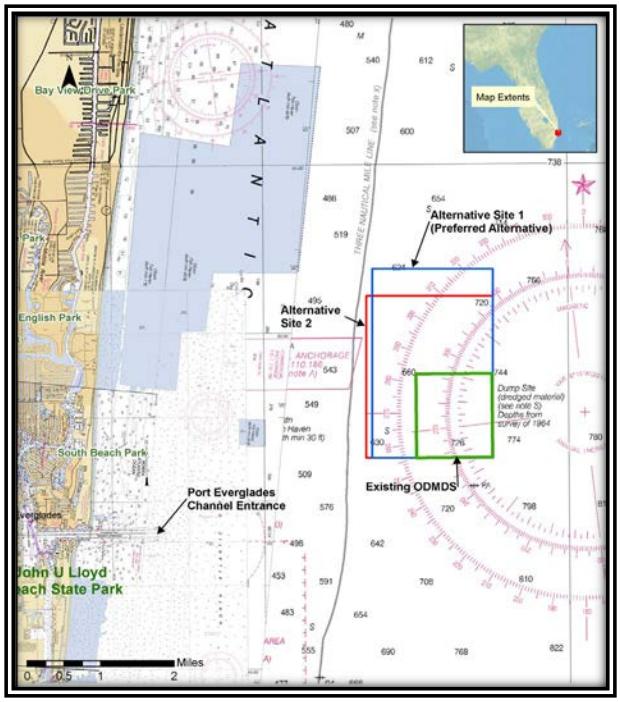
DRAFT ENVIRONMENTAL ASSESSMENT ON THE EXPANSION OF THE PORT EVERGLADES HARBOR OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) BROWARD COUNTY, FLORIDA



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Cooperating Agency: U.S. Army Corps of Engineers, Jacksonville District

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DRAFT ENVIRONMENTAL ASSESSMENT ON THE EXPANSION OF THE PORT EVERGLADES HARBOR OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) BROWARD COUNTY, FLORIDA

1 PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY

The Administrator of the U. S. Environmental Protection Agency (EPA) has the authority to promulgate ocean dumping criteria, designate recommended ocean disposal sites for all authorized materials, and issue permits for dumping of materials other than dredged materials into ocean waters. Under Sections 102 and 103 of the *Marine Protection, Research, and Sanctuaries Act (MPRSA)* of 1972, as amended (33 U.S.C. 1412), also known as the *Ocean Dumping Act,* the EPA and the U. S. Army Corps of Engineers (USACE) have the responsibility for ensuring that ocean dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, amenities, or the marine environment.

Section 102 of the MPRSA authorizes the EPA to designate sites or times at which dumping may occur and establish criteria for reviewing and evaluating permit applications. It also requires the EPA, in conjunction with the USACE, to develop site management and monitoring plans (SMMPs) for dredged material disposal sites. Section 103 of the MPRSA authorizes the USACE to issue permits for the transportation of dredged material, subject to compliance with the EPA environmental criteria (Ocean Dumping Criteria at 40 CFR Part 227) and the EPA's concurrence with USACE's finding of compliance.

The Port Everglades Harbor ODMDS was designated by EPA Region 4 in February 2005 (70 FR 2808, 1/18/2005). A Final Environmental Impact Statement (FEIS) in support of designation was published in July 2004. The November 2004 Port Everglades Harbor ODMDS SMMP placed project volume restrictions of 500,000 cubic yards (cy) per dredging event until capacity modeling was completed. In 2009, the USACE initiated capacity modeling for the proposed Port Everglades expansion project. Preliminary results have indicated that the existing ODMDS is insufficient in size to contain the potential volume of dredged material from future projects. Therefore, it has been determined that there is a need to enlarge the existing ODMDS.

1.2 ODMDS LOCATION

The ODMDS is located east northeast of Port Everglades and approximately 3.25 nautical miles (nmi) (6.0 km) offshore of Fort Lauderdale, Broward County, Florida (Figure 1). Water depths at

the project site range from 587 ft. (179 m) to 761 ft. (232 m). The Alternative sites and existing ODMDS are defined by the boundary coordinates presented in Table 1.

