was not placed in the 20 perimeter cells of HOODS (Figure 2). However, starting in May 2015, only certain disposal cells within the overall HOODS site have been used for disposal (especially for sand) due to mounding of previously disposed materials. Currently, all disposal must take place over the northwest and northeast slopes of the existing mound. Figure 3 shows the new, more restrictive placement requirements since May 2015, including portions of some buffer cells.

The original HOODS was a square site, extending from 3-4 nautical miles (nmi) offshore and covering 1 square nmi (Figure 1). It was divided into quadrants and cells (Figure 2) to facilitate management of individual disposal events so that mounding would not substantially exceed the target depth of 130 feet (MLLW). The buffer zone helped ensure that most of the dredged material discharged would settle on the seafloor within the site boundaries.

Because the majority of sediment disposed at HOODS since 1995 has been sand that stays in place after disposal in these water depths, this approach resulted in a symmetrical mound, with a surface elevation averaging approximately 130 feet deep, covering all of the internal cells (Figure 3).

As interior disposal cells reached (and in some cases slightly exceeded) the 130-foot depth target overtime, EPA closed those cells to further disposal and restricted ongoing disposal to fewer and fewer

cells. By 2020, disposal was only allowed in the inner portions of the buffer zone cells on the north and west sides of the site, along the slopes of the mound (Figure 3). This ensured that incremental growth of the mound would only occur in the directions that EPA proposed expanding the site footprint. Buffer zone cells on the south and east sides of the site remained off-limits for disposal because EPA did not anticipate allowing disposal to the south (closer to the Humboldt Bay entrance channel) or to the east (inside the 3-mile limit, which are also State waters).

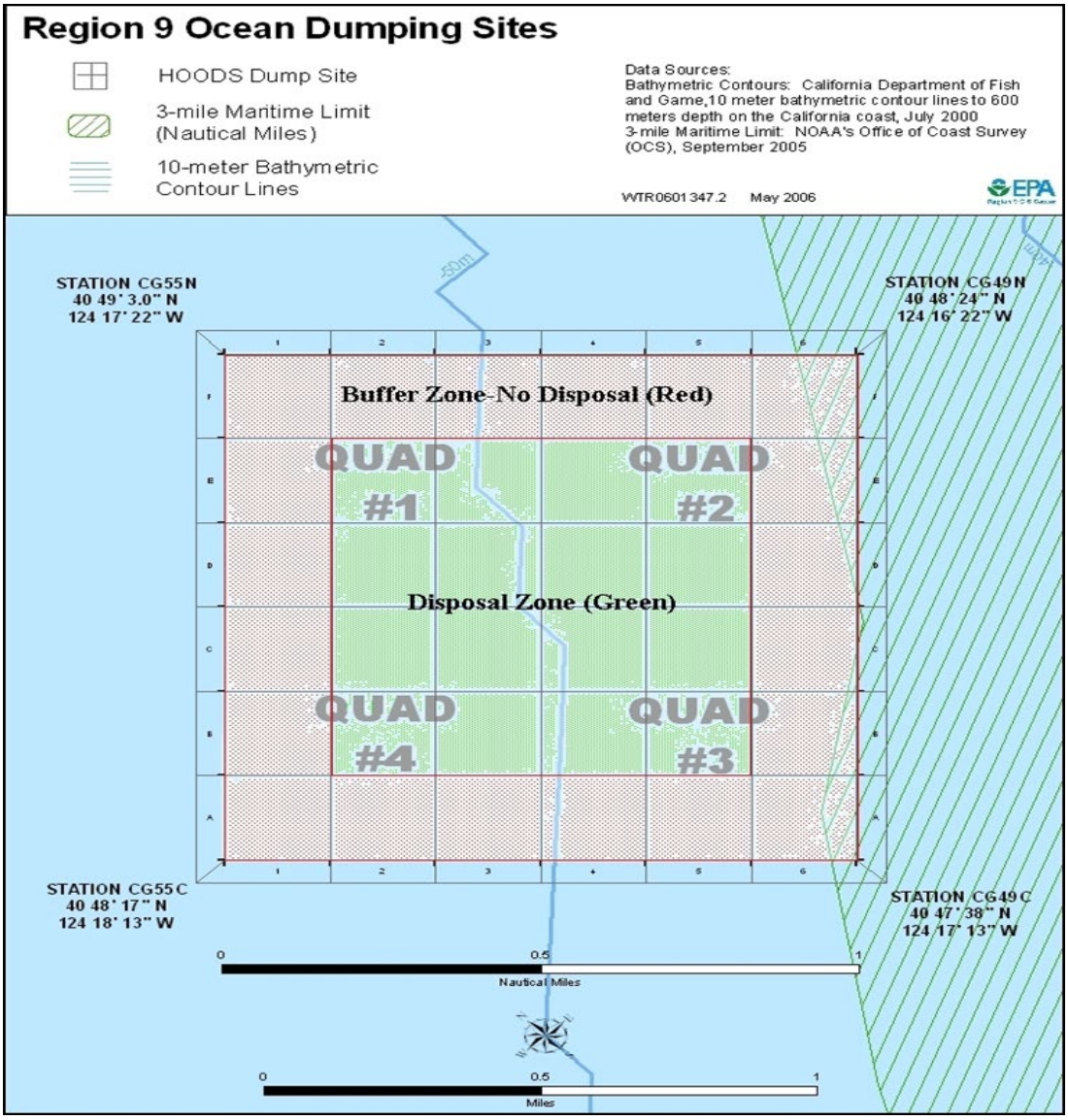
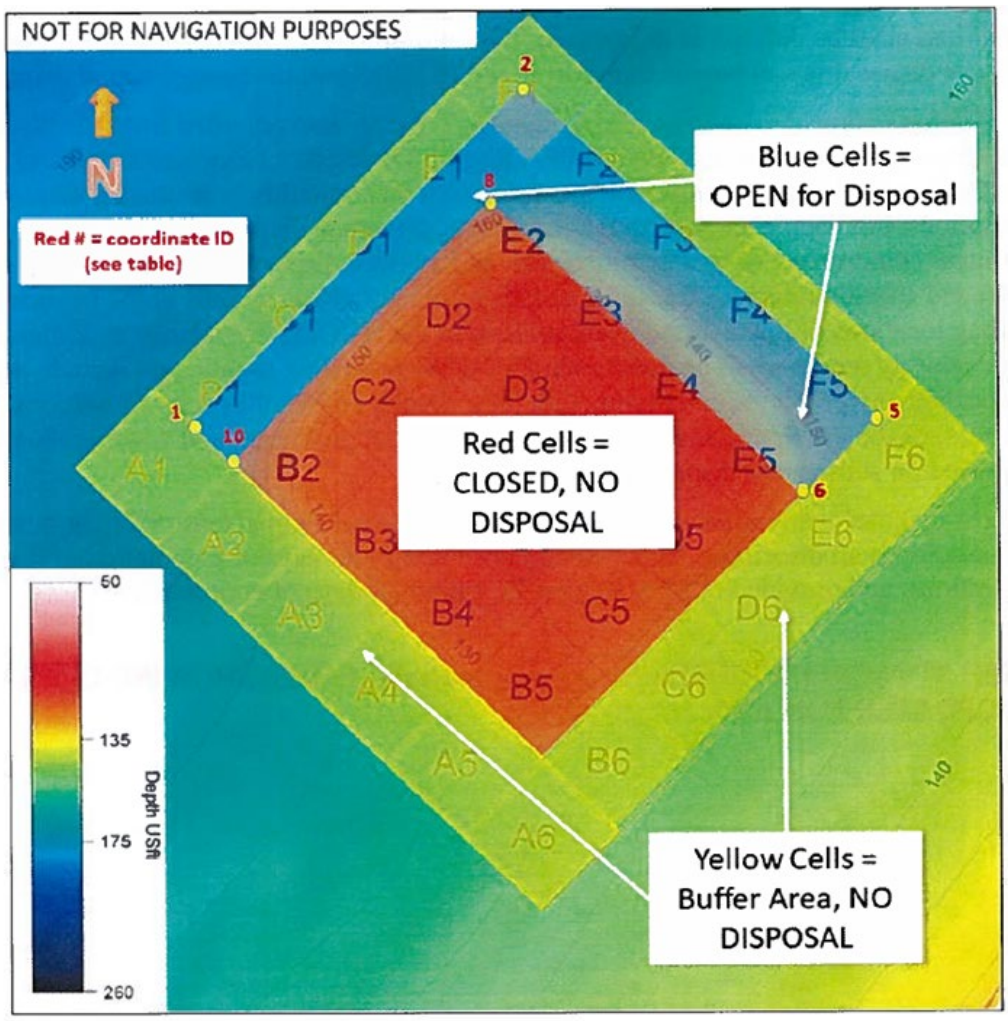


Figure 2. Humboldt Open Ocean Disposal Site—Original Quads (May 2006)

The USEPA, which is primarily responsible for ocean disposal under Section 102 of the Ocean Dumping Act, is significantly expanding the HOODS disposal footprint. The expansion is now expected to be in effect by spring 2021 (Brian Ross, USEPA, pers. comm. December 12, 2019).



Humboldt Open Ocean Disposal Site (HOODS) map, showing individual disposal cells that are open for vs closed to disposal in 2020. Underlying bathymetry is from 2014 survey.

Figure 3. Humboldt Open Ocean Disposal Site—2020 Placement Quads

Expanded HOODS

The expanded HOODS overlaps with the original site (superseding the original boundary) and extends an additional 1 nmi to the north and west (Figure 4). It covers 4 square nmi and is in water depths ranging from approximately 150 to 210 feet (MLLW). Table 2 provides the outer corner coordinates of the expanded site. The effective total capacity of the site will increase from the original 25 MCY to over 100 MCY (i.e., allowing for 75 MCY of additional disposal to occur), before mounding to -130 feet MLLW could again occur across the entire site. So, if today's disposal practices were to continue unchanged (i.e., if on average 1 MCY of dredged sand per year were to continue being placed at HOODS indefinitely), the site would reach capacity again in about 75 years. However, the effective life of the expanded site could be much longer than 75 years if nearshore placement of sand for beach or littoral system support were to begin at some point in the future (as shown in Figure 4). In

that event, disposal of finer sediment would continue in the expanded HOODS footprint, but it could be managed in such a way that little or no additional long-term mounding would occur at all.

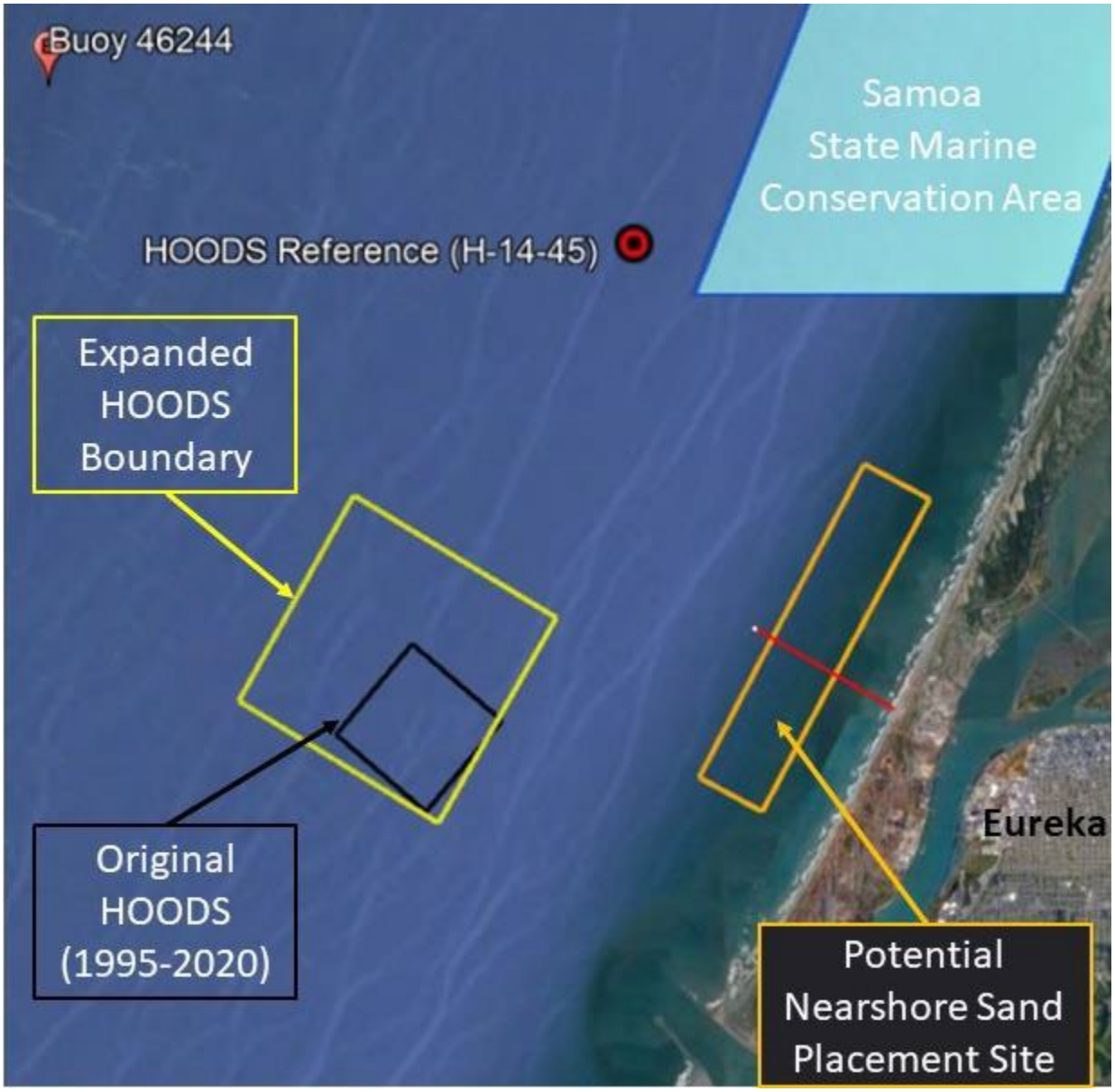


Figure 4. Expanded HOODS, beginning 2021. Showing location in relation to the original HOODS, the new HOODS reference site, the Samoa State Marine Conservation Area, the potential future Nearshore Sand Placement Site (NSPS), and the city of Eureka, California.

Table 2. Expanded HOODS corner coordinates and centroid (NAD 83).

Alternative 1 (Proposed): Expand by 1 nmi to North and West				
Corner	***Latitude***	***Longitude***	***Centroid Lat.***	***Centroid Long.***
North	40° 50' 18" N	124° 18' 01" W	|	|
East	40° 49' 16" N	124° 15' 46" W	40° 48' 56" N	124° 17' 32" W
South	40° 47' 33" N	124° 17' 05" W		
West	40° 48' 34" N	124° 19' 18" W	|	|

The expanded HOODS is also divided into quadrants and cells (Figure 5). Each quadrant is 1 square nmi (the size of the original HOODS) and each is divided into 36 square cells that are approximately 1,000 feet by 1,000 feet in size. The mound in the original HOODS occupies Quadrant 1 of the expanded site and will remain closed to ongoing disposal. The outermost cells of the expanded site will also continue to serve as a buffer zone closed to disposal. The 75 remaining cells in Quadrants 2, 3, and 4 are available to be specified in permits for disposal. However, initially only the 39 cells nearest the mound will be used, with the other 36 cells reserved for possible future use if needed (Figures 5, 6).

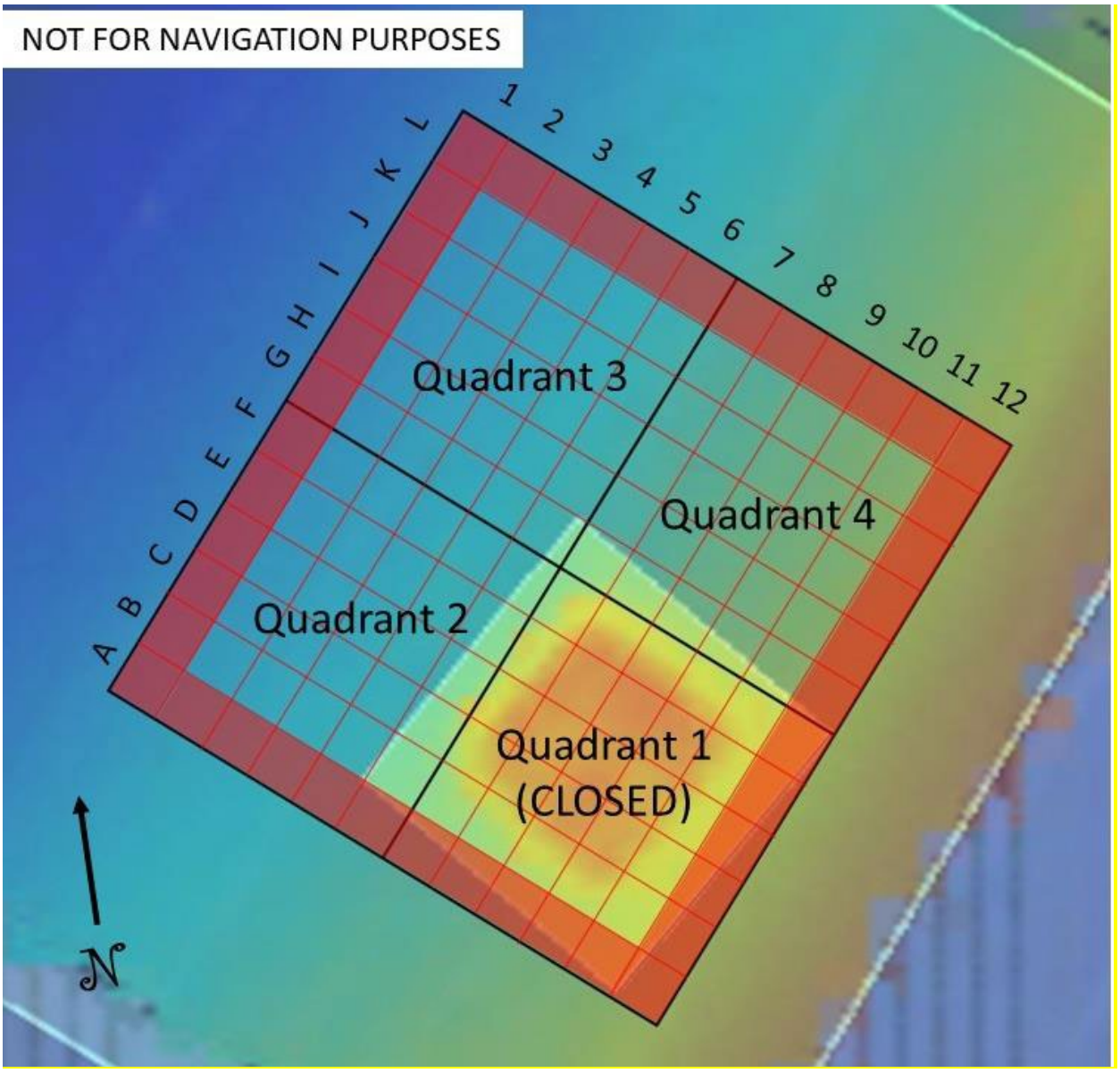


Figure 5. Map showing the overall layout of quadrants and disposal cells in the expanded HOODS, beginning in 2021. Quadrant 1 includes the original HOODS, which is closed to further disposal. The outermost cells of the expanded site (red shading) comprise a buffer zone that is also closed to disposal. Allowable disposal cells will be specified on a project-specific basis.

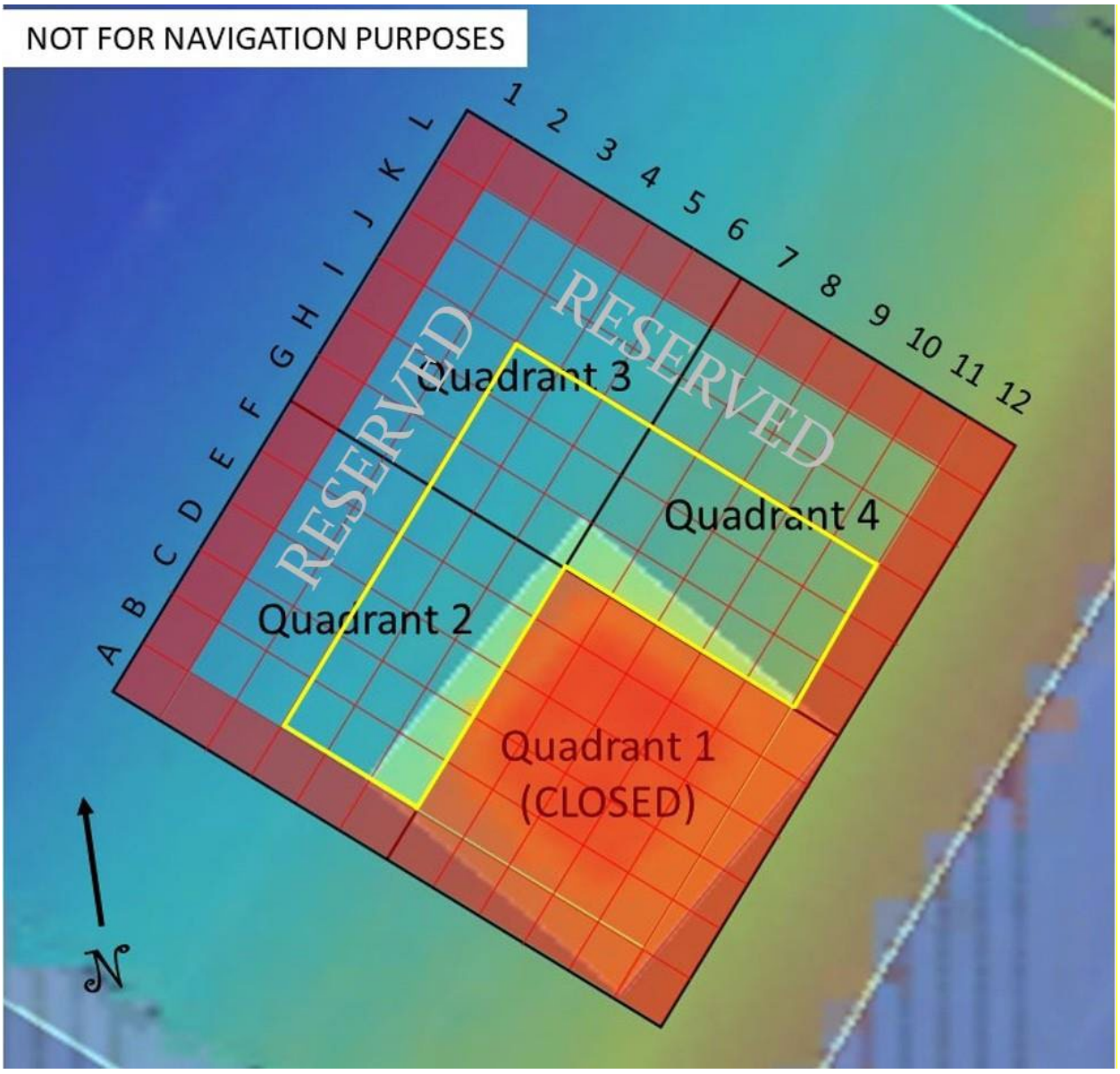


Figure 6. Map showing the layout of Reserved vs Available (yellow box) disposal cells in the expanded HOODS, beginning in 2021. Disposals will occur over the slopes of the existing mound, slowly growing it to the north and west over time while leaving the remainder of the site undisturbed for as long as possible. EPA will specify allowable disposal cells on a project-specific basis.

For individual projects, a subset of disposal cells will be specified in each EPA ocean disposal concurrence, to manage future mounding. In any year, ongoing disposal will be limited to occurring over the northern and western slopes of the existing mound. As the mound slowly expands laterally in these directions, specified allowable disposal cells will be shifted outward as well, so that the mound does not increase in height (i.e., so that it does not become shallower than the minimum target depth of -130 feet MLLW). Furthermore, no disposal will be allowed in the buffer cells around the edges of the site, or in the 36 interior cells marked as "RESERVED" in Figure 6. Use of the "RESERVED" cells will

only be considered in the future when the mound is again nearing capacity in the available cells. At that time, a revision will be issued with an opportunity for public comment.

The original HOODS footprint will be off-limits to further disposal. USEPA anticipates directing USACE to the following cells in the new expansion area for spring 2021 dredging purposes, as shown in Figure 6: A6, B6, C6, D6, E6, F6, G6, G7, G8, G9, G10, and G11.

Sediment Suitability for Disposal at HOODS

Based on decades of dredging experience, sediment dredged from the Humboldt Bar and Entrance channel, and from all of the interior channels, is predominantly (80-98%) clean sand that is clearly suitable for disposal at HOODS. The USACE is currently sampling and testing sediment from these channels, as it does roughly every 5 years (last done in 2016). According to the contractor's latest schedule, sampling is slated to start (weather permitting) February 16, with testing results and a draft report completed by April 30, 2021.

Conservation Measures

The USACE will implement the following conservation measures to protect listed species:

- The dredge shall be primed and cleared as close to the bottom as possible (preferably on the bottom).
- The USACE shall immediately stop/repair and clean up any fuel or hazardous waste leaks or spills on the Project site during Project activities at the time of occurrence. The USACE shall exclude the storage and handling of hazardous materials from construction and operation zones and shall properly contain and dispose of any unused or leftover hazardous products off-site; and
- The USACE shall maintain cleanliness of the dredger by removing from the site, and properly disposing of, all debris.

Potential Project Impacts

Potential impacts of the proposed project to sensitive species generally are associated with the following factors:

- Creation of temporary and localized turbidity plumes and sedimentation during dredging activities in the federal channels of Humboldt Bay, and as material is placed at offshore or nearshore disposal sites (for 2021 dredging, only HOODS will be used).
- Removal/disturbance of sediment and benthic organisms from the federal channels of Humboldt Bay; and
- Temporary and localized disruption of the aquatic environment (e.g., noise and boat movement) during dredging and placement activities.

Effects Determination

Marbled murrelets nest from approximately mid-April through July in inland areas (e.g., old growth forest), but may be present in waters of the proposed project area for foraging especially during the non-breeding season. Murrelets are diving birds which forage for fish and invertebrates under water.

Project impacts to feeding marbled murrelet are expected to be insignificant because similar habitat is widely available along other areas of the Humboldt County coast. Disturbance from project activities and impacts to fish and benthic food organisms in the project area will be minor, temporary, and localized. The project area is part of an active harbor, hence disturbance from boat traffic is common. Feeding birds are expected to simply avoid the project area and activities and feed in nearby areas. Additionally, USFWS has stated in a previous ESA consultation for this project that marbled murrelet is "uncommon in the vicinity of the proposed project" and that eelgrass habitats [important to murrelet prey fish species] are "not likely to be found in the deeper interior channels that have ongoing annual dredging" (letter dated October 20, 2017 from Stephanie Blihovde [USFWS] to Dr. Mark Wiechmann [USACE]).

Based on the effects analysis above, we are requesting your written concurrence with our determination that the proposed project *may affect, but is not likely to adversely affect* the marbled murrelet. If you disagree with our determination or require additional information, please contact Beth Campbell of my staff at elizabeth.a.campbell@usace.army.mil, or at (415) 503-6845 regarding this consultation request.

Sincerely,

BEACH.TESSA.EVE.1385598781

Digitally signed by BEACH.TESSA.EVE.1385598781
Date: 2021.03.17 16:02:39 -07'00'

Dr. Tessa E. Beach
Chief, Environmental Sections

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVE.
SAN FRANCISCO, CA 94102

March 24, 2021

SUBJECT: Humboldt Harbor and Bay 2021-2025 Maintenance Dredging Project

Lisa Van Atta
Assistant Regional Administrator, California Coastal Office
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

Dear Ms. Van Atta:

Pursuant to Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 50 C.F.R. Part 402), the U.S. Army Corps of Engineers, San Francisco District (USACE) is requesting consultation with the National Marine Fisheries Service (NMFS) to assess the effects of the proposed Humboldt Harbor and Bay, 2021-2025 maintenance dredging project on Northern California (NC) Steelhead (*Oncorhynchus mykiss*; threatened), Southern Oregon-Northern California Coastal (SONCC) coho Salmon (*O. kisutch*; threatened), California Coastal (CC) Chinook Salmon (*O. tshawytscha*; threatened), and the Southern distinct population segment (DPS) of North American Green Sturgeon (*Acipenser medirostris*; threatened), and the designated critical habitats for these four species.

