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2015 National Ocean Dumping Site Monitoring Assessment Report

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2015 National
Site Monitoring Assessment Report
EPA Ocean Dumping Management Program

Executive Summary

The Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the United States Ocean Dumping Act, regulates the transportation and dumping of any material into ocean waters. Under the MPRSA, the U.S. Environmental Protection Agency (EPA) is responsible for designating and managing all ocean disposal sites used for the permitted disposal of materials. EPA is also responsible for issuing ocean dumping permits for the disposal of material apart from dredged materials. For dredged material, the U.S. Army Corps of Engineers (USACE) is responsible for issuing ocean dumping permits using EPA's environmental criteria. These permits are subject to EPA review and written concurrence. EPA, together with USACE, develops site management and monitoring plans (SMMPs) for each site designated for the disposal of dredged material. EPA management and monitoring of these ocean sites ensures that disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities.

In Fiscal Year (FY) 2015, EPA managed 98 designated ocean disposal sites off the U.S. Atlantic, Gulf of Mexico, and Pacific Coasts; and near Puerto Rico, Hawaii, Guam, and American Samoa. EPA monitored nine of the 98 designated ocean disposal sites in FY 2015. EPA also conducted monitoring surveys along the central coast of Texas to determine if the 2014 Texas City "Y" oil spill adversely impacted designated disposal sites, reference areas, and an area where, in the future, EPA may consider designating a new ocean disposal site. Additionally, EPA collected data to support the development of new monitoring methods and techniques for the Historic Area Remediation Site (HARS) as well as new tools for the evaluation of dredged material proposed for ocean disposal in the western Gulf of Mexico. This National Ocean Dumping Site Monitoring Assessment Report provides a comprehensive overview of EPA's FY 2015 monitoring activities conducted in six of the seven EPA coastal Regions:

- Massachusetts Bay Disposal Site, Massachusetts (Region 1)
- HARS, New Jersey (Region 2)
- Norfolk Ocean Dredged Material Disposal Site (ODMDS), Virginia (Region 3)
- Brunswick Harbor, Georgia ODMDS (Region 4)
- Fernandina Beach, Florida ODMDS (Region 4)
- Corpus Christi Ship Channel ODMDS and Corpus Christi New Work ODMDS, Texas (Region 6)
- Matagorda Ship Channel, Texas ODMDS and nearby area (Region 6)
- Newport Beach (LA-3) OMDMS, California (Region 9)

Based on the results of these FY 2015 ocean disposal site surveys:

- EPA found that environmentally acceptable conditions have been met and determined that permitted disposal of dredged material under the MPRSA could continue without modifications to site usage at eight of the monitored ocean disposal sites: HARS, Norfolk, Brunswick Harbor, Fernandina Beach, Corpus Christi Ship Channel, Corpus Christi New Work, Matagorda Ship Channel, and LA-3 ODMDSs.
- EPA also used the data collected during these surveys to:
    - Inform the proposal to expand the boundaries of the existing Massachusetts Bay Disposal Site to include a portion of the historical Industrial Waste Site (IWS). This site expansion is a key step in the Massachusetts Bay IWS Restoration

Project, whereby suitable dredged material from a federal navigation project authorized under the MPRSA would be disposed of at an expanded Massachusetts Bay Disposal Site (MBDS), isolating legacy contaminants on the seafloor under a protective layer of dredged material;[1]

- Identify the location of two shipwrecks within the MBDS and establish a 50-meter disposal buffer around the wrecks to avoid impacts to these potential cultural resources during future disposal activities;
- Better understand the ecological succession and variability of rock habitat within the HARS and inform methodologies to be utilized during future studies of the site;
- Inform future studies of the benthic communities in the Norfolk ODMDS;
- Confirm that the SMMP for the Brunswick Harbor ODMDS is effective in ensuring that disposal is not unreasonably degrading or endangering human health, amenities, or the marine environment;
- Confirm that the Fernandina ODMDS is performing as anticipated and inform future studies of the site and surrounding area;
- Confirm that the Corpus Christi Ship Channel, Corpus Christi New Work, and Matagorda Ship Channel ODMDSs were not adversely impacted by the 2014 Texas City “Y” oil spill;
- Inform future monitoring surveys to evaluate the fate and transport of dredged material disposed of at the Corpus Christi Ship Channel ODMDS and identify a reference area that is more suitable for comparison to the material being disposed of at the ODMDS;
- Contribute to a compendium of background tissue values for contaminants of concern that may be used in future disposal permit evaluations in the Western Gulf of Mexico; and
- Confirm that there were no long-term adverse impacts resulting from dredged material disposal at the LA-3 ODMDS.

[1]The Final Rule for the Modification of an Ocean Dredged Material Disposal Site in Massachusetts Bay was published in the Federal Register on May 29, 2018, with an effective date of June 28, 2018 (83 FR 24408).

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ACRONYMS AND ABBREVIATIONS

aRPD	apparent redox potential discontinuity
CFR	Code of Federal Regulations
CTD	conductivity temperature depth (probe)
DDT	dichloro-diphenyl-trichloroethanes
DOC	dissolved organic carbon
EPA	United States Environmental Protection Agency
ERL	effects range-low
ERM	effects range-median
FDA	United States Food and Drug Adminsitration
FH	fish haven
ft	feet
FR	Federal Register
FY	fiscal year
HARS	Historic Area Remediation Site
m	meter
IWS	Industrial Waste Site
MBDS	Massachusetts Bay Dredged Material Diposal Site
MBES	multi-beam echo sounder
MDL	method detection limit
MDS	Mud Dump Site
MPRSA	Marine Protection, Research, and Sanctuaries Act
MRL	method reporting limit
nmi^2	square nautical mile
nmi	nautical mile
NOAA	National Oceanic and Atmospheric Administration
N/S	NOAA Ship
NR	natural reef
ODMDS	ocean dredged material disposal site
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PRA	primary remediation area
PVI	plan view imaging/image
ROV	remotely operated [underwater] vehicle
R/V	research vessel
SMMP	site management and monitoring plan
SPI	sediment profile imaging/image
SQG	sediment quality guideline
SVOC	semi-volatile organic compounds
TBT	tributyl tins
TDL	target detection limit
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
USC	U.S. Code

1.0 Introduction

The Marine Protection, Research, and Sanctuaries Act (MPRSA), also known as the Ocean Dumping Act, regulates the disposition of any material into the ocean unless expressly excluded under the MPRSA. The MPRSA prohibits or restricts (primarily in terms of material type, amount, and location) ocean dumping that would adversely affect human health, welfare, or amenities; or the marine environment, ecological systems, or economic potentialities. Section 101 of the MPRSA (33 U.S.C. 1411) generally prohibits the transportation of any material for the purpose of dumping, except as authorized by a permit.

In the United States today, the primary type of material (in terms of volume) disposed of in the ocean is uncontaminated dredged material, which is sediment that is excavated or otherwise removed from our Nation's waterways. The removal of sediment supports a network of coastal ports and harbors which enable myriad commercial, transportation, national defense, and recreational uses. In 2015, this marine transportation network, partially facilitated by the dredging of waterways, contributed more than $65 billion and 454,000 jobs to the U.S. economy (National Ocean Economics Program). Other materials disposed of in the ocean include fish wastes, vessels, marine mammal carcasses, and human remains for burial at sea.

Under the MPRSA, the U.S. Environmental Protection Agency (EPA) establishes environmental criteria for the evaluation of all permit applications. EPA is the permitting authority for the ocean dumping of all materials other than dredged material. In the case of dredged material, the U.S. Army Corps of Engineers (USACE) issues the ocean dumping permits (or, in the case of federal projects, authorizes ocean dumping of dredged material) using EPA's environmental criteria. All MPRSA permits and federal projects involving ocean dumping of dredged material are subject to EPA's review and written concurrence.

EPA establishes the criteria for the designation of ocean disposal sites and is responsible for designating ocean disposal sites under the MPRSA. EPA considers specific criteria (published at 40 CFR 228.5 and 229.6) as part of any site designation evaluation. To minimize the adverse impacts of ocean dumping on human health and the marine environment, EPA designates sites based on environmental studies of the proposed site, environmental studies of regions adjacent to the proposed site, and historical knowledge of the impact of disposal on areas having similar physical, chemical, and biological characteristics. EPA analyzes these impacts through environmental assessments or environmental impact statements. In general, EPA designates sites only in areas where ocean dumping will not have a significant impact on various amenities, such as fisheries, coral reefs, and endangered species.

EPA is also responsible for managing all ocean disposal sites designated under the MPRSA. Management of ocean disposal sites involves:

- regulating the times, quantity, and characteristics of the material dumped at the site;
- establishing disposal controls, conditions, and requirements to minimize potential impacts to the marine environment; and
- monitoring the site and surrounding environment to verify that unanticipated or significant adverse effects are not occurring from historical or continued use of the ocean disposal site and that terms of the MPRSA permit are met.

In Fiscal Year (FY) 2015, EPA Regions managed 98 designated ocean disposal sites off the U.S. Atlantic, Gulf of Mexico, and Pacific Coasts; and near Puerto Rico, Hawaii, Guam, and American Samoa. All but one of the 98 ocean disposal sites are designated for the disposal of

dredged material permitted under the MPRSA. One EPA-designated site, located offshore of American Samoa, is designated for the disposal of fish processing wastes.

All designated dredged material disposal sites are required to have a site management and monitoring plan (SMMP). EPA, in conjunction with USACE, develops an SMMP for each ocean dredged material disposal site. Each SMMP includes, but is not limited to:

- a baseline assessment of site conditions;
- a monitoring program for the site;
- special management conditions or practices to be implemented at the site that are necessary for protection of the environment;
- consideration of the quantity of disposed material and the presence, nature, and bioavailability of the contaminants in the material;
- consideration of the anticipated long-term use of the site; and
- a schedule for review and revision of the SMMP.

1.1 Ocean Disposal Site Monitoring

EPA monitors environmental conditions in and around ocean disposal sites as part of its implementation of the MPRSA. Under the MPRSA and the ocean dumping regulations, EPA uses monitoring data to:

- Evaluate potential ocean disposal sites and designate ocean disposal sites (MPRSA 102(c)(1); 40 CFR 228.4(b), 40 CFR 228.6(a));
- Assess trends in environmental impact (40 CFR 228.9(a)(1));
- Evaluate disposal impact (40 CFR 228.10(a) and (b));
- Modify disposal site use (40 CFR 228.11(a) and (d));
- Prohibit dumping where necessary (MPRSA 102(c)(2)); and
- Develop or update an SMMP for each site (SMMPs must be reviewed and revised at least every ten years (MPRSA 102(c)(3))).

EPA Regional Ocean Dumping Coordinators and Chief Scientists plan and conduct ocean disposal site monitoring surveys using scientifically proven principles and methods to assess the physical, biological, and chemical states of ocean disposal sites and the surrounding marine environment. EPA typically evaluates the environmental impact at a site by comparing current conditions to those at the time of designation (baseline conditions) along with any other historical survey data. For example, EPA may use monitoring information to evaluate movement and deposition of the dumped material to determine whether or how to modify future site use. Reference areas, which are near the disposal site but are not affected by disposed materials, are also used for comparisons to assess the impact from disposal. The quantity and distribution of samples collected in each monitoring survey are determined based on survey- and site-specific factors.