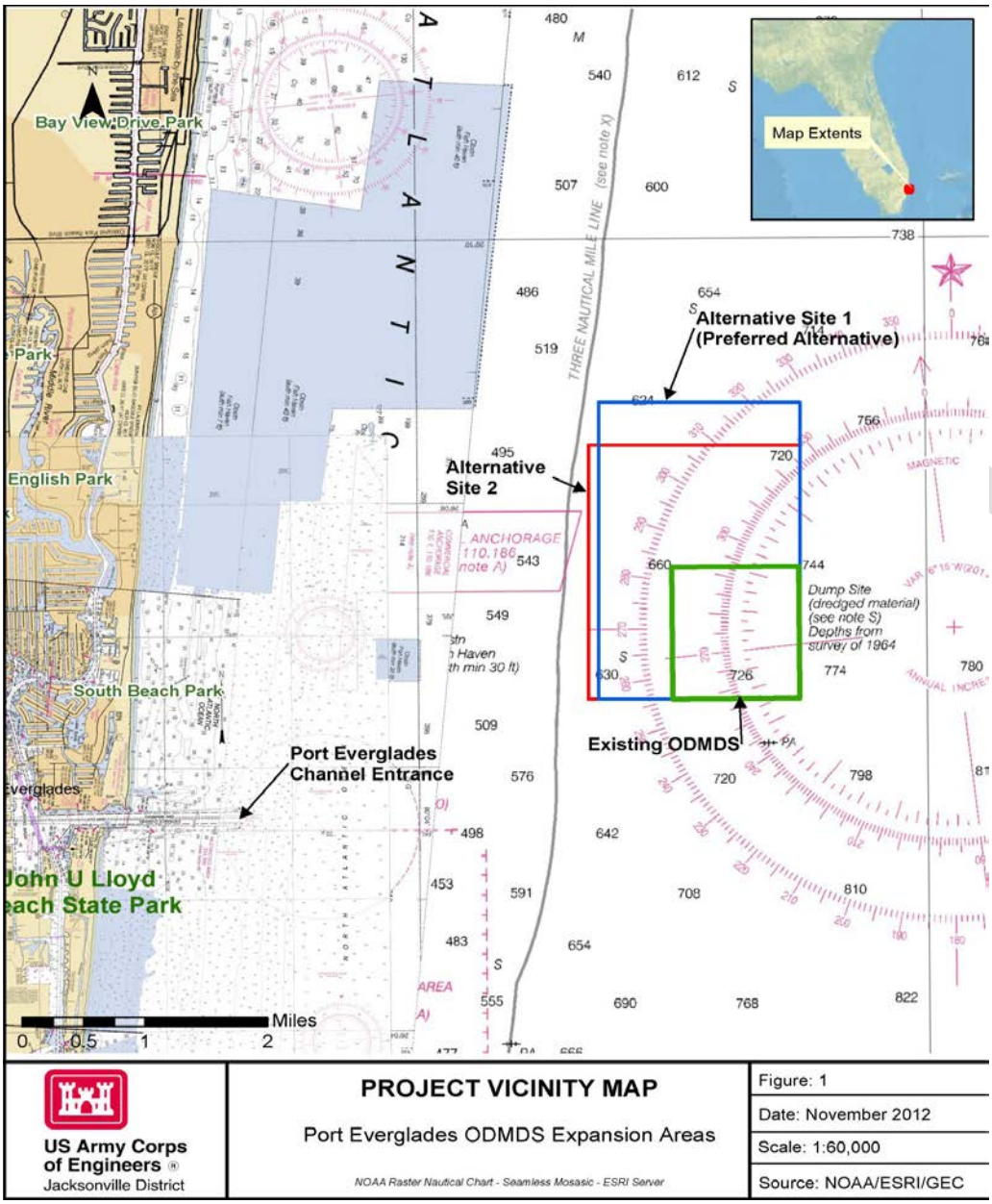


Figure 1. Project vicinity map showing the location of the two proposed alternatives, the existing ODMDS, and the entrance to the Port Everglades channel.

Table 1. Coordinates and total area in square nautical miles (nmi^2) for the existing Port Everglades Harbor ODMDS and Proposed Alternative Sites 1 and 2.