The proposed action involves the annual maintenance dredging of the Bar and Entrance Channel and the North Bay, Eureka, Samoa, and Field's Landing Channels (interior channels) and associated turning basins located in Humboldt Harbor and Bay, for fiscal years 2021 through 2025. A maximum of 2 million cubic yards is expected to be dredged annually from the channels by USACE's hopper dredges, the Yaquina or the Essayons, or by contracted hopper dredges with similar specifications. Dredge material will be placed at the recently expanded Section 102 (33 U.S.C. 1401 et seq) U.S. Environmental Protection Agency-designated Humboldt Open Ocean Disposal Site (HOODS). Dredge activities will occur for up to 60 days per year during the time period from March 15 through September 30. Dredging may occur in one or multiple episodes. A complete project description and analysis of effects is provided in the enclosed Biological/Essential Fish Habitat (EFH) Assessment

The USACE has made the following ESA determinations regarding the proposed action:

- The proposed action is *not likely to adversely affect* NC Steelhead or the southern DPS of North American green sturgeon, or the designated critical habitats of these species;

- The proposed action is *likely to adversely affect* SONCC coho and CC Chinook salmon; however, it is *not likely to jeopardize* the continued existence of these species;

- The proposed action is *likely to adversely affect* the designated critical habitat of SONCC coho and CC Chinook salmon, but is *not likely to adversely modify* the capability of designated critical habitat for these species to support the survival and recovery of this species.

In addition, USACE is requesting consultation pursuant to section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; Public Law 104-297). We have determined that the proposed action *may affect* EFH managed as part of the Pacific Groundfish Fishery Management Plan (FMP), Pacific Salmon FMP, and Pacific Coastal Pelagic Species FMP.

The NMFS has provided guidance to USACE regarding EFH consultations for maintenance dredging of federal navigation channels (i.e., NMFS Procedure 03-201-16, dated February 2, 2018). This letter is intended to notify NMFS that USACE intends to utilize this guidance for any future consultations regarding Humboldt Harbor and Bay maintenance dredging. Specifically, the USACE believes that future Humboldt maintenance dredging activities will fall under Scenario C of the guidance which states in part the following:

> "For an existing channel that is proposed for maintenance and the USACE (or non-federal designee) has previously completed an EFH consultation, impacts within the channel should have been covered by the original consultation."

Consequently, unless the project description has a substantive change in the future, the USACE does not intend to consult further with NMFS on EFH for this project.

If you disagree with our determinations or require additional information, please contact Beth Campbell of my staff at elizabeth.a.campbell@usace.army.mil, or at (415) 503-6845 regarding this consultation request.

Sincerely,

BEACH.TESSA.EVE.1385598781

Digitally signed by BEACH.TESSA.EVE.1385598781
Date: 2021.03.24 05:24:53 -07'00'

Dr. Tessa E. Beach
Chief, Environmental Sections

Enclosure

APPENDIX A: ENVIRONMENTAL PERMITS

Biological Assessment
Essential Fish Habitat Assessment
National Marine Fisheries Service and

Humboldt Harbor and Bay Operations and Maintenance Dredging (2021-2025)

U.S. Army Corps of Engineers, San Francisco District

March 2021

U.S. Army Corps of Engineers
San Francisco District
Programs, Planning, & Project Management Division
Environmental Services Branch
Navigation and Operations Environmental Section

Summary of Findings, Conclusions, and Determinations

This document presents the U.S. Army Corps of Engineers, San Francisco District (USACE) Biological Assessment (BA) for formal consultation with the National Marine Fisheries Service (NMFS) under section 7 of the Endangered Species Act (ESA) for the 2021 through 2025 dredging cycle for the federal channels of Humboldt Bay, Humboldt County, California and for Essential Fish Habitat (EFH) compliance under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCA). This BA/EFH Assessment presents technical information about the 2021 through 2025 dredging cycle (proposed project), and assesses potential effects to federally-listed threatened or endangered species, and their critical habitats, as well as potential affects to EFH.

The proposed action involves the annual maintenance dredging of the Bar and Entrance Channel and the North Bay, Eureka, Samoa, and Field's Landing Channels (interior channels) and associated turning basins located in Humboldt Harbor and Bay, for fiscal years 2021 through 2025. A maximum of 2 million cubic yards (MCY) is expected to be dredged annually from the channels. Dredge material will be placed at the permanently designated Section 102 disposal site, Humboldt Open Ocean Disposal Site (HOODS). Beginning in 2021, HOODS will have an expanded footprint.
Annual maintenance dredging to maintain navigability of Humboldt Bay's navigation channels will occur for up to 60 days during the time period from March 15 through September 30. Dredging may occur in one or multiple episodes.
The action area, as defined in 50 Code of Federal Regulations (CFR) § 402.02, includes all areas to be directly or indirectly affected by the federal action, as well as interrelated and interdependent actions. The action area for the proposed action includes the Bar and Entrance Channel, interior channels and associated turning basins, and the expanded HOODS including the routes used to transport the dredge material for disposal.

An official species list for the project area was obtained from NMFS on March 11, 2021, for the Eureka and Fields landing U.S. Geological Survey quads (Matt Goldsworthy, NMFS, personal communication, March 11, 2021).

The action area provides potential habitat for four federally-threatened or endangered species:

- **Northern California (NC) Steelhead** (*Oncorhynchus mykiss)* (threatened)
- **Southern Oregon-Northern California Coastal (SONCC) coho Salmon ESU** *(O. kisutch)* (threatened)
- **California Coastal (CC) Chinook Salmon ESU** *(O. tshawytscha)* (threatened)
- **Southern DPS North American Green Sturgeon** (*Acipenser medirostris)* (threatened)

In addition, designated critical habitat for all four of the above species falls within the action area.

The action area also contains EFH as designated under the Pacific Groundfish, Coastal Pelagic, and Pacific Salmon fisheries management plans (FMPs).

After a literature review and consideration of the proposed construction activities and the planned avoidance and minimization activities, USACE has determined that:

- The proposed action is *not likely to adversely affect* NC Steelhead or the southern DPS of North American green sturgeon, or the designated critical habitats of these species;

- The proposed action is *likely to adversely affect* SONCC coho and CC Chinook salmon; however, it is *not likely to jeopardize* the continued existence of these species;

- The proposed action is *likely to adversely affect* the designated critical habitat of SONCC coho and CC Chinook salmon, *but is not likely to adversely modify* the capability of designated critical habitat for these species to support the survival and recovery of this species;

- The proposed action *may affect* EFH in the action area for species managed under the Pacific Groundfish, Coastal Pelagic, and Pacific Salmon FMPs.

General Avoidance and Minimization Measures

To avoid or minimize effects on federally-listed species and their habitat within the action area, the following general avoidance and minimization measures will be implemented:

- The USACE shall limit the duration of overflow to the extent practicable during each dredge cycle.

- Standard best-management practices (BMPs) will be applied to protect species and their habitat(s) from pollution because of fuels, oils, lubricants, and other harmful materials. Equipment that is used during the proposed project will be fueled and serviced in a manner that will not affect federally-protected species in the action area or their habitats;

- A Spill Prevention Control and Countermeasure (SPCC) plan will be prepared to address the emergency cleanup of any hazardous material and will be available on site. The SPCC plan will incorporate measures to address hazardous waste, stormwater, and other emergency planning requirements;

- 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, leaked material will be cleaned up, and the cleaning materials will be collected and properly disposed of;

- Fueling of marine-based equipment will occur at designated safe locations adjacent to the proposed project. Spills will be cleaned up immediately using spill-response equipment;

- The USACE will exercise every reasonable precaution to protect listed species, critical habitats, and EFH from pollutants and other deleterious materials.

1. Introduction

Purpose of the Biological Assessment

This document presents the U.S. Army Corps of Engineers (USACE) Biological Assessment (BA) for formal consultation with the National Marine Fisheries Service (NMFS) under section 7 of the Endangered Species Act (ESA) for the proposed 2021 through 2025 maintenance dredging cycle for Humboldt Harbor and Bay, and for Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

This combined BA/EFH Assessment presents technical information about the proposed project and assesses potential effects to threatened or endangered species, and designated critical habitats in the action area, in accordance with legal requirements found in section 7(a)(2) of the federal ESA (16 U.S. C 1536[c]). This document also assesses the potential for the proposed project to affect EFH, as required by section 305(b) of the MSFCMA (Public Law 104-297).

Threatened and Endangered Species, and Critical Habitat

To prepare this BA/EFH Assessment, a variety of sources were reviewed to identify threatened and endangered species designated critical habitat, or EFH that may be present within the vicinity of the proposed project. Updated species life history and status information was obtained from NMFS (e.g., https://www.fisheries.noaa.gov/species-directory/threatened-endangered). As this project is ongoing, the most recent biological opinion (BO) for the project was consulted as well, which was issued by NMFS on April 18, 2016 (NMFS File Number: WCR-2015-3779).

The species list was refined to limit the remaining analysis to those species that could reasonably be expected to occur within the action area, as shown in Table 1. A species was not included in Table 1 if it met any of the following criteria:

- It could not occur within the action area because of habitat constraints; or
- The action area was outside the species' known range.

TABLE 1 DESIGNATED CRITICAL HABITAT AND LISTED SPECIES WITH POTENTIAL TO OCCUR WITHIN ACTION AREA

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS[1]	SPECIES OR HABITAT PRESENCE[2]	RATIONALE
Oncorhynchus mykiss	NC Steelhead ESU	T	P	From Redwood Creek (Humboldt County), south to the Gualala River, inclusive.
--	Critical Habitat, NC Steelhead	X	P	Designated in 2005, 70 FR 52630.
Oncorhynchus kisutch	SONCC coho salmon ESU	T	P	From Cape Blanco, Oregon to Punta Gorda, California
--	Critical Habitat, SONCC coho salmon	X	P	Designated 1999, 64 FR 24049
Oncorhynchus tshawytscha	CC Chinook Salmon ESU	T	P	From Redwood Creek (Humboldt County) south through the Russian River
--	Critical Habitat, CC Chinook Salmon	X	P	Designated 2005, 70 FR 52488
Acipenser medirostris	North American Green Sturgeon, Southern DPS	T	P	Known to occur within Humboldt Bay and along its coast.
--	Critical Habitat, North American Green Sturgeon, Southern DPS	X	P	Designated 2009, 74 FR 52300

DPS Distinct Population Segment

Notes:

[1] **Status**
E Endangered
T Threatened
X Critical Habitat

[2] **Species or Habitat Presence**
P Species, critical habitat, or general habitat is present.

Essential Fish Habitat

The action area contains EFH as designated under the Pacific Groundfish, Coastal Pelagic, and Pacific Salmon fisheries management plans (FMPs).

Description of the Proposed Action

Project History

Humboldt Bay has been maintained for shipping commerce since 1881 when the interior channels were first constructed to provide safe navigation into and within the bay. The first attempt at stabilizing the entrance to Humboldt Bay occurred in 1889, resulting in the construction of twin jetties that bounded Bar and Entrance Channel. Tables 2 and 3 below details

the chronological use of Humboldt Bay, and the initial improvements made to Humboldt Harbor and Bay to provide for safe navigation.

TABLE 2 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 deepened to 25 feet deep and 100 feet wide.
1900	Initial jetty construction completed—8,000 feet long, 5 to 10 feet above MLLW.
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.
1954	Eureka and Samoa Channels deepening (30 feet) completed and North Bay Channel initial construction
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.

TABLE 3 DETAILED CHRONOLOGY OF HUMBOLDT BAY USE IMPROVEMENTS		
Project Authority	**Recommendation**	**Document**
Rivers and Harbor Act (RHA) of 3 March 1881	Dredging of a 10 feet deep by 350 feet wide channel along Eureka waterfront and 8 feet deep by 200 feet wide west to the natural channel; and dredging Mad River Shoal to 8 feet deep.	House Ex. Document 59 Congress, 3rd Session.
RHA of 5 July 1884	Construct South Jetty and continue channel improvements.	RHA Appropriations Act Of 1884.
RHA of 5 August 1886	$75,000 continued improvement of Harbor with provision for title to 12 acres of land to be conveyed to the United States.	RHA Appropriations Act Of 1886.
RHA of 3 July 1892	Map and cost estimates for continuing Harbor improvements with provision for two parallel jetties.	Chief of Engineers Annual Report (p. 3120), Annual RHA Appropriations Act from 1892 –1899.
RHA of 3 March 1899	Continuing Harbor improvements with provision for two parallel jetties.	House Document 528, 55th Congress, 2nd session, dated 8 June 1898.
RHA of 25 June 1910	Rebuilding the jetties and channel improvements to Arcata and Hookton.	House Document 950, 60th session, dated 16 April 1908; House Document 204, 61st Congress, 2nd session and House Document 326, 61st Congress, 2nd session, dated 6 and 13 May 1909, respectively.
RHA of 3 July 1930	Dredged the Eureka Channel to 20 feet deep and 300 feet wide; Samoa Channel to 20 feet deep and 250 feet wide; Arcata Channel 18 feet deep and 150 feet wide; and Fields Landing Channel 20 feet deep and 250 feet wide.	House Document 755, 69th Congress, 2nd session.
RHA 30 August 1935	Dredged the Entrance Channel 30 feet deep and 500 feet wide.	Rivers and Harbors Committee Document 11, 75th Congress, 1st session.
RHA 26 August 1937	Dredged the Eureka Channel to 26 feet deep and 400 feet wide; Samoa Channel 26 deep and 300 feet wide; Fields Landing Channel to 26 feet deep and 300 feet wide; and the Turning Basin (off Fields Landing Wharf) to 26 feet deep, 600 feet wide and 800 feet long.	Rivers and Harbors Committee Document 143, 82nd Congress, 1st session.
RHA 16 July 1952	Dredged the Bar and Entrance Channel to 40 feet deep, tapered from 1,600 feet to 500 feet wide; North Bay Channel to 30 feet deep and 400 feet wide; Eureka Channel to 30 feet deep to mile 5.0; and the Samoa Channel to 30 feet deep.	Rivers and Harbors Committee Document 143, 82nd Congress, 1st session.
RHA August 1968	Dredged the North Bay Channel to 35 feet deep; widen the turns at mile 0.75 and 2.6 to provide a 1,200 by 1,200-foot anchorage in the North Bay.	House Document 330, 90th Congress 2nd session.

TABLE 3 DETAILED CHRONOLOGY OF HUMBOLDT BAY USE IMPROVEMENTS		
Project Authority	**Recommendation**	**Document**
Committee on Public Works and Transportation of the United States House of Representatives Resolution, 23 September 1982.	Dredging of approximately 5.6 million cy of dredged material from the Humboldt Harbor and Bay navigation channels and disposing the dredged material at HOODS and disposing 26,000 cy of dredged material unsuitable for unconfined aquatic disposal at the upland Louisiana Pacific Site. Dredging includes: Bar and Entrance to –48 feet MLLW; "Middle Ground Area" of the North Bay Channel to –48 feet MLLW; North Bay and Samoa Channels to –38 feet MLLW; the Entrance Channel ranging from 275 feet at the Entrance to 200 feet at the "Middle Ground" area; move the Entrance Channel away from the South Jetty by 100 feet; realign the Samoa Channel Turning Basin. (Note: In the end, there were only 4.6 million cys of material dredged, and the 26,000 cys of material that was to be placed at the Louisiana Pacific Site was left in place in the Samoa Channel.)	*Humboldt Harbor and Bay (Deepening) Project Final Environmental Affect Statement/Report*, April 1995.
Water Resources Development Act (WRDA) of 1996.	Dredged approximately 5.6 million cy of material from the Humboldt Harbor and Bay navigation channels, placing the dredged material at HOODS, and placing 26,000 cy of dredged material unsuitable for unconfined aquatic placement at the upland Louisiana Pacific Site. Dredging includes: Bar and Entrance to a depth of 48 ft MLLW; "Middle Ground Area" of the North Bay Channel to a depth of 48 ft MLLW; North Bay and Samoa Channels to a depth of 38 ft MLLW; the Entrance Channel ranging from 275 ft at the Entrance to 200 ft at the "Middle Ground" area; move the Entrance Channel away from the South Jetty by 100 ft; realign the Samoa Channel Turning Basin. (Note: Only 4.6 million cy of material dredged, and the 26,000 cy of material that was to be placed at the Louisiana Pacific Site was left in place in the Samoa Channel.).	Public Law (PL) 104-303-Oct. 12, 1996. Title I-Water Resources Projects. Sec. 101 Project Authorizations. (2) Humboldt Harbor and Bay, California.

Consultation History

Biological opinions for previous periods of this project were issued by NMFS on March 2, 2007 (NMFS File Number: 2003/02253) and April 18, 2016 (NMFS File Number: WCR-2015-3779). An official species list for the proposed project was obtained from NMFS on March 11, 2021 quads (Matt Goldsworthy, NMFS, personal communication, March 11, 2021).

Project Description

The proposed action involves the annual maintenance dredging of the bar, entrance and North Bay, Eureka, Samoa, and Field's Landing channels and associated turning basins located in Humboldt Harbor and Bay for the FY2021-25 timeframe. **Table 4** provides an overview of the congressionally authorized depths, widths, and lengths of the navigation channels. **Table 5** shows recent dredging volumes from the proposed project area, and **Table 6** lists planned dredging activities at Humboldt during FY2021-25. A maximum of 2 million cubic yards (MCY) are expected to be dredged annually from the Bar and Entrance channel and the various interior channels during FY2021-25 using the USACE hopper dredges *Essayons* and *Yaquina*, or with contracted hopper dredges. Depending on the result of sediment characterization, material dredged from Humboldt Bay's navigation channels would be placed at the permanently designated disposal site, HOODS. The

Table 4. Humboldt Harbor and Bay Navigation Channel Dimensions

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 5. Humboldt Harbor and Bay Channel – Recent Dredging Volumes

Fiscal Year	Bar and Entrance Channel	*Interior Channels (CY)	Total Volume (CY)
2011	1,165,398	154,881	1,320,279
2012	1,182,620	---	1,182,620
2013	674,928	---	674,928
2014	432,490	---	432,490
2015	715,296	---	715,296
2016	1,588,906	20,777	1,609,683
2017	1,115,051	---	1,115,051
2018	759,625	---	759,625
2019	1,181,388	---	1,181,388
2020	1,047,669	110,834	1,158,503
Annual Average	**986,337**	**28,649**	**1,014,986**

*Includes the North Bay, Samoa, Eureka, and Field's Landing Channels.
n/a = not available.

Table 6. FY 2021-25 Planned Dredging Activities

Year	Dredge Dates/ Dredge	Number of days dredging	Maximum Volumes	Placement Site(s)	Dredged Channels
2021	Mid-March—>end of Sept. (*Essayons, Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	**HOODS**	Bar and Entrance Channel and/or Interior Channels
2022	Mid-March—>end of Sept. (*Essayons, Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	**HOODS**	Bar and Entrance Channel and/or Interior Channels
2023	Mid-March—>end of Sept. (*Essayons, Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	**HOODS**	Bar and Entrance Channel and/or Interior Channels
2024	Mid-March—>end of Sept. (*Essayons, Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	**HOODS**	Bar and Entrance Channel and/or Interior Channels
2025	Mid-March—>end of Sept. (*Essayons, Yaquina*, or contract)	**60 days** (up to 8 ½ weeks)	**2,000,000** CY	**HOODS**	Bar and Entrance Channel and/or Interior Channels

HOODS was first used as a disposal site for the sediment from Humboldt Harbor and Bay in September of 1990. Beginning in 2021, HOODS will have an expanded footprint as described below. Additionally, it should be noted that placement (beneficial use) of sandy dredged material at a nearshore sand placement site (NSPS) to alleviate the effects of erosive wave actions along the North Spit could potentially occur during the 5-year period once a demonstration site is created (see Figure 2 for potential location of tentative nearshore demonstration site). However, establishment of a demonstration site/ NSPS would first need to be analyzed under a separate NEPA document and environmental permitting process, including ESA and EFH compliance. Material determined to be unsuitable or infeasible for nearshore beneficial use that meets the standards and criteria for open ocean disposal would still be placed at HOODS.

2.3.1 *ORIGINAL* Humboldt Open Ocean Disposal Site (HOODS) – *1990-2020*

The original HOODS is in the Pacific Ocean, approximately three nautical miles (nm) west of the entrance to Humboldt Bay (**Figure 1**). It is one square nautical mile (nm^2) in size with depths ranging from 160 to 180 feet (49 to 55 meters). It is divided into four quadrants ("quads"), each containing nine cells (**Figure 2**). The placement of dredged material from Humboldt Bay navigation channels involves alternating the placement within the various cells, while preventing excessive mounding. Annual bathymetry surveys allow for USACE, in consultation with EPA, to determine where mounding occurs and limit placement of dredged material within these mounding cells so as not to go above the 130-foot depth target.

Historically, in order to form a buffer zone, sediment was not placed in the 20 perimeter cells of HOODS (see pink cells, **Figure 2**). Because most of the sediment disposed at HOODS since 1995 has been sand that stays in place after disposal, this approach resulted in a symmetrical mound covering all the internal cells. Currently, all disposal must take place over the northwest and northeast slopes of the existing mound. **Figure 3** shows the new, more restrictive placement requirements since May 2015, including portions of some buffer cells. By 2020, disposal was only allowed in the inner portions of the buffer zone cells on the north and west sides of the site, along the slopes of the mound (Figure 3). This ensured that incremental growth of the mound would only occur in the directions that EPA proposed expanding the site footprint. Buffer zone cells on the south and east sides of the site remained off-limits for disposal because EPA did not anticipate allowing disposal to the south (closer to the Humboldt Bay entrance channel) or to the east (inside the 3-mile limit, which are also State waters).

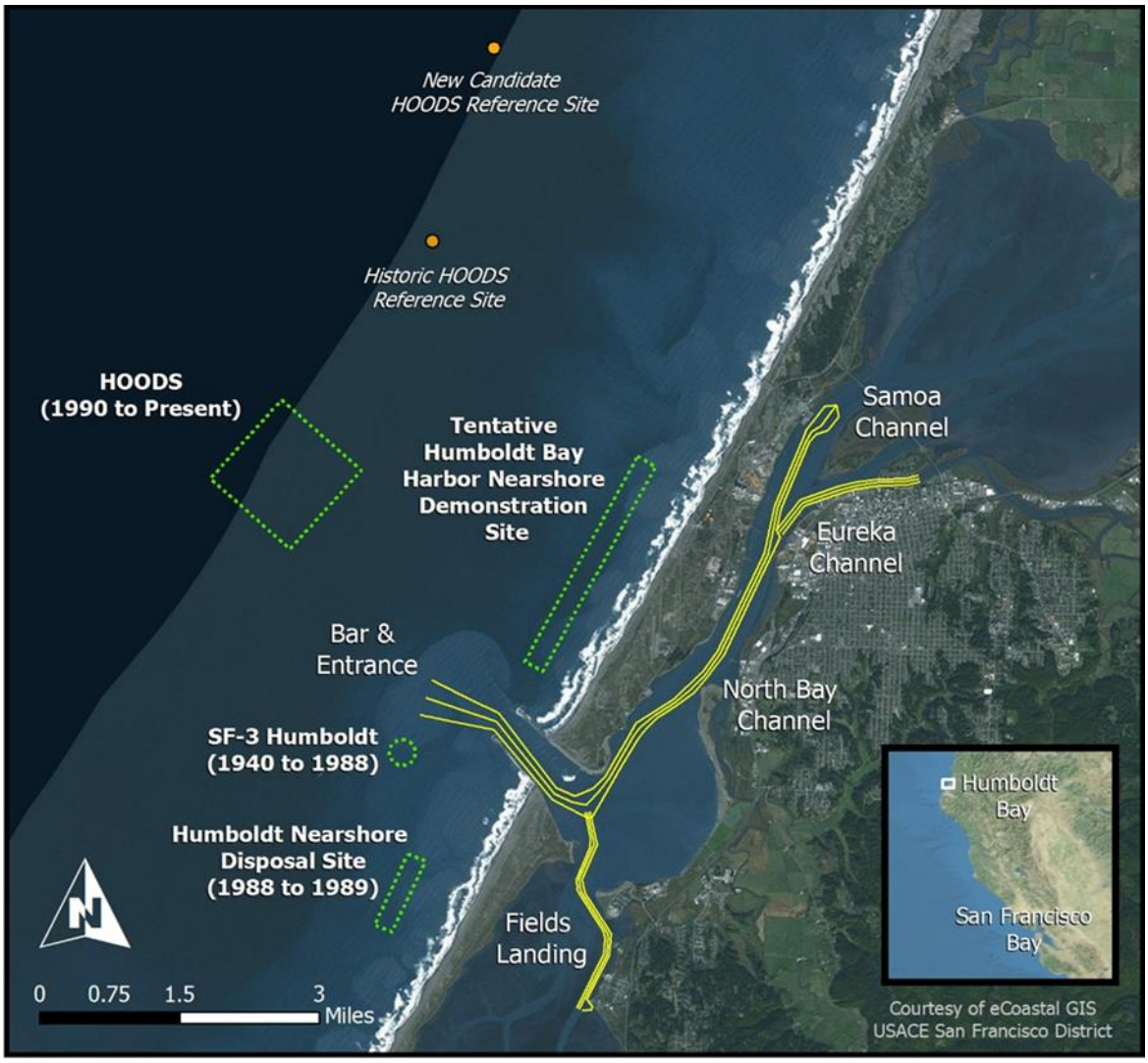


Figure 1. Federal navigation channels in the vicinity of Humboldt Bay are shown, as well as past, current, and tentative placement sites.