EPA utilizes many different methods to assess the physical, biological, and chemical states of ocean disposal sites, reference areas, and the surrounding marine environment. Those methods include collecting sediment and water samples, sediment plan view images (PVI) (photographs of the surface of the seafloor), sediment profile images (SPI) (photographs of a cross-section of the upper 15 to 20 cm of the sediment-water interface) and/or conducting

benthic trawls. Parameters used to evaluate benthic habitat composition or quality include but are not limited to: sediment grain size distribution, depths of oxygenated sediment and apparent redox potential discontinuity (aRPD) (which indicate habitat quality by measuring interactions between sediment chemistry and biological activity within sediment), and sediment penetrability (Rhoads and Germano, 1982). Benthic community health can be classified using defined successional stages and species diversity. Successional stages at an ocean disposal site can range from stage zero (recently disturbed) to stage three (mature); species diversity is a measure that combines species richness (the number of different species) and evenness (the relative abundance of species) to give an overall indication of community structure.

EPA may also analyze sediment samples for total organic carbon (TOC) and contaminants of concern including metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), pesticides, semi-volatile organic compounds (SVOC), volatile solids, organotins, and/or dioxins and dioxin-like compounds. To evaluate the potential for disposed dredged material to have an impact on the benthic communities at or near disposal sites, EPA commonly compares contaminant concentrations in sediments collected from in and around ocean disposal sites to sediment quality guidelines (SQGs), which are informal benchmarks used to relate chemical concentrations in sediments to the potential toxicity to benthic or aquatic organisms. EPA Regions often rely on the Effects Range Low (ERL) and Effects Range Median (ERM) national SQGs developed by the National Oceanic and Atmospheric Administration (NOAA, 1999) to assess conditions at ocean disposal sites. Chemical concentrations below the NOAA ERL are not likely to cause adverse effects, while chemical concentrations above the NOAA ERM are likely to cause adverse effects. Based upon assessments of contaminants of concern in the sediment, EPA may, among other things, pursue further investigations or management actions.

2.0 Report Objectives

In FY 2015, EPA Chief Scientists conducted surveys at nine designated ocean disposal sites (Figure 1). This national report serves as a comprehensive summary of the activities, findings, conclusions, and actions resulting from these EPA site monitoring efforts.

***Table 1*. Area and depth of ocean disposal sites surveyed in FY 2015.**

Region	Disposal Site	Area (nmi^2)	Depth (ft)
1	Massachusetts Bay Disposal Site (MBDS)	3.1	295-328
2	Historic Area Remediation Site (HARS)	15.7	40-138
3	Norfolk ODMDS	50.0	43-85
4	Brunswick Harbor ODMDS	2.0	24-36
4	Fernandina Beach ODMDS	4.0	37-69
6	Corpus Christi Ship Channel ODMDS	0.5	35-50
6	Corpus Christi New Work ODMDS	1.1	47-55
6	Matagorda Ship Channel ODMDS	0.4	25-40
9	Newport Beach, CA (LA-3) ODMDS	0.8	1,500-1,675

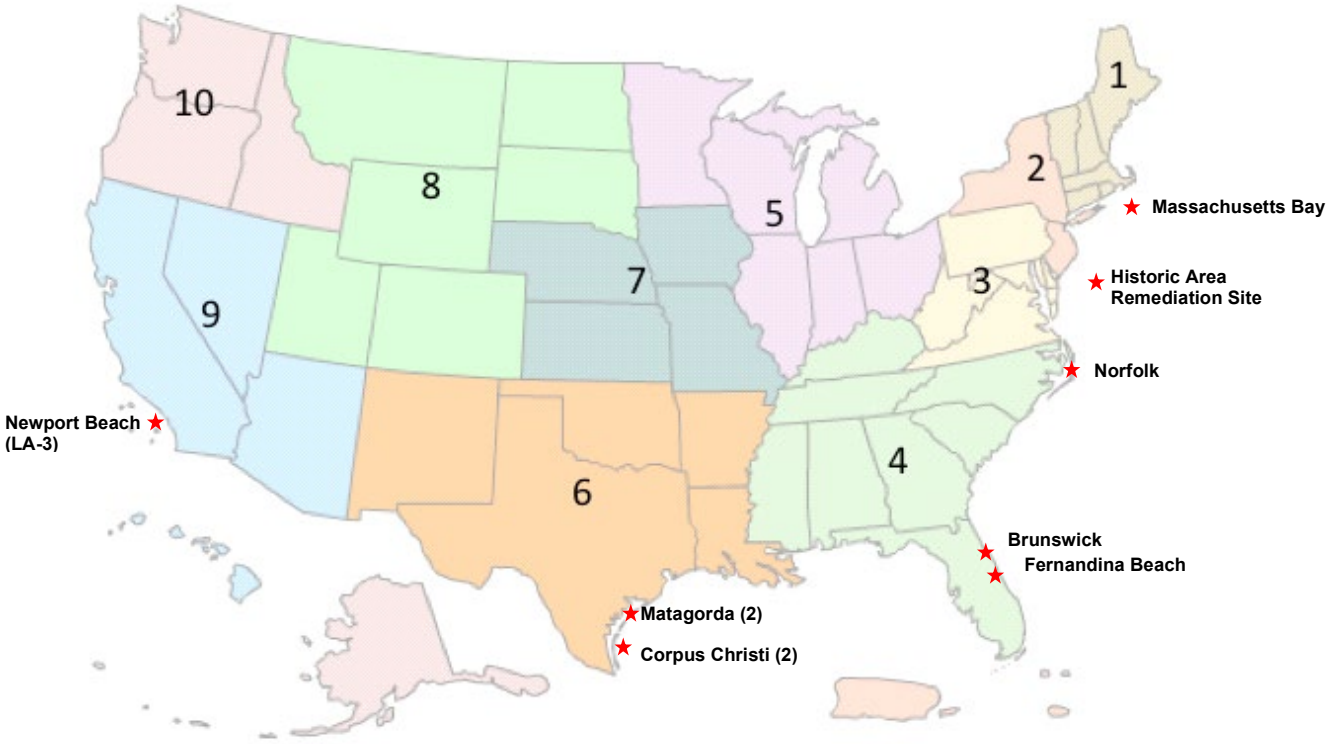

Figure 1. **Approximate locations of the nine ocean disposal sites surveyed in FY 2015. Numbers indicate EPA Regions.**

3.0 Summary of Monitoring Surveys

A summary of the FY 2015 survey objectives, activities, and results, as well as conclusions and recommended management actions resulting from these surveys is presented below.

3.1 Region 1 – Massachusetts Bay Dredged Material Disposal Site, Massachusetts

3.1.1 Background

The Boston Harbor Deep Draft Navigation Project, scheduled to begin in 2018, was designed to allow for the passage of larger cargo vessels and expected to generate approximately 11 million cubic yards of suitable dredged material. EPA Region 1 and USACE New England District worked together for several years to identify options to use the suitable dredged material that would be generated from this project. One of the options considered was to expand the boundaries of the Massachusetts Bay Disposal Site[2] (MDBS) to encompass an adjacent historical waste site and allow for disposal of this large volume of material.

The MBDS is centrally located within Massachusetts Bay, approximately 22 nmi east of Boston, Massachusetts. The MBDS is west of, and adjacent to, the Stellwagen Bank National Marine Sanctuary. The MBDS was designated as an ocean dredged material disposal site in 1993 and overlaps in part with two historical disposal sites:

[2] The MBDS as depicted and described in this report refers to the site as designated in 1993.

- an interim Massachusetts Bay disposal site (pursuant to the MPRSA[3]) that was used between 1977 and 1992; and
- the Industrial Waste Site (IWS), which was used for the disposal of various waste materials (including barrels of low-level radioactive, chemical, and hospital wastes; construction debris; contaminated dredged material; derelict vessels; ordinance; etc.) from the early twentieth century until 1977. The MBDS overlaps the southern portion of the historical IWS but does not include the area with the greatest concentration of waste containers (known as the "barrel field").

Expanding the boundaries of the MBDS to encompass the historical barrel field portion of the IWS would allow for suitable dredged material to be disposed of in this area. By disposing of dredged material from the deepening project in the ocean over the historical barrel field and other waste in the former IWS, the dredged material would serve as a protective layer on the seafloor by isolating the historically disposed waste barrels from the surrounding marine environment and thereby protecting important marine resources in the area. Region 1 and USACE New England District collected the information to evaluate whether the boundaries of the MBDS could be expanded to include the former IWS barrel field.

3.1.2 Survey Objectives, Activities, and Findings

To evaluate conditions within and around the MBDS and to investigate the potential for expanding the MBDS, Region 1, in collaboration with the USACE New England District, conducted a three-part survey in September and October 2015 (September 9-10, September 23-24, and October 7-8) aboard the research vessel (R/V) *Jamie Hanna*. The objectives of the survey were to:

1) complete an acoustic survey to characterize the surficial features of the study area encompassing the location adjacent to the MBDS being considered for a potential expansion of the site (Figure 2);
2) collect SPI and PVI to further evaluate the physical characteristics of surficial sediment and make a baseline characterization of the benthic community over the area being considered for potential expansion as well as the reference areas for the MBDS. SPI and PVI would be used to measure apparent redox potential discontinuity (aRPD) depth, benthic community successional stage, and presence and number of subsurface feeding voids – all of which are indicators of benthic habitat quality and community health (Figure 3); and
3) use a remotely operated underwater vehicle (ROV) to gather high-resolution video footage of potential artifacts in the historical IWS to investigate the integrity of the legacy waste barrels located there, to determine if any areas should be avoided with any potential expansion of the MBDS, and to identify any area that should not be used for dredged material disposal in the future.

[3]Interim ocean disposal sites are no longer available for use. Amendments enacted in 1992 under the MPRSA require that no permits for ocean dumping shall be issued for an EPA-established ocean disposal site after January 1, 1997, unless the site has received a final designation. In 2008, EPA repealed expired, and therefore obsolete, provisions regarding interim ocean disposal sites.