Site		Geographic (NAD83, Decimal Degrees)		State Plane (Florida East NAD83)		Area nmi^2
		Latitude	Longitude	N	E	
Existing ODMDS	Center	26°07.000’	-80°01.500’	649292.40	976098.20	0.90
	SE	26°06.500’	-80°01.000’	646284.00	978856.00	
	SW	26°06.500’	-80°02.000’	646243.00	973386.00	
	NW	26°07.500’	-80°02.000’	652301.00	973341.00	
	NE	26°07.500’	-80°01.000’	652342.00	978810.00	
Alternative Site 1	Center	26°07.625’	-80°01.784’	653067.18	974516.67	3.20
	SE	26°06.500’	-80°01.000’	646,283	978,856	
	SW	26°06.500’	-80°02.578’	646,220	970,225	
	NW	26°08.750’	-80°02.578’	659,851	970,124	
	NE	26°08.750’	-80°01.000’	659,915	978,753	
Alternative Site 2	Center	26°07.464’	-80°01.825’	652090.13	974299.72	2.89
	SE	26°06.493’	-80°01.000’	646242.90	978855.70	
	SW	26°06.504’	-80°02.666’	646242.90	969745.00	
	NW	26°08.434’	-80°02.650’	657932.00	969745.00	
	NE	26°08.423’	-80°00.984’	657932.00	978855.70	