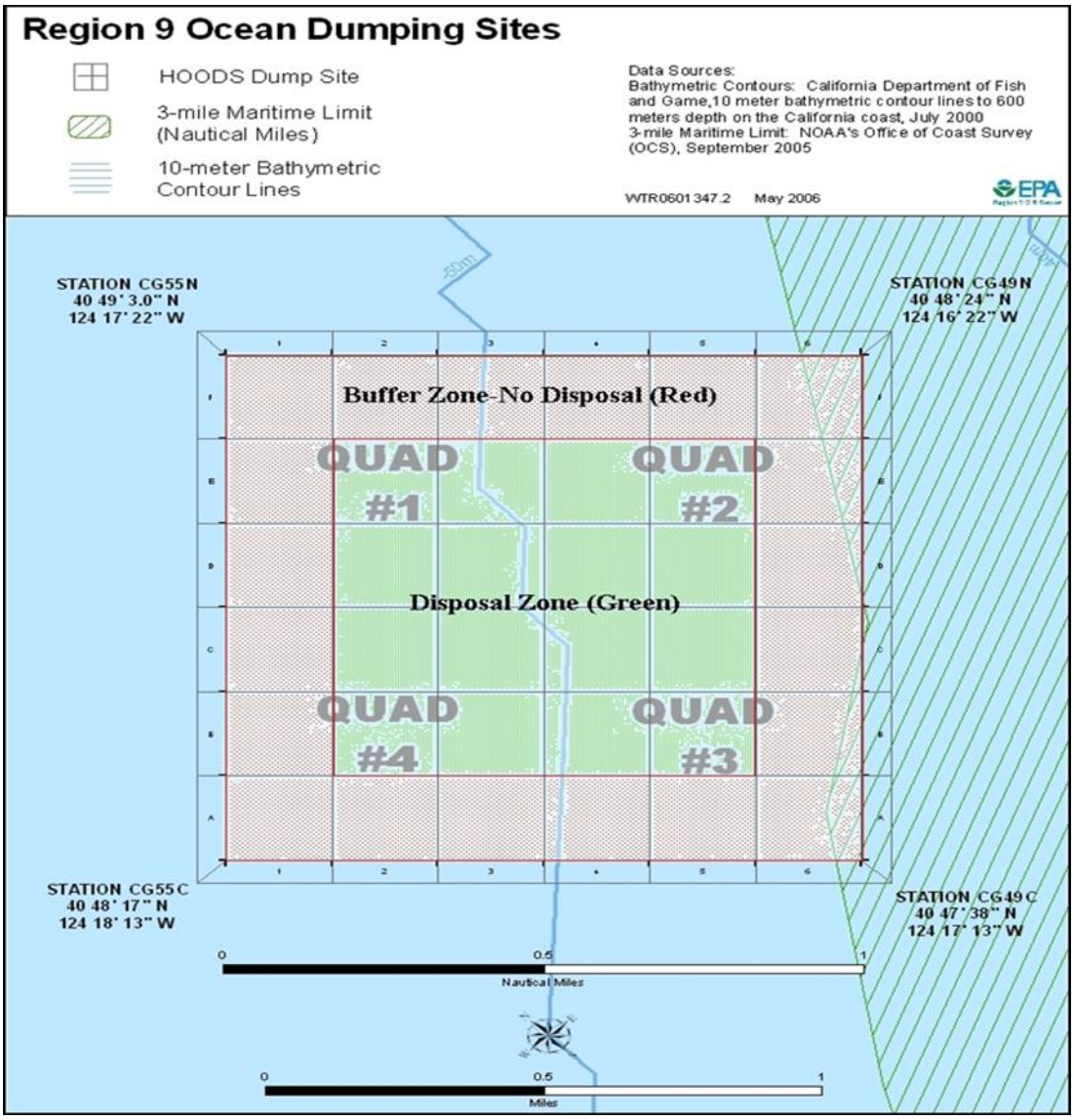
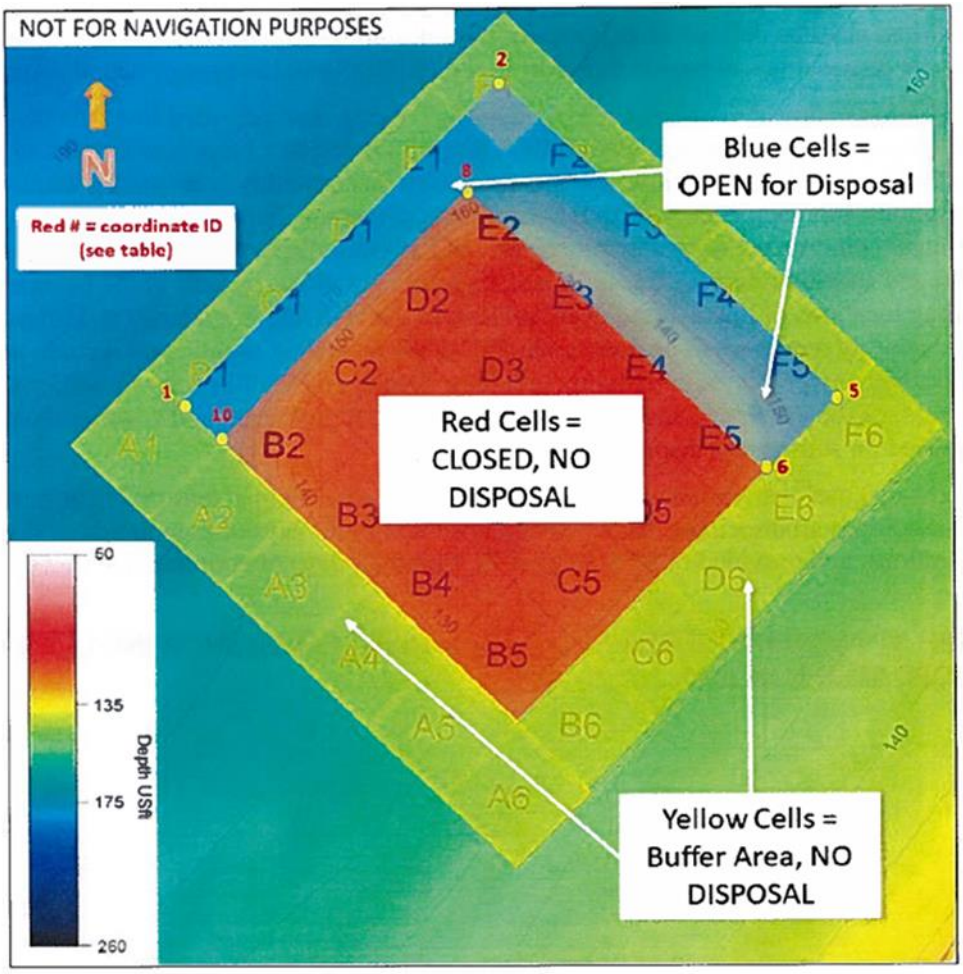


Figure 2. Humboldt Open Ocean Disposal Site—Original Quads (May 2006)



Humboldt Open Ocean Disposal Site (HOODS) map, showing individual disposal cells that are open for vs closed to disposal in 2020. Underlying bathymetry is from 2014 survey.

Figure 3. Humboldt Open Ocean Disposal Site—2020 Placement Quads

2.3.2 *EXPANDED* Humboldt Open Ocean Disposal Site – *2021-25 Disposal*

The expanded HOODS overlaps with the original site (superseding the original boundary) and extends an additional 1 nm to the north and west (**Figure 4**). It covers 4 square nm and is in water depths ranging from approximately 150 to 210 feet (MLLW). **Table 7** provides the outer corner coordinates of the expanded site. The effective total capacity of the site will increase from the original 25 MCY to over 100 MCY (i.e., allowing for 75 MCY of additional disposal to occur), before mounding to -130 feet MLLW could again occur across the entire site. So, if today's disposal practices were to continue unchanged (i.e., if on average 1 MCY of dredged sand per year were to continue being placed at HOODS indefinitely), the site would reach capacity again in about 75 years.

The effective life of the expanded HOODS could be much longer than 75 years if the Nearshore Sand Placement Site (NSPS; **Figure 4**) described by the EPA in their recent EA for expanding HOODS (EPA and USACE 2020) were to be implemented. In that event, disposal of finer sediment would continue in the expanded HOODS footprint, but it could be managed in such a way that little or no additional long-term mounding would occur at all. The NSPS is expected to begin as a demonstration site, possibly within the next 5 years. Should that happen, USACE will amend this consultation to include the NSPS when more information becomes available.

Table 7. Expanded HOODS corner coordinates and centroid (NAD 83).

Alternative 1 (Proposed): Expand by 1 nmi to North and West

Corner	*Latitude*	*Longitude*	*Centroid Lat.*	*Centroid Long.*
North	40° 50' 18" N	124° 18' 01" W	|	|
East	40° 49' 16" N	124° 15' 46" W	40° 48' 56" N	124° 17' 32" W
South	40° 47' 33" N	124° 17' 05" W		
West	40° 48' 34" N	124° 19' 18" W	|	|

The expanded HOODS also is divided into quadrants and cells (**Figure 5**). Each quadrant is 1 square nm (the size of the original HOODS) and each is divided into 36 square cells that are approximately 1,000 feet by 1,000 feet in size. The mound in the original HOODS occupies Quadrant 1 of the expanded site and will remain closed to ongoing disposal. The outermost cells of the expanded site will also continue to serve as a buffer zone closed to disposal. The 75 remaining cells in Quadrants 2, 3, and 4 are available to be specified in permits for disposal. However, initially only the 39 cells nearest the mound will be used, with the other 36 cells reserved for possible future use if needed (**Figures 5, 6**).

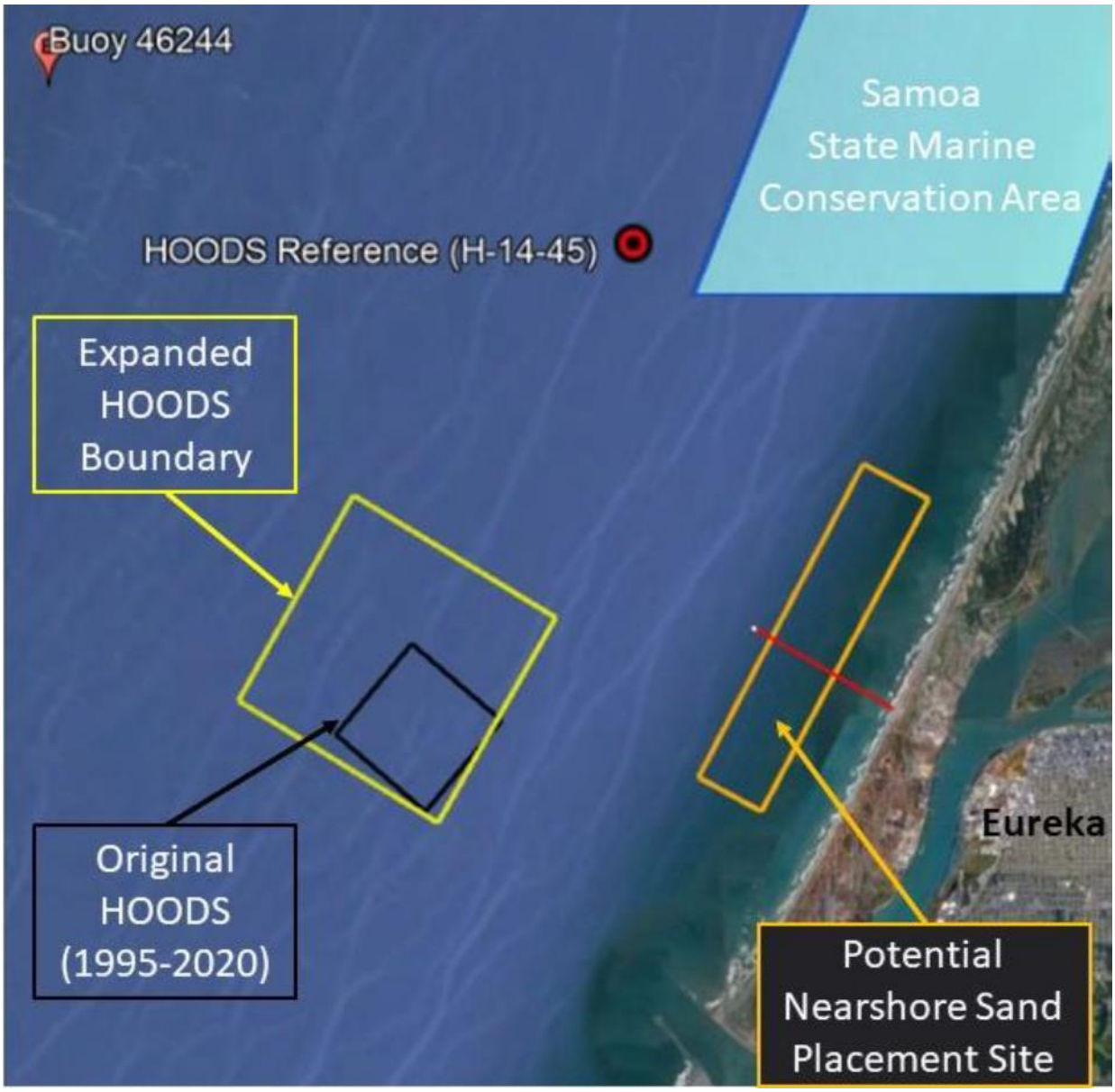


Figure 4. Expanded HOODS, beginning 2021. Showing location in relation to the original HOODS, the new HOODS reference site, the Samoa State Marine Conservation Area, the potential future Nearshore Sand Placement Site (NSPS), and the city of Eureka, California.

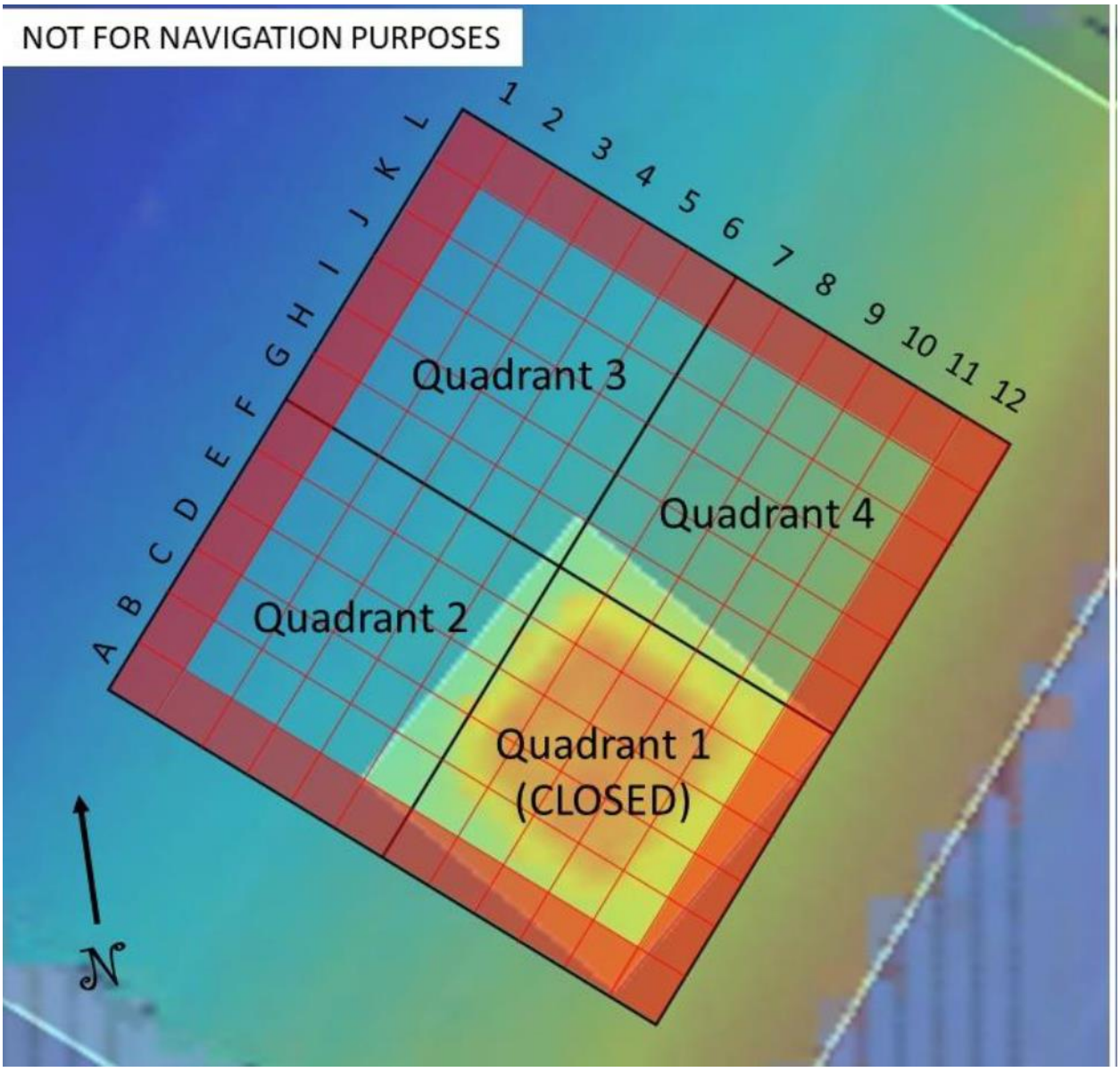


Figure 5. Map showing the overall layout of quadrants and disposal cells in the expanded HOODS, beginning in 2021. Quadrant 1 includes the original HOODS, which is closed to further disposal. The outermost cells of the expanded site (red shading) comprise a buffer zone that is also closed to disposal. Allowable disposal cells will be specified on a project-specific basis.

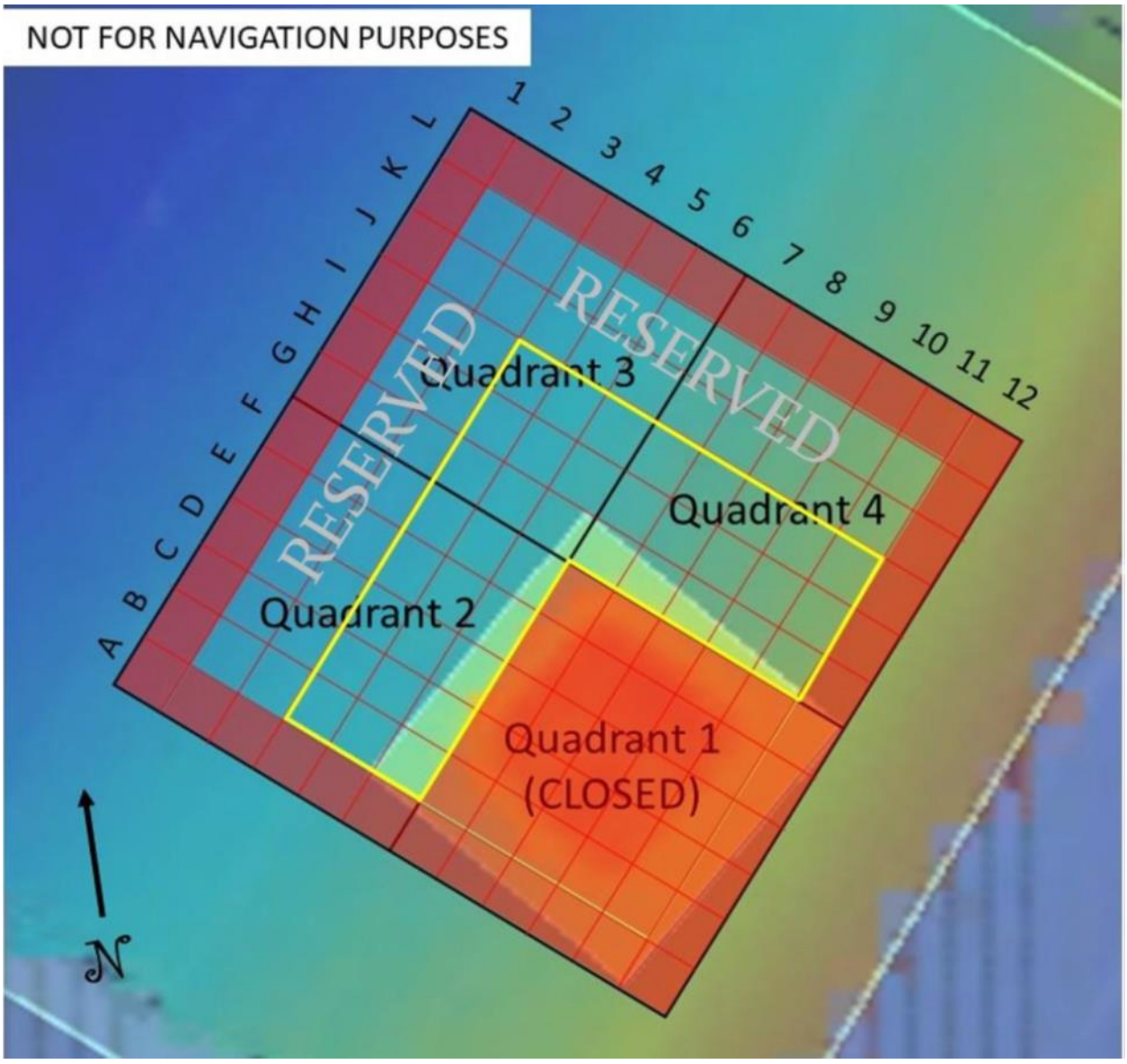


Figure 6. Map showing the layout of Reserved vs Available (yellow box) disposal cells in the expanded HOODS, beginning in 2021. Disposals will occur over the slopes of the existing mound, slowly growing it to the north and west over time while leaving the remainder of the site undisturbed for as long as possible. EPA will specify allowable disposal cells on a project-specific basis.

For individual projects, a subset of disposal cells will be specified in each EPA ocean disposal concurrence, to manage future mounding. In any year, ongoing disposal will be limited to occurring over the northern and western slopes of the existing mound. As the mound slowly expands laterally in these directions, specified allowable disposal cells will be shifted outward as well, so that the mound does not increase in height (i.e., so that it does not become shallower than the minimum target depth of -130 feet MLLW). Furthermore, no disposal will be allowed in the buffer cells around the edges of the site, or in the 36 interior cells marked as "RESERVED" in

Figure 6. Use of the "RESERVED" cells will only be considered in the future when the mound is again nearing capacity in the available cells. At that time, a revision will be issued with an opportunity for public comment.

The original HOODS footprint will be off-limits to further disposal. USEPA anticipates directing USACE to the following cells in the new expansion area for spring 2021 dredging purposes, as shown in Figure 6: A6, B6, C6, D6, E6, F6, G6, G7, G8, G9, G10, and G11. The cells to be used in out years are unknown at this time.

2.3.3 Sediment Suitability for Disposal at HOODS

Based on decades of dredging experience, sediment dredged from the Humboldt Bar and Entrance channel, and from all the interior channels, is predominantly (80-98%) clean sand that is clearly suitable for disposal at HOODS. The USACE currently is sampling and testing sediment from these channels, as it does roughly every 5 years (last done in 2016). A draft report is expected to be completed by April 30, 2021.

Dredging Process

Two USACE hopper dredges, the *Essayons* and the *Yaquina*, or similar contracted dredges, will be used for the proposed maintenance dredging of the Humboldt Bay federal channels. A hopper dredge is equipped with port and starboard drag arms, and each drag arm has drag heads attached to the bottom end. The drag arms are lowered into the water until the drag heads are on the channel bottom, and are then slowly dragged over the bottom by forward movement of the vessel. Dredged material is drawn up through the drag arms by on-board pumps, and pumped into the hopper bins in the vessel's mid-section. As the dredging progresses, the hopper is filled with slurry of sediment and water.

As pumping continues to fill the hopper with water and sediment, the level rises in the hopper bins, and the heavier, coarser material settles out to the bottom of the dredge. The lighter, finer sediment remain suspended in the water, which flows into weirs and tubes, and are released under the dredge. This excess water, or overflow, returns fine material to the water column. When the hoppers are full, the dredge raises the drag arms, moves to the designated placement site, and empties the dredged material through large doors located in the bottom of the vessel.

Hopper Dredge *Essayons*

The *Essayons* is a 350-ft, self-propelled hopper dredge powered by two 3,600 horsepower diesel engines. When in use, the *Essayons'* drag arms can extend up to 94 ft in length. When fully loaded, it has a mean draft of approximately 32 feet, and can reach speeds of up to 13.5 knots. When the *Essayons* is not loaded, the dredge has a mean draft of about 22 ft and can reach speeds of up to 13.8 knots. The *Essayons* has four dredge pumps, two 1,650 horsepower pumps located on the drag arm, and two 3,000 horsepower pumps mounted inboard. The *Essayons* can dredge up to 80 feet MLLW, and its hopper can hold up to 6,000 cy of dredged material. Sophisticated instrumentation allows the *Essayons* to dredge 24 hours per day, which can result in dredging up to 50,000 cy of material per day. The dredged material exits the vessel from 12 independently-opening doors (each 10-ft long by 8.7-ft wide) located along the ship's hull. The doors are positioned in two rows of six with one row along the starboard 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 moving the *Essayons* during placement.

Hopper Dredge *Yaquina*

The *Yaquina* is smaller than the *Essayons* and, therefore, is often used to dredge smaller, shallow coastal channels. The length of the dredge is 200 ft, and it draws 17 ft unloaded. When the dredge is fully loaded, its draft is approximately 14 ft, and it can attain speeds of 10 knots. When it is not loaded, the draft is 8 ft, and it can travel at speeds of 11 knots. The *Yaquina's* drag arms normally dredge to a depth of 45 feet MLLW; however, when loaded, the drag arms can extend to a depth of 55 ft MLLW. The hopper capacity of the *Yaquina* is 1,050 cy of dredged material. The *Yaquina* operates with two 565 horsepower centrifugal dredge pumps, each with an 18-inch intake and a 16-inch discharge. As with the *Essayons*, the *Yaquina* operates with an unattended engine room, and a semi-automatic drag arm handling system. The *Yaquina* has two 1,125 horsepower diesel engines. Generally, the *Yaquina* maintains a 24-hour per day dredging schedule; however, the dredge is decommissioned for approximately 8 hours per week to refuel and restock with supplies.

Hopper Dredge Overflow

During the 2002 to 2003 shipyard repairs of the *Essayons*, devices called anti-turbidity valves were added to the overflow weirs of the *Essayons*. The purpose of the valves is to reduce the environmental affect 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 in 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, then the water runs down the side of the overflow tube more evenly, without drawing in large volumes of air. These devices greatly reduce the turbidity in the water around the operating dredge by reducing the volume of air that is entrained in the overflow mixture

Sediment Testing Analysis for Humboldt Bay's Navigation Channels

The USACE is currently sampling and testing sediment from the federal channels, as it does roughly every 5 years (last done in 2016). A draft report is expected to be completed by April 30, 2021. As part of the requirements for dredge material disposal at the HOODS, the sediment must be analyzed for placement suitability there. This includes grain-size analysis to determine sediment types, and normally, if the dredged material contains less than 80 percent sand, chemical and biological analyses are conducted to determine environmental acceptability.

In the past, sediment samples from two of the three reaches in the Bar and Entrance and North Bay channels had greater than 98 percent sand. Samples from the other interior channels have been more variable, ranging from sandy silt/clay in the Eureka Inner Channel to silty sand in the Eureka Outer Channel, and greater than 80 percent sand in the Field's Landing Channel and Turning Basin. Total organic carbon (TOC) was low (0.4 to 1.3 percent) among all composite areas.

Concentrations of metals and polycyclic aromatic hydrocarbons (PAHs) detected in samples from channel composite areas were generally low and similar to those detected in the HOODS

reference site sample. Nearly no pesticides, Polychlorinated Biphenyl (PCB), or butyltin constituents were detected in any composite sample or the HOODS reference sample.

Threatened and Endangered Species

This section describes federally-listed species that may be present within the action area, and describes each species in detail.

Threatened and Endangered Species Listed by NMFS

Four federally-listed fish species have potential to occur within the action area *(Northern California steelhead ESU, SONCC Coho salmon ESU, CC Chinook salmon ESU, and the southern DPS of North American green sturgeon)*. In addition, designated critical habitat is present for all four species. Below are short descriptions of each listed species, as well as likelihood of occurrence, listing and recovery status, and factors limiting population growth.

Northern California Steelhead

Taxonomy, Ecology, and Biology

Steelhead is an anadromous form of rainbow trout; however, their life histories more closely resemble that of the Pacific salmon because of their ecological requirements. Therefore, steelhead is also known as "Pacific salmon". Steelhead typically migrates to marine waters after spending about two years in fresh water. They generally reside in marine waters for two- to three-years prior to returning to their natal stream to spawn at four or five years old. Steelhead are iteroparous, meaning they are capable of spawning more than once before they die. However, it is unlikely that steelhead spawn more than twice in a lifetime. "Half-pounders", which are sexually immature steelhead that return to fresh water after spending less than a year in the ocean, are unique to this Evolutionary Significant Unit (ESU).

The Northern California ESU includes both winter and summer run steelhead. Summer steelhead populations (i.e., those that populate Smith, Klamath, Trinity, Mad, and Eel Rivers and Redwood Creek) are less abundant. As with the Klamath River, some of the larger rivers in this ESU have migrating steelhead year-round, and seasonal runs have been named (i.e. Klamath, Mad, and Eel support a sizeable fall-run of steelhead that migrate into fresh water from late summer through fall).

Generally, this ESU migrates to freshwater to spawn between August and June, with peaking between December and April. Depending on water temperature, steelhead eggs may incubate in reeds for 1.5 to 4 months before hatching as alevins. Following absorption of the yolk sack, fry emerge from the gravel and begin actively feeding. Juveniles rear in fresh water from one to four years, and then migrate as smolts. Juvenile and adult steelhead prey on euphausiid crustaceans, squid, herring, and other small fishes available in the marine environment.

Biologically, steelhead can be divided into two reproductive ecotypes, based on their state of sexual maturity at the time of river entry and the duration of their spawning migration. These two

ecotypes are termed “stream maturing” and “ocean maturing”. Stream maturing steelhead enter fresh water in a sexually immature condition and require several months to mature and spawn. Ocean maturing steelhead enter fresh water with well-developed gonads and spawn shortly after river entry. These two reproductive ecotypes are more commonly referred to by their season of freshwater entry, summer and winter.

Status of Species in the Action Area

NC steelhead smolts in the action area are in the second and third year of life, are relatively large (150-200 mm), remain in relatively deep water, and move rapidly through the estuary to the ocean in late spring and summer (Emmett *et al*. 1991, Meehan and Bjornn 1991, Wallace 2006). Most NC steelhead adults likely enter Humboldt Bay to begin their spawning migration in October or later (Busby *et al*. 1996). No steelhead were captured during regular trawling conducted by USACE from March through October at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b).

Factors Limiting Population Growth

The biggest threat to the continued survival of steelhead is habitat destruction. Logging, agriculture and mining activities, urbanization, stream channelization, dams, and wetland loss, have significantly contributed to the decline of this ESU. In addition, depletion and storage of natural flows have drastically altered natural hydrological cycles in many rivers and streams of California. Alteration of stream flows has increased salmonid mortality by delaying migration, creating unusable habitat because of dewatering and blockage, stranding fish resulting from rapid flow fluctuations, entrainment of juveniles into poorly screened diversions, and increased juvenile mortality resulting from increased water temperatures. Moreover, reduced flows degrade or diminish fish habitats via increased deposition of fine sediment in spawning gravels, decreased recruitment of new spawning gravels, and encroachment of riparian and non-endemic vegetation into spawning and rearing areas.