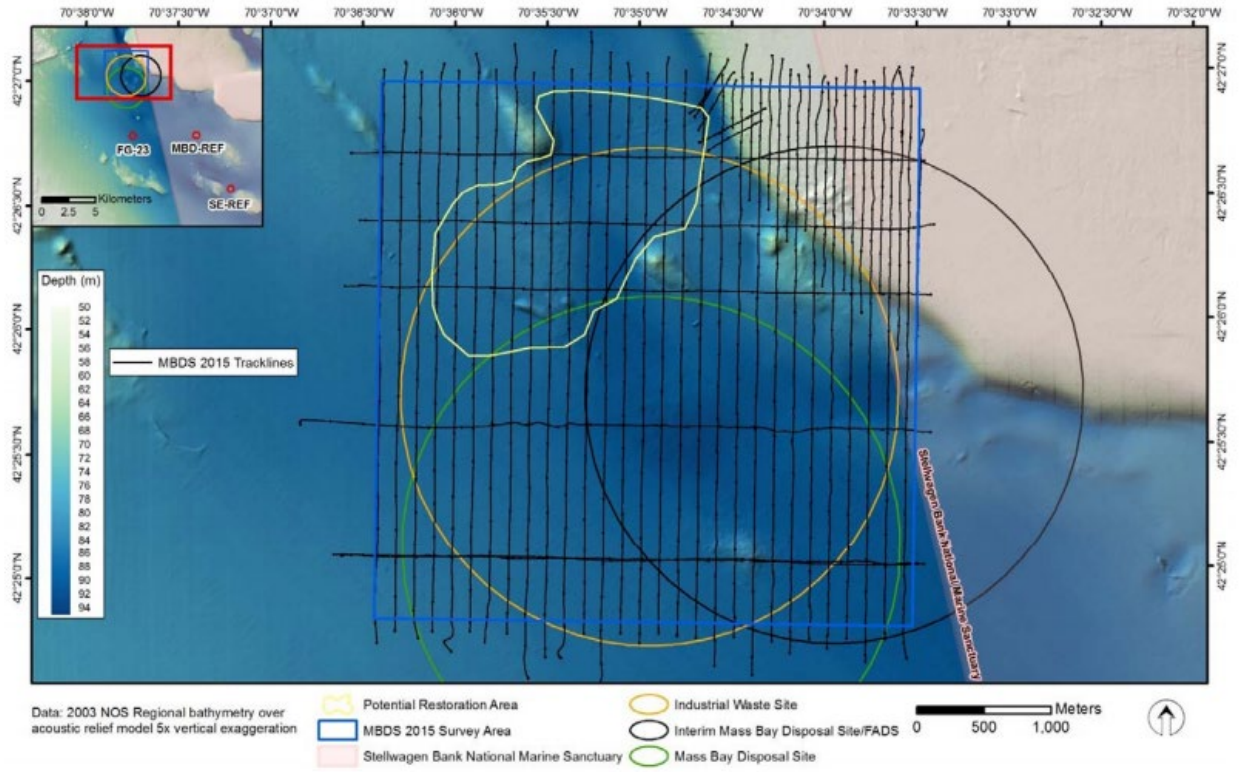

Figure 2. **Tracklines and survey boundary of the acoustic survey conducted at the MBDS (green circle), IWS (yellow circle), Interim Massachusetts Bay disposal site (black circle), historical barrel field (area enclosed by white line), and surrounding area (Sturdivant and Carey, 2017).**

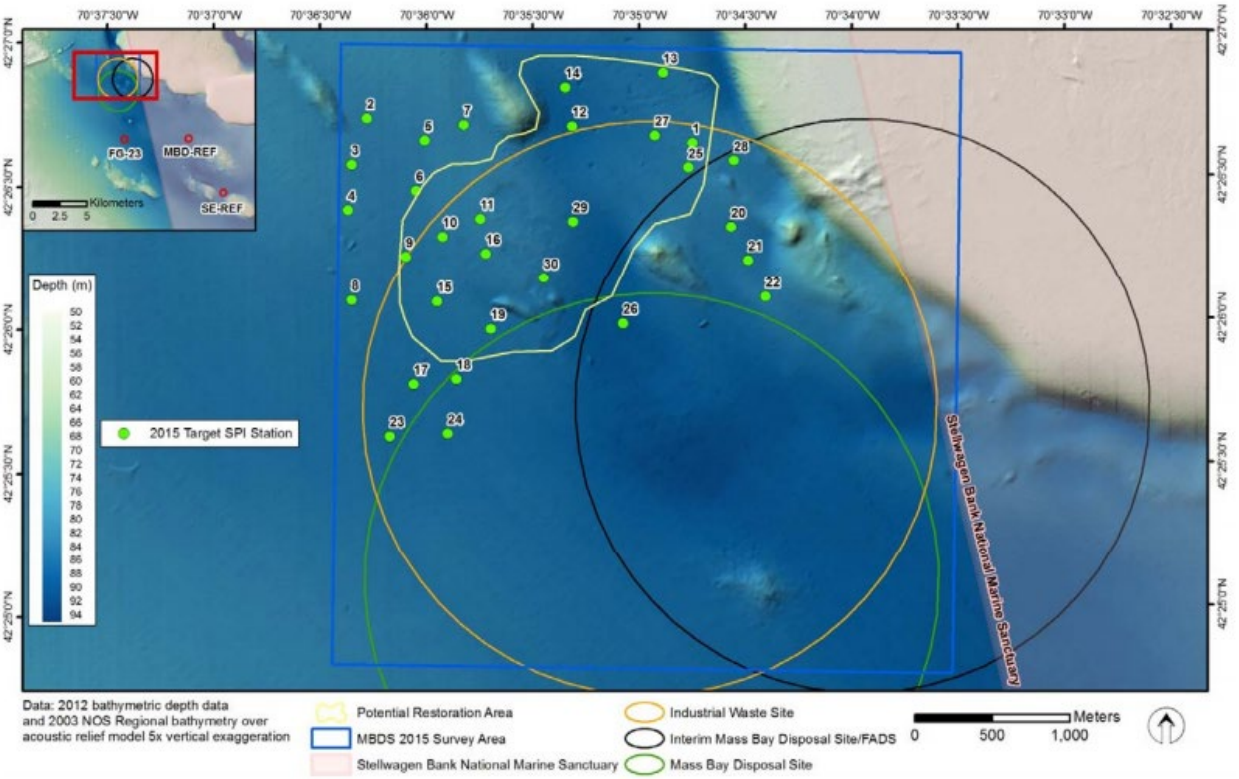

Figure 3. **The green dots represent the locations where SPI and PVI were collected from the MBDS and adjacent area including the historical IWS (Sturdivant and Carey, 2017).**

The results from the acoustic survey showed that the sediments in the MBDS study area were mostly spatially homogenous, consisting of uniform silt-clay material.

The SPI and PVI confirmed the presence of historical dredged material disposal at the majority of the sampling stations in the study area, including in and around the historical IWS. The benthic characteristics of sampling stations in the historical IWS did not differ from those observed on the ambient seafloor. SPI and PVI collected from the historical IWS, MBDS, and reference areas for the MBDS also showed robust benthic community assemblages. Across the historical IWS, MBDS, and reference areas, Stage 3 fauna were consistently found at every station, indicating a mature successional community. These data suggest that the area supports stable benthic and infaunal communities.

Video footage collected during the ROV portion of the survey showed that the legacy barrels located in the historical IWS had mostly disintegrated or crumbled, leaving the inner concrete casing of the barrels exposed on the seafloor. Past reports indicated that the containers of low-level radioactive wastes had been filled with concrete to encase the hazardous contents before disposal in the ocean. Video footage and side-scan imagery from the acoustic survey of the study area also identified two shipwrecks inside the MBDS. Results from the acoustic survey indicated that one wreck was an iron-hulled vessel approximately 89 ft (27 m) long and 20 ft (6 m) wide, and the other wreck was likely a 19th-century vessel approximately 115 ft (35 m) long and 23 ft (7 m) wide.

3.1.3 Conclusions and Recommended Management Action

Region 1 achieved its survey objectives of characterizing the surficial features within the MBDS and adjacent portions of the historical IWS, assessing benthic recolonization following disposal activities, investigating the integrity of the legacy waste barrels, and identifying two shipwrecks located within the MBDS and along the southwestern border of the barrel field. Given the presence of robust benthic community assemblages observed across the study area, the Region predicted that the effects from any future dredged material disposal operations within the MBDS would be transient and that the infaunal community would quickly reestablish itself following completion of disposal operations. Given the age of the two shipwrecks investigated during this survey, Region 1 and USACE New England District recommended avoiding impacts to these potential cultural resources by establishing a 50-meter buffer around the wrecks until a more detailed assessment can be completed. Region 1 used the information collected during this survey to inform a proposal to expand the boundary of the MBDS to include a portion of the barrel field within the historical IWS.[4] This is a key step in the Massachusetts Bay IWS Restoration Project, whereby suitable dredged material from a federal navigation project authorized under the MPRSA would be disposed of at an expanded Massachusetts Bay Disposal Site, isolating legacy contaminants on the seafloor under a protective layer of dredged material.

3.2 Region 2 – Historic Area Remediation Site, New Jersey

3.2.1 Background

From the 1800s until 1972, a variety of wastes were dumped in the New York Bight, including municipal and industrial wastes, construction materials, sewage sludge, and dredged material. After the passage of the MPRSA in 1972, EPA formally designated the Mud Dump Site (MDS)

[4]The Final Rule for the Modification of an Ocean Dredged Material Disposal Site in Massachusetts Bay was published in the Federal Register on May 29, 2018, with an effective date of June 28, 2018 (83 FR 24408).

on an interim basis for the disposal of dredged material[5]. In 1984, EPA designated the MDS permanently for dredged material disposal to support regional port and harbor maintenance. However, the MDS was closed in 1996 after surveys revealed toxic levels of dioxin and PCB accumulation in benthic invertebrates within and around the site.

To remediate the adverse impacts of historical material disposal at the MDS, EPA designated the Historic Area Remediation Site (HARS) in 1997. The HARS is located 3.5 nmi off the coast of Sandy Hook, New Jersey, and encompasses the former MDS and the area impacted by historical disposal. It has an area of 15.7 nmi^2 and an average depth of 89 ft (27 m). The management priority of the HARS is to reduce the impacts of previous disposal to acceptable levels by covering the surface of the site with uncontaminated dredged sediments. As such, EPA designated the HARS as an ocean placement site, restricting disposal in the area solely to remediation material that meets the ocean dumping criteria and HARS-specific bioaccumulation standards. The placement of such remediation material renders toxic sediments unavailable to marine organisms and minimizes food chain transfer of sediment-associated contaminants.

The area targeted for remediation within the HARS is comprised of nine individual Priority Remediation Areas (PRAs), each measuring approximately one nmi^2 in size (Figure 4). The management priority of the HARS, as described in the SMMP, is to reduce the impacts of past disposals to acceptable levels by covering the surface of each PRA with at least one meter of suitable remediation material that meets the ocean dumping criteria. The HARS is jointly managed by the EPA and the USACE, and multiple stakeholders and government agencies collaborate in this effort, including state and federal agencies, port authorities, non-governmental organizations, and academics.

Previous surveys conducted at the HARS have focused on analyzing the chemical, physical, and biological parameters of the soft and sandy sediments placed within the PRAs. These surveys have identified that remediation of the HARS is progressing and the overall conditions of the site are acceptable, as defined in the SMMP. While the primary management priority of the HARS is to reduce the impacts of historic disposal, a secondary management strategy for remediation is to improve the fish communities and benthic habitats within the area. To achieve this, rocky and glacial till material, resulting from various deepening and widening projects in New York and New Jersey Harbors, have been placed at the HARS. To confirm the effectiveness of this approach, EPA conducted a survey to assess the health and diversity of epibenthic communities and fish populations associated with the rock placed at the site.

3.2.2 Survey Objectives, Activities, and Findings

Region 2 surveyed the HARS on September 4-10, 2015, aboard the NOAA Ship (N/S) *Nancy Foster*. The Region's survey objectives were to:

1) gain a better understanding of the nature and variability of the rock habitat within the HARS and
2) develop quantitative methods for assessing the quality and ecological status of the hard dredged material (i.e., rock) habitat which cannot be monitored using standard shipboard monitoring methods (e.g., benthic grabs, SPI).

[5]Interim ocean disposal sites are no longer available for use. Amendments enacted in 1992 under the MPRSA require that no permits for ocean dumping shall be issued for an EPA-established ocean disposal site after January 1, 1997, unless the site has received a final designation. In 2008, EPA repealed expired, and therefore obsolete, provisions regarding interim ocean disposal sites.