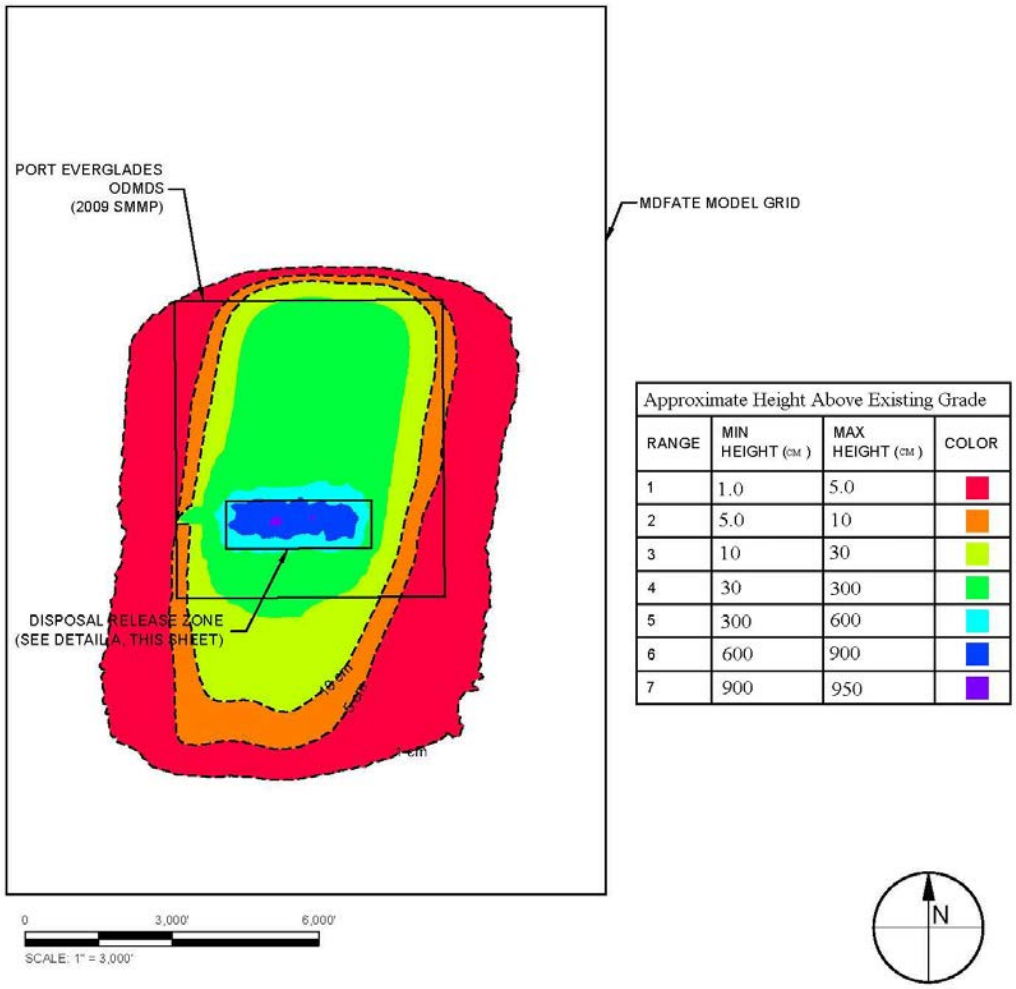
1.3 NEED OR OPPORTUNITY

Port Everglades is a major cargo and cruise ship port in Florida contributing $14 billion of economic activity to Florida’s economy and nearly 10,000 jobs via the companies that provide direct services to the Port (http://www.porteverglades.net/about-us/). With the enlargement of the Panama Canal, larger ships are currently calling on Port Everglades, although light-loaded and not able to fully maximize their capacity, due to existing depth limitations. In order to allow these vessels to fully maximize their capacity, the USACE has completed a Congressionally authorized feasibility study and FEIS for dredging and expansion activities at Port Everglades. In 2017 the Record of Decision was rescinded and a supplemental NEPA document is being prepared. The proposed expansion would deepen the entrance channel from -45 feet to -55 feet mean lower low water (MLLW) (plus up to two feet of required and allowable overdepth) and to deepen all other channels to -48 feet MLLW (plus up to two feet of required and allowable overdepth) (USACE, 2015). Subsequent to the release of the USACE 2015 FEIS, the USACE is reinitiating the National Environmental Policy Act (NEPA) process for dredging and expansion activities for Port Everglades. It is EPA’s understanding that the Preferred Alternative identified in the FEIS will remain the same.

The existing ODMDS was designated to accommodate dredged material from periodic maintenance events in the Port. The Port Everglades Harbor ODMDS received its final designation by the EPA in February 2005 (70 FR 2808) following the completion of a July 2004 EIS for the ODMDS designation. However, capacity modeling (Figure 2) indicates the existing, approved ODMDS is insufficient in size to contain any expansion projects.

Broward County has identified a need to dispose of non-beach quality dredged material from the Port Everglades Sand Bypass Project (SAJ-2008-2034). Project volumes are expected to exceed 500,000 cubic yards (Creed, 2013) requiring site expansion. The U.S. Navy and U.S. Coast Guard also have facilities in the area that may require use of the ODMDS although no need has currently been identified.

The proposed 6.63 mcy of dredged material associated with the proposed Port Everglades expansion project (Taylor 2010) in addition to continued maintenance material. Additionally, surveys performed of the existing ODMDS indicate that fine material has potentially moved northward out of the existing smaller site. Therefore, there is a need to expand the existing ODMDS to accommodate dredged material resulting from the planned Port Everglades Harbor expansion project and future maintenance dredging needs. The need for ocean disposal is based primarily on the lack of economically, logistically, and environmentally feasible alternatives for the disposal of the projected quantities of dredged material deemed unsuitable for beach re-nourishment or beach placement (USACE, 2015). The 2018 WRDA (America's Water Infrastructure Act) authorizes the Port Everglades expansion.



Approximate Height Above Existing Grade			
RANGE	MIN HEIGHT (CM)	MAX HEIGHT (CM)	COLOR
1	1.0	5.0	
2	5.0	10	
3	10	30	
4	30	300	
5	300	600	
6	600	900	
7	900	950	

Figure 2. MDFATE and STFATE capacity modeling conducted by Taylor Engineering (Taylor 2010) shows simulated, high-quantity dredged material exceeding the boundaries of the existing Port Everglades ODMDS.

1.4 RELATED ENVIRONMENTAL DOCUMENTS

The following documents are relevant to the proposed ODMDS expansion:

Final Environmental Impact Statement (FEIS) for Designation of the Palm Beach Harbor Ocean Dredged Material Disposal Site and the Port Everglades Harbor Ocean Dredged Material Disposal Site. USEPA, July 2004

Port Everglades Harbor Ocean Dredged Material Disposal Site - Site Management and Monitoring Plan, USEPA/USACE, November 2004

Revisions to the Port Everglades Harbor Ocean Dredged Material Disposal Site (ODMDS) Site Management and Monitoring Plan, USEPA/USACE, May 2009

Sediment and Water Quality of Candidate Ocean Dredged Material Disposal Sites for Port Everglades and Palm Beach, Florida, USEPA, prepared for USACE, June 1999

Rapid Seafloor Reconnaissance and Assessment of Southeast Florida Ocean Dredged Material Disposal Sites Utilizing Sediment Profile Imaging - Post-Disposal SPI Mapping at the Port Everglades Harbor ODMDS, Germano & Associates, Inc., prepared for USEPA, May 2006