SONCC coho Salmon ESU

Taxonomy, Ecology, and Biology

The SONCC coho salmon is an anadromous, iteroparous salmonid species that exhibits a three-year life cycle. The SONCC Coho salmon generally spawns and rears in coastal and interior rivers in Northern California and Southern Oregon, and forages in vast nearshore and marine zones of the Northern Pacific Ocean. Coho begin their freshwater spawning migration sometime between September and December, and spawn between mid-October and mid-November, after which, they die. Adult females lay eggs in redds (gravel pits excavated by females) and the eggs incubate for 1.5 to 5 months. Alevins emerge from the redds and following yolk sac absorption, and become fry (juveniles). Juveniles rear in freshwater for up to 15 months before migrating as smolts to the ocean in spring to late summer (March to May). SONCC coho salmon generally spend two growing seasons (years) at sea before returning to their native stream to spawn as

three-year-olds; however, some males, referred to as jacks, return to spawn after only six months at sea.
Sufficient quantities of good quality water are essential for coho survival, growth, reproduction, and migration. Important elements include water temperatures, generally in the range of 11.8 to 14.6 degrees Celsius (°C), well-oxygenated water that is present year-round, and water that is free of excessive suspended sediment and other pollutants.

In their freshwater stages, coho feed on plankton and insects, and switch to a diet of small fishes as adults in the ocean.

Listing Status

The SONCC coho salmon, *Oncorhynchus kisutch*, is listed as a threatened species by NMFS in the "Southern Oregon/Northern California Coast (SONCC) Evolutionary Significant Unit (ESU)" (62 FR 24588; May 6, 1997).
SONCC coho salmon stocks in the region are from the Rogue, Klamath, and Trinity rivers. The stocks of three artificial propagation programs (Cole Rivers Hatchery, Trinity River Hatchery, and Iron Gate Hatchery) are considered part of the ESU.
Status of Species in the Action Area

Coho salmon are common all year-round in fresh water tidal creeks and sloughs, deep and shallow tidal channels, and creeks and rivers in and around Humboldt Harbor and Bay. Adult coho salmon migrate through Humboldt Bay to reach their spawning tributaries upstream, juveniles use the Bay as a nursery, and in the summer, the adults move in with tides to feed and anglers catch them from the jetties. In Humboldt Bay tributaries, adults are expected to begin entering freshwater in mid-October (Weitkamp et al.1995). No coho salmon were captured during regular trawling conducted by USACE from March through October at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b).
Factors Limiting Growth

In the SONCC ESU, the decline of coho salmon has been attributed to several human-caused factors such as: habitat degradation (i.e. increased water temperatures, pesticides, non-point source runoff, etc.); harvesting of trees; water diversions; and artificial propagation of salmon. These factors, in turn, exacerbate the adverse effects of the natural environmental variability from drought, floods, El Niño, and poor ocean conditions. In addition, reduced flows degrade or diminish fish habitats via increased deposition of fine sediment in spawning gravels, decreased recruitment of new spawning gravels, and encroachment of riparian and non-endemic vegetation into spawning and rearing areas.
Disease is another factor that can influence coho salmon survival. Disease is spread via waterborne pathogens or interbreeding with infected fish. Typical pathogens that can infect coho include *Renibacterium salmoninarum*, the causative agent of bacterial kidney disease (BKD).

CC Chinook Salmon ESU

Taxonomy, Ecology, and Biology

The California Coastal Chinook salmon is morphologically different than other salmon species because of its large size. Like all salmon species, the CC Chinook salmon is anadromous and semelparous (i.e., dies after spawning only once). The CC Chinook salmon is an ocean-type race of salmon (opposed to the stream-type race, which spends longer residence in fresh water). Ocean-type Chinook salmon reside in estuaries for longer periods as fry and fingerlings, than do yearling with stream-type race. In addition, ocean-type salmon spend a short time in freshwater as juveniles and migrate to sea during their first year of life - normally within three months after emerging from the spawning gravel. Generally, the CC Chinook salmon ESU spawns and rears in coastal and interior rivers in Northern California and Southern Oregon, and forages in vast nearshore and marine zones of the Northern Pacific Ocean. Adults may reach of weight of 45 kilograms.

The CC Chinook salmon is an anadromous salmonid species that generally exhibits a relatively simple three-year life cycle**.** Between August and September, CC Chinook salmon make an upstream migration to spawn in the same stretch of river where they originally hatched. They stay in the river for a couple of months before spawning peaks between October and November. Depending on river temperatures, eggs incubate in redds for 1.5 to 4 months before hatching as alevins. Following yolk sac absorption, alevins emerge from the gravel as young juveniles or fry and begin actively feeding. Juveniles rear in fresh water for up to 15 months, and then migrate to the ocean as smolts in the spring. CC Chinook salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as three-year-olds. Some males (referred to as jacks), however, return to spawn after only three months at sea. CC Chinook salmon spend most of life in the open ocean but migrate through estuaries, and then upstream to spawn in the upper reaches of their natal rivers. To reproduce successfully, these fish require cold (6° to 13°C or 43° to 56°F), clean, fast-flowing rivers with gravel bottoms to lay their eggs in.

The diet of out migrating CC Chinook salmon varies geographically and seasonally, and feeding appears to be opportunistic. Aquatic insect larvae and adults, *Daphnia*, amphipods (*Eogammarus* and *Corophium spp.*), and *Neomysis* have been identified as important food items. Rivers with well-developed estuaries can sustain larger ocean-type populations than those without.

Listing Status

The CC Chinook salmon is federally-listed as a threatened species (64 FR 50394; September 16, 1999). Seven artificial propagation programs are considered part of the ESU and include: the Humboldt Fish Action Council (Freshwater Creek), Yager Creek, Redwood Creek, Hollow Tree,

Van Arsdale Fish Station, Mattole Salmon Group, and Mad River Hatchery fall-run Chinook hatchery program.

Status of Species in the Action Area

Chinook salmon are common all year-round in fresh water tidal creeks and sloughs, deep and shallow tidal channels, creeks, and rivers, and near the jetties in and around Humboldt Harbor and Bay. Adult Chinook salmon migrate through Humboldt Bay to reach their spawning tributaries upstream, juveniles use the Bay as a nursery, and in the summer, the adults move in with tides to feed and anglers catch them from the jetties. No Chinook salmon were captured during regular trawling conducted by USACE from March through October at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b).

Factors Limiting Growth

Salmonid species on the west coast of the United States have experienced dramatic declines in abundance during the past several decades because of human-induced and natural factors. Because there is no single factor solely responsible for this decline, it is only possible to highlight factors that have significantly affected the status of a particular species. Factors that have threatened the CC Chinook salmon and other salmon species are numerous. Water storage, withdrawal, conveyance, and diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat or resulted in direct entrainment mortality of juvenile salmonids. Modification of natural flow regimes have resulted in increased water temperatures, changes in fish community structures, depleted flows necessary for migration, spawning, rearing, flushing of sediment from spawning gravels, gravel recruitment and transport of large woody debris. Physical features of dams, such as turbines and sluiceways, have resulted in increased mortality of both adults and juvenile salmonids. Likewise, land use activities associated with logging, road construction, urban development, mining, agriculture, and recreation have significantly altered fish habitat quantity and quality. Associated effects of these activities include: alteration of stream banks and channel morphology; alteration of ambient stream water temperatures; degradation of water quality; reduction in available food supply; elimination of spawning and rearing habitat; fragmentation of available habitats; elimination of downstream recruitment of spawning gravels and large woody debris; removal of riparian vegetation resulting in increased stream bank erosion; and increased sedimentation input into spawning and rearing areas resulting in the loss of channel complexity, pool habitat, suitable gravel substrate, and large woody debris.

Southern DPS Green Sturgeon

Taxonomy, Ecology, and Biology

Green sturgeon are found in nearshore marine waters ranging from Mexico to the Bering Sea and are common in bays and estuaries along the west coast of the Americas. North American green sturgeon is composed of two genetically distinct population segments (DPS), the Northern DPS (Klamath and Rogue River spawning populations) and Southern DPS (Sacramento River spawning populations; 68 FR 4433). The Northern DPS green sturgeon is listed as a species of concern under the federal ESA and the Southern DPS is listed as threatened. However, little is known about either population of green sturgeon. Fish in both DPS are long-lived, slow-growing, and iteroparous.

San Francisco Bay and its tributaries are thought to contain a majority of the Southern DPS green sturgeon populations. Adults and juveniles occur throughout the upper Sacramento River where spawning occurs. The range of Southern DPS green sturgeon was thought to be within the coastal waters south of the Eel River through Mexico; however, adults travel as far north as Canada (74 FR 52300).

Green sturgeon spawn every three to five years. Adults typically migrate to freshwater beginning in late February, and spawning occurs from March through July, with peak spawning occurring from mid-April through mid-June in freshwater. Green sturgeon generally spawn in their natal streams and appear to have high homing capabilities for spawning grounds. Mature males range from 139 to 199 centimeters fork length at 15 to 30 years of age; mature females, on the other hand, range from 157 to 233 centimeters fork length at 17 to 40 years of age. Generally, spawning occurs at 160 to 170 centimeters fork length for males (17 to 18 years old) and 182 to 192 centimeters fork length for females (27 to 28 years old) (68 FR 4433).

Spawning appears to occur in the upper Sacramento River in deep pools with large cobble substrate; however, spawning also occurs on clean sand to bedrock substrate (68 FR 4433). Historically, spawning occurred in areas above Shasta Dam and in the Feather River; however, following the construction of Shasta and Oroville Dams, green sturgeon were not able to migrate farther upstream. Females produce approximately 60,000 to 140,000 eggs that are spawned over cobble substrate where they settle in the spaces between cobbles. Water temperatures must be less than 60 °F (20° C) for the eggs to be viable.

After spawning, adults may hold between June and November in deep pools near spawning grounds and out migrate in the late fall to early winter, or they may directly out migrate in the late spring to early summer after spawning. In the Sacramento River, adult green sturgeon may be present through November and December before moving downstream with increased flows (68 FR 4433).

Green sturgeon larvae begin feeding approximately 10 to 15 days after hatching, and approximately 35 days later metamorphose into juveniles. Juveniles spend approximately one to three years in freshwater before moving to the ocean. Juveniles in the San Francisco-San Joaquin Delta feed on opossum shrimp and amphipods (68 FR 4433).

Following outmigration from freshwater, green sturgeon disperse widely in ocean waters and coastal estuaries. Tagging studies indicate that the Southern DPS green sturgeon migrate extensively in ocean waters and are located in waters off the Oregon and Washington coasts. Adult green sturgeon feed on benthic invertebrates including shrimp, mollusks, amphipods, and small fish (68 FR 4433).

The only feeding data available for adult green sturgeon shows that they are eating "benthic" invertebrates including shrimp, mollusks, amphipods, and even small fish (Moyle et al., 1992).

Listing Status

On April 7, 2006, the Southern DPS of the North American green sturgeon was listed as threatened by NOAA Fisheries (71 FR 17757).

Status of Species in the Action Area

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 (**Figure 7**). 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.

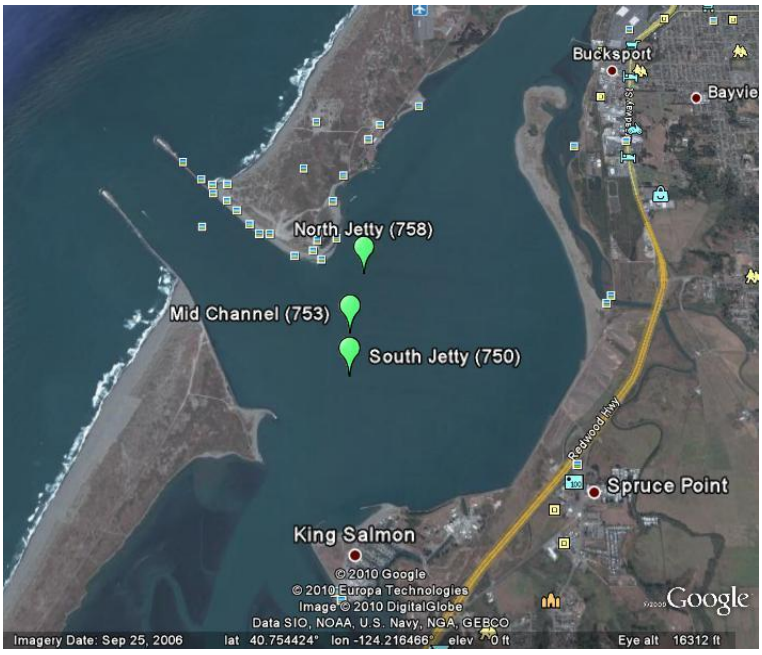


Figure 7. VR2 receiver locations at the entrance of the channel of Humboldt Harbor

On August 4 and 18, 2006, two VR2 receivers were placed in North Humboldt Bay (NB). One was placed near Bird Island, and the other to the northeast, in the central part of NB (**Figure 8**).

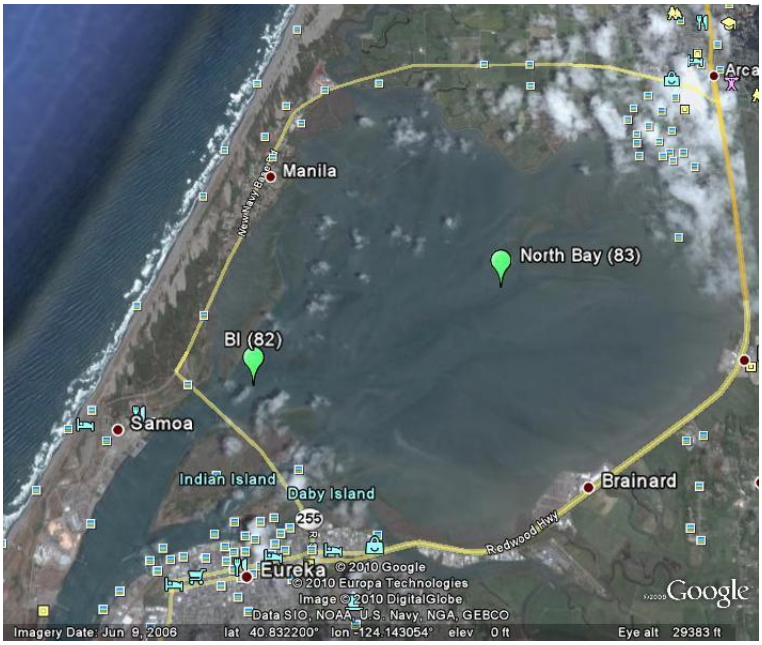


Figure 8. VR2 receiver locations in the North Bay of Humboldt Harbor

- **Transient South 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 South 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. Except for 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, except for 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 USACE hopper dredges *Essayons* and *Yaquina* typically 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 unlikely to be present while the dredges are working in Humboldt Harbor. This is in agreement with some more recent data collected by USACE. Regular trawling from March through October at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b) captured only one immature green sturgeon (total length = 964 mm) in the federal channels in October 2020.

Factors Limiting Population Growth

The primary factor limiting growth of this species is the exclusion from or modification of historic breeding grounds (NOAA Fisheries, 2009). Green sturgeon are also extremely susceptible to overfishing (Miller and Kaplan, 2001). Other factors that may be limiting growth

include the introduction of nonnative estuarine species, which limit the available supply of food, alterations in water quality and flow regimes because of water diversions, and recreational fishing takes (NOAA Fisheries, 2009).

Critical Habitat

Humboldt Bay is designated critical habitat for all four species addressed in this biological assessment (i.e., three salmonids and green sturgeon).

Critical Habitat for Northern California Steelhead

Critical habitat was established for the NC steelhead on September 2, 2005 (70 CFR 52529). The designation includes natal spawning and rearing waters, migration corridors, and estuarine areas that serve as rearing areas. The lateral extent of this critical habitat is defined by the ordinary high-water line. Under this ruling, Humboldt Bay is designated as critical habitat. The action area is included in this area. The following primary constituent elements (PCEs) defined by NMFS, which are physical or biological features essential to the conservation of a species on which its critical habitat is based, have been designated for this species:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.
- Freshwater rearing sites with:
  - Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
  - Water quality and forage supporting juvenile development; and
  - Natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
- Estuarine areas free of obstruction and excessive predation with:
  - Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh water and saltwater;

- Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and

- Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

The entire action area is considered critical habitat for NC steelhead.

Critical Habitat for SONCC coho Salmon ESU

Critical habitat for the SONCC coho salmon encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between the Mattole River in California, and the Elk River in Oregon, inclusive (May 5, 1999, 64 FR 24049). The final rule designating SONCC coho salmon critical habitat (May 5, 1999, 64 FR 24049) indicated the PCEs essential for the conservation of the SONCC coho salmon ESU are:

- Spawning sites, food resources, water quality and quantity, and riparian vegetation (64 FR 24050, May 5, 1999). Specifically, the adjacent riparian area is defined as the area adjacent to a stream that provides the following functions: shade, sediment, nutrient or chemical regulation, stream bank stability, and input of large woody debris or organic matter. NMFS defines 10 essential habitat features to include substrates, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (64 FR 24059, May 5, 1999).

The NMFS acknowledged in the final rule designating SONCC coho salmon critical habitat (May 5, 1999, 64 FR 24049) that marine habitats (*i.e.,* oceanic and nearshore areas seaward of the mouth of coastal rivers) are vital to the survival of the species, however, no areas of the Pacific Ocean were designated as critical habitat.

Critical Habitat for CC Chinook Salmon ESU

Designated critical habitat for CC Chinook salmon includes the stream channels within the stream reaches as identified within the final rule (September 2, 2005, 70 FR 52488), and includes a lateral extent as defined by the ordinary high-water line (33 CFR § 329.11). In areas for which the ordinary high water line has not been defined pursuant to 33 CFR § 329.11, the lateral extent will be defined by the bankfull elevation.

Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge, which generally has a recurrence interval of 1 to 2 years on the annual flood series. Critical habitat in estuaries (*e.g.*, Humboldt Bay) is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater. In the final rule, NMFS stated that:

"In estuarine areas we believe that extreme high water is the best descriptor of lateral extent. We are proposing the area inundated by extreme high tide because it encompasses habitat areas typically inundated and regularly occupied during the spring and summer when juvenile salmonids are migrating in nearshore estuarine areas and relying heavily on forage, cover, and refuge qualities provided by these occupied habitats."

The PCEs of critical habitat essential for CC Chinook salmon are those sites and habitat components that support one or more life stages, including:

- Freshwater spawning sites with water quality and quantity conditions and substrate supporting spawning, incubation, and larval development.

- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams, and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

- Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

- Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

In particular, Humboldt Bay contains PCEs for rearing and migration and is of high conservation value for CC Chinook salmon because it provides migratory connectivity for juveniles and adults between high-value freshwater spawning and rearing habitat and the ocean (December 10, 2004, 69 FR 71880).
NMFS acknowledged in the final rule designating CC Chinook salmon and NC steelhead critical habitat (September 2, 2005, 70 FR 52488) that offshore marine areas are essential for conservation, but did not designate any specific offshore areas as critical habitat.

Critical Habitat for Southern DPS Green Sturgeon

On October 9, 2009, the NMFS issued a final designation of critical habitat for green sturgeon (74 CFR 52347). This includes the designation of specific rivers, estuaries, and coastal areas as critical habitat for this species. Under this ruling, Humboldt Bay and its coastal waters are designated as critical habitat. The entire action area is included in this area.

The PCEs essential for the conservation of the southern DPS in estuarine areas defined by NMFS are:

- Food resources. Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages. Prey species for juvenile, subadult, and

adult green sturgeon within bays and estuaries consist primarily of benthic invertebrates and fishes, including crangonid shrimp, burrowing thalassinidean shrimp, amphipods, isopods, clams, annelid worms, crabs, and small fish;

- Water flow. Within bays and estuaries adjacent to the Sacramento River (i.e., the Sacramento, San Joaquin Delta, and the Suisun, San Pablo, Humboldt and San Francisco Bays), sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds;

- Water quality. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;

- Migratory corridor. A migratory pathway necessary for the safe and timely passage of southern DPS fish within estuarine habitats and between estuarine and riverine or marine habitats. Safe and timely passage requires that human-induced physical, chemical, or biological impediments do not alter the migratory behavior of the fish such that its survival or the overall viability of the species is compromised (i.e., an impediment is something that compromises the ability of individual fish to reach a thermal refuge by the time it enters a particular life stage);

- Depth. A diversity of depths necessary for shelter, foraging, and migration of juveniles, subadult and adult life stages. Subadult and adult green sturgeon occupy a diversity of depths within bays and estuaries for feeding and migration. Tagged adults and subadults within the San Francisco Bay estuary primarily occupied waters over shallow depths of less than 33 feet, either swimming near the surface or foraging along the bottom; and

- Sediment quality. Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages. This element includes sediment free of elevated levels of contaminants (e.g., selenium, organochlorine pesticides) that can cause adverse effects on all life stages of green sturgeon.

Essential Fish Habitat

Essential Fish Habitat

Humboldt Bay, including the action area, is classified as EFH under the MSFCMA for Pacific Salmonids, Coastal Pelagic, and Pacific Groundfish fisheries. Essential Fish Habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (MSA §3). "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are currently or historically used by fish; "substrate" includes sediment, hard bottom, structures underlying the waters and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breading, feeding, or growth to maturity" covers the species' full life cycle (50 CFR 600.10). In addition, the definition of EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate to the FMP. Adverse effects include any affect, which reduces the quality and/ quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide affects, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Eelgrass (*Zostera marina*) beds are an important habitat type within Humboldt Bay and an important aspect of EFH. They are integral part of the life histories of many fish species, including steelhead, salmon, groundfish, and pelagic species. Moreover, eelgrass influences sedimentation patterns, distribution of infaunal organisms, and the occurrence of bird species within the bay. Generally, eelgrass is found near the level of the mean low water and grows in muddy to silty sediment. Both the Arcata and South Bays have large eelgrass habitats, 435 hectares (ha) and 786 ha, respectively (USFWS, 1992). Recent studies have shown that eelgrass beds are denser in the South Bay, typically occurring at depths of less than 12 feet MLLW. Although the eelgrass beds in Arcata Bay contribute significantly to the overall productivity of the Bay, eelgrass beds are not as dense as those in the South Bay. This may be attributed to the dredging of oysters on commercial beds in Arcata Bay (USFWS, 1992). As is shown in **Figure 9** below, eelgrass is not expected to occur within the project footprint.

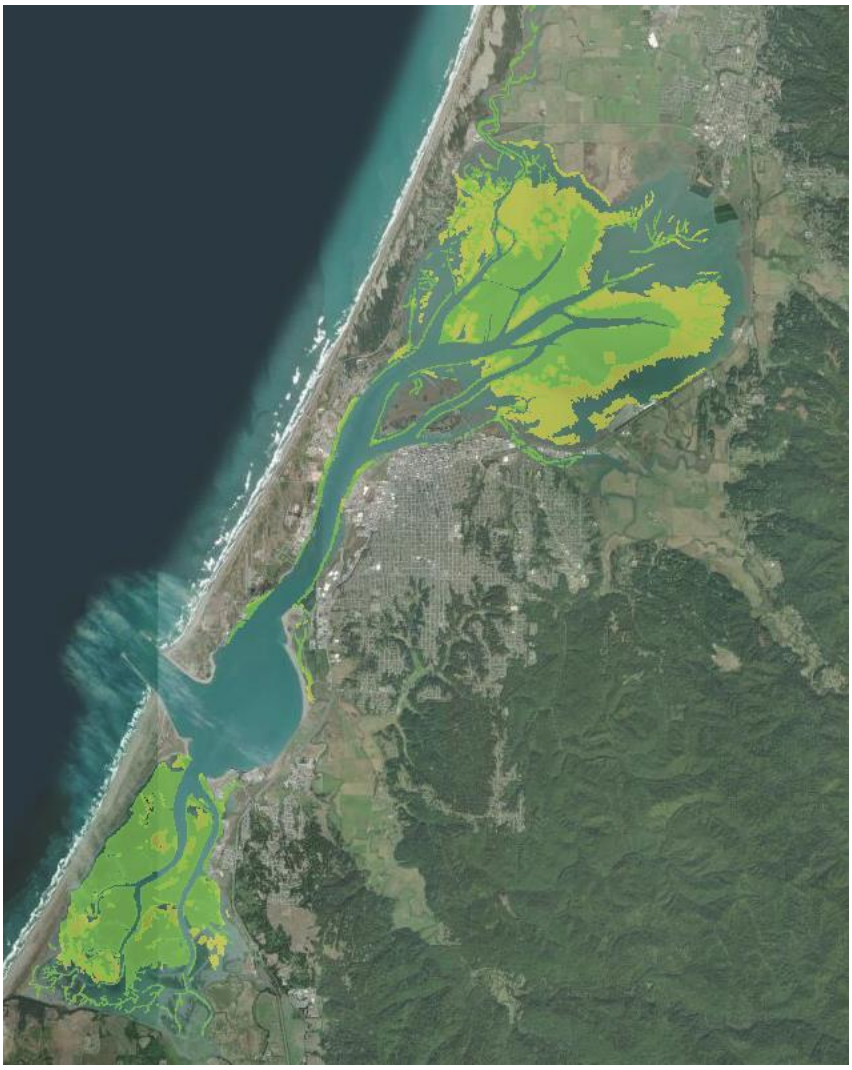


Figure 9. Eelgrass distribution in Humboldt Bay. Last updated in Fall 2016. (http://humboldtbay.org/eelgrass-distribution-map)

Analysis of Effects of the Proposed Action

A discussion of the effects from the proposed project are separated by type and categorized as follows: temporary increases in turbidity and species entrainment.
Section 8 evaluates the proposed project's potential effects on the listed species, critical habitat and EFH occurring in the action area, presents measures to avoid and minimize potential adverse effects on these species, and provides final determinations.

Temporary Increases in Turbidity

The proposed project will result in temporary and localized increases in turbidity during dredging activities, but would not result in increases in excess of ambient turbidity levels that have been recorded throughout the Bay. Additionally, both juveniles and adults of the listed salmonids and green sturgeon would be large enough to swim toward or away from turbid areas as desired. The discussion below describes ambient turbidity levels within the action area and

how the proposed action would temporarily increase turbidity within the action area and its effect on relative species.

Baseline Turbidity in Humboldt Bay

In general, the natural turbidity of the waters in the bay subsystem of the action area is primarily the result of (1) suspended sediment from tributary inflow and surface runoff, (2) sediment resuspended from the mudflats by tidal or wind waves action, and (3) phytoplankton in the water column during periods of higher productivity (Harding 1973, Barnhart *et al*. 1992). In Humboldt Bay, the nearshore turbidity tends to be higher than turbidity in the water column in the deeper channels. In the nearshore of the Eureka Channel, turbidity (1) generally ranges from approximately 10 to 20 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, are generated during rain between March and May (CICORE 2005). In May 2005, ambient turbidity in the upper 7.5 meters of the water column in the Samoa Channel ranged from 5 to 22 NTU (Dickerson *et al*. 2005). Most of the sediment in the marine subsystem is sand derived from the Eel River and the Mad River. In May 2005, ambient turbidity in 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.

According to CICORE turbidity data for 2011, turbidity levels in South Humboldt Bay have ranged from 0 to 96.6 NTU (CNCOOS, 2011).

Overflow Plumes

In May of 2005, the United States Army Engineer Research and Development Center (ERDC) 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*. 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. The study is discussed below. No overflow studies have been conducted since 2005 for the hopper dredges at Humboldt Bay, though records of overflow times have been kept.

Overview of Study

Surveys were conducted using the USACE's *Yaquina* hopper dredge, which is not equipped with an Anti-Turbidity Valve as is the *Essayons*. As such, turbidities measured following the use of the *Yaquina* are expected to be higher than if the *Essayons* were used. Furthermore, the *Yaquina* is used to dredge the Interior Channels, which are composed of finer-grained sediment, and the *Essayons* is used to dredge the Bar and Entrance Channel, which is composed of coarse-grained sand and gravel. As such, the overflow turbidities measured as part of this survey provide a conservative estimate of the expected overflow turbidities resulting from an entire maintenance dredging episode.

Acoustic doppler current profiler (ADCP) and optical backscatter sensor (OBS) surveys where used to characterize the spatial extent and relative intensities of overflow plumes in the North Bay and Samoa Channels and the Samoa Turning Basin. Existing sediment in both channels consisted primarily of fine sand 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 by 200 meters); however, the measured turbidities and decay rates of the overflow plumes differed, owing to the differences in sediment composition.