Region 2 collected video and still images at stations within the PRAs using an ROV and divers. Stations at fish havens (FHs, also known as artificial reefs) which received rock at the same time as the HARS, and stations at natural reefs (NRs) outside of the HARS (Figure 4) were also surveyed to compare conditions measured within the PRAs to ambient (reference) conditions. ROV video was recorded along transects in the HARS and in the reference areas to assess the type of bottom surfaces present in each area, map high-profile, hard bottom areas, and refine locations to conduct diver operated surveys. Divers obtained video footage and still images in the HARS and reference areas. To collect additional information about the fish populations and water quality in the area, Region 2 also conducted acoustic surveys of fish and used a thermosalinograph to collect surface water quality data. At each station, Region 2 determined the size and relief of the rock surface, organisms present, and the level of grazing and other biological activities.

Results from the video transects did not show distinct patterns and measurable differences in rock habitat. The distribution of rock sizes in the HARS was not significantly different from each other nor from those located in the reference areas. Indicators of the status of the benthic community, such as barnacle grazing rates, appeared to be somewhat higher within the reference areas, while the incidence of encrusting organisms (i.e., sponges, corals, hydroids, and barnacles) appeared to be higher in the southern areas of the HARS and at FH sites outside of the HARS. Surface water data collected during the survey revealed the presence of a freshwater influence over the HARS. Freshwater was not found in either of the reference areas.

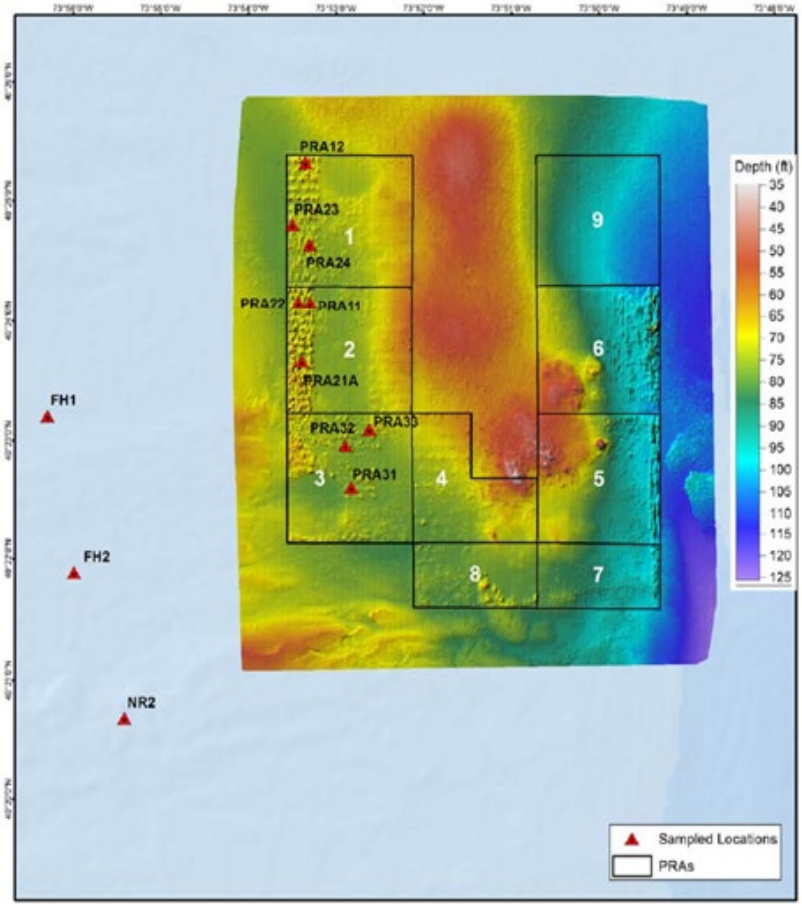

Figure 4. **Sampled locations within the HARS (PRA stations) and outside the HARS (FH and NR stations).**

3.2.3 Conclusions and Recommended Management Action

Data collected during this survey provided Region 2 with a better understanding of the characteristics and variability of the rock habitat within the HARS and surrounding areas. The video methodology utilized during this survey proved to be sufficient to investigate the quality and ecological status of hard dredged material habitat. This methodology must be further refined to develop quantitative monitoring and quality assurance methods that could be used in future surveys to evaluate ecological succession on rocky substrate at the HARS.

Differences in hard substrate ecology between the HARS and reference areas could not be confidently attributed to dredged material management activities at the HARS because of the influence of the freshwater plume identified over the HARS. This freshwater influence is likely originating from the Hudson River and it is expected to transport carbon, nutrient, and solid loads into the HARS. The freshwater plume did not occur in the reference areas. Region 2 will conduct future monitoring surveys to identify reference areas that are more suitable for comparison to the HARS (i.e., ones that are influenced by the plume but not HARS activities).

The benthic community variations observed within the HARS was not significantly related to differences in water depths, water quality, or time elapsed since rock material had been placed. Qualitative assessment of the images suggests that the epibenthic community associated with the rock placed in areas with coarser sediments (i.e., sands/gravels) is more diverse and abundant than those associated with rock placed near finer sediments (i.e., clays). Future monitoring will be conducted to quantitatively investigate this possibility.

3.3 Region 3 – Norfolk Ocean Dredged Material Disposal Site, Virginia

3.3.1 Background

The Norfolk Ocean Dredged Material Disposal Site (ODMDS) is located approximately 17 nmi off the Virginia coast, east of Fisherman's Island. The site is circular with a radius of four nmi and a total area of about 50 nmi^2. Water depth at the site ranges from 43 to 85 ft (14 to 26 m) with a gradual slope from west to east. It has been in use since its designation as a disposal site by Region 3 in 1993.

The Norfolk ODMDS is designated to accept dredged material without any restrictions concerning the source of the material. All dredged material disposed of at this site must meet the ocean dumping criteria. The current planned use of the site includes the disposal of 100,000-500,000 cubic yards of material from the Naval Facilities in Yorktown, Virginia every three years. USACE Norfolk District and Virginia Port Authority have proposed new dredging projects to improve the current and future transit of commercial vessels using the federal navigation channels at the Norfolk Harbor. These projects may increase future dredged material disposal at the Norfolk ODMDS. The total quantity of dredged material disposed of at this site is not expected to exceed 1.3 billion cubic yards.

3.3.2 Survey Objectives, Activities, and Findings

EPA Region 3 monitored the Norfolk ODMDS on August 24-30, 2015, aboard the N/S *Nancy Foster*. Pursuant to the SMMP, Region 3 collected sediment samples at both the Norfolk ODMDS and a reference area (Figure 5) to verify that significant adverse effects are not occurring as a result of past or continued use of the site and that disposal permit conditions have been met. To evaluate the site, 25 sediment samples from both the Norfolk ODMDS and a reference area (50 samples total) were collected and analyzed for metal concentrations, TOC, grain size distribution, and benthic infaunal abundance, diversity, and evenness. Water quality parameters including salinity, temperature, dissolved oxygen, and pH were also recorded at

selected stations for both sites. Region 3 compared results from the Norfolk ODMDS to those of the reference area as well as to the data collected from surveys conducted in previous years.

Region 3 analyzed the sediment samples for seven metals: cadmium, copper, lead, mercury, nickel, silver, and zinc. Metal concentrations in the sediment samples collected from the disposal site were similar to those from the reference area. Cadmium and silver were not detected in the reference area nor the disposal site, and mercury was only detected in one sample from the disposal site. All of the metal concentrations in samples collected on this survey were well below the NOAA ERLs and therefore are not anticipated to have adverse effects on the marine benthic community.

When comparing the sediment samples collected from the ODMDS to those collected from the reference area, Region 3 found statistically significant differences between the physical properties of those samples. While all sediment samples were composed predominantly of sand with a silt/clay mix, the samples collected within the disposal site contained a marginally higher percentage of clay than those collected within the reference area, indicating the presence of dredged material within the bounds of the disposal site. Other grain size fractions in samples from the disposal site were not significantly different from those in the reference area.

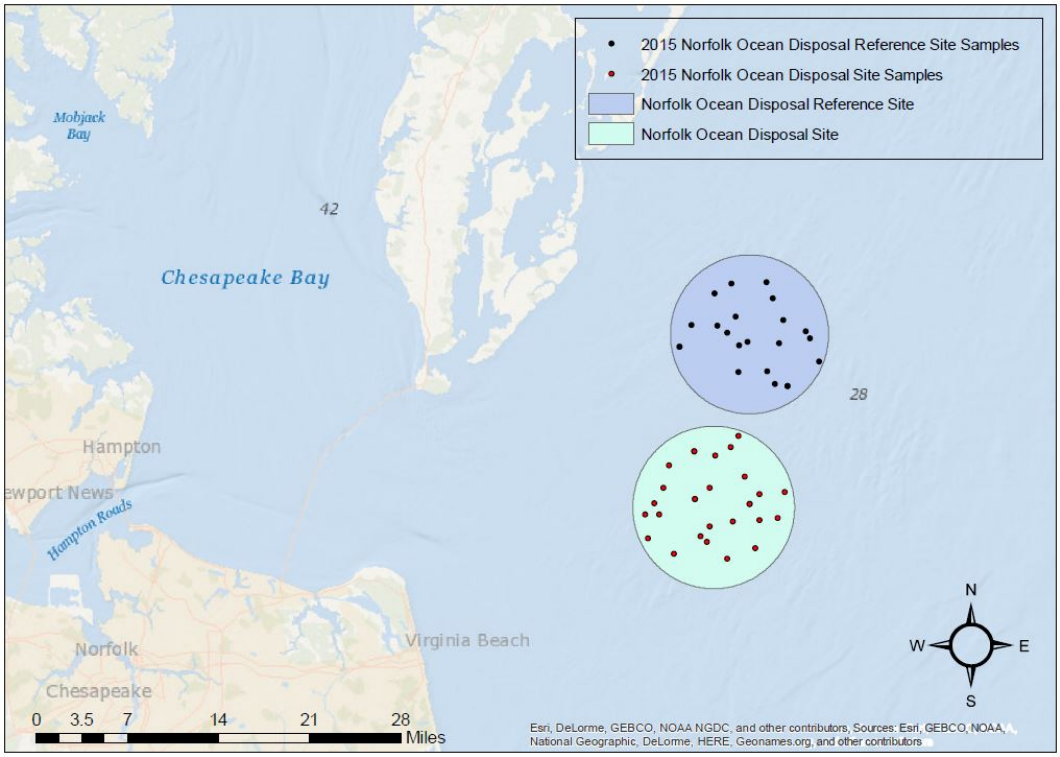

Figure 5. **Map of Norfolk ODMDS and reference area sampling locations.**

Benthic infaunal diversity, evenness, and richness were all statistically lower in samples from the disposal site than the reference area. Additionally, a comparison of the results from the 2015 survey to those of the 2014 survey indicated a reduction in all three benthic community parameters for the disposal site but not for the reference area.

3.3.3 Conclusions and Recommended Management Actions

Based on the data collected during this survey, Region 3 confirmed that environmentally acceptable conditions are being met at the Norfolk ODMDS and does not recommend any

changes to the SMMP because the site is operating as anticipated. The biological community measures observed in the Norfolk ODMDS are typically seen in areas of recent disturbance due to dredged material disposal. This finding is consistent with an increase in disposal activity at the Norfolk ODMDS. Region 3 will use the results from this study to inform future studies of the benthic communities at the Norfolk ODMDS.