Evaluation of Dredged Material Behavior at the Port Everglades Harbor Federal Project Ocean Dredged Material Disposal Site; by Taylor Engineering, Inc. for ANAMAR Environmental, Inc., prepared for USACE, June 2010 (Updated November 2010)

Port *Everglades ODMDS Survey, Port Everglades, Florida*, by ANAMAR Environmental Consulting, Inc., prepared for USACE, November 2010

Site Designation Study for the Port Everglades Harbor Ocean Dredged Material Disposal Site Expansion: May 2011 Survey Results. ANAMAR Environmental Consulting, Inc., prepared for USACE, January 2012

1.5 DECISIONS TO BE MADE

This EA evaluates the expansion of the current authorized Port Everglades ODMDS to a size that will allow for dredged material disposal needs in excess of 500,000 cubic yards as projected for the proposed Port Everglades maintenance operations, expansion, and sand bypass dredging events and the alternatives considered to accomplish that goal.

1.6 SCOPING AND ISSUES

1.6.1 Issues Evaluated in Detail

The following issues were identified to be relevant to the proposed action and appropriate for detailed evaluation:

- Vegetation;
- Threatened and Endangered Species;
- Hardbottom Habitats;
- Fish and Wildlife Resources;
- Essential Fish Habitat;
- Coastal Barrier Resources;
- Water Quality;
- Hazardous, Toxic, and Radioactive Wastes;

- Air Quality;
- Noise;
- Recreation Resources;
- Navigation and Public Safety;
- Historic and Cultural Resources; and
- Military Usage.

1.6.2 Impact Measurement

The following provides the means and rationale for measurement and comparison of impacts of the proposed alternatives.

In the deep-water marine environment of the existing and proposed alternative ODMDSs, there is a finite amount of information available on which to design the expanded ODMDS and measure and compare the impacts of the proposed alternatives. For the proposed ODMDS expansion, the EPA considered sidescan sonar surveys; biological, sediment, and water quality surveys; still photography; and modeling tools such as Short-Term Fate (STFATE) and Multi-Dump Fate (MDFATE) to evaluate the impacts of the proposed alternatives (described in Section 2).

The available sidescan sonar data along with plan view and Sediment Profile Imaging (SPI) photography was reviewed to identify the most appropriate area in which to expand the existing ODMDS. Sidescan sonar data provides scientists with an understanding of existing bottom features and is useful in identifying potential benthic structure and other features such as potential shipwrecks. It is a key factor in locating suitable ODMDS sites in deep-water environments.

Simulations of dredged material disposal at the existing Port Everglades Harbor ODMDS were conducted using the Automated Dredging and Disposal Alternatives Modeling System (ADDAMS). STFATE and MDFATE modeling studies were used to determine the need for expansion and the required size of the expanded ODMDS. Several simulations were performed on multiple disposal release zone configurations within the existing ODMDS. The results found that the area of the deposition contour exceeding the existing ODMDS boundary for all model simulations was excessive, thus indicating a need to expand the ODMDS (Figure 2). Expansion alternative configurations were determined based on containing dredged material (1 cm thickness or less beyond the boundaries.)

Alternative ODMDS configurations were identified using sidescan sonar data to identify possible locations for the ODMDS expansion and modeling to determine the size of the expansion sites. Biological, water quality and sediment data from the May 2011 site study and cultural resource surveys conducted in November 2011 and July 2012 were then used to confirm the suitability of

the proposed alternative sites and, where possible, measure and compare impacts within the proposed alternatives.

1.6.3 Issues Eliminated from Detail Analysis

Aesthetic Resources and Solid Waste were not considered important or relevant issues to the proposed action, as they are not located in the action area.

1.7 PERMITS, LICENSES, AND ENTITLEMENTS

Refer also to Sections 1.1.4, Permits, Licenses and Entitlements and 4.35, Compliance with Environmental Requirements of the 2004 Final EIS for site designation.