Results of the Hopper Overflow Plume/Turbidity Study

This section provides a discussion of the measured turbidities of the overflow plumes generated by the *Yaquina* during the 2005 dredging episode (**Table 4**). Surveys were conducted in the North Bay and Samoa Channels. Updated information regarding turbidity from overflow plumes in not available.

TABLE 4 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 sediment composition of the North Bay Channel (96.2 percent coarse-grained sand). Measured turbidity of the overflow plume in the Samoa Channel was considerably greater than that of the North Bay Channel. This again is because of the increase of fine-grained sand and silt within the Samoa Channel.

North Bay Channel

As hopper overflow begins, the core of the plume is a well-defined vertical feature approximately 15 meters in width. As overflow continues, the plume increases in width to approximately 70 to 90 meters wide at the channel bottom. The channel width is approximately 122 to 175 meters wide along its length; thus, the overflow plume generally comprises about half the channel width. Surveys further indicated that there is little evidence of plume trajectories migrating over shoals adjacent to the North Bay Channel boundaries.

Overflow plumes in the North Bay Channel tended to decay in approximately 15 to 25 minutes following the passage of the *Yaquina* to the HOODS and 33 minutes following the onset of dredge overflow.

Samoa Channel and Turning Basin

Samoa Channel is 122 meters wide and expands into a turning basin that is 305 meters wide at its northern end. The turning basin's additional width extends to the east, leaving a swath of shoal along the periphery of marshes west of Indian Island.

Overflow plumes in the Samoa Channel and Turning Basin behaved somewhat differently than those generated in the North Bay Channel. It took approximately 49 to 58 minutes for the water to return to ambient conditions following the onset of hopper overflow. Specifically, the plume persisted for about 39 minutes while the hopper was overflowing and quickly dissipated within 10 to 15 minutes of the dredge's departure for the disposal site. The increased fine-grained sediment found in the Samoa Channel and Turning Basin can explain the increased length of time it took for the overflow plume to dissipate; the sediment composition of the Samoa Channel is approximately 22 percent fine-grained sand and silt, compared to North Bay Channels 1.3 percent (USACE, 1998).

Turbidity Generated by the Prop Wake and Draghead Operation

Consistent observations of the *Yaquina* during dredging operations indicated that the prop wake was confined to the upper 5 to 6 meters of the water column. During dredging operations, the ADCP survey showed an absence of indications of distinct near-bottom sediment re-suspension attributable to the movement of the dragheads across the substrate. As such, increased turbidity resulting from the movement of the dragheads is considered minimal.

Dredged Material Disposal-Induced Turbidity and Sedimentation at HOODS

The HOODS normally has clearer waters at mid-depths than at surface waters, but decreased transmissivity near the bottom. It is suspected that the decreased transmissivity is a result of suspended sediment or phytoplankton.

Annual maintenance dredging of Humboldt Harbor and Bay's navigation channels and entrance would result in up to 2 MCY of material being deposited at the expanded HOODS. Dredged material would be transported from the dredging site to HOODS via hopper dredge. Once over the placement site, the doors located beneath the hopper of the dredge open and release dredged material from the bin in a hemispherical shaped cloud (plume). The plume descends through the water column under the influence of gravity until it settles on the bottom or reaches a stable point of neutral buoyancy.

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 the original HOODS, one hour after release, fine-grained suspended sediment plumes (composed of 75 percent silt clay and 25 percent fine sand) measured 500,000 ppb and silt/clay measured 1,000 ppb above ambient conditions (Scheffner, 1990). These results indicate that the dredged material rapidly disperses and settles within the boundaries of HOODS following its release from the hopper bin. Additionally, the relatively low ambient currents in the vicinity of the disposal site (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 sediment (Scheffner, 1990). Suspended sediment tests for coarse sediment, defined as 93 percent sand and 7 percent silt and clay, showed that all sediment was deposited within the first 100 seconds following disposal and no sediment remained in suspension.

Overall, increases in turbidity are expected to be temporary and localized, and often not different from conditions that occur naturally. Both juveniles and adults of the listed salmonids and green sturgeon are expected to swim toward or away from turbid areas as desired.

The HOODS is a non-dispersive disposal site. Sediment disposed at the HOODS is deposited on the bottom very rapidly, leaving little or no suspension of sediment for subsequent transport into

sensitive areas. Sedimentation could bury or disturb benthic food organisms with limited motility (e.g., marine worms), but these effects would be localized and not expected to affect the overall food supply for listed species.

Species Entrainment

The proposed project has the potential to entrain juvenile salmonids and green sturgeon as well as prey species, which are discussed below.

Juvenile Salmonids

Entrainment of Juvenile Salmonids in Dragheads

Direct effects to juvenile salmonids resulting from annual maintenance dredging of Humboldt Bay may include entrainment by the dredge's dragheads. However, many studies have concluded that juvenile salmonid entrainment in dredge dragheads is highly unlikely, owing to their high mobility and avoidance capabilities (McGraw and Armstrong, 1990; Larson and Moehl 1990; Clark and Wilber, 2005). No salmonids were captured during regular trawling conducted by USACE from March through October at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b).

McGraw and Armstrong (1990) as well as Larson and Moehl (1990) conducted fish entrainment studies on hopper dredge draghead entrainment in Gray's Harbor Washington. Results of their studies showed that juvenile salmonids in estuaries and large river mouths did not appear to be a problem, citing that anadromous fish species are highly migratory and relatively fast swimmers. Similarly, dredge entrainment monitoring has been conducted aboard the *Essayons* during most years in San Francisco Bay since 2011, and no juvenile salmonids have been detected although they likely have been present in the area (Novotny et al. 2019, their Appendix B).

The navigation channels of Humboldt Bay are at least 0.5 miles from the nearest river mouth (Field's Landing to Elk River). Moreover, the navigation channels of Humboldt Bay are rather narrow compared to the total migration space available for juvenile salmonids. The dredge would be operating in a relatively small space at any one time and thus it is unlikely that juvenile salmonids would become entrained in the dragheads because there would be ample space for migration around dredging activities.

Entrainment of Juvenile Salmonids in Propeller Wash

Hopper dredges are nothing more than modified sea-going vessels with standard propulsion systems. As such, it is expected that entrainment of juvenile salmonid species by the turbulence generated by the dredge's prop wash would be not be distinguishable from other commercial and fishing vessel traffic, and any incremental affect would be negligible.

Moreover, Humboldt Bay fishermen land anywhere from 20 to 30 million pounds of fish per year (Department of Fish and Game, 2001 through 2004) and transport a total tonnage of approximately 600,000 to 1,000,000 annually (deep-draft vessels that require the use of deep navigation channels transport the Bay's tonnage commodities) (Pacific Maritime Association, 1997). As such, the Bay's navigation channels are heavily trafficked with both shallow- and deep-draft, sea-going vessels, and it is likely that salmonids would avoid the increased turbidities generated from normal vessel traffic in Humboldt Bay's navigation channels, as well as the prop wash generated by the hopper dredges.

In addition, during dredging overflow events where increased turbidity from the overflow is indistinguishable from the propeller wash turbulence; juvenile salmonids are likely to avoid the increased turbulence (Bash et al., 2001 and Simenstad, et al., 1999).
Although it is likely that salmonids would avoid the area of propeller wash associated with dredging activities, they could become disoriented in vessel propeller wash and the dredge's overflow plume, and as a result be more susceptible to predation. However, because these dredging effects would be temporary and localized, the number of salmonids affected is expected to be small.

Southern DPS of North American Green Sturgeon

Entrainment of Green Sturgeon

During dredging there is the potential for special status fish such as green sturgeon to become entrained. The entrainment potential for green sturgeon is based on many factors related to both the dredging operation and the behavior of the organism itself, including the strength of the entrainment field generated by hydraulic dredging, the abundance of organisms in the area, swimming ability of the organism (positively related to size of the organism), behavioral responses of the organism to dredging activities, total area dredged, and the speed of dredging. Adult and juvenile life stages that may be present in the vicinity of the dredge head may not be able to escape the entrainment field. However, larger organisms are known to be better swimmers, so they may be less likely to be entrained than smaller organisms (Reine and Clark 1998). One green sturgeon (partial carcass so size could not be measured) has been captured during dredge entrainment monitoring activities aboard the *Essayons* that have been conducted in most years since 2011 in San Francisco Bay (Gold et al. 2017; Novotny et al. 2019 Appendix B). Organisms swimming close to the bottom that are not able to escape the entrainment field are most likely to be entrained during hydraulic dredging operations. The likelihood of entrainment may increase in narrow channels with slower and shallower waters (Reine and Clark 1998). Telemetry data indicate that green sturgeon are unlikely to be present in the action area during the summer, and hence would avoid dredging activities during this portion of the work window. They are more likely to be present in spring and fall. Regular trawling from March through October at five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b) captured only one immature green sturgeon (total length = 964 mm) in the federal channels in October 2020. Adults may migrate through the federal channels when dredging is occurring on their way to their spawning grounds. Because adults are large and capable swimmers and tend to migrate uni-directionally and quickly to spawning grounds, they are expected to simply avoid dredging activities as they pass by. Smaller, immature individuals could be more vulnerable but are not expected to be entrained in large numbers based on the entrainment monitoring in San Francisco Bay.

Entrainment of Prey Species

Potential effects to the food web resulting from the proposed maintenance dredging could include localized reduction in phytoplankton and zooplankton because of direct entrainment and temporary and localized reduction in phytoplankton because of increases in turbidity. Benthic organisms in the federal channels would be directly removed by dredging. The annual disturbance from dredging may prevent complete recolonization of benthic communities in dredged areas. Prey fish also may be entrained. However, the loss of prey is expected to be minor, temporary, and localized and not affect the overall food supply for salmonids or green

sturgeon, which likely would simply avoid dredging activities as necessary and move to other areas to feed.

Essential Fish Habitat

As stated above in section 5.1, the proposed project is not expected to affect eelgrass beds, an important component of EFH. The proposed is expected to affect EFH primarily through the entrainment of food organisms, particularly invertebrates including Dungeness crab and prey fish.

Entrainment of Dungeness Crab

Entrainment can occur when crab on or near the seabed are taken up by the suction inflow field generated at the draghead. Most entrainment studies have been conducted along coastal Washington (Grays Harbor and Puget Sound) and were reviewed by Reine and Clarke (1998) and Nightingale and Simenstad (2001). Also, a series of studies were conducted in the Columbia River estuary that examined Dungeness crab entrainment rates by age class and location of dredging (Pearson et al. 2003; 2005; 2006a). **Table 5** below provides a summary of Dungeness crab entrainment studies rates since 1975 at the Columbia River.

TABLE 5 DUNGENESS CRAB ENTRAINMENT STUDIES IN GRAYS HARBOR AND THE

Source	Dredge	Study Date	Location	Entrainment
Tegelberg and Arthur 1977	Hopper	Mar 1975	Middle and outer	0.131-0.327
	Hopper	Mar 1975	Outer estuary	0.449
Stevens 1981	Clamshell	Oct-Dec 1978	Middle estuary	0.012
	Hopper	Nov-Dec 1978	Outer estuary	0.233
	Pipeline	Sep-Dec 1979	Outer estuary	0.243
		Nov-Dec 1979	Inner harbor	0.0017
	Hopper	Mar 1979	Outer estuary	0.182
Armstrong et al. 1982	Hopper	Jun 1980	Inner harbor	0.079
		Aug 1980	Middle estuary	0.107
		May-Sep 1980	Middle estuary	0.075
Armstrong et al. 1987	Hopper	Oct 1985	Outer estuary	0.046
Dinnel et al. 1986a	Hopper	Oct 1985	Outer estuary	0.118
Dinnel et al. 1986b	Hopper	Aug 1986	Outer estuary	0.135
				0.592
			Middle estuary	0.088
McGraw et al. 1988	Hopper	Aug 1986	Outer estuary	0.155
				0.500
				0.079
			Middle estuary	0.058

TABLE 5 (CONT'D) DUNGENESS CRAB ENTRAINMENT STUDIES IN GRAYS HARBOR				
Source	**Dredge**	**Study Date**	**Location**	**Entrainment**
Dumbauld et al. 1988	Hopper	Aug 1987	Outer estuary	0.222
				0.397
				0.133
				0.224
			Outer estuary (Bar)	9.367
Larson and Patterson 1989	Hopper	Apr-Oct 1985	Mouth of Columbia River	10.74 (0.04)[a]
		Apr-Oct 1986		1.12 (0.08)[a]
		Apr-Oct 1987		3.54 (0.18)[a]
		Apr-Oct 1988		0.32 (0.03)[a]
Wainwright et al. 1990	Hopper	Aug 1989	Outer estuary	0.220
				0.325
				0.115
				0.260
				0.400
Pearson et al. 2003	Hopper	Jul-Oct 2002	Mouth of Columbia River	0.0104 (3+)[b]
				0.0322 (2+)[b]
				0.0144 (1+)[b]
				0.0033 (0+)[b]
Pearson et al. 2006a	Hopper	Jun 2002	Desdemona Shoals	0.001 (3+)[b]
				0.024 (2+)[b]
				0.193 (1+)[b]
				0.005 (0+)[b]
Pearson et al. 2006a	Hopper	Sep 2002	Desdemona Shoals	0.033 (3+)[b]
				0.065 (2+)[b]
				0.022 (1+)[b]
				0.000 (0+)[b]
Pearson et al. 2006a	Hopper	Aug 2004	Desdemona Shoals	0.007 (3+)[b]
				0.004 (2+)[b]
				0.000 (1+)[b]
				0.014 (0+)[b]
Pearson et al. 2006b	Hopper	Jun 2006	Desdemona Shoals	0.002 (3+)[b]
				0.052 (2+)[b]
				0.000 (1+)[b]
				0.187 (0+)[b]

[a]adults only, [b]year class

*(Wainwright et al. 1992)

Dungeness crab entrainment rates are associated with the specific type of dredge because the strength of the inflow suction field created by hydraulic dredges varies with size, pump capacity, and mode of operation (Reine and Clarke 1998). Suspended sediment plumes and low-frequency vibrations associated with mechanical dredges may cause crabs to avoid areas near mechanical dredging activities, thus lowering entrainment rates (Stevens 1981).

Entrained crabs are not necessarily killed by the dredge. 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, crushing under sediment, or 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 to 10 mm crabs up to 86% mortality for greater than 75 mm crabs, Wainwright et al. 1992 (**Table 6**).

TABLE 6 POST-ENTRAINMENT MORTALITY RATES FOR DUNGENESS CRAB BY AGE, SEASON, AND DREDGE TYPE*

Dredge Type	Age-Class	Season	Size range (mm)	Mortality (%)
Hopper	0+	Apr-May	7-10	5
		Jun-Sep	11-30	10
		Oct-Dec	31-40	20
		Jan-Mar	41-50	40
	1+	Apr-Sep	51-75	60
		Oct-Mar	>75	86
	>1+	All	>75	86
Clamshell	All	All	All	10
Pipeline	All	All	All	100

*(Wainwright et al. 1992)

In Humboldt Bay, juvenile Dungeness crabs are abundant but adults rarely are found there (Emmett et al. 1991 as cited in Williamson 2006). Williamson (2006) used minnow traps to collect juvenile crabs in the South Bay and found that crabs were more abundant in areas with greater eelgrass shoot density and in habitat close to the channel. Sampling was conducted from May through August and peak juvenile crab collections occurred in June (Williamson 2006). The USACE conducted a fish survey by trawling five paired locations in and just outside of the federal channels in Humboldt Bay in 2019 and 2020 (Novotny et al. 2020a,b). Trawls were conducted approximately twice per month from March through October of each year. A total of 5,986 juvenile and 166 adult Dungeness crab were collected in 2019, whereas 1,454 juveniles and 92 adults were collected in 2020. Crab capture locations (i.e., inside vs. outside of the federal channels) differed between the two years. Specifically, juveniles were collected about equally inside and outside of the channels in 2019, and adults were collected more often inside the channels. Results in 2020 were much more similar to the statements of Emmett et al. (1991) and Williamson (2006) described above, with greater than 70% of both juveniles and adults collected outside the channels.

Overall, benthic organisms will be removed from the federal channels during maintenance dredging, and recolonization is likely to be continually disrupted. Although these effects will be localized and minor compared to the overall benthic habitat in Humboldt Bay, EFH may be affected.

Entrainment of Prey Fish Species

In their trawling survey of Humboldt Bay, Novotny et al. (2020a) captured 12,048 northern anchovy and 100 Pacific herring in 2019. Northern anchovy was by far the most abundant fish species in that a total of 18,654 fish were captured overall. Catch-per-unit-effort (CPUE) was not significantly different for northern anchovy inside versus outside of the federal channels in 2019. However, CPUE tended to be higher for northern anchovy at the more northerly Samoa and Fairhaven reaches, and CPUE of northern anchovy also significantly increased with time, particularly after August. Total catch of fish was much less in 2020 despite approximately the

same amount of sampling effort expended (Novotny et al. 2020b). A total of 897 northern anchovy and 430 Pacific herring were collected out of 5,083 fish in total. Northern anchovy again was the most abundant species captured, and Pacific herring was the third most abundant. Over 75% of the total catch of northern anchovy and Pacific herring were collected from two trawls in 2020, resulting in high variance of the data. Consequently, there were no significant differences in locations, although northern anchovy was most abundant in the Samoa reach, and Pacific herring was most abundant in the North Spit reach.
This work indicates that prey fish, especially northern anchovy, are likely to be present in the federal channels of Humboldt Bay during the maintenance dredging work window. Northern anchovy often has been the most common species collected during entrainment monitoring conducted when the *Essayons* is working in San Francisco Bay (Novotny et al. 2019, their Appendix B). Consequently, northern anchovy and other prey fish species are expected to be entrained during the maintenance dredging of Humboldt Bay, and EFH may be affected.

Conclusions and Determinations

Conclusions

This section presents the conclusions and determinations of this BA/EFH Assessment that were formulated using the discussion of species presence, habitat presence, and project effects as discussed in prior sections.

Potential Effects on Listed Species

Species Not Likely to be Adversely Affected

The BO for the previous 5-year period of this project was issued by NMFS on April 18, 2016 (NMFS File Number: WCR-2015-3779). The findings of that BO are described below in italics. Activities and effects of the current project are expected to be similar to those of past years.

- **NC Steelhead:**

NMFS (2016), Page 103:

"…The extent of turbidity and the re-suspension of sediment-associated contaminants are not expected to result in levels that adversely affect listed NC steelhead. Because the majority of NC steelhead adults will likely enter Humboldt Bay to begin their spawning migration in October or later (Busby et al. 1996), NMFS anticipates NC steelhead adults are very unlikely to be present in the action area during dredging of the Federal Navigation Channels and during disposal at HOODS and HBDS. Because adult NC steelhead are not expected to be present during the timing of the Project, NMFS believes the likelihood of exposure to NC steelhead individuals to be low, and therefore discountable.

The best available science indicates NC steelhead smolts in the action area are in the second and third year of life, are relatively large (150-200 mm), remain in relatively deep water, and move rapidly through the estuary to the ocean in late spring and summer (Emmett et al. 1991, Meehan and Bjornn 1991, Wallace 2006). NC steelhead smolts exposed to increased levels of turbidity

are likely to temporarily relocate to suitable habitat elsewhere, as juvenile NC steelhead are highly mobile and adept to avoid plumes of sediment (O'Connor 1991, USACE 1998). NMFS does not expect there to be any fitness consequence (reduced feeding or growth) to NC steelhead who avoid the turbidity plume by relocating to suitable habitat elsewhere. NMFS expects the effects of turbidity to NC steelhead smolts in Humboldt Bay to be insignificant, as there is ample habitat and prey elsewhere in the action area. Therefore, NMFS concurs with the Corps that the project is not likely to adversely affect NC steelhead individuals.

The effects of the proposed action may include risk of entrainment to NC steelhead smolts during the dredging operation. However, due to the timing of the Project, NMFS finds it highly unlikely for NC steelhead adults to be present and at low risk for entrainment…Because substantial risk through entrainment of a draghead is likely to occur within a four-foot radius (Hoover et al. 2011), and NC steelhead are a highly mobile species, often exhibiting avoidance behavior to disturbances, NMFS expects the possibility of entrainment to be discountable for NC steelhead."

Maintenance dredging practices and amounts have been consistent for approximately the last 20 years and are not expected to change over the next five years. Thus, USACE anticipates that the aforementioned NMFS rationale for NC steelhead should remain the same as well and be applied to the proposed project. As such, the proposed action *is not likely to adversely affect NC steelhead*.

- **<u>Adult SONCC coho Salmon and CC Chinook Salmon:</u>**

NMFS (2016), page 92:

"…NMFS has determined that the effects of Project implementation in Humboldt Bay would be discountable on adult CC Chinook and SONCC coho salmon, because the adults will not be present in the action area from March through May…"

The rationale above is predicated on that fact that neither adult SONCC coho nor CC Chinook Salmon would be present in the action area during the spring. Additionally, adults will be migrating into their spawning streams in the fall so encounters with dredging activities should be brief, and avoidance should easily occur due to their large size and excellent swimming ability. The dredging work window will remain the same in 2021 to 2025 as it was in 2016 to 2020. Thus, the proposed action is *not likely to adversely affect* adult SONCC Coho or CC Chinook salmon.

- **<u>Southern Green Sturgeon DPS:</u>**

NMFS (2016), begin page 104:

"…Although temporary increases in turbidity will likely result in decreased visibility for green sturgeon, NMFS does not anticipate green sturgeon to be negatively affected. Studies suggest that green sturgeon are generally more

attracted to turbid water due to an increase in prey abundance, which could result in a greater foraging opportunity. Moreover, NMFS does not expect green sturgeon to be negatively affected by turbidity plumes because they often make use of large expanses of habitat in and around Humboldt Bay, are a highly mobile species, are adept to avoid sediment plumes (SAIC, 2011), and have a high tolerance for suspended sediment… Due to their high tolerance for suspended sediment and preference for shallow areas, NMFS does not expect green sturgeon to be negatively affected. Therefore, NMFS expects the effects from increased levels of turbidity and SSC (suspended solids concentration) will be insignificant on listed green sturgeon…

…Given that green sturgeon are typically found outside of the dredging windows and the action area, are strong swimmers, and will likely engage in avoidance behavior before encountering a vessel, NMFS believes that it is unlikely for green sturgeon to become entrained or struck by a dredging vessel, therefore NMFS expects that the possibility of entrainment to be discountable for green sturgeon…."

The dredging work window will remain the same in 2021 to 2025 as it was in 2016 to 2020. Based on the above analysis, the proposed action is *not likely to adversely affect* the southern DPS of North American green sturgeon.

Species Likely to be Adversely Affected, **But Not Jeopardized**

- **<u>Juvenile SONCC coho/ CC Chinook Salmon</u>:**

Based on several assumptions, NMFS indicated in their BO for the 2016 through 2020 dredging cycle that up to 1.48 percent of the total population of juvenile SONCC coho salmon (page 94) and 2.05 percent of the total population of juvenile CC Chinook salmon (page 95) would be adversely affected annually by the project and likely to experience reduced survival. Specifically, NMFS stated that juveniles are likely to be exposed to dredging activities occurring from March through May, and (on page 93)

"…will be disoriented from exposure to the synergistic effects of prop-wash turbulence and overflow plume of suspended sediments and be subjected to increased bird predation. NMFS also expects the reduction or loss of migratory corridor functional attributes, resulting in reduced growth and survival either due to reduction in prey availability alone, or, depending on location, in combination with increased metabolic costs of turbidity plume avoidance…"

The USACE believes that the potential effects to juvenile SONCC coho and CC Chinook salmon would be the same as previously anticipated by NMFS, if operating under the same assumptions as for past activities. Thus, the proposed project is *likely to adversely affect* juvenile SONCC coho and CC Chinook salmon during the 2021 through 2025 on an order of magnitude similar to

the previous 2016 through 2020 dredging cycle, but *not jeopardize* the continued existence of the species.

Potential Effects on Critical Habitat

Humboldt Bay maintenance dredging activities will create a turbidity/sediment plume in and near the federal channels, and placement activities will create a plume at HOODS and HBDS. According to NMFS's BO for the 2016 through 2020 dredging cycle (page 103), dredging activities would not be likely to adversely affect critical habitat for NC steelhead or the southern DPS of North American green sturgeon. Adult NC steelhead are not likely to be present during project activities, and hence will not encounter the adverse effects to critical habitat as they will be temporary. Juveniles and smolts may be present but would be large enough to avoid the sediment plumes. Green sturgeon may be present both in Humboldt Bay and at the dredge material placement sites during project activities, but are well-adapted to turbid and low visibility conditions.

The proposed maintenance dredging will use the same work window and remove and place approximately the same amount of material in 2021 to 2025 as occurred in 2016 to 2020. Therefore, for the 2021 through 2025 dredging cycle, USACE has determined that the project *is not likely to adversely affect* designated critical habitat for NC steelhead or the Southern DPS of North American green sturgeon.

According to NMFS's BO for the 2016 through 2020 dredging cycle, dredging activities would adversely affect critical habitat for SONCC coho salmon and CC Chinook salmon, particularly in the March to May timeframe when juveniles may be present, due to the reduction in light levels and reduced prey visibility until turbidity subsides (page 92). NMFS estimated that these adverse effects could occur up to 61 days per year.

As the proposed action would not greatly differ from the previous dredging cycle, it is anticipated that the effects to designated critical habitat for SONCC coho salmon and CC Chinook salmon would be similar for the 2021 through 2025 dredging cycle and consequently that it *may adversely affect* critical habitat for these two species. However, effects to habitat will continue to be minor, temporary, and localized. Given the wide availability of similar suitable designated critical habitat in the project vicinity for all aforementioned species, the temporary loss of habitat associated with proposed project would be minimal, and is not likely to adversely modify critical habitat for these species. Implementing the proposed avoidance and minimization measure described below would further reduce the potential for temporary adverse habitat affects associated with overflow plumes and turbidity.

Avoidance and Minimization Measure

- The USACE shall limit the duration of overflow to the extent practicable during each dredge cycle.

Potential Effects to Essential Fish Habitat

Within the previous BO (page 108), NMFS identified four adverse effects to EFH as a result of the proposed action:

- Elevated levels of turbidity from dredging and dredge material placement;

- Removal of epibenthic and benthic prey items from dredging;
- Removal of pelagic prey items from dredging; and
- Burial of prey items from dredge disposal.

The USACE believes that these four adverse effects to EFH within the action area will still apply for the 2021 through 2025 dredging cycle. The avoidance and minimization measure listed above in Section 7.1.2.1, will continue to be integrated as part of the proposed action to reduce the adverse effects to EFH.

In the previous BO, NMFS expressed a particular interest in the adverse effects of the project Dungeness crab, northern anchovy, and Pacific herring as these species are important food items for salmonids. Although USACE has not been able to conduct entrainment monitoring aboard the *Essayons* in Humboldt Bay due to safety concerns, northern anchovy often has been the most common species collected during entrainment monitoring conducted when the *Essayons* is working in San Francisco Bay (Novotny et al. 2019, their Appendix B).

The USACE has been implementing a fish survey and monitoring plan in Humboldt Bay by regularly bottom trawling from March through October in paired sites located in and just outside of the federal channels (Novotny et al. 2020a,b). This work occurred in 2019 and 2020, and the third and final year of the survey will occur in 2021. The results from the 2019 and 2020 surveys are described in section 6.3.

The 2021 through 2025 dredging cycle is almost identical in scope and timing to the previous five-year dredging cycle. Consequently, the 2021 through 2025 dredge cycle *may affect* EFH by increasing turbidity and entraining or burying prey items (e.g., polychaete worms, Dungeness crab, and prey fish) during dredging activities. These effects would be minor, temporary, and localized as they would only occur during annual dredging activities and affect a small portion of the EFH available the Pacific salmon, groundfish, and coastal pelagic species.

Determinations

The USACE has made the following determinations regarding the proposed action:

- The proposed action is *not likely to adversely affect* NC Steelhead or the southern DPS of North American green sturgeon, or the designated critical habitats of these species;

- The proposed action is *likely to adversely affect* SONCC coho and CC Chinook salmon; however, it is *not likely to jeopardize* the continued existence of these species;

- The proposed action is likely to adversely affect the designated critical habitat of SONCC coho and CC Chinook salmon, *but is not likely to adversely modify* the capability of designated critical habitat for these species to support the survival and recovery of this species;

- The proposed action *may affect* EFH in the action area for species managed under the Pacific Groundfish, Coastal Pelagic, and Pacific Salmon FMPs.

References

ADH Environmental. 2010. Environmental suitability of sediment from the Humboldt channels for dredging and for placement at Humboldt Open Ocean Disposal Site (HOODS).