3.4 Region 4 - Brunswick Harbor Ocean Dredged Material Disposal Site, Georgia

3.4.1 Background

The Brunswick Harbor ODMDS was designated by EPA in 1989 for the disposal of dredged material from the Brunswick, Georgia area. It is located approximately seven nmi offshore of Jekyll Island, Georgia. It covers approximately two nmi^2 with depths that vary from 24 to 36 ft (7 to 11 m). Material disposed of in the Brunswick Harbor ODMDS is dredged from approximately 30 miles of channels that provide access to the Port of Brunswick. Since its designation, the Brunswick Harbor ODMDS has, on average, received approximately one million cubic yards of dredged material annually.

3.4.2 Survey Objectives, Activities, and Findings

Region 4 monitored the Brunswick Harbor ODMDS on August 9-16, 2015, aboard the N/S *Nancy Foster*. The objectives of this survey were to:

1) assess the status of the benthos and water column within and adjacent to the Brunswick Harbor ODMDS; and
2) evaluate the performance of the site to determine if any management changes needed to be incorporated into the SMMP.

To evaluate the status of the site, Region 4 collected sediment and biological samples from within and outside of the disposal site boundaries (Figure 6). Sediment samples were analyzed for grain size distribution and chemical analytes including PCBs, pesticides, SVOCs, metal concentrations, TOC, total solids, organotins, and dioxins. Biological samples were analyzed to determine macroinvertebrate abundance, diversity, and evenness. Additionally, Region 4 measured water quality parameters and collected water samples from three stations within the study area. In situ water quality parameters, including salinity, temperature, dissolved oxygen concentration, and turbidity, were measured using a conductivity, temperature, and depth probe (CTD). Water samples were collected from just below the surface and just above the bottom of the water column. Water samples were analyzed for pesticides, trace metals, mercury, TOC, dissolved organic carbon (DOC), and organotins.

Results from the sediment grain size analysis indicated that sediments within, and adjacent to, the ODMDS were predominantly sand. Chemical analyses of the sediments revealed that most chemical analytes were undetectable. In the few sediment samples where metals were detected, none of the metal concentrations exceeded the NOAA ERLs. Concentrations of pesticides, butylins, and PAHs were measured at values equivalent to or below the method detection limits (MDLs), indicating levels below the ERL even for estimated values. While sediments collected from two stations had detectable levels of PCBs, the concentrations of PCBs were below the NOAA ERLs. Results from the dioxin analyses indicated that some of the less toxic dioxin compounds, such as octachlorodibenzodioxin (OCDD), were present throughout the study area.

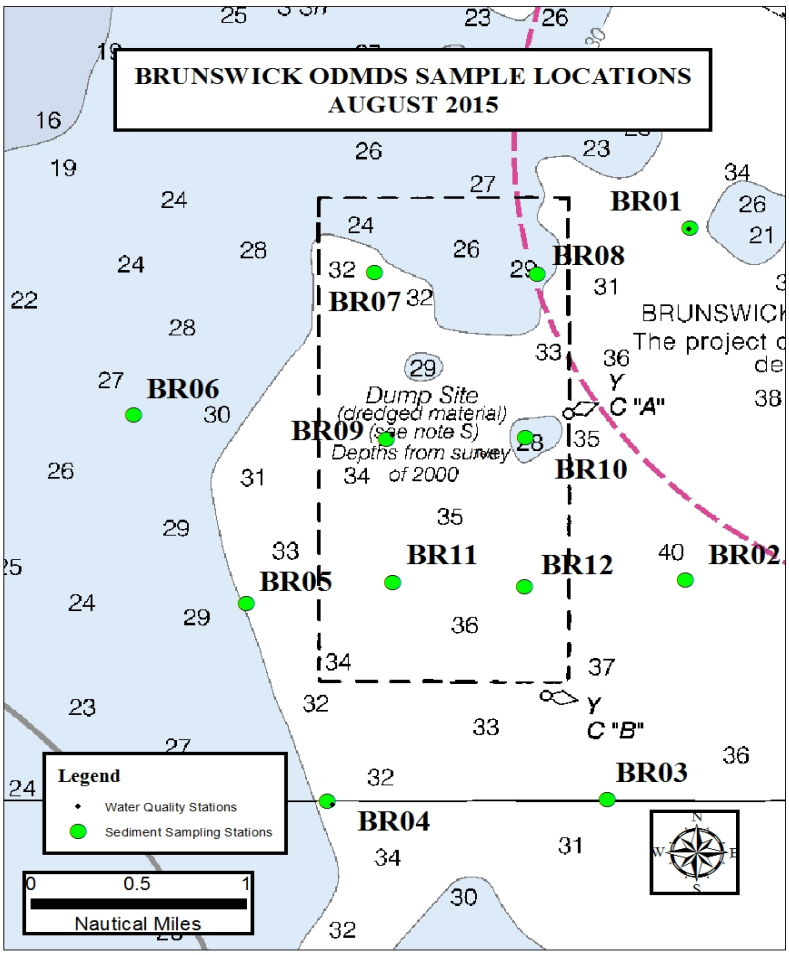

Figure 6. **Brunswick Harbor ODMDS sampling locations.**

Results from the biological analyses showed no significant differences in taxa richness, density, diversity, or evenness when comparing the benthic communities within and outside of the disposal site boundaries. Comparison of benthic biological results from this survey to those from surveys conducted in 1995 and 2006 revealed that taxa richness was significantly greater in 2015 and 2006 than in 1995, while density was lower in 2015 and 1995 than in 2006.

In situ water quality parameters were nearly identical across all sampling stations. Results from the water sample analyses showed that all chemical analytes, with the exception of eight metals, were undetectable above the MDL. All eight metals detected were found at concentrations below the NOAA ERLs.

3.4.3 Conclusions and Recommended Management Actions

Data collected during this survey enabled Region 4 to confirm that no lasting adverse impacts are resulting from the continued use of the Brunswick Harbor ODMDS. Based on the low concentrations of chemical analytes, the similarities in benthic communities, and nearly identical water quality measurements inside and outside of the ODMDS, the Region confirmed that there is little difference in the physical, chemical, and biological conditions between the disposal site and the surrounding area. Further investigation into the results from the dioxin analysis that indicated the presence of octachlorodibenzodioxin throughout the study area revealed that similar concentrations were detected in the laboratory method blanks. This suggested the possibility of cross-contamination during the lab analyses. Given this information, in addition to

the lower toxic equivalency of the specific measured dioxin congener, Region 4 does not consider dioxin as a concern for the Brunswick Harbor ODMDS. The variations in the benthic communities observed when comparing the data collected during this survey to those collected in previous surveys were attributed to the timing of Region 4's sample collection with respect to the completion of the most recent disposal event. As little as two to three weeks of additional recovery time between disposal and sample collection could have substantial effects on benthic community parameters observed. Considering all of the data collected from the Brunswick Harbor ODMDS study area, Region 4 concluded that the site is performing as anticipated and recommended no changes in site management.

3.5 Region 4 - Fernandina Beach Ocean Dredged Material Disposal Site, Florida

3.5.1 Background

The Fernandina Beach ODMDS was designated by EPA in 1987. The ODMDS comprises an approximately two nmi by two nmi square area and is located seven nmi offshore. The depth of the site ranges from 37 to 69 ft (11.4-21.2 m), with an average depth of 53 ft (16.2 m). The benthos within the site boundaries consists mostly of sands with some areas of gravel and low relief rock.

Since its designation, a total of approximately 20 million cubic yards of dredged material has been disposed of at the ODMDS. Most of the material has been generated from maintenance dredging of the Kings Bay Entrance Channel, Florida. Approximately 626,000 cubic yards of silty material is dredged from the Entrance Channel annually from a combination of civil works projects and U.S. Navy-permitted dredging. Additionally, between 2011 and 2012, the Fernandina Beach ODMDS received a large amount of dredged material, over 1.2 million cubic yards, generated from the deepening of the Mayport Naval Station in Jacksonville, Florida.

3.5.2 Survey Objectives, Activities, and Findings

On August 9-16, 2015, Region 4 surveyed the Fernandina Beach ODMDS aboard the N/S *Nancy Foster.* The objectives of this survey were to:

1) monitor the physical, chemical, and biological conditions within and surrounding the disposal site following the disposal of material from the Mayport Naval Station deepening project and
2) collect data for a trend assessment, allowing Region 4 to assess the performance of the site over time.

To assess the impacts of recent dredged material disposal activity on the Fernandina Beach ODMDS, Region 4 collected sediment and biological samples from within and outside of the disposal site boundaries (Figure 7). Sediment samples were analyzed for grain size distribution and chemical analytes. Biological samples (macroinvertebrates) were analyzed to determine macroinvertebrate abundance, diversity, and evenness. Region 4 also measured water quality parameters and collected water samples from just below the surface and just above the bottom of the water column at three sampling stations. Water quality parameters, including salinity, temperature, dissolved oxygen concentration, and turbidity, were measured in situ using a CTD. Water samples were analyzed for pesticides, trace metals, mercury, TOC, DOC, and tributyltins (TBT). Region 4 compared the results both spatially (inside versus outside the disposal site boundaries) and temporally (to data collected during a 2005 survey).

Results from the sediment grain size analyses indicated that sediments within and outside of the disposal site boundaries were primarily sand. The predominant sediment grain size was slightly less coarse when compared to grain size distributions measured in 2005. All organic and

inorganic chemical analyte concentrations in the sediment were either below the method reporting limit (MRL), or below the benchmark concentrations outlined in the SQGs, therefore no adverse effects were anticipated. Some less toxic dioxins and furans were detected in sediments inside and outside the Fernandina Beach ODMDS. In comparison to samples from the 2005 survey, sediments showed significant increases in copper, selenium, and mercury both inside and outside of the ODMDS boundaries. However, silver concentrations in sediments outside of the disposal site were significantly lower than those measured in 2005.

Comparison of benthic community assemblages between 2005 and 2015 revealed a transition from an assemblage dominated by more opportunistic species in 2005 to one more dominated by late-successional stage organisms in 2015. This transition indicates recovery of the benthic community and generally low levels of benthic disturbance at the Fernandina Beach ODMDS.

All organic or inorganic chemical analyte concentrations in the water samples were either below the MRL for the analyte or well below EPA's recommended marine water quality criteria.

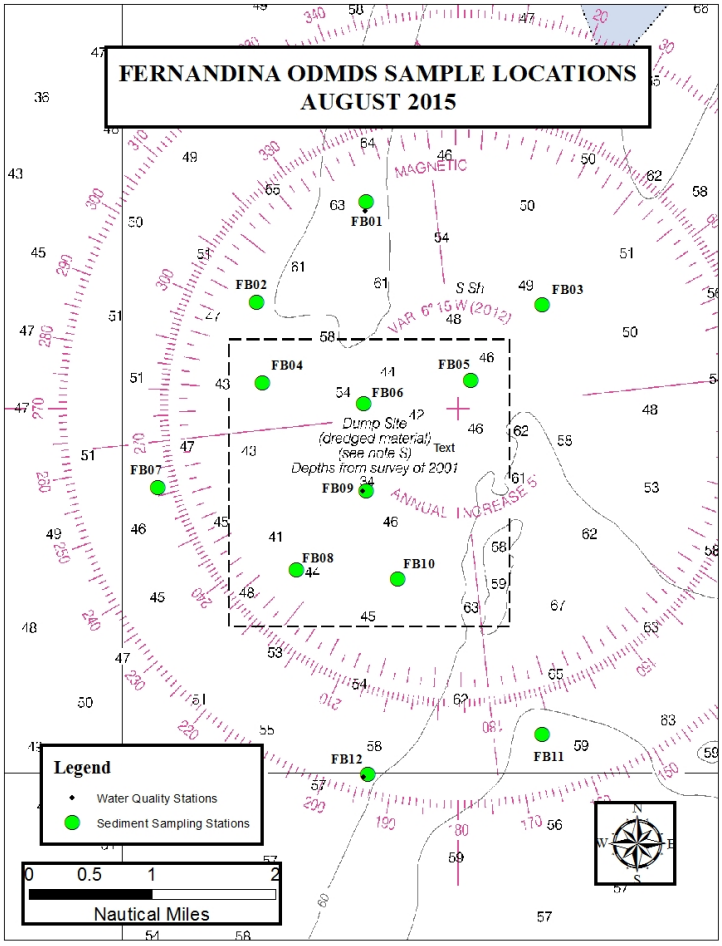

Figure 7. **Fernandina Beach ODMDS sediment and water sampling station locations.**

3.5.3 Conclusions and Recommended Management Actions

Based on the physical, chemical, and biological data collected during this survey, Region 4 concluded that there were very little significant differences when comparing parameters measured inside and outside of the disposal site and that no observable adverse impacts are resulting from the recent and continued use of the Fernandina ODMDS.