EPA Region 4 and the USACE Jacksonville District share responsibility for control and management of the Port Everglades Harbor ODMDS under the MPRSA. The MPRSA assigns basic responsibility to the EPA and the USACE for ensuring that ocean dredged material disposal activities will not unreasonably degrade or endanger human health, welfare, amenities, or the marine environment (MPRSA Sections 102 and 103). Section 102 of the MPRSA authorizes the EPA to designate sites or times at which dumping may occur and to establish criteria for reviewing and evaluating permit applications and also requires the EPA, in conjunction with the USACE, to develop site specific SMMPs for each ODMDS. Section 103 of the MPRSA authorizes the USACE to issue permits for the transportation of dredged material, subject to compliance with the EPA environmental criteria (Ocean Dumping Criteria at 40 CFR Part 227) and the EPA's concurrence with the USACE's finding of compliance.

During preparation of this EA, a process of coordination and concurrence has been conducted through the distribution of the EA for this proposed action to Federal and Florida state agencies, offices, and organizations having authority over issues associated with this action. Appendix B of the Final EA will include all such correspondence.

2 ALTERNATIVES

This section describes the alternatives that were studied in detail. Based on the information and analysis presented in the sections on the Affected Environment and the Environmental Effects, this section presents the beneficial and adverse environmental effects of all alternatives in comparative form, providing a clear basis for choice among the options for the decision-maker and the public.

2.1 DESCRIPTION OF ALTERNATIVES

The existing ODMDS was designed to accommodate material from operation and maintenance (O&M) dredging events and small new work projects (i.e., projects that generate less than 500,000 cy of dredged material). The Port Everglades Harbor ODMDS SMMP requires capacity modeling for amounts over 500,000 cy of material.

Considering the Port Everglades expansion and the Sand Bypass project are each expected to generate more than 500,000 cy of dredged material, studies were initiated to determine the size and location of an ODMDS that could accommodate the volume of dredge material anticipated to be generated by these activities.

STFATE and MDFATE were performed using 6.63 million cubic yards of dredge material to determine the needed size of the expanded ODMDS. The results confirmed that dredged material deposition exceeded the existing ODMDS footprint. The modeling studies identified an initially proposed expansion area; however, the southern portion of the potential expansion area encroached into a Navy Use Area that had specifically been avoided during the original site designation at the request of the Navy (see Section 2.4). Existing sidescan sonar survey data of areas adjacent to the existing ODMDS and outside of the Navy Use Area were reviewed to identify other possible expansion sites.

Modeling of the expanded ODMDS was done using both an east-west and a north-south disposal release configuration (Figure 3). Resulting expansion areas were designed to contain all sediment deposition of a thickness greater than 1 cm and to be located within the area of existing sidescan sonar data.

The results generated two potential expansion areas: a 3.21 sq. nmi site with a north-south oriented release zone; and a 2.89 sq nmi site with an east-west oriented release zone. The western edge of both alternative sites is approximately 3.25 nmi offshore.