Anderson, F. E. 1980. The variation in suspended sediment and water properties in the floodwater front traversing the tidal flat. Estuaries 3(1):28-37.

Applied Marine Sciences. 2009. Benthic Survey of Commercial Aggregate Mining Leases in Central San Francisco Bay and Western Delta. Available at: http://www.slc.ca.gov/division_pages/DEPM/DEPM_Programs_and_Reports/Hanson_Sand_Mining_Project/pdfs%20files/App-F_pt1.pdf.

Armstrong, D.A., B.G. Stevens, and J.C. Hoeman. 1982. Distribution and abundance of Dungeness crab and Crangon shrimp, and dredging-related mortality of invertebrates and fish in Grays Harbor, Washington. Tech. rep. for Washington Department of Fisheries and U.S. Army Corps of Engineers, Seattle District by School of Fisheries, University of Washington, Seattle. 349 pages plus appendices.

Armstrong, D.A., T.C. Wainwright, J. Orensanz, P.A. Dinnel, and B.R. Dumbauld. 1987. Model of dredging impact on Dungeness crab in Grays Harbor, Washington. Final rep. to Battelle Pacific Northwest Laboratories and U.S. Army Corps of Engineers, Seattle District Office. Univ. Washington, Fish. Res. Inst., FRI-UW-8702. Seattle. 167 pages plus appendices.

Barnhart, R. A., M. J. Boyd, and J. E. Pequegnat. 1992. The Ecology of Humboldt Bay, California: an Estuarine Profile. U.S. Fish and Wildlife Service Biological Report 1. 121 p.

Bash, J., C. Berman, and S. Bolton. 2001. Effects of Suspended Solids on Salmonids. November 2001.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L.J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon and California. U.S. DOC, NOAA Technical Memo NMFS-NWFSC-27, Seattle, Washington.

Borgheld, J.C. 1985. Holocene stratigraphy and sedimentation on the northern California continental shelf. University of Washington, Seattle, Washington.

Borgheld, J.C. and J.E. Pequegnat. 1986. The transportation characteristics of dredged material disposed at the interim designated Humboldt ocean disposal site (SF-3). Humboldt State University, Telonicher Marine Laboratory, Technical Report TML-3.

Borgheld, J.C. 1988. Influence of the Humboldt Bay Ebb-tidal Plume on Sedimentation on the Eel River, California Continental Shelf. Joint Ocean Sciences Conference, Transactions of the American Geophysical Union.

Boyd, Milton J. 2002. Non-indigenous Marine Species of Humboldt Bay, California: A Report to the California Department of Fish and Game. Available at: http://www.humboldtbay.org/conservation/exoticspecies/non_indigenous_marine_boyd_etal_2002.pdf.

California Department of Fish and Game. 2001 – 2004. Poundage and Value Landings By Port, Eureka Area.

Carter, A., E. Hague, and L. Floyd. 2008. Benthic Infauna Recovery Following Channel Dredging in the Vicinity of Bogue Inlet, North Carolina. Available at: http://www.fsbpa.com/08Proceedings/05CarterHague2008.pdf.

CICORE, 2005. Center for Integrative Coastal Observation, Research, and Education, Humboldt State University. http://cicore.humboldt.edu/?content=data_tbr_entrance&menu=menu2

CNCOOS, 2011, http://cencoos.humboldt.edu/?content=data_southbay&menu=menu2, accessed 24 May 2011

Clarke, D.G. and D.H. Wilber (USACE). 2005. A review of potential suspended sediment effects on salmonid fishes. August

Dickerson, C., D. Clarke, and K. Reine. 2005. Monitoring hopper dredge overflow plumes in Humboldt Bay, California. Submitted to the U.S. Army Corps of Engineers, San Francisco District. San Francisco, California. 68 pages.

Dinnel, P.A., D.A. Armstrong, and B.R. Dumbauld. 1986a. Impact of dredging and dredged material disposal on Dungeness crab, *Cancer magister*, in Grays Harbor, Washington during October, 1985. Final Report to the U.S. Army Corps of Engineers, Seattle District Office. Univ. Washington, Fish. Res. Inst., FRI-UW-8606. Seattle. 30 pages.

Dinnel, P.A., D.A. Armstrong, B.R. Dumbauld, and T.C. Wainwright. 1986b. Impact of dredging and dredged material disposal on Dungeness crab, *Cancer magister*, in Grays Harbor, Washington during August, 1986. Final rep. to the U.S. Anny Corps of Engineers, Seattle District Office. Univ. Washington, Fish. Res. Inst., FRI-UW-8611. Seattle. 34 pages.

Dumbauld, B., D. Armstrong, P. Dinnel, and T. Wainwright. 1988. Impact of dredging on Dungeness crab, Cancer magister, in Grays Harbor, Washington, during August 1987. Final rep. to U.S. Army Corps of Engineers, Seattle District Office. Univ. Washington, Fish. Res. Inst., FRI-UW-8820. Seattle. 25 pages.

Durand, J. 2008. Delta Food web Conceptual Model. Sacramento, California: Delta Regional Ecosystem Restoration Implementation Plan. Available at: http://science.calwater.ca.gov/pdf/drerip/DRERIP_food_web_conceptual_model_final_120208.pdf.

Gold, J., Novotny, S., and S. Willis. 2017. Fish entrainment monitoring report, 2017 dredging of the Pinole Shoal channel conducted by the U.S. Army Corps of Engineers' Hopper Dredge Essayons. October 2017. 37 pages plus appendices.

Emmett, R. L., S. L. Stone, S. A. Hinton, and M. E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in West Coast estuaries. Volume II: species life history summaries. ELMR Rpt. No.8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, Maryland. 329 p.

EPA and USACE. 2020. Final evaluation and environmental assessment for expansion of the existing Humboldt Open Ocean Disposal Site (HOODS), offshore of Eureka, California. October 19, 2020. 82 pages plus appendices. https://www.epa.gov/sites/production/files/2020-12/documents/epa-r09-ow-2020-0188-hoods-final-ea-smmp-2020-10-19.pdf

Evans, Robert A. Jr., 1994. Humboldt Bay Numerical Hydrodynamics and Sedimentation Study. July 1994. United States USACE of Engineers Waterways Experiment Station, Vicksburg, MS.

Gilkinson K.D., D.C. Gordon, K.G. MacIsaac, D.L. McKeown, E.L.R. Kenchington, C. Bourbonnais, & W.P. Vass. 2005. Immediate affects and recovery trajectories of macrofaunal communities following hydraulic clam dredging on Banquereau, eastern Canada. Ices Journal of Marine Science 62 (5): 925-947.

Griggs, G.B., 1974. THE EVOLUTION OF THE COASTLINE, In: In the Ocean Wind, P. Scott and C. Wayburn, Eds., Big Trees Press, Felton, p. 37-45.

Guerra-García, José M., Juan Corzo, and J. Carlos García-Goméz. 2003. Short-Term Benthic Recolonization after Dredging in the Harbour of Ceuta, North Africa. Marine Ecology, 24 (3): 217-229. Available at: http://personal.us.es/jmguerra/pdfs/pdf33.pdf.

Hanson, J., M. Helvey, & R. Strach. 2003. Non-fishing affects to essential fish habitat and recommended conservation measures. National Marine Fisheries Service (NOAA Fisheries), version 1. Southwest Region, Long Beach, CA.
Harding, L. W., Jr. 1973. Primary production in Humboldt Bay. Master's Thesis. Humboldt State University, Arcata, California. 55 p.
Hoover, J. J., Boysen, K. A., Beard, J. A. and Smith, H. 2011. Assessing the risk of entrainment by cutterhead dredges to juvenile lake sturgeon (*Acipenser fulvescens*) and juvenile pallid sturgeon (*Scaphirhynchus albus*). Journal of Applied Ichthyology, 27: 369–375.
Larson, K.W. and C.E. Moehl 1990. Entrainment of Anadromous Fish by Hopper Dredge at the Mouth of the Columbia River.
Larson, K., and K. Patterson. 1989. Entrainment of Dungeness crab by hopper dredge at the mouth of the Columbia River, OR, and WA, USA. Dredging: Proceedings of WODCON VII, Orlando, FL, 268-85.
Lenihan, H. S. and F. Micheli. 2001. In Bertness, M.D., S. D. Gaines and M. Hay [eds.] Marine Community Ecology, Sinauer Associates, Inc., Sunderland, MA.
McGraw, K.A., L.L. Conquest, J.O. Waller, P.A. Dinnel, and D.A. Armstrong. 1988. Entrainment of Dungeness crab, Cancer magister Dana by hopper dredge in Grays Harbor, Washington. 3. Shellfish Res. 7(2):219-231.
McGraw, K.A. and D.A. Armstrong, 1990. Fish Entrainment by Dredges in Grays Harbor, Washington.
Meehan, W. R. and T. C. Bjornn. 1991. Salmonid distributions and life histories. In W. R. Meehan (Editor), Influences of forest and rangeland management on salmonid fishes and their habitats, p. 47-82. American Fisheries Society Special Publication 19. Bethesda, Maryland.
Miller, A.J., et. al., 1999. Observing and Modeling the California Current System. Eos, Transactions, American Geophysical Union, v. 80, p. 533-539. September 1, 1999.
Miller and Kaplan, 2001. Petition to list the North American Green Sturgeon (*Acipenser medirostris*) as an endangered or threatened species under the Endangered Species Act, Prepared by the Environmental Protection Information Center, Center for Biological Diversity, and Waterkeepers Northern California.
Moyle, P.B., P.J. Foley, and R.M. Yoshiyama. 1992. Status of green sturgeon, *Acipensermedirostris*, in California. Final Report submitted to National Marine Fisheries Service. 11 p. University of California, Davis, CA 95616.
Newell, R.C., L.J. Seiderer and D.R. Hitchcock. 1998. The effect of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Available at: http://www.seasurvey.co.uk/node/107.
NMFS. 2007. Report on the subtidal habitats and associated biological taxa in San Francisco Bay. Schaeffer K, McGourty K, and Cosentino-Manning N, editors. Santa Rosa, CA. p 86.
Nightingale, B. and C. A. Simenstad. 2001. Dredging Activities: Marine Issues. White Paper, Research Project T1803, Task 35. Submitted to Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Department of Transportation.
NOAA. 2005. Humboldt Bay Current Surveys: December 2002 – October 2004. NOAA Technical Report NOS CO-OPS 046, September 2005.
NOAA Fisheries. 2009. Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon; Final Rule. 50 CFR Part 226. Federal Register (Volume 74, Number 195): 52300-52351

Novotny, S., L. Hornung, and S. Willis. 2019. Fish entrainment monitoring report, 2019 dredging of the Pinole Shoal channel conducted by the U.S. Army Corps of Engineers' Hopper Dredge *Essayons*. November 2019. 48 pages plus appendices.
Novotny, S., J. Staton, R. Reed, and E. Campbell. 2020a. Benthic fish and invertebrate trawl surveys of sub-tidal habitat reaches inside and outside of the federally maintained Humboldt Bay navigation channels – 2019. January 2020. Report prepared for the U.S. Army Corps of Engineers. 44 pages plus appendices.
Novotny, S., J. Staton, R. Reed, and E. Campbell. 2020b. Benthic fish and invertebrate trawl surveys of sub-tidal habitat reaches inside and outside of the federally maintained Humboldt Bay navigation channels – 2020. December 2020. Report prepared for the U.S. Army Corps of Engineers. 57 pages plus appendices.
Oliver, J.S., P.N. Slattery, L.W. Hulberg and J.W. Nybakken. 1977. Patterns of succession in benthic infaunal communities following dredging and dredged material disposal in Monterey Bay. U.S. Army Corps of Engineers. Technical Report D-77-27.
Pacific Maritime Association. 1997. Port Hours and Tonnage.
Pequegnat, J.E. and D. Mondell-Jarvis. 1991. Humboldt Bay and Harbor Ocean Disposal Site Designation Study: Water Column Characteristics Sampled on April 26, 1991. September 6, 1991. Humboldt State University, Department of Oceanography, Telonicher Marine Laboratory.
Pearson, W.H., G.D. Williams, and J.R. Skalski. 2003. Estimated Entrainment of Dungeness Crabs During Maintenance Dredging of the Mouth of the Columbia River, Summer 2002. PNNL-14190. Prepared for the U.S. Army Corps of Engineers, Portland District, by Pacific Northwest National Laboratory, Marine Sciences Laboratory, Sequim, Washington.
Pearson, W.H., G.D. Williams, and J.R. Skalski. 2005. Dungeness Crab Dredging-Entrainment Studies in the Lower Columbia River, 2002-2004: Loss Projections, Salinity Model, and Scenario Analysis. PNNL-15021. Prepared for the U.S. Army Corps of Engineers, Portland District, by Pacific Northwest National Laboratory, Marine Sciences Laboratory, Sequim, Washington.
Pearson, W.H., N.P. Kohn, and J.R. Skalski. 2006a. Entrainment of Dungeness Crabs in the Desdemona Shoals Reach of the Lower Columbia River Navigation Channel. PNNL-16139. Prepared for the U.S. Army Corps of Engineers, Portland District, by Pacific Northwest National Laboratory, Marine Sciences Laboratory, Sequim, Washington.
Pearson, W.H., N.P. Kohn, and J.R. Skalski. 2006b. Entrainment of Dungeness Crabs in the Desdemona Shoals Reach of the Lower Columbia River Navigation Channel. PNNL-16139. Prepared for the U.S. Army Corps of Engineers, Portland District, by Pacific Northwest National Laboratory, Marine Sciences Laboratory, Sequim, Washington. September 2006.
Photo Science Geospatial Solutions. 2007. Benthic Habitat Data Inventory and Collection, Humboldt Bay, California. Available at: http://www.csc.noaa.gov/id/Humboldt_Bay_Data_Inventory_Final_Delivered_March19.pdf.
Ray, G.L. 2005. Ecological functions of shallow, unvegetated estuarine habitats and potential dredging affects (with emphasis on Chesapeake Bay).
Reine, K. and D. Clarke. 1998. Entrainment by hydraulic dredges – A review of potential affects. Technical Note DOER-E1. U.S. Army Corps of Engineers Environmental Laboratory, Vicksburg, MS.
Reish, D.J. 1961. A study of the benthic fauna in a recently constructed boat harbor in southern California. Ecology, 42: 84-91.

Rumrill, S.S. and V.K. Poulton. 2004. Ecological Role and Potential Effects of Molluscan Shellfish Culture in the Estuarine Environment of Humboldt Bay, CA. Oregon Department of Lands, South Slough National Estuary Research Reserve and Estuarine and Coastal Science Laboratory. Available at: http://www.humboldtbay.org/harbordistrict/documents/other/Shellfish%20Culture%20Affect.pdf
Scheffner, Norman W., October 1990. A Dispersion Analysis of the Humboldt Bay, California Interim Offshore Disposal Site
Shaughnessy, F., and K. Williamson. 2005. Patterns and potential drivers of turbidity in Humboldt Bay, California. Poster at "A regional perspective to restoring physical and ecological processes in Humboldt Bay," March 14-15, 2005. Humboldt State University, Arcata, California.
Simenstad, C.A., B.J. Nightingale, R.M. Thom, and D. K. Shreffler. 1999. Effects of ferry terminals on juvenile salmon migration along Puget Sound shorelines. June 1999. Phase I: Synthesis of State of Knowledge.
Stevens, B. G. 1981. Dredging-related mortality of Dungeness crabs associated with four dredges operating in Grays Harbor, Washington. Final Report to Seattle District, U.S. Army Corps of Engineers Contract # DACW67-79-C-0045.
Tegelberg, H., and R. Arthur. 1977. Distribution of Dungeness crabs (*Cancer magister*) in Grays Harbor, and some effects of channel maintenance dredging. Appendix N in Maintenance Dredging and the Environment of Grays Harbor, Washington. USACE, Seattle. 94 pages plus appendices.
Thrush S.F., J.E. Hewitt, V.J. Cummings, & P.K. Dayton. 1995. The effect of habitat disturbance by scallop dredging on marina benthic communities: What can be predicted from the results of experiments? Marine Ecology Progress Series, 129(1-3): 131-150.
Tuck, I.D., S.J. Hall, & M.R. Robertson. 1998. Effects of physical trawling disturbance in a previously unfished sheltered Scottish sea loch. Marine Ecology-Progress Series, 162: 227-242.
UK Marine Special Areas of Conservation (SAC). 2001. Dredging: Removal of Benthic Animals. Available at: http://www.ukmarinesac.org.uk/activities/ports/ph5_2_2.htm#a1.
USACE and Humboldt Bay Harbor RCD. 1995. Final environmental affect statement/environmental affect report. Humboldt Harbor and Bay Deepening Navigation Project. April.
USACE. 1995. Humboldt Harbor and Bay (Deepening). Humboldt County, California. Feasibility study for navigation improvements. San Francisco District. 82 pages plus appendices.
USACE. February 1998, Environmental Assay, Fiscal Year 1998 Spring Maintenance Dredging of the Humboldt Harbor, North Bay, Eureka, Samoa, and Field's Landing Channels.
USFWS. The Ecology of Humboldt Bay, California: An Estuarine Profile. Biological Report 1, January 1992.
USGS. 1998. Classification of wetlands and deepwater habitats of the Unites States unconsolidated bottom.
Wainwright, T.C., K.A. McGraw, D.A. Armstrong, B.R. Dumbauld, and L.L. Conquest. 1990. Impact of dredging on Dungeness Crab, *Cancer magister*, in Grays Harbor, Washington, during August 1989. Final rep. to U.S. Army Corps of Engineers, Seattle District. Univ. Washington, Fish. Res. Inst., FRI-UW-9905. Seattle. 18 pages.
Watling, L., R.H. Findlay, L.M. Lawrence & D.F. Schick. 2001. Effect of a scallop drag on the sediment chemistry, microbiota, and faunal assemblages of a shallow subtidal marine benthic community. Journal of Sea Research, 46: 309-324.

Wilber, D.H., G.L., Ray, D.G. Clarke, and R.J. Diaz. 2008. Responses of Benthic Infauna to Large-Scale Sediment Disturbance in Corpus Christi Bay, Texas. Journal of Experimental Marine Biology and Ecology, 365; p. 13-22.
Wilber, D.H. & D.G. Clarke. 2001. Biological effects of suspended sediment: A review of suspended sediment effects on fish and shellfish with relation to dredging activities in estuaries. North American Journal of Fisheries Management, 21: 855-875.
Wainwright, T.C., D.A. Armstrong, P.A. Dinnel, J.M. Orensanz, and K.A. McGraw. 1992. Predicting effects of dredging on a crab population: an equivalent adult loss approach. Fishery Bulletin 90:171-182.
Wallace, M. 2006. Juvenile salmonid use of Freshwater Slough and tidal portion of Freshwater Creek, Humboldt Bay, California. 2003 Annual Report. California Department of Fish and Game. Natural Stocks Assessment Project, Northern California North Coast Region. Arcata, California. 32 p.
Weitkamp, L. A., T. C. Wainwright, G. J. Bryant, G. B. Milner, D. J. Teel, R. G. Kope, and R. S. Waples. 1995. Status review of Coho salmon from Washington, Oregon, and California.

Williamson, K. J. 2006. Relationships between eelgrass (*Zostera marina*) habitat characteristics and juvenile Dungeness crab (*Cancer magister*) and other invertebrates in southern Humboldt Bay, California, USA. Master Thesis, Humboldt State University 66 pp.
Zajac, R.N., R.B. Whitlatch, and S.F. Thrush. 1998. Recolonization and Succession in Soft-Sediment Infaunal Communities: the spatial scale of controlling factors. *Hydrobiologia* 375/376: 227–240. Available at: http://www.springerlink.com/content/g9338317517r4h3x/fulltext.pdf.

APPENDIX B: DRAFT FINDING OF NO SIGNIFICANT IMPACT

Draft - Finding of No Significant Impact

Humboldt Harbor and Bay
Operations and Maintenance Dredging (FY 2021-25)

Humboldt Bay, Humboldt County, California

The U.S. Army Corps of Engineers, San Francisco District (USACE) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Draft Environmental Assessment (EA), dated March 2021, for the Humboldt Harbor and Bay Operations and Maintenance Dredging (FY 2021-25) addresses annual maintenance dredging in the federal navigation channels of Humboldt Bay, Humboldt County, California. The final recommendation is contained in this EA.

The Draft EA, incorporated herein by reference, evaluated annual maintenance dredging and subsequent disposal of the dredged material at the Humboldt Open Ocean Disposal Site (HOODS) as one alternative ('proposed action'), and it also evaluated the 'no action' alternative of no annual maintenance dredging and no disposal. The recommended plan is the proposed action.

For all alternatives, the potential effects were evaluated as appropriate. A summary assessment of the potential effects of the proposed action is listed in Table 1.

Table 1. Summary of the Potential Effects of the Proposed Action

Resource	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☐	☒	☐
Air quality	☐	☒	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☐	☒	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species	☒	☐	☐
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☐	☐	☒

Land use	☐	☐	☒
Navigation	☒	☐	☐
Noise levels	☐	☒	☐
Public infrastructure	☐	☒	☐
Socioeconomics	☐	☒	☐
Environmental justice	☐	☐	☒
Soils	☐	☐	☒
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☐	☐	☒
Turbidity, suspended particulates	☒	☐	☐
Substrate	☒	☐	☐
Currents, circulation or drainage patterns	☐	☐	☒
Mixing zone	☐	☒	☐
Erosion and accretion patterns	☒	☐	☐
Aquifer recharge	☐	☐	☒
Base flow	☐	☐	☒
Water supplies, conservation	☐	☐	☒
Aquatic habitat	☒	☐	☐
Terrestrial habitat	☐	☐	☒
Contaminants in dredge or fill material	☒	☐	☐
Mineral resources	☐	☐	☒
Recreation	☐	☐	☒
Land use classification	☐	☐	☒
Transportation and traffic	☐	☒	☐
Prime farmland	☐	☐	☒
Public health and safety	☐	☐	☒
Energy consumption or generation	☐	☐	☒
Growth-inducing impacts	☐	☐	☒
Conflict with land-use plans, policies	☒	☐	☐
Irretrievable commitment of resources	☐	☐	☒
Other	☐	☐	☒
Cumulative effects not related to the proposed action	☐	☐	☒
	☐	☐	☐
	☐	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs) and
avoidance or minimization measures as detailed in the EA, will be implemented, as appropriate, to
minimize these impacts. No compensatory mitigation is required as part of the recommended plan.

Environmental Compliance Requirements:

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the USACE, in informal consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), determined that the recommended plan may affect, but is not likely to adversely affect, the following federally listed species, or its designated critical habitat, within the project footprint:

- ✓ Marbled Murrelet (*Brachyramphus marmoratus*)
- ✓ Northern California (NC) Steelhead (*Oncorhynchus mykiss*)
- ✓ NC Steelhead Critical Habitat
- ✓ Southern Distinct Population Segment (DPS) of North American Green Sturgeon (*Acipenser medirostris*)
- ✓ Southern DPS of North American Green Sturgeon Critical Habitat

The USACE, in formal consultation with NMFS, has determined that the recommended plan is likely to adversely affect, but is not likely to jeopardize the continued existence or adversely modify the following federally listed species and critical habitats, respectively, within the project footprint:

- ✓ Southern Oregon/Northern California Coastal (SONCC) Coho Salmon (*O. kisutch*)
- ✓ SONCC Coho Salmon Critical Habitat
- ✓ California Coastal (CC) Chinook Salmon (*O. tshawytscha*)
- ✓ CC Chinook Salmon Critical Habitat

Requests for consultation documenting these determinations were submitted to USFWS on March 18, 2021 (Appendix A), and to NMFS on March 23, 2021 (Appendix A).

Pursuant to the Clean Water Act, Sections 401 and 404(b)(1), the USACE has determined that there is no jurisdiction because Humboldt Open Ocean Disposal Site (HOODS) falls outside of the 3-mile limit and is under Ocean Dumping Act jurisdiction. Under Rivers and Harbors Act, Section 10 (33 U.S.C. § 401), USACE does not give permits to itself, and therefore there is no authority requiring the federal government to seek Water Quality Certification.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers determined that the recommended plan has no effect on historic properties.

The USACE has applied (Appendix A) to the California Coastal Commission (CCC) for a Negative Determination (ND) under the Coastal Zone Management Act of 1972. An ND is

given when consistency with the California Coastal Zone Management Program is demonstrated. Historically, the USACE has received consistency determinations from the CCC every year in the past for its annual maintenance dredging of Humboldt Harbor and Bay, and it therefore expects a similar outcome for the proposed action.

Public and Agency Review:

A 30-day public and agency review of the draft EA and FONSI will occur between March 24, 2021 and April 23, 2021. Comments submitted will be reviewed and responded to. Where applicable, text will be updated in the EA to incorporate the comments. The comments received and the USACE responses will be documented in Appendix H.

Determination and Statement of Finding:

All applicable environmental laws have been considered, and coordination with appropriate state and federal agencies has been completed. Technical, environmental, and economic criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 *Economic and Environmental Principles and Guidelines*. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives.

Based on this report, the reviews by other Federal, State and local agencies, input from the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment, and therefore, preparation of an Environmental Impact Statement is not required.

Approved by:

_____ _____

John D. Cunningham
Lieutenant Colonel, U.S. Army
District Commander and Engineer

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 USEPA 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 USEPA 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 USEPA REGION 9. THIS SURVEY SHALL AT A MINIMUM BE CONSISTENT IN RESOLUTION AND ACCURACY TO POST-DISPOSAL SURVEYS FROM 2004, 2005, 2006, AND 200.

APPENDIX D:

HUMBOLDT SHORELINE MONITORING PROGRAM: Evaluation of Excessive Shoreline Retreat Criteria

1. Background

As part of the designation of the Humboldt Open Ocean Disposal Site (HOODS), the San Francisco District of the U.S. Army Corps of Engineers (USACE-SPN) established the Humboldt Shoreline Monitoring Program (HSMP). The HSMP was established because the California Coastal Commission (CCC) expressed concerns that the placement of large volumes of sand in the relatively deep waters of HOODS could have significant adverse impacts to nearby beaches (**Figure 1**). The primary concern was that sand which would typically supply local beaches was going to effectively be removed from the local littoral cell by being placed in waters deeper that the depth of closure (DOC). As a result, the objective of the HSMP are to (1) monitor the surrounding shoreline for excessive shoreline retreat, (2) determine the cause of any excessive shoreline retreat that is observed, and (3) recommend corrective action should sediment disposal at HOODS be the cause.

The criteria for excessive shoreline retreat were established in a MOU between USACE and the CCC (USACE, 1995), and were based on shoreline change rates derived from an analysis of historical aerial photographs (Moffatt & Nichol Engineers, 1991). The analysis covered the time period from 1948 to 1990, and found that rates of shoreline change substantially varied for different time periods at several locations. As a result, the analysis derived shoreline change rates for 1948 to 1974, 1974 to 1990, and 1948 to 1990. In the absence of specific guidance in this analysis, USACE (2007) defaulted to the more recent shoreline change rate (1974 to 1990) and utilized it to determine the excessive shoreline retreat criteria. As a result, the subsequent USACE HSMP data analyses have found that the excessive shoreline retreat criteria has never been exceeded from 1992 to 2016.

In general, the period for 1974 to 1990 was significantly more erosional than the other periods, with rates of up to 20 feet per year in some areas. This increased erosion rate is associated with anomalously strong winter storms and large waves associated with strong El Niño conditions (1982-1983) in the eastern Pacific Ocean (**Figure 2**, NOAA, 2017). There were also extensive repairs to the head and trunk sections of both jetties in the early 1970s (USACE, 1970). These repairs could have altered local sediment transport patterns and contributed to the increased erosion rates in the section of the North Spit closest to the North Jetty.

The most recent data analysis (USACE, 2017) noted that if the rates of shoreline change from 1974 to 1990 were used to predict future shoreline movement, then there would be significant erosion of dunes and other backshore features on the North Spit (**Figure 3**). As a result, the excessive shoreline retreat criteria based on the 1974 to 1990 would allow for significant erosion, and may not be consistent with the intent of the HSMP. Following a review of this most recent analysis, representatives from the CCC requested that USACE re-evaluate if the excessive shoreline criteria should continue to be based on the 1974 to 1990 rate. This document summarizes the findings of this requested re-evaluation.

Figure 1. Looking northeast toward the Humboldt Entrance Channel and Jetties (photograph by Gary Todoroff). Note the spits with beaches and extensive dune systems to the north and south of the Entrance Channel.