Predominant grain size variations between sediment samples from 2015 to those collected in 2005 were likely due to the differences in the dredged material sediment compositions disposed of in the site both over time and from various dredging projects. Further investigations into the low levels of dioxins and furans that were detected in the study area did not identify a source for these contaminants. Due to the relatively low levels and low toxicity of the detected dioxin and furan congeners, they are not expected to have any adverse effects on benthic organisms. Additionally, differences in the minimum quantification limit of analytical methods used in 2005 versus 2015 may be responsible for the apparent increases in concentrations of several analytes (e.g., copper, selenium, mercury, and silver).

The variations in the benthic communities observed when comparing the data collected during the 2015 survey to those collected in previous surveys revealed a transition from a biological assemblage dominated by more opportunistic species in 2005 to one more dominated by late-successional stage organisms in 2015. This transition indicates the recovery of the benthic community following dredged material disposal at the Fernandina Beach ODMDS. All organic or inorganic chemical analyte concentrations in water samples collected were either below the MRL for the analyte or well below EPA's recommended marine water quality criteria. Considering all of the data collected from the Fernandina ODMDS study area, Region 4 recommended that dioxin and furan concentrations should continue to be assessed inside and outside the Fernandina Beach ODMDS, but concluded that the site is performing as anticipated and no changes to site management are necessary.

3.6 Region 6 – Corpus Christi and Matagorda Ocean Dredged Material Disposal Sites, Texas

3.6.1 Background

On March 22, 2014, in Galveston Bay near Texas City, Texas, the bulk carrier *Summer Wind* collided with the oil tank barge *Kirby 27706*. The collision resulted in 168,000 gallons (4,000 barrels) of fuel oil RMG 380 being spilled into the immediate area. The fuel oil from this Texas City "Y" oil spill dispersed from Galveston Bay and into the Gulf of Mexico, carried along the Texas coast by waves and currents. While fuel oil RMG 380 is not acutely toxic, it has the potential to persist in the environment. A review of the NOAA Overflight Observation reports suggested that the benthic sediments within EPA's designated ODMDSs and reference areas located off the coasts of Corpus Christi and Matagorda, Texas, could have been contaminated with oil from this spill.

EPA has designated two dredged material disposal sites off the coast of Corpus Christi, Texas: the Corpus Christi Ship Channel ODMDS and the Corpus Christi New Work ODMDS. The Corpus Christi Ship Channel ODMDS is located 1.3 nmi off the coast of Texas. It has an area of 0.5 nmi^2 and depths ranging from 35 to 50 ft (11 to 15 m). The Corpus Christi Ship Channel ODMDS was designated in 1989 and receives approximately 1.3 million cubic yards of maintenance material dredged from the Corpus Christi Ship Channel every 1 to 2 years. The Corpus Christi New Work ODMDS was designated in 1988 to provide a disposal area for dredged material generated from the U.S. Navy's Homeport Project at Ingleside, Texas. This disposal site is located adjacent to and seaward of the Corpus Christi Ship Channel ODMDS. It has an area of 1.1 nmi^2 and depths ranging from 47 to 55 ft (14 to 17 m). Through 2015, no dredged material has been disposed of at this ODMDS. However, it is expected to receive material from the Corpus Christi Ship Channel Improvement Project.

Two locations off the coast of Matagorda, Texas, were also monitored during this survey: the Matagorda Ship Channel ODMDS and an area where, in the future, EPA may consider designating a new site for disposal of dredged material generated from capital, or "new work,"

dredging of the Matagorda Ship Channel. The Matagorda Ship Channel ODMDS is located approximately 1.7 nmi off the coast of the Matagorda Peninsula, just southeast of the centerline of the Matagorda Ship Channel Entrance. It has an area of 0.6 nmi^2 and depths ranging from 25 to 40 ft (7 to 12 m). The Matagorda Ship Channel ODMDS was designated in 1990 and receives 350,000 cubic yards of dredged material generated from maintenance dredging of the Matagorda Ship Channel every few years. The other area monitored during this survey is referred to as the potential new work disposal site; this area is located in 38 to 44 ft (11 to 13 m) of water and approximately 3 nmi offshore of the Matagorda Peninsula, adjacent to and seaward of the Matagorda Ship Channel ODMDS.

3.6.2 Survey Objectives, Activities, and Findings

In July 2015, Region 6 surveyed the area within, adjacent to, and in proximity to several designated ODMDSs located off the central and southern coasts of Texas aboard the R/V *Point Sur*. The general survey objectives were twofold: to conduct routine monitoring at the Corpus Christi Ship Channel ODMDS required to inform ongoing ODMDS management and to collect information that would help Region 6 determine the magnitude of the impact of the Texas City "Y" Oil Spill on the ODMDSs in the area.

More specifically, Region 6's survey objectives were to:

1) determine the extent of the dredged material footprint relative to the Corpus Christi Ship Channel ODMDS boundaries and assess chemical and biological characteristics of this site;
2) confirm that the Texas City "Y" oil spill had no adverse impacts on the Corpus Christi Ship Channel, Corpus Christi New Work, and Matagorda Ship Channel ODMDSs, reference areas, and an area off the coast of Matagorda where, in the future, a potential new work disposal site may be considered for designation; and
3) collect polychaete and bivalve tissues from unaffected areas close to the ODMDSs to measure background level concentrations of common contaminants of concern. Any tissue concentration data collected in this survey would contribute to the development of a compendium of background concentration tissue data for the Western Gulf of Mexico, which could serve as a potential tool for evaluating the suitability of dredged material for ocean disposal in the Western Gulf of Mexico.

To accomplish these objectives, Region 6 employed several sampling techniques within the study area. From the Corpus Christi Ship Channel ODMDS, the Region collected SPI and PVI to determine the dredged material footprint relative to the site boundaries; sediment samples to be analyzed for grain size distribution; sediment samples to be analyzed for metals, TOC, PCBs, PAHs, pesticides, and other SVOCs; and macroinvertebrates samples to determine diversity and abundance. Region 6 also collected sediment samples throughout the rest of the study area to be analyzed for PAHs and used a basket dredge and rocking chair dredge to collect polychaete worms and bivalves.

3.6.2.1 Corpus Christi Ship Channel ODMDS

Region 6 collected images, sediment, and biological samples from a total of 23 stations within and around the Corpus Christi Ship Channel ODMDS and reference area (Figure 8). Analyses of SPI and PVI revealed that dredged material was present at all stations within the ODMDS boundary and all stations adjacent to the ODMDS. No dredged material was present at stations within the reference area. Measurements of aRPD depths ranged from 3.5 to 7.0 cm across all stations sampled. Sediments collected within and adjacent to the Corpus Christi Ship Channel ODMDS were composed of greater than 90% sand, while the reference area was predominantly clay and silt.

Results from the sediment chemistry analyses revealed that, while all metal concentrations were above the target detection limit (TDL), none of the concentrations were above either the ERL or the ERM. Additionally, concentrations of 11 of the 13 metals measured[6] in the sediments collected from the reference area were significantly higher than those measured in the ODMDS or adjacent to the ODMDS. TOC measurements were similar across all stations sampled. No PCBs, PAHs, pesticides, or SVOCs were detected above the TDLs in any of the samples collected.

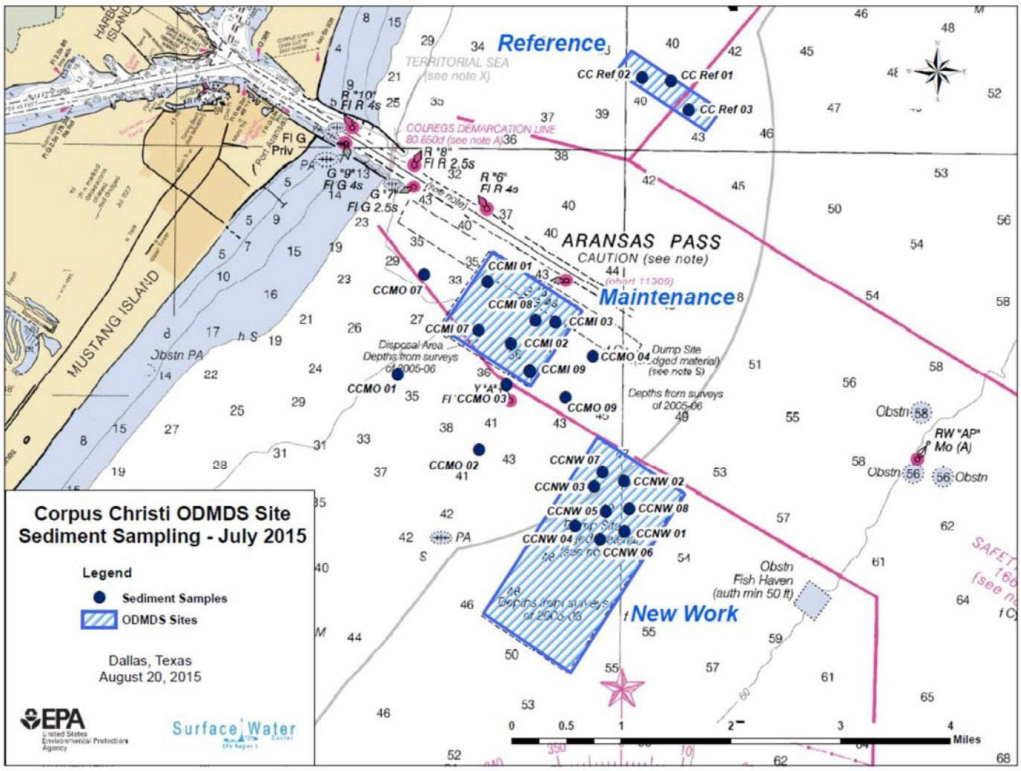

Figure 8. **Sediment sampling locations at the Corpus Christi Maintenance ODMDS, Corpus Christi New Work ODMDS, and Corpus Christi reference area.**

Results from the biological analyses indicated that stations inside the Corpus Christi Ship Channel ODMDS had significantly lower numbers of taxa, lower diversity (Shannon-Weiner Index), and lower evenness (Pielou's Evenness Index) than those located outside the ODMDS boundaries. These results (lower taxa, diversity, and evenness) are indicative of disturbed benthic communities undergoing successional recovery within the ODMDS.

3.6.2.2 Corpus Christi New Work Ocean Dredged Material Disposal Site

Region 6 collected sediments from eight stations within and around the Corpus Christi New Work ODMDS which were analyzed for 18 PAHs and compared with samples from the Corpus Christi Ship Channel ODMDS, associated reference area, and to samples from a survey conducted in 2002, i.e., before the Texas City "Y" oil spill. PAHs were not detected above the TDL in any of the samples collected from the Corpus Christi New Work ODMDS, Corpus Christi Ship Channel ODMDS, or the reference area. The TDLs were all below NOAA ERL and ERM

[6]The remaining two metals (mercury and selenium) did not have enough samples with concentrations above the TDL, inside or outside the ODMDS, to complete statistical analysis.

values for each compound, and therefore concentrations of PAHs at this ODMDS are not likely to cause adverse effects at these locations.

Of the 18 PAH compounds analyzed from sediment samples collected during this 2015 survey, 16 of these were historically investigated during the 2002 survey. In the 2002 survey, sediment samples were collected from the Corpus Christi Ship Channel ODMDS and reference area. Results from 2002 showed that all 16 PAH compounds were detected in the sediments from the Corpus Christi Ship Channel and 11 of the 16 PAHs compounds were detected in sediments from the reference area. In comparing the PAH concentrations measured in 2015 to those measured in 2002, the total PAH concentrations in 2015 were significantly lower than those measured in 2002.

3.6.2.3 Matagorda Ship Channel ODMDS

Region 6 sampled sediments from several stations within and around the Matagorda Ship Channel ODMDS and from the reference area (Figure 9) to be analyzed for PAHs. The PAH concentrations measured in these samples were compared to historical data to determine if the area was contaminated by the Texas City “Y” oil spill. No PAHs were detected in sediments from the Matagorda Ship Channel ODMDS nor from the reference area. Historically, PAHs were detected in sediments collected from the ODMDS and reference area in 1995 but were not detected in either the 2012 or 2015 samples.

3.6.2.4 Potential area for new work disposal site offshore of Matagorda

Region 6 collected sediments for PAH analysis from several stations within and around an area being considered as a potential new work disposal site. Two of the 18 PAH compounds analyzed were detected in these samples, 1-ethylnaphthalene and pyrene. The concentrations of both compounds were below the NOAA ERL and ERM.

3.6.2.5 Compendium of Polychaete and Bivalve Tissue Concentrations

Region 6 collected polychaetes and bivalves from benthic areas outside of the influence of ODMDSs to assess the background concentration of metals, PCBs, and SVOCs including PAHs, pesticides, dioxins, and furans accumulated in their tissues. Results from the tissue analyses detected a limited number of metals, PCBs, pesticides, and other SVOCs. All 13 of the metals analyzed were detected at least one of the polychaete and bivalve tissue samples; however, concentrations were below the United States Food and Drug Administration (FDA) limits (comparisons to FDA limits are described in the Ocean Testing Manual (EPA and USACE, 1991)). Concentrations of total PCBs measured in polychaete tissue were below the analytical detection limits. PCBs were also not detected in bivalve tissues. The concentrations of total PAHs ranged from approximately 10 to 42 µg/kg wet weight in polychaete samples and from 3 to 103 µg/kg wet weight in bivalve samples. Thirteen of the 16 PAHs analyzed were detected in one or more of the polychaete tissue samples; however, the majority of the concentrations were below the TDL.

3.6.3 Conclusions and Recommended Management Actions

Using the data collected from the Corpus Christi Ship Channel ODMDS, Region 6 drew several conclusions about the status of the disposal site. The Corpus Christi Ship Channel ODMDS is dispersive in nature. When designating a dispersive dredged material disposal site, EPA expects to see dredged material transported outside of the site boundaries via ocean currents present in the area; however, it is expected that the material will not move in distinct mounds, but instead will disperse with the surrounding environment causing a progressive transition to the ambient sediment. While SPI and PVI identified dredged material deposits that extended beyond the boundaries of the ODMDS, no distinct mounds were observed. Furthermore, the

aRPD depths throughout the study area are indicative of well-oxygenated, healthy benthic conditions. These data indicate that the site is functioning as anticipated. Region 6 concluded that future surveys should include additional SPI and sediment sampling to delineate the full extent to which dredged material has migrated beyond the disposal site boundaries.

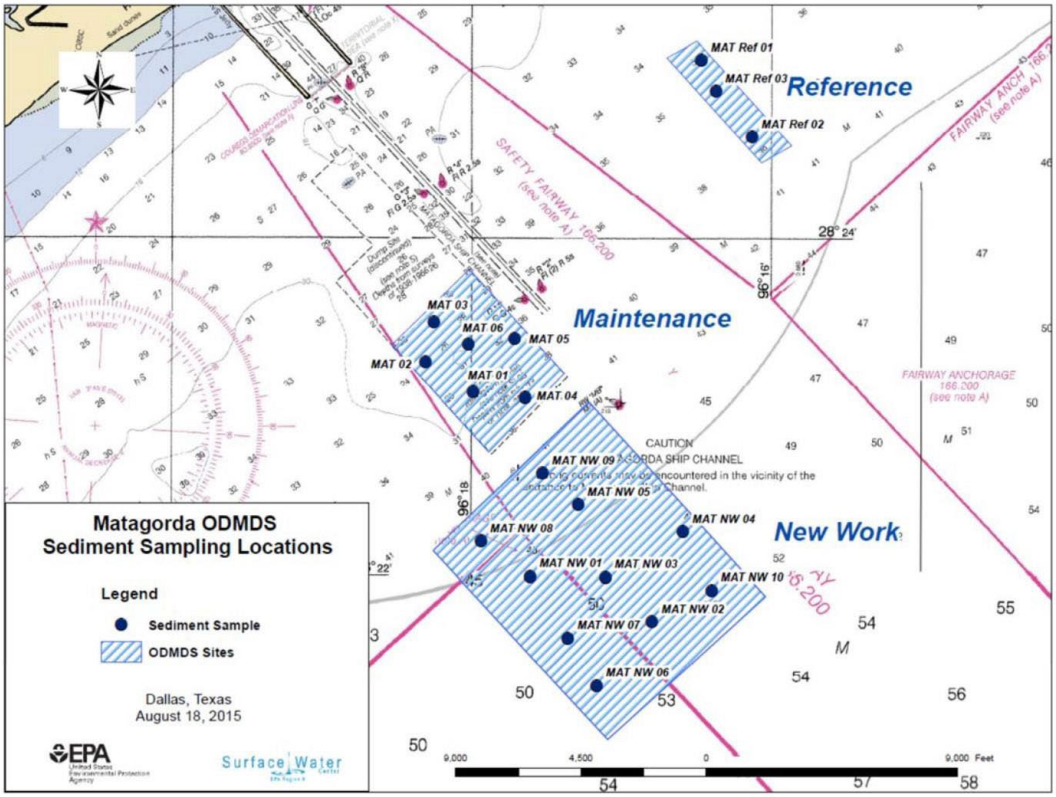

Figure 9. **Sediment sampling locations at the Matagorda Maintenance ODMDS and reference area, as well as a potential area for a new work disposal site.**

Differences observed in the predominant sediment types between the samples within and adjacent to the ODMDS and those from the reference area were consistent with dredged material characteristics and disposal operations. Sediments collected within and adjacent to the ODMDS were composed of greater than 90% sand, while the reference area was predominantly clay and silt. The differences in the physical characteristics of the sediments likely explain the variations in sediment chemistry between the ODMDS and the reference area. More specifically, the higher concentrations of metals measured in the reference area are likely associated with the higher percentage of fine-grained sediments found in the reference area. Region 6 will use these data to inform future surveys to identify a reference area that is more suitable for comparison to the ODMDS (i.e., area with comparable grain size distribution).

To determine potential impacts from the Texas City “Y” oil spill, PAH concentrations were measured in sediments collected from the Corpus Christi Ship Channel, Corpus Christi New Work, Matagorda Ship Channel ODMDSs, and an area that may be considered for the designation of a potential new work disposal site. No evidence of impacts from the Texas City “Y” oil spill was observed across the entire study area.

The background concentrations of metals, PCBs, and SVOCs measured in polychaete and bivalve tissues collected from outside the area of influence of the ODMDSs will contribute to the development of a compendium of background tissue concentrations for contaminants of

concern for bivalves and polychaetes collected from the Western Gulf of Mexico. Upon completion, this compendium will be useful in dredged material evaluations under the MPRSA Section 103.

3.7 Region 9 – Newport Beach (LA-3) Ocean Dredged Material Disposal Site, California

3.7.1 Background

The Newport Beach (LA-3) ODMDS is located 4.5 nmi from the mouth of Newport Harbor, California. The site is circular with an area of 0.8 nmi^2 and ranges in depth from 1,500 to 1,675 ft (457 to 511 m). Since its designation in 2005, the site has been used annually to dispose of an average of 189,068 cubic yards of dredged material generated from maintenance and capital dredging projects in Newport Bay, California. Before LA-3 was designated, an interim site[7], located northeast of LA-3, was used for ocean disposal of dredged material (Figure 10). The scale of dredged material disposal at the interim site was variable from 1976 through 2005, resulting in a total ocean disposal volume of 3,360,275 cubic yards and an annual volume average of 140,011 cubic yards.

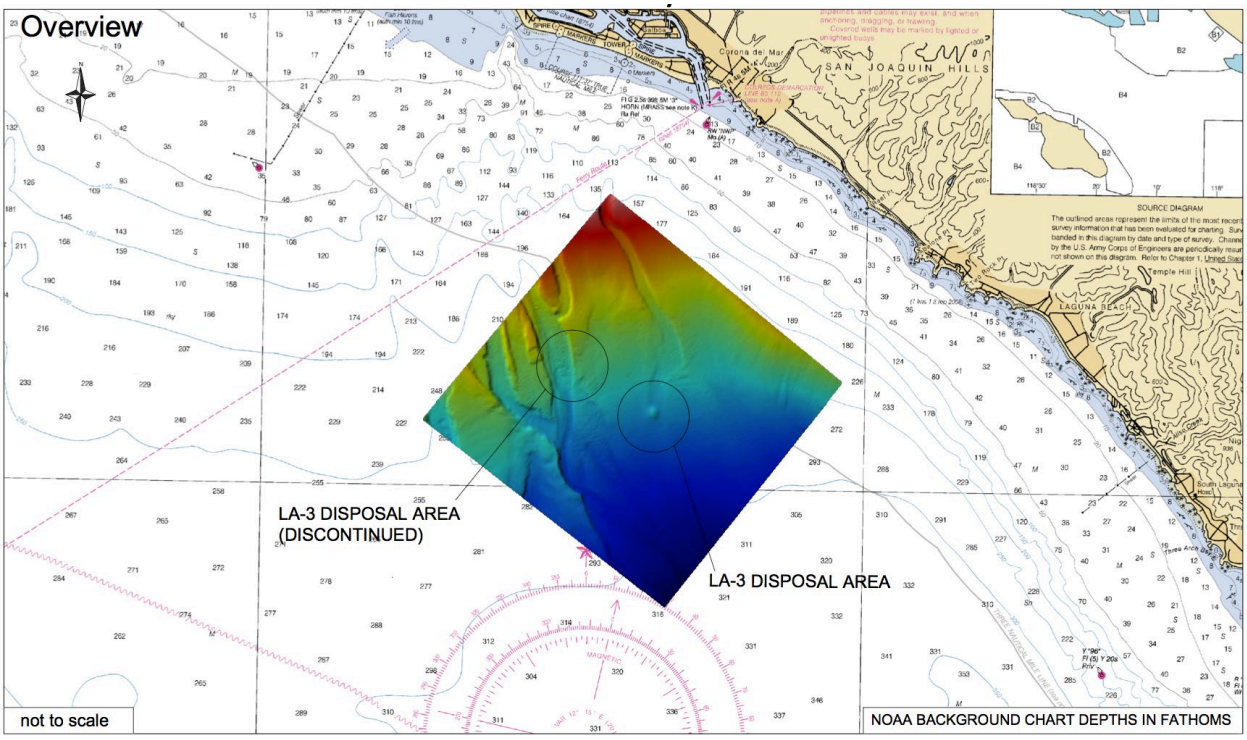

Figure 10. **Overview map of the LA-3 ODMDS and interim site (labeled "discontinued").**

3.7.2 Survey Objectives, Activities and Findings

EPA Region 9 monitored the LA-3 ODMDS with two separate surveys: a multi-beam echo sounder (MBES) survey and a geophysical survey. In July 2015, during the MBES survey,

[7]Interim ocean disposal sites are no longer available for use. Amendments enacted in 1992 under the MPRSA require that no permits for ocean dumping shall be issued for an EPA-established ocean disposal site after January 1, 1997, unless the site has received a final designation. In 2008, EPA repealed expired, and therefore obsolete, provisions regarding interim ocean disposal sites.