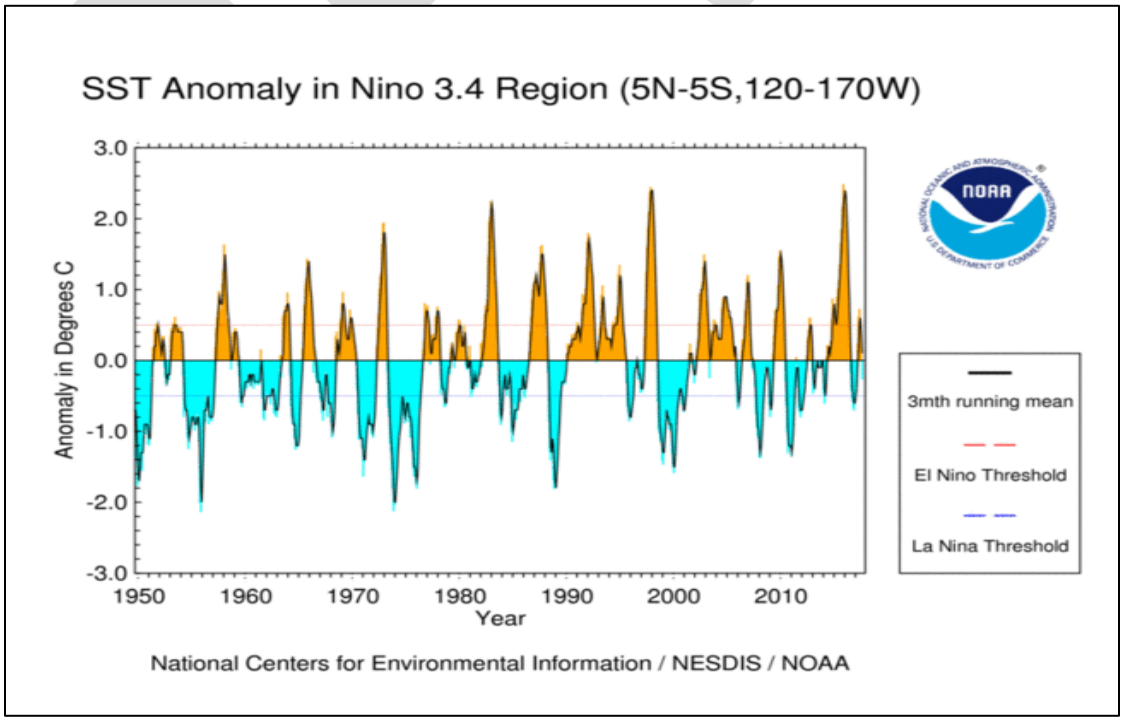


Figure 2: Time series of sea surface temperature (SST) anomalies that represent El Niño and La Niña events.

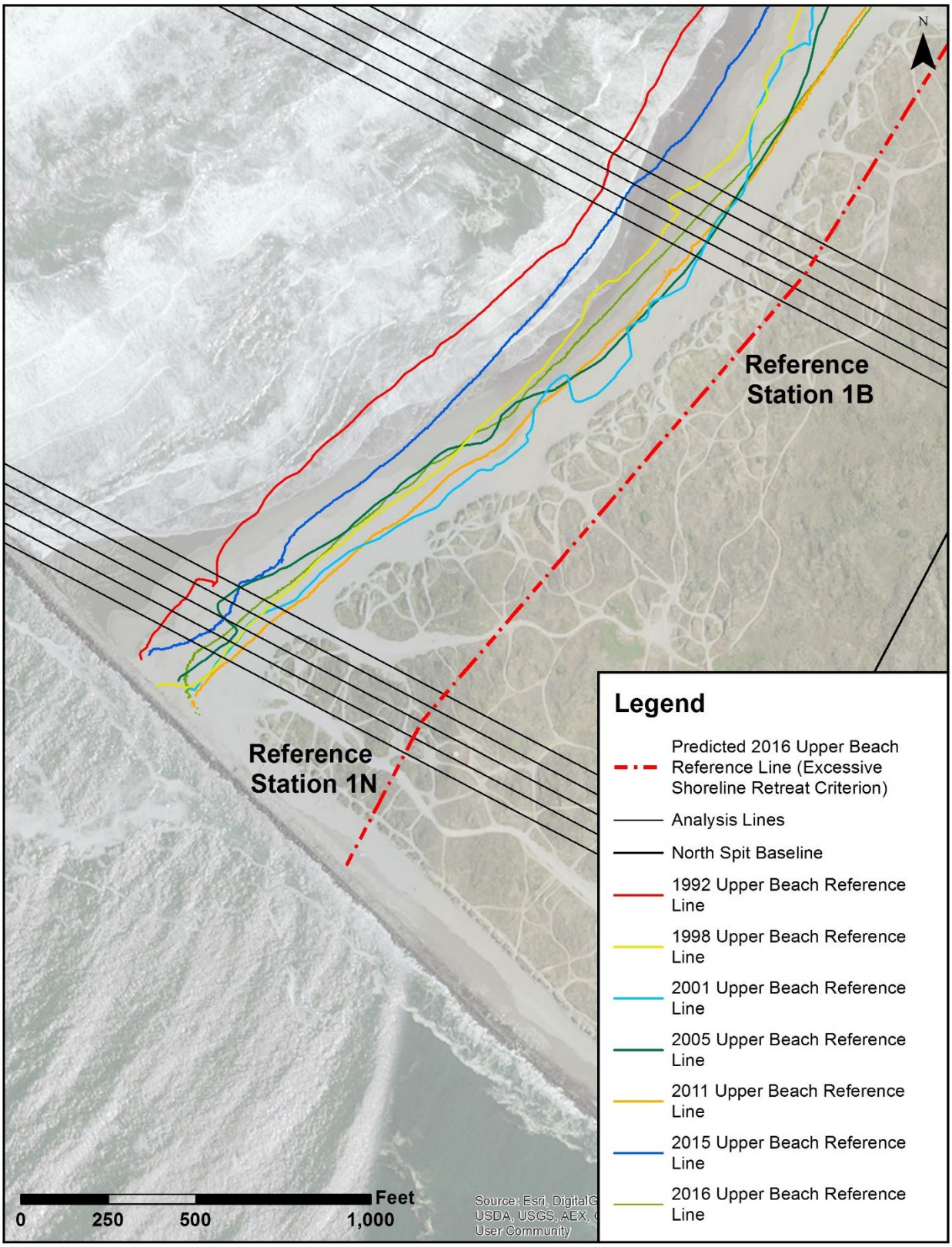


Figure 3: Predicted future shoreline movement (dashed red line) based on the 1974 to 1990 rate (from USACE, 2017).

2. Data

This analysis utilized a GIS database of 8 shoreline historic shoreline positions from 1992 to 2016. The 5 earliest historic shoreline positions from 1992 to 2005 were delineated in 2007 based on an upper beach reference line derived from digital terrain models generated from aerial orthophotogrammetric surveys. These surveys were conducted by a contractor to USACE (Towill Inc) at an altitude of approximately 6,000 feet, with the resulting orthophotos mapped at a scale of 1:12,000 with a 0.5 foot ground resolution. The upper beach reference line was defined by the 8 foot (NGVD29) contour, and the reasoning for selecting this particular elevation is detailed in the initial USACE (2007) data analysis. This contour translates to an elevation of 11.36 feet NAVD88 (see USACE, 2014), and all subsequent upper beach reference lines were delineated based on this elevation.

The shorelines (upper beach reference lines) from 2011, 2015, and 2016 were derived from topography generated from aerial LiDAR surveys. The 2011 and 2015 surveys were performed by the USACE Joint Airborne Lidar Technical Center of Expertise (JALBTCX), with the resulting topographic data formatted as a raster (grid) files with a 1 meter (3.28 foot) pixel resolutions (USACE, 2011 and 2014). The 2016 survey was performed under the supervision of the United States Geological Survey (USGS) as part of a West Coast-wide initiative to map coastal topography following the strong El Niño event over the winter of 2015-16 (USACE, 2017). The 2016 survey dataset was also delivered as a raster (grid) file with a pixel resolution of 0.5 meters (1.64 feet).

Table 1. Summary of shoreline data used in DSAS Analysis.

Date	Collection Method	Source	Notes
Nov 18, 1992	Aerial Photogrammetry	Towill Inc. under contract to USACE	Strong El Niño during winter of 1991-92
September 19, 1995	Aerial Photogrammetry	Towill Inc. under contract to USACE	-
October 19, 1998	Aerial Photogrammetry	Towill Inc. under contract to USACE	Strong El Niño during winter of 1997-98
October 9, 2001	Aerial Photogrammetry	Towill Inc. under contract to USACE	-
October 13, 2005	Aerial Photogrammetry	Towill Inc. under contract to USACE	-
August 2011	Airborne LiDAR	USACE JALBTCX	-
July 18 to 23, 2015	Airborne LiDAR	USACE JALBTCX	-
July 18 to 21, 2016	Airborne LiDAR	Dewberry under contract USGS	Strong El Niño during winter of 2015-16

3. Methods

The original shoreline change analysis (Moffatt & Nichols Engineers, 1991) documented changes in the distance of the shoreline to fixed baselines along a series of reference stations on both spits from 1948 to 1990 (**Figure 4**). Each reference station was represented by 5 analysis lines, spaced fifty feet apart, in order to reduce the effects of transitory changes in small scale geomorphic features (e.g., cusps) on the analysis. There were 7 reference stations for the South Spit, 9 reference stations for the North Spit, and separate baselines for each spit. It should be noted that the 1948 to 1990 shoreline positions were not readily available in GIS format, and were not included in the GIS analysis conducted in support of this evaluation. However, the 2007 USACE data analysis recreated the original reference stations in CAD format, and these reference stations were then imported into GIS during the update to the HSMP in 2014.

The 1991 shoreline change analysis determined the shoreline change rates (feet per year) at the 16 reference stations based on the "slope of best fit straight line" for the three time periods described in the **Background** section. This method was then replicated for the eight more recent shorelines (1992 to 2016) by utilizing the USGS Digital Shoreline Analysis (DSAS) tool (Thieler et al., 2017) to compute linear regression rates (LRRs) of shoreline change at the 16 reference stations. The LRRs were computed using the least squares method with a 95% confidence interval (**Table 1**). It should also be noted that the analysis lines were spaced at an interval of 15 meters (49.2 feet), as opposed to 50 feet in the previous analysis, due to the requirement to use metric units in DSAS. However, it is unlikely that this small difference will result in any significant inconsistency with the 1991 analysis.

The LRRs from 1992 to 2016 where then utilized to compute predicted shoreline positions (distances from baseline) along the sixteen reference stations. These computations followed the methods used in previous HSMP data analyses, which are described in detail in USACE (2007). The predicted shoreline positions were then compared to their respective measured shoreline positions, in order to determine if the excessive shoreline retreat criteria were exceeded at any point in time from 1992 to 2016. The results of the analysis based on the 1992 to 2016 shoreline change rates were then compared to analyses based on shoreline change rates from the previous time periods. The results of this comparison was in turn used to formulate a recommendation regarding which time period was the most appropriate to use to establish the shoreline change rates for the excessive shoreline criteria.

Figure 4. Reference stations used in the analysis.

4. Results

The period from 1992 to 2016 was characterized by modest accretion along most of the South Spit, and minor erosion along all of the North Spit (**Table 2**). In general, the magnitude of the shoreline change rates were not as great as those prior to 1990, with a significant decrease in the rates of erosion along the reference stations closest to the North Jetty. For example, at reference station 2N, the shoreline retreated at a rate of just over 22 feet per year from 1974 to 1990 (**Figure 5)** and 1.4 feet per year from 1992 to 2016 (**Figure 6**). This reduction in shoreline change rates also occurred along the South Spit, where the rates of accretion decreased from rates of 4 to 7 feet per year from 1974 to 1990 to 1 to 2.5 feet per year in the most recent time period (**Figures 7 and 8**).

Table 2. Temporal variation in shoreline change rates at the reference stations

Reference Station	1948 to 1974 Rate [ft/yr]	1974 to 1990 Rate [ft/yr]	1992 to 2016 Rate [ft/yr]
7S	-	-5.4	-0.2
6S	-	6.8	2.6
5S	0.9	4.5	2.0
4S	-3.9	4.9	1.3
3S	0.2	7.1	0.8
2S	2.7	7.4	0.9
1S	-0.8	5.5	2.5
1N	12.3	-18.9	-1.2
1B	-1.5	-13.4	-1.7
1C	-0.5	-18.7	-3.1
2N	3.5	-22.3	-1.4
3N	9.2	-16.7	-1.9
4N	-1.2	-5.4	-2.0
5N	4.6	-5.2	-1.3
6N	8.6	-3.5	-0.1
7N	2.2	1.9	-0.3

The excessive shoreline retreat criteria computations based on rates from three time periods (1948 to 1974, 1974 to 1990, and 1992 to 2016) are presented in **Tables 3 to 5**, and summarized in **Table 6**. If the rates from 1948 to 1974 were used to determine the criteria, then there would be excessive shoreline retreat (as of 2016) at several reference stations along the North Spit. In contrast, the relatively high rates of shoreline retreat from 1974 to 1990 yield a considerably further inland predicted shoreline position, which results in the 2016 shoreline position not exceeding the criteria at any reference stations. In the case of 1992 to 2016 rates, the excessive shoreline retreat criteria would be exceeded at one reference station (1C) on the North Spit (**Figure 8**).

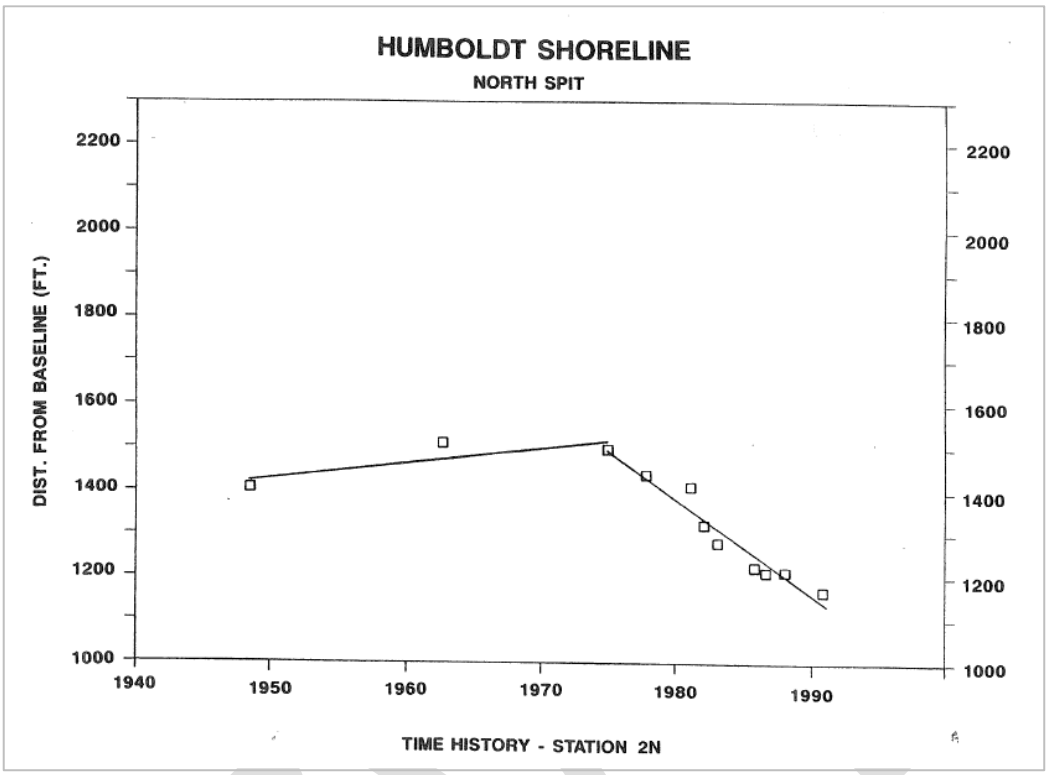


Figure 5. Time history of distance from baseline measurements (feet) and shoreline change rates at Reference Station 2N from 1948 to 1990 (from Moffatt & Nichol Engineers, 1991).

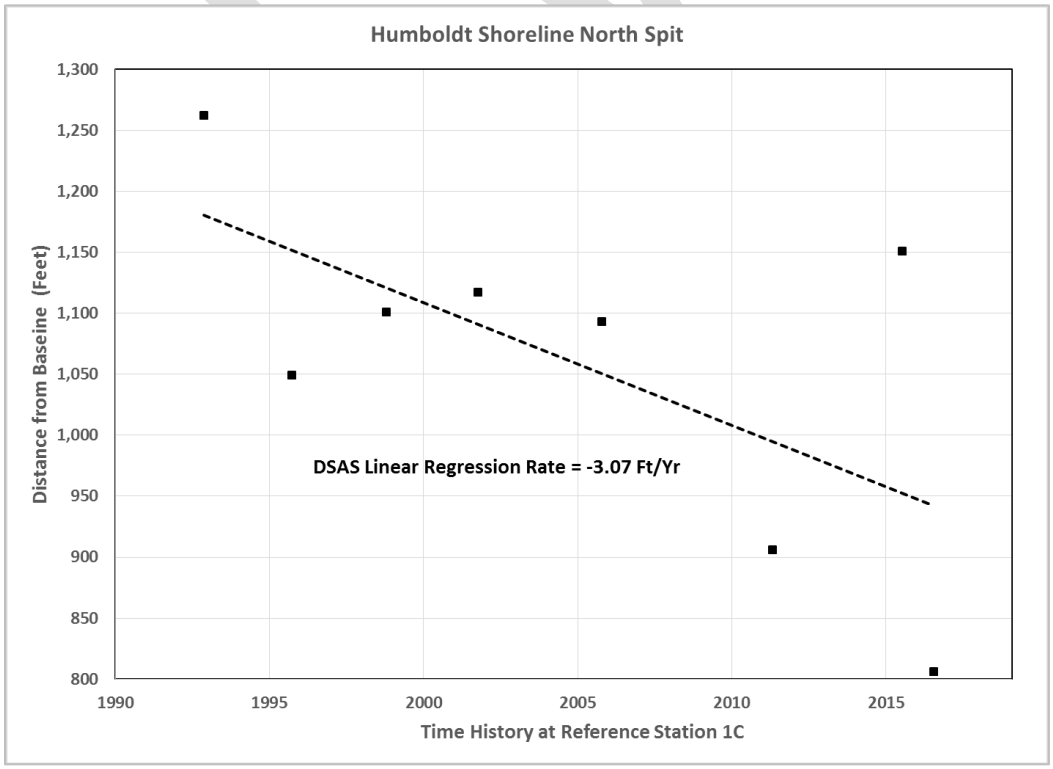


Figure 6. Time history of distance from baseline measurements (feet) and shoreline change rates at Reference Station 2N from 1992 to 2016.

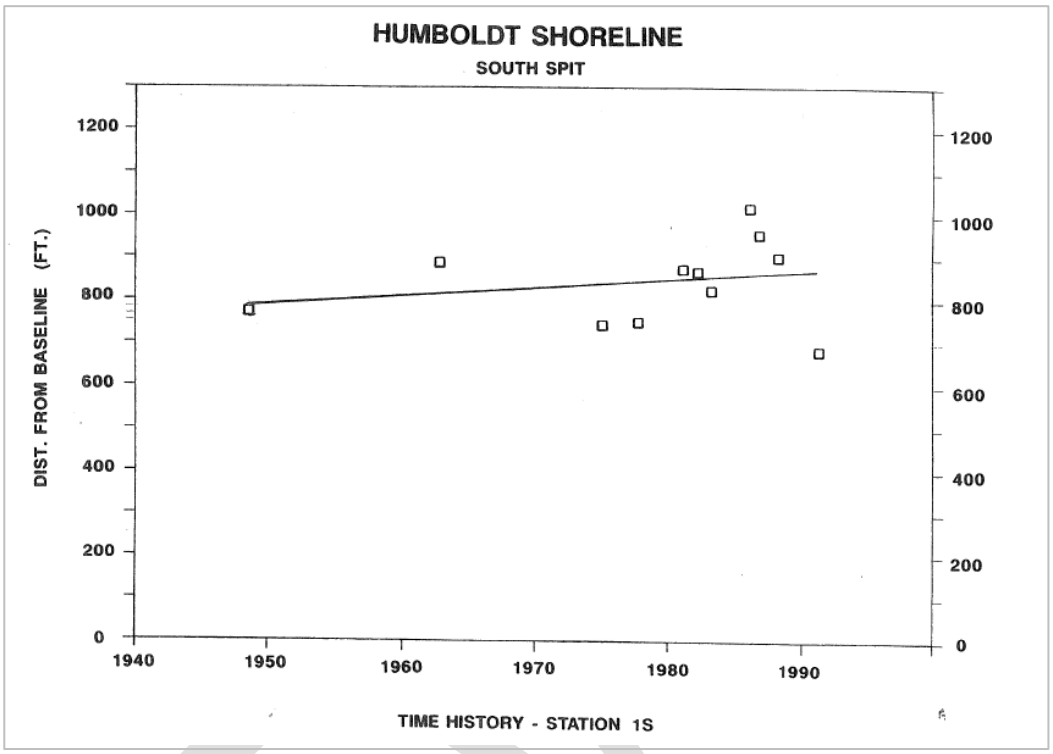


Figure 7. Time history of distance from baseline measurements (feet) and shoreline change rates at Reference Station 1S from 1948 to 1990 (from Moffatt & Nichol Engineers, 1991).

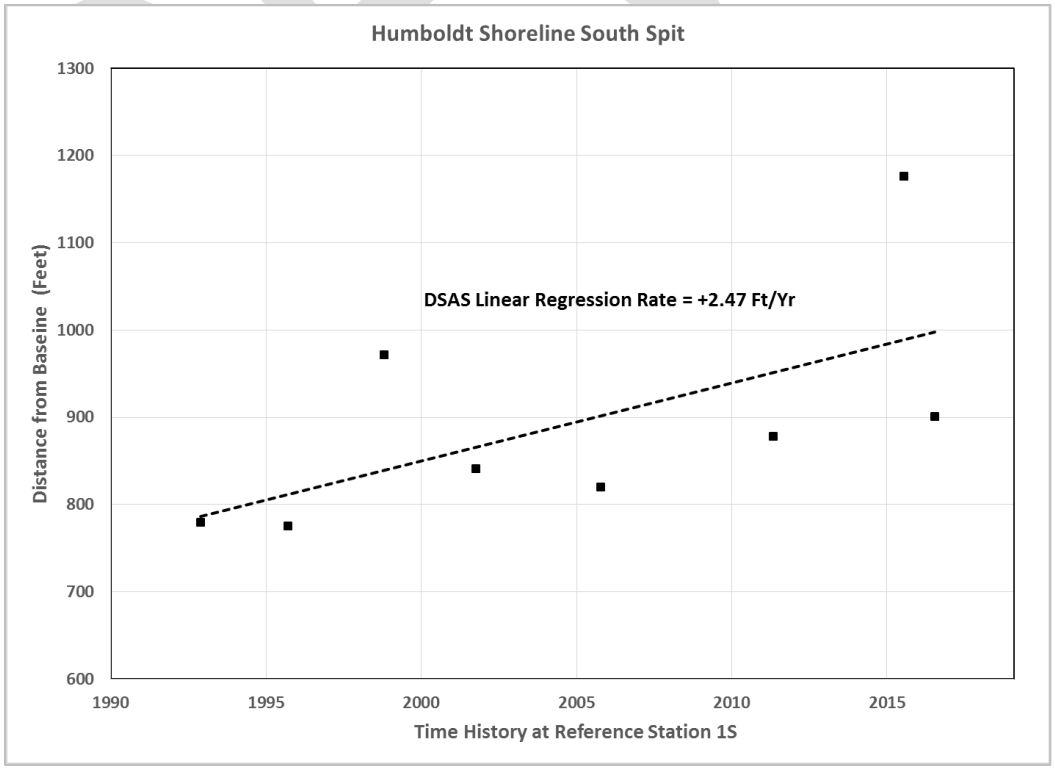


Figure 8. Time history of distance from baseline measurements (feet) and shoreline change rates at Reference Station 1S from 1992 to 2016.

Table 3. Excessive shoreline retreat criterion calculations for 2016 using the 1948 to 1974 rate

Ref. Sta.	1990 Wetted Bound [ft]	48-74 Rate [ft/yr]	Years [1990 to 2016]	Sub-Total [ft]	Error Factor [ft]	2016 Trend Line [ft]	2016 8 ft NGVD Line [ft]	Adj. Factor [ft]	Diff [ft]
7S	947	-	26	-	-120	687	1,207	178	-
6S	1,098	-	26	-	-120	1,155	1,226	40	-
5S	846	0.9	26	23.4	-120	843	963	43	256
4S	593	-3.9	26	-101.4	-120	600	768	18	414
3S	501	0.2	26	5.2	-120	566	543	88	245
2S	559	2.7	26	70.2	-120	631	650	95	236
1S	837	-0.8	26	-20.8	-120	860	901	137	342
1N	***1,865***	***12.3***	***26***	***319.8***	***-120***	***1,254***	***1,683***	***173***	***-209***
1B	1,312	-1.5	26	-39.0	-120	844	1,052	141	40
1C	***1,321***	***-0.5***	***26***	***-13.0***	***-120***	***715***	***806***	***139***	***-243***
2N	1,167	3.5	26	91.0	-120	467	1,061	88	11
3N	***803***	***9.2***	***26***	***239.2***	***-120***	***249***	***651***	***95***	***-176***
4N	675	-1.2	26	-31.2	-120	415	476	54	6
5N	***626***	***4.6***	***26***	***119.6***	***-120***	***371***	***458***	*77*	***-90***
6N	***631***	***8.6***	***26***	***223.6***	***-120***	***420***	***519***	***149***	***-67***
7N	730	2.2	26	57.2	-120	659	621	148	102

Table 4. Excessive shoreline retreat criterion calculations for 2016 using the 1974 to 1990 rate

Ref. Sta.	1990 Wetted Bound [ft]	74-90 Rate [ft/yr]	Years [1990 to 2016]	Sub-Total [ft]	Error Factor [ft]	2016 Trend Line [ft]	2016 8 ft NGVD Line [ft]	Adj. Factor [ft]	Diff [ft]
7S	947	-5.4	26	-140.4	-120	687	1,207	178	699
6S	1,098	6.8	26	176.8	-120	1,155	1,226	40	111
5S	846	4.5	26	117.0	-120	843	963	43	163
4S	593	4.9	26	127.4	-120	600	768	18	186
3S	501	7.1	26	184.6	-120	566	543	88	66
2S	559	7.4	26	192.4	-120	631	650	95	114
1S	837	5.5	26	143.0	-120	860	901	137	178
1N	1,865	-18.9	26	-491.4	-120	1,254	1,683	173	602
1B	1,312	-13.4	26	-348.4	-120	844	1,052	141	349
1C	1,321	-18.7	26	-486.2	-120	715	806	139	230
2N	1,167	-22.3	26	-579.8	-120	467	1,061	88	681
3N	803	-16.7	26	-434.2	-120	249	651	95	497
4N	675	-5.4	26	-140.4	-120	415	476	54	115
5N	626	-5.2	26	-135.2	-120	371	458	77	164
6N	631	-3.5	26	-91.0	-120	420	519	149	248
7N	730	1.9	26	49.4	-120	659	621	148	109

Table 5. Excessive shoreline retreat criterion calculations for using the 1992 to 2016 rate

Ref. Sta.	1990 Wetted Bound [ft]	92-16 Rate [ft/yr]	Years [1990 to 2016]	Sub-Total [ft]	Error Factor [ft]	2016 Trend Line [ft]	2016 8 ft NGVD Line [ft]	Adj. Factor [ft]	Diff [ft]
7S	947	-0.2	26	-4.6	-120	822	1,207	178	563
6S	1,098	2.6	26	68.5	-120	1,047	1,226	40	219
5S	846	2.0	26	52.4	-120	778	963	43	227
4S	593	1.3	26	33.4	-120	506	768	18	280
3S	501	0.8	26	21.5	-120	402	543	88	229
2S	559	0.9	26	22.7	-120	462	650	95	283
1S	837	2.5	26	64.2	-120	781	901	137	257
1N	1,865	-1.2	26	-31.4	-120	1,714	1,683	173	142
1B	1,312	-1.7	26	-45.3	-120	1,147	1,052	141	46
1C	***1,321***	***-3.1***	***26***	***-79.7***	***-120***	***1,121***	***806***	***139***	***-176***
2N	1,167	-1.4	26	-37.5	-120	1,009	1,061	88	139
3N	803	-1.9	26	-48.7	-120	634	651	95	111
4N	675	-2.0	26	-52.3	-120	503	476	54	27
5N	626	-1.3	26	-35.0	-120	471	458	77	64
6N	631	-0.1	26	-3.3	-120	508	519	149	160
7N	730	-0.3	26	-6.7	-120	603	621	148	165

Table 6. Scenarios of excessive shoreline retreat criteria for different shoreline retreat rates.

Reference Station	1948 to 1974 Rate	1974 to 1990 Rate	1948 to 1990 Rate	1992 to 2016 Rate
7S	-	Pass	Pass	Pass
6S	-	Pass	Pass	Pass
5S	Pass	Pass	Pass	Pass
4S	Pass	Pass	Pass	Pass
3S	Pass	Pass	Pass	Pass
2S	Pass	Pass	Pass	Pass
1S	Pass	Pass	Pass	Pass
1N	Fail	Pass	Pass	Pass
1B	Pass	Pass	Pass	Pass
1C	Fail	Pass	Fail	Fail
2N	Pass	Pass	Pass	Pass
3N	Fail	Pass	Pass	Pass
4N	Pass	Pass	Pass	Pass
5N	Fail	Pass	Fail	Pass
6N	Fail	Pass	Pass	Pass
7N	Pass	Pass	Pass	Pass

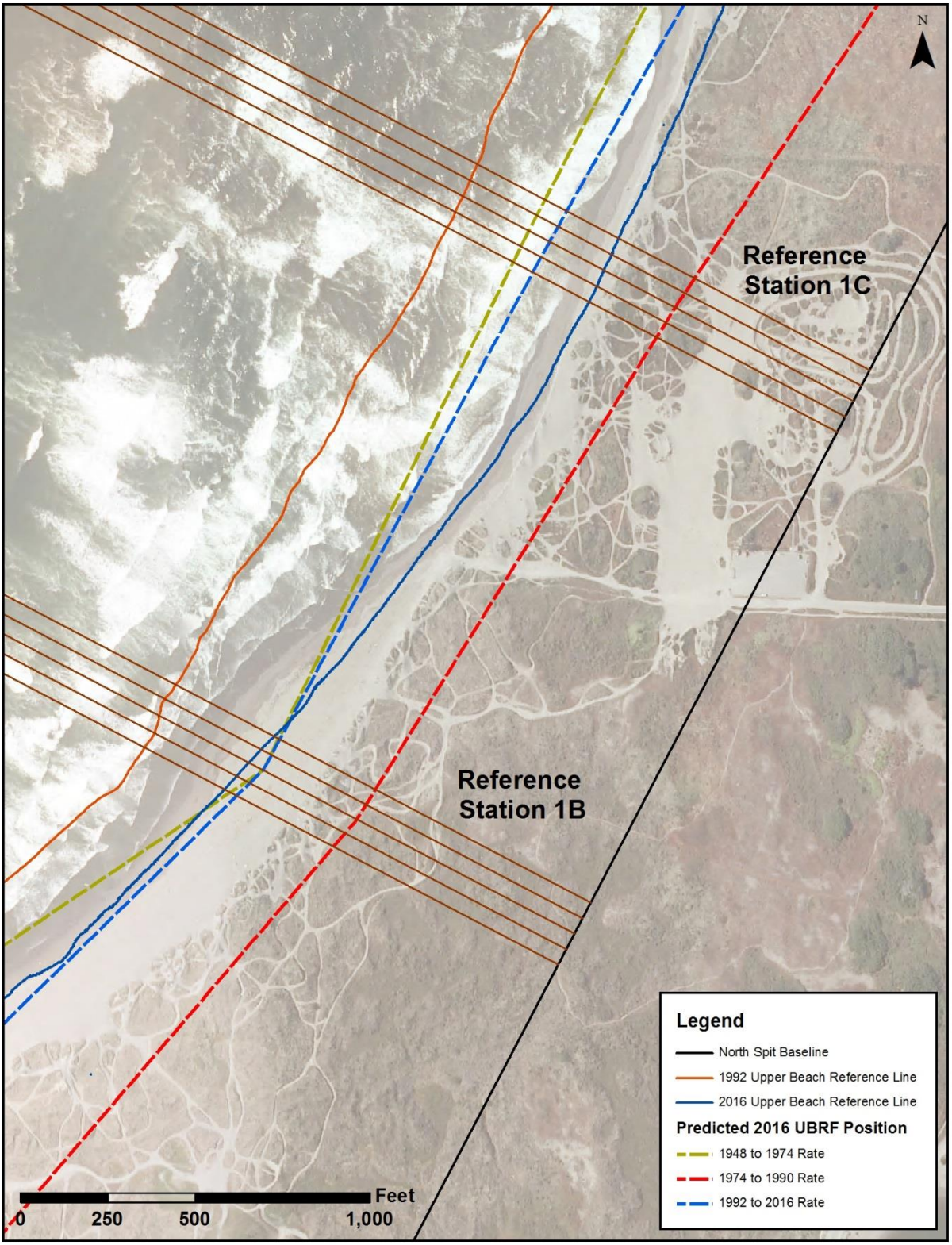


Figure 8: Comparison of upper beach reference lines (shorelines) from 1992 and 2016, and predicted positions of the shoreline using different change rates.

Discussion of Results

The intent of this analysis is to determine if the excessive shoreline retreat criteria, as determined by the 1974 to 1990 shoreline change rate, provides an accurate representation of baseline conditions. The results strongly suggest that conditions along the North Spit were exceptionally erosive from 1974 to 1990, when compared to rates from both 1948 to 1974 and 1992 to 2016. In addition, the South Spit experienced significant accretion from 1974 to 1990, as opposed to relatively little change in shoreline position in the two other time periods. The combination of anomalous erosion and accretion rates on the respective spits during 1974 to 1990 suggest there was a change in environmental conditions specific to this time period that forced the observed shoreline response.

There are a number of environmental factors that could impact sediment supply, transport, and the response of local beaches. These include storm wave activity, precipitation in contributing watersheds, and human activities such as dredging and construction/maintenance of coastal structures (Moffatt & Nichol Engineers, 1991). A detailed statistical analysis of the impacts of these different factors on shoreline response along both jetties is beyond the scope of this evaluation. However, the following discussion offers a hypothesis based on a qualitative assessment and engineering judgment in order to inform a recommendation regarding the excessive shoreline retreat criteria.

In the case of the California coast, increased storminess is often associated with strong El Niño conditions in the eastern Pacific, where anomalously warm water tends to temporarily increase the sea level and strengthen Pacific storm systems with additional energy. These stronger (and often more frequent) storms then produce large waves, the effects of which on beach erosion are often exacerbated by elevated sea levels (Flick, 1998). There were several strong El Niño events throughout all three periods considered in the analysis (1972-73, 1982-83, 1997-98), so it is unlikely that strong El Niño conditions can completely account for the exceptionally erosive conditions along the North Spit from 1974 to 1990.

Large floods can also deliver significant quantities of sand to the coast, and often serve as the key source of sand for the maintenance of beaches. The largest single nearby source of sand is the Eel River, which is located 10 miles to the south of the entrance to Humboldt Bay, and delivers an estimated 2 million cubic yards (cy) of sand annually to the coast (Ritter, 1972). It has been hypothesized that sand delivered by the Eel River is periodically transported to the north along the South Spit toward Humboldt Bay Entrance, the South Jetty, and Bar and Entrance Channel (Madalon and Kendall, 1993; Winkelman, et al., 1999). A significant portion of this sand is trapped in the Bar and Entrance Channel, where it is then removed (via dredging) and placed at HOODS (USACE, 2007).

As in the case of the El Niño events, there were a number of large flows on the Eel River throughout all three time period, with no clear trends of larger or smaller peak flows from 1974 to 1990 (USGS, 2017b). The greatest peak flow occurred in December 1964, and most of the reference stations experienced relatively little shoreline change from 1962 to 1974, with the period of increased accretion on the South Spit occurring nearly a decade after this large flow.

Thus, it is unlikely that the higher rate of accretion along the South Spit from 1974 to 1990 can be accounted for by changes (increases) in sediment delivery from the Eel River.

However, there was one significant change in environmental conditions in the early 1970s, when USACE repaired the trunk and head sections of both the North and South Jetties (USACE, 1970). The repairs to the trunk sections included the placement of several thousand 10 to 14 ton armor stones on the North Jetty, and repair of the caps on both jetties. The repairs to head sections included restoration of the concrete monoliths and placement of a couple of thousand 42 ton dolosse in two layers around the monoliths (**Figure 9** to **Figure 11**). As a result, it is hypothesized that these repairs fortified the barrier presented by the jetties to alongshore sediment transport resulting in excessive deposition of sand along the South Spit and in the Entrance Channel. This deposition then effectively removed a significant portion of sand from the littoral sand budget, which resulted in a long-term net sand deficit and observed increased erosion rates along the North Spit.

While there have been a number of engineering studies (including modeling) in the project area, they have primarily focused on the performance of the jetties (USACE, 1970), sedimentation rates in the Entrance Channel (Humboldt Harbor District and USACE, 1995), and sedimentation and erosion within Humboldt Bay (Evans, 1994). Thus, the author of this report was not able to find a record of an engineering study that explicitly addressed the impacts of the early 1970s jetty repair on shoreline change rates. However, the above hypothesis is consistent with the well documented scientific understanding that shore perpendicular structures (such as jetties), when combined with a dredged inlet, can disrupt alongshore transport resulting in a net sediment deficit and erosion of "downdrift" beaches (USACE, 2008).

Insert DoC discussion here… Depth of Closure – the depth beyond which net sediment transport is very small or nonexistent.
DoCs at Humboldt (Brutsché et al., 2016).
Depth near jetty heads – ranges from xx to xx feet (see eTrac, 2017)

The regression of the more recent shoreline change rates (1992 to 2016) toward the rates prior to the jetty repairs (1948 to 1974) further indicate that there was a distinct period of shoreline adjustment to the jetty repairs in the mid-1970s to the late-1980s. While the increased erosion rates along the North Spit in the 1980s may have been exacerbated by the strong El Niño event of 1982-83, it is likely the that the jetty repairs served as the primary factor in driving the increased erosion rates. As a result, the period from 1974 to 1990 represents an adjustment of the shoreline to an unnatural change to the sediment supply and budget, and is not representative of the natural baseline condition

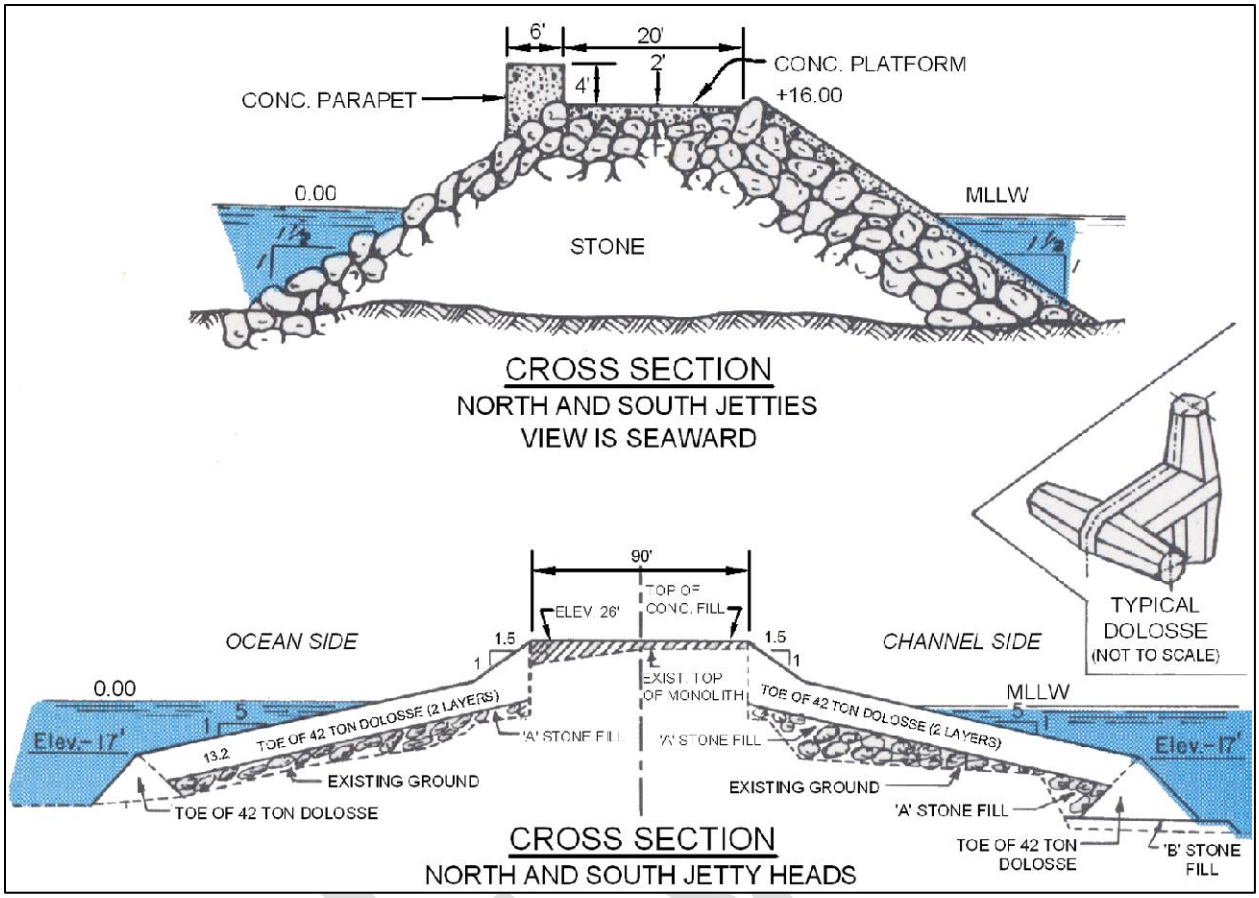


Figure 9: Typical cross sections of the jetties including the head sections that were repaired in the early 1970s.

Figure 10: View from the head section of the North Jetty toward the shoreline (August 2016). This area was extensively repaired in the early 1970s. Note the extensive coverage of 42 dolosse and high crest elevation.

Figure 11: View from the head section of the South Jetty toward the shoreline (August 2016). This area was extensively repaired in the early 1970s. Note the extensive coverage of 42 dolosse and high crest elevation.

5. Conclusions and Recommendations

The analysis of past and recent shoreline change strongly suggests that increased shoreline change rates from 1974 to 1990 represent a response to the rehabilitation of the Humboldt Harbor jetties in the early 1970s. This rehabilitation fortified the barrier to the vast majority of alongshore sediment transport between the North and South Spits, which resulted in a significant increase in erosion in the North Spit. As a result, the very high erosion rates observed along the North Spit are not representative of natural background conditions, and should not serve as a baseline against which to compare post-HOODS shoreline change.

Given the impacts of jetty rehabilitation on observed shoreline changes from 1974 to 1990, it is recommended that the excessive shoreline retreat criteria should be based on the 1948 to 1974 shoreline rates, as this best represents pre-HOODs baseline conditions. As such, the criteria based on the 1948 to 1974 rates indicate that there has been excessive shoreline retreat at several reference stations along the North Spit since the designation of HOODS. As a result, it is recommended that USACE evaluate the feasibility of placement of dredged sand on North Spit beaches or in the adjacent nearshore to mitigate for the effects of removal of sand from the littoral zone.

6. References

Brutsché, K. E.; Rosati, J. III; Pollock, C.E. and B. C. McFall (2016). Calculating depth of closure using WIS Hindcast Data, *ERDC/CHL CHETN-VI-45*, March 2016.

eTrac, Inc. (2017). *Humboldt Jetties and Entrance Channel Survey*, performed for USACE San Francisco District, December 2017.

Evans Jr., R.A. (1994). *Humboldt Bay Numerical Hydrodynamics and Sedimentation Study*, U.S. Army Corps of Engineers, Waterways Experiment Station, Miscellaneous Paper HL-94-2, July,1994.

Flick, R. E. (1998). Comparison of California tides, storm surges, and mean sea level during the El Niño winters of 1982–83 and 1997–98, *Shore and Beach*, v. 66, no. 3, p. 7–11.

Madalon, L. J., Jr. and T. R. Kendall (1993). Dependence of shoreline change on channel dredge material disposal practices, Humboldt Bay, CA - a case study. *Eighth Symposium on Coastal and Ocean Management (World Meeting Number 933 5003)*. New Orleans, LA (USA).

Humboldt Bay Harbor, Recreation, and Conservation District, and USACE (1995). *Final Feasibility Report for Navigation Improvements: Humboldt Harbor and Bay (Deepening), Appendices*, April 1995.

Moffatt & Nichol Engineers (1991). *Shoreline mapping Pacific Coast near entrance to Humboldt Bay, California*, Moffatt & Nichol Engineers, San Francisco, CA, 1 August 1991.

National Oceanic and Atmospheric Administration (2017). *Historical El Niño and La Niña Episodes (1950 to Present.* Available from: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

Ritter, J.R. (1972). *Sand Transport by the Eel River and its Effect on Nearby Beaches*. USGS Open File Report 1973-0236: https://pubs.usgs.gov/of/1973/0236/report.pdf

Thieler, E.R., Himmelstoss, E.A., Zichichi, J.L., and A. Ergul, (2017). *Digital Shoreline Analysis System (DSAS) version 4.0- An ArcGIS extension for calculating shoreline change: U.S. Geological Survey Open-File Report 2008-1278*, https://pubs.er.usgs.gov/publication/ofr20081278

Towill, Inc. (2012). *CEPD Corrective Actions, Samoa and Fields Landing Water Level Stations*, Contract Number: W912P7-10-D-0001.

United States Army Corps of Engineers (1970). *Brief Design Memorandum: Repairs to Humboldt Harbor and Bay Jetties, Humboldt County, California*. U.S. Army Engineer District, San Francisco, January 1970.

United States Army Corps of Engineers (1986). *Comprehensive Condition Survey: North and South Jetties, Humboldt Harbor, Humboldt County, CA*

United States Army Corps of Engineers (1995). *Draft Humboldt dredging memorandum of agreement, US Army Engineer District San Francisco, CA,* 5 July 1995.

United States Army Corps of Engineers (2007). *Humboldt Shoreline Monitoring Analysis of Data, 1992 through 2005.* Submitted to CESPN-PM-B on 30 January 2007.

United States Army Corps of Engineers (2008). Part 5, Chapter 6: Sediment Management at Inlets, *Coastal Engineering Manual, EM 1110-2-1100,* 1 August 20008.

United States Army Corps of Engineers (2012). *Five-Year Programmatic Environmental Assessment, 404(b) (1) Analysis, and FONSI: Humboldt Harbor and Bay Operations and Maintenance Dredging (FY 2012-2016),* April 2012.

United States Army Corps of Engineers (2013). *Joint Airborne Lidar Bathymetry Center of Expertise, National Coastal Mapping Program (2013).* Data delivered to USACE San Francisco District on 22 July 2013, "NCMP read me.txt" file available from in-house GIS server.

United States Army Corps of Engineers (2014). *Humboldt Shoreline Monitoring Data Analysis, 2014 Update*. Submitted to CESPN-PM and CESPN-ET-PA in February 2014.

United States Army Corps of Engineers (2016a). *Humboldt Shoreline Monitoring Data Analysis, 2016 Update*. Submitted to CESPN-PM and CESPN-ET-PA in April 2016.

United States Army Corps of Engineers (2016b). *Joint Airborne Lidar Bathymetry Center of Expertise, National Coastal Mapping Program (2016).* Data delivered to USACE San Francisco District on 24 March 2016.

United States Army Corps of Engineers (2017). *Humboldt Shoreline Monitoring Data Analysis, Post 2015-16 El Niño Update*. Submitted in February 2017.

United States Geological Survey (2017a). *West Coast El Nino UTM 10 2016, Project Metadata from XML File*. Delivered to USACE San Francisco District on 23 January 2017.

United States Geological Survey (2017b*). National Water Information System: Peak Stream flow for the Nation, USGS 11477000 Eel River at Scotia CA*: https://nwis.waterdata.usgs.gov/usa/nwis/peak/?site_no=11477000

Winkelman, J.W., D. Schaaf, and T.R. Kendall (1999). Humboldt beach and dune monitoring, in *Proceedings Sand Rights '99 Bringing Back the Beaches,* 23-26 September 1999 at Ventura, CA, edited by L. Ewing, O.T. Magoon, and S. Robertson, *American Society of Civil Engineers*, Reston, VA, pp. 176-190.

APPENDIX E: SPECIES LISTS

==========

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

Document number: 808653797-174454

==========

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 which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

From: Matt Goldsworthy - NOAA Federal matt.goldsworthy@noaa.gov
To: Campbell, Elizabeth A CIV USARMY CESPN (USA)
Elizabeth.A.Campbell@usace.army.mil

Good Morning Beth: I typically handle all of the ESA and EFH consultations for all Projects in Humboldt Bay for NOAA/NMFS- so you found the correct person. The automated species list generator is not the most useful- especially when a quad overlaps with the ocean. I am guessing you are scoping for dredging the bay and entrance and perhaps disposal at HOODS. The species and critical habitats are similar inside and outside the bay- but outside the bay there is not critical habitat for any of the salmonids (just potential exposure of individuals outside the bay). Is the Corps preparing to (re)initiate the consultation soon? I am trying to scope what kind of work lies ahead for me, as there is a lot going on!

For within Humboldt Bay:
ESA: Southern Oregon/Northern California Coast (SONCC) coho salmon individuals and designated critical habitat; California Coast (CC) Chinook salmon individuals and designated critical habitat; Northern California (NC) steelhead individuals and designated critical habitat; Southern Distinct Population Segment (SDPS) North American green sturgeon individuals and designated critical habitat. (no Pacific eulachon critical habitat in the bay and no individuals)
MSA/EFH: Pacific Coast Groundfish FMP; Pacific Coast Salmon FMP; Coastal Pelagic Species FMP

For Disposal at HOODS:
ESA: Southern Distinct Population Segment (SDPS) North American green sturgeon individuals and designated critical habitat; Southern Oregon/Northern California Coast (SONCC) coho salmon individuals; California Coast (CC) Chinook salmon individuals; Northern California (NC) steelhead individuals. (no salmonid critical habitat outside the bay- no Pacific eulachon critical habitat- green sturgeon critical habitat extends to the 50-fathom contour line)
MSA/EFH: Pacific Coast Groundfish FMP; Pacific Coast Salmon FMP; Coastal Pelagic Species FMP

Hope you are all well!

Matt

On Thu, Mar 11, 2021 at 9:41 AM Campbell, Elizabeth A CIV USARMY CESPN (USA) <Elizabeth.A.Campbell@usace.army.mil> wrote:

Hey Matt:

I just contacted the NMFS Santa Rosa Office as I have tried multiple times without success to obtain an updated species list for our Humboldt Bay dredging through the automated process. They told me the automated process is not working right now and is taking longer than expected to fix. I was told to contact the Arcata office directly for a species list. I am forwarding the email from the automated process; we need info on two quads, Eureka and Fields Landing. Can you please assist? I am not sure who to contact up there. Thanks!

Beth

Elizabeth A. Campbell, Ph.D.

Regional Fishery Biologist

U.S. Army Corps of Engineers

San Francisco District (SPN)

450 Golden Gate Avenue, 4th Floor

San Francisco, CA 94102

415-503-6845

From: Campbell, Elizabeth A CIV USARMY CESPN (USA)
Sent: Wednesday, March 10, 2021 1:43 PM
To: nmfswcrca.specieslist@noaa.gov

Subject: U.S. Army Corps of Engineers, Humboldt Harbor and Bay Operations and Maintenance Dredging (FY2021-25)

Quad Name Eureka

Quad Number 40124-G2

ESA Anadromous Fish

SONCC Coho ESU (T) - X

CCC Coho ESU (E) -

CC Chinook Salmon ESU (T) - X

CVSR Chinook Salmon ESU (T) -

SRWR Chinook Salmon ESU (E) -

NC Steelhead DPS (T) - X

CCC Steelhead DPS (T) -

SCCC Steelhead DPS (T) -

SC Steelhead DPS (E) -

CCV Steelhead DPS (T) -

Eulachon (T) -

sDPS Green Sturgeon (T) - X

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat - X

CCC Coho Critical Habitat -

CC Chinook Salmon Critical Habitat - X

CVSR Chinook Salmon Critical Habitat -

SRWR Chinook Salmon Critical Habitat -

NC Steelhead Critical Habitat - X

CCC Steelhead Critical Habitat -

SCCC Steelhead Critical Habitat -

SC Steelhead Critical Habitat -

CCV Steelhead Critical Habitat -

Eulachon Critical Habitat -

sDPS Green Sturgeon Critical Habitat - X

ESA Marine Invertebrates

Range Black Abalone (E) -

Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) - X

Olive Ridley Sea Turtle (T/E) - X

Leatherback Sea Turtle (E) - X

North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) - X

Fin Whale (E) - X

Humpback Whale (E) - X

Southern Resident Killer Whale (E) - X

North Pacific Right Whale (E) - X

Sei Whale (E) - X

Sperm Whale (E) - X

ESA Pinnipeds

Guadalupe Fur Seal (T) -

Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH - X

Chinook Salmon EFH - X

Groundfish EFH - X

Coastal Pelagics EFH - X

Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office

562-980-4000

MMPA Cetaceans - X

MMPA Pinnipeds - X

Quad Name Fields Landing

Quad Number 40124-F2

ESA Anadromous Fish

SONCC Coho ESU (T) - X

CCC Coho ESU (E) -

CC Chinook Salmon ESU (T) - X

CVSR Chinook Salmon ESU (T) -

SRWR Chinook Salmon ESU (E) -

NC Steelhead DPS (T) - X

CCC Steelhead DPS (T) -

SCCC Steelhead DPS (T) -

SC Steelhead DPS (E) -

CCV Steelhead DPS (T) -

Eulachon (T) -

sDPS Green Sturgeon (T) - X

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat - X

CCC Coho Critical Habitat -

CC Chinook Salmon Critical Habitat - X

CVSR Chinook Salmon Critical Habitat -

SRWR Chinook Salmon Critical Habitat -

NC Steelhead Critical Habitat - X

CCC Steelhead Critical Habitat -

SCCC Steelhead Critical Habitat -

SC Steelhead Critical Habitat -

CCV Steelhead Critical Habitat -

Eulachon Critical Habitat -

sDPS Green Sturgeon Critical Habitat - X

ESA Marine Invertebrates

Range Black Abalone (E) -

Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) - X

Olive Ridley Sea Turtle (T/E) - X

Leatherback Sea Turtle (E) - X

North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) - X

Fin Whale (E) - X

Humpback Whale (E) - X

Southern Resident Killer Whale (E) - X

North Pacific Right Whale (E) - X

Sei Whale (E) - X

Sperm Whale (E) - X

ESA Pinnipeds

Guadalupe Fur Seal (T) -

Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH - X

Chinook Salmon EFH - X

Groundfish EFH - X

Coastal Pelagics EFH - X

Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office

562-980-4000

MMPA Cetaceans - X

MMPA Pinnipeds - X

Agency

U.S. Army Corps of Engineers

San Francisco District (SPN)

450 Golden Gate Avenue, 4th Floor

San Francisco, CA 94102

Contact:

Elizabeth A. Campbell

Elizabeth.a.campbell@usace.army.mil

415-503-6845

_____

Matt Goldsworthy
Fisheries Biologist
National Marine Fisheries Service
(707) 357-1338 (cell only)

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. Sandbags.
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 AND REVIEWERS

For further information regarding this document, contact:

Preparer: Mark J. Wiechmann, Ph.D.
Physical Scientist
U.S. Army Corps of Engineers, San Francisco District
450 Golden Gate Ave., 4th Floor
San Francisco, CA 94102
SPNETPB@usace.army.mil

Preparer: Beth Campbell
Fishery Biologist
U.S. Army Corps of Engineers, San Francisco District
450 Golden Gate Ave., 4th Floor
San Francisco, CA 94102
SPNETPB@usace.army.mil

Reviewer: Chris Eng
Environmental Planner
U.S. Army Corps of Engineers, San Francisco District
450 Golden Gate Ave., 4th Floor
San Francisco, CA 94102
SPNETPA@usace.army.mil

Reviewer: Tessa E. Beach, Ph.D.
Chief, Environmental Section
U.S. Army Corps of Engineers, San Francisco District
450 Golden Gate Ave., 4th Floor
San Francisco, CA 94102
SPNETPA@usace.army.mil

APPENDIX H: AGENCY/PUBLIC COMMENTS AND USACE RESPONSES