Region 9 collected bathymetric and backscatter data. These data provided the EPA a better understanding of the depth, contour, and texture of the benthos within and around the LA-3 ODMDS and the discontinued interim site. These data also informed adjustments to the locations where sediment imaging and sampling would be conducted during the subsequent geophysical survey. The geophysical survey was conducted in September 2015 aboard the Scripps Institution of Oceanography's R/V *Robert Gordon Sproul*. During this survey, Region 9 collected SPI and PVI and benthic samples to assess the performance of the LA-3 ODMDS and to document the recovery of the area encompassing the discontinued interim site (Figure 11). Prior to this survey, the study area had not been monitored since baseline surveys were conducted before the LA-3 designation (2003-2004).

The MBES survey results showed that the LA-3 site and discontinued interim site contained coarser-grained sediments than the ambient sediments in the surrounding area. Additionally, MBES results identified potential short dumping, or the release of dredged material shoreward of the disposal site, associated with the older discontinued site.

SPI and PVI were taken within the study area to map the dredged material footprint. SPI results were used to identify dredged material thickness and aRPD depths. PVI results were collected to evaluate surface sediment features, including epifaunal colonies and burrow openings and to identify the presence of any larger macrofauna not captured during benthic sediment sampling. The SPI results indicated that the dredged material thickness was consistent with disposal operations at both the LA-3 site and the discontinued interim site. Measurements of aRPD depths indicated that stations with thicker dredged material deposits had deeper aRPD depths; however, aRPD depths indicated healthy benthic conditions across all sampling stations. PVI results showed that the native seafloor surrounding the LA-3 site consisted of a uniform layer of light tan colored fine silt-clay with rippled surfaces and surface tubes. PVI collected from within the disposal site boundaries did not show any significant differences in these features, nor in the presence and abundance of epifauna.

Benthic sediment and biological samples were collected from within and around the LA-3 ODMDS and the discontinued interim site. Benthic sediment samples were analyzed for grain size distribution and the presence of chemical analytes including PCBs, PAHs, dichloro-diphenyl-trichloroethanes (DDTs), metals, TOC, organotins, and dioxins. Benthic biological samples were analyzed to determine macroinvertebrate abundance, diversity, and evenness. Sediment samples collected from within the LA-3 site had significantly more sand, less fines, and slightly less organic carbon content than samples collected from outside of the disposal site. Sediment chemistry results showed that most sampling stations throughout the study area had chemical concentrations below NOAA's ERL. Some sampling stations, located both within and outside of the LA-3 site boundaries, showed ERL exceedances of metal concentrations, DDTs, and PCBs; however, the screening level exceedances were minor in magnitude. Results from the biological sample analyses identified multiple benthic infauna successional stages within the LA-3 ODMDS and at the sampling stations located within the discontinued interim site.

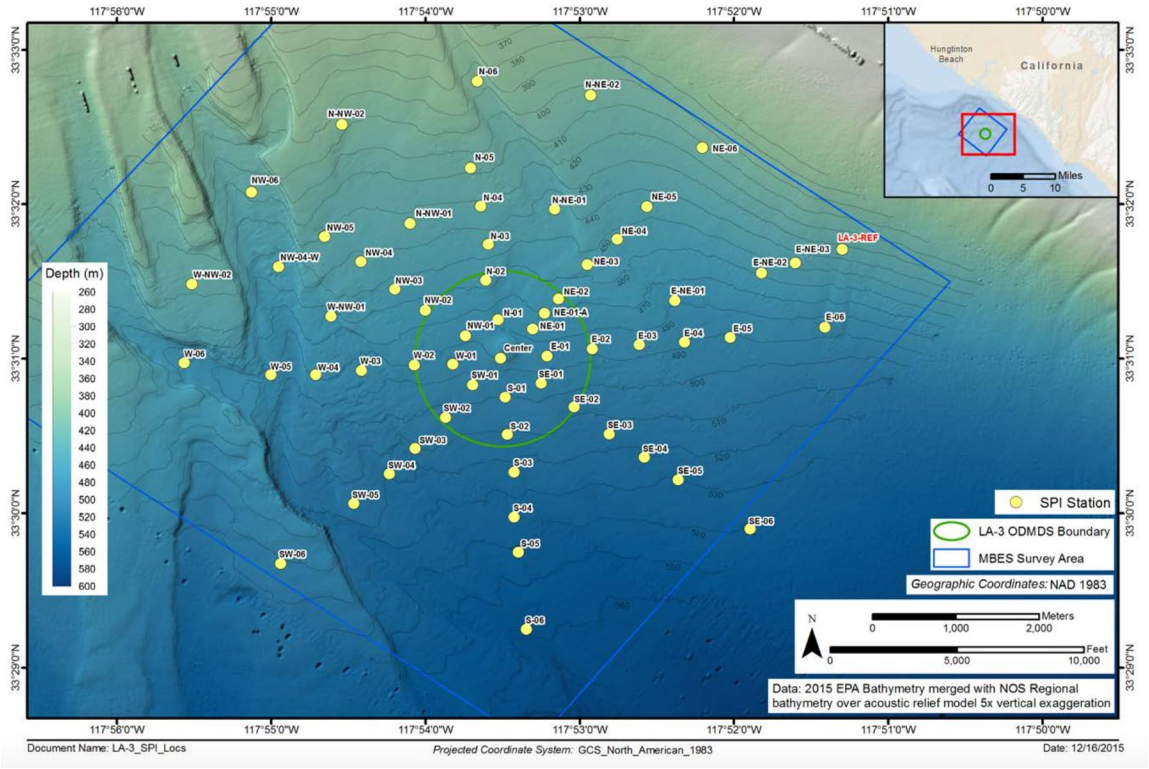

Figure 11. **SPI/PVI station locations at the LA-3 ODMDS.**

3.7.3 Conclusions and Recommended Management Actions

Based on the physical, chemical, and biological data collected during this survey, Region 9 concluded that there were no long-term adverse impacts resulting from dredged material disposal at the LA-3 ODMDS, the discontinued interim site, or in the area surrounding those sites. Differences in predominant sediment types between the ODMDS and areas outside of the site were consistent with dredged material characteristics and disposal operations. The variations in aRPD depths, with greater aRPD depths in areas with thicker deposits of dredged material, suggested that dredged material disposal may increase aRPD depth. However, the greater aRPD depths observed were not associated with any adverse impacts to the benthic communities within or around the disposal site and the aRPD depths measured throughout the study area indicated healthy benthic conditions. The metal, DDT, and PCB concentrations measured in the LA-3 ODMDS that exceeded the ERL reflected levels consistent to those identified during predisposal testing of dredged material; these concentrations were not elevated enough to be associated with toxicity in the benthic community. The multiple infauna successional stages observed through the study area indicated a well-established benthic community that was able to recolonize following historical and continued disposal activities. Considering all of the results from the LA-3 ODMDS survey, Region 9 concluded that the benthic community in the discontinued interim site has recovered from historical dredged material disposal operations and that the LA-3 ODMDS is performing as anticipated and no changes to site management are necessary at this time.

4.0 Conclusions

EPA conducts oceanographic surveys to monitor the impacts of regulated dumping at ocean disposal sites and to inform management decisions in accordance with EPA roles and responsibilities under the MPRSA and the ocean dumping regulations. EPA monitors ocean disposal sites to ensure that dumping will not unreasonably degrade or endanger human health

or the environment, to verify that unanticipated adverse effects are not occurring from past or continued use of sites, and to ensure that terms of ocean dumping permits are met.

Based on the results of these FY 2015 ocean disposal site surveys:

- EPA found that environmentally acceptable conditions have been met and determined that permitted disposal of dredged material under the MPRSA could continue without modifications to site usage at eight of the monitored ocean disposal sites: HARS, Norfolk, Brunswick Harbor, Fernandina Beach, Corpus Christi Ship Channel, Corpus Christi New Work, Matagorda Ship Channel, and LA-3 ODMDSs.
- EPA also used the data collected during these surveys to:
    - Inform the proposal to expand the boundaries of the existing Massachusetts Bay Disposal Site to include a portion of the historical Industrial Waste Site (IWS). This site expansion is a key step in the Massachusetts Bay IWS Restoration Project, whereby suitable dredged material from a federal navigation project authorized under the MPRSA would be disposed of at an expanded Massachusetts Bay Disposal Site (MBDS), isolating legacy contaminants on the seafloor under a protective layer of dredged material;[8]
    - Identify the location of two shipwrecks within the MBDS and establish a 50-meter disposal buffer around the wrecks to avoid impacts to these potential cultural resources during future disposal activities;
    - Better understand the ecological succession and variability of rock habitat within the HARS and inform methodologies to be utilized during future studies of the site;
    - Inform future studies of the benthic communities in the Norfolk ODMDS;
    - Confirm that the SMMP for the Brunswick Harbor ODMDS is effective in ensuring that disposal is not unreasonably degrading or endangering human health, amenities, or the marine environment;
    - Confirm that the Fernandina ODMDS is performing as anticipated and inform future studies of the site and surrounding area;
    - Confirm that the Corpus Christi Ship Channel, Corpus Christi New Work, and Matagorda Ship Channel ODMDSs were not adversely impacted by the 2014 Texas City “Y” oil spill;
    - Inform future monitoring surveys to evaluate the fate and transport of dredged material disposed of at the Corpus Christi Ship Channel ODMDS and identify a reference area that is more suitable for comparison to the material being disposed of at the ODMDS;
    - Contribute to a compendium of background tissue values for contaminants of concern that may be used in future disposal permit evaluations in the Western Gulf of Mexico; and
    - Confirm that there were no long-term adverse impacts resulting from dredged material disposal at the LA-3 ODMDS.

[8]The Final Rule for the Modification of an Ocean Dredged Material Disposal Site in Massachusetts Bay was published in the Federal Register on May 29, 2018, with an effective date of June 28, 2018 (83 FR 24408).

5.0 Acknowledgements

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