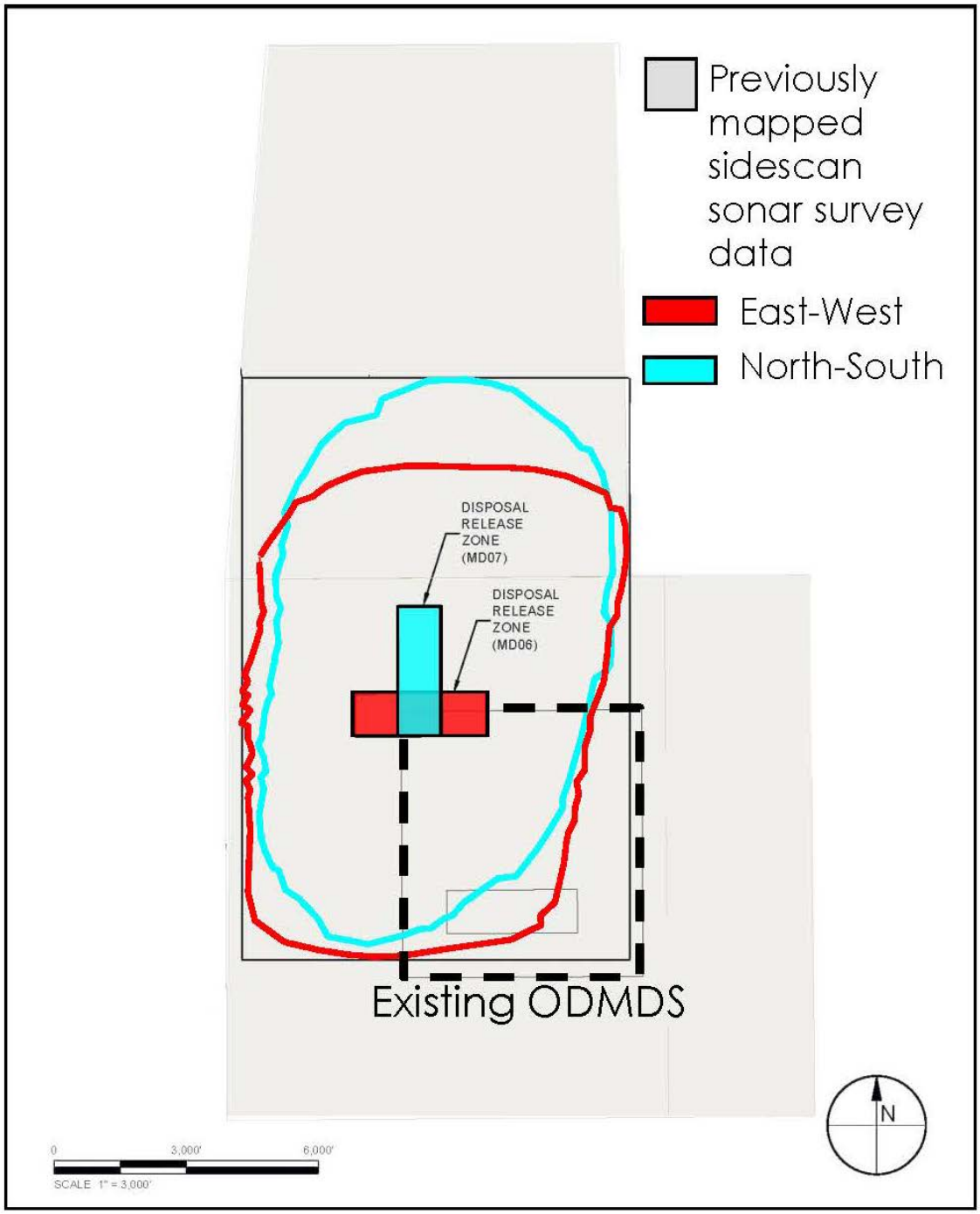


Figure 3. Results of modeling, using both an east-west (red) and a north-south (blue) disposal release configurations denoted in the center of the site in red and blue, respectively. Resulting expansion areas were designed to contain all sediment deposition of a thickness greater than 1 cm, denoted by red and blue contours, and to be located within the area of existing sidescan sonar data.

To be considered as a potential ODMDS, alternatives are considered under the five general (40 CFR Part 228.5) and 11 specific (40 CFR Part 228.6) criteria of the MPRSA. The general criteria are:

(1) 40 CFR 228.5(a). The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

(2) 40 CFR 228.5(b). Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

(3) 40 CFR 228.5(c). [Removed from regulation.]

(4) 40 CFR 228.5(d). The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

(5) 40 CFR 228.5(e). USEPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

The 11 specific criteria are:

(1) Geographical position, depth of water, bottom topography and distance from coast;

(2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;

(3) Location in relation to beaches and other amenity areas;

(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any;

(5) Feasibility of surveillance and monitoring;

(6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;

(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);

(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;

(9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;

(10) Potentiality for the development or recruitment of nuisance species in the disposal site;

(11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.

The general and specific criteria were considered in the 2004 EIS for the ODMDS designation, Sections 4.3.3 and 4.3.4 respectively, for the designation of the existing ODMDS (USEPA 2004) and are incorporated by reference. Consideration of the criteria for the expansion Alternatives 1 and 2 are not expected to deviate from the findings for the designation of the existing site. Section 2.6 examines a comparison of the proposed alternatives and compliance with the general criteria and specific criteria in Table 2 and Table 3.

2.1.1 Alternative Site 1: North-South Disposal Zone - Preferred Alternative

Alternative 1, a 3.2 sq. nmi. (2,701 acres) site has a release zone that was modeled in a north-south orientation and is the environmentally and operationally preferred alternative (Figure 4). Although the release zone was modeled in a particular alignment for the analysis, it can be changed in response to operational concerns by modifying the SMMP. The western edge of the site is located approximately 3.3 nmi (6.1 km) offshore and the center of the site is located approximately 4.0 nmi (7.4 km) offshore. Water depths range from 604 to 735 feet (184 to 224 meters). Previously collected sidescan sonar data (EPA 2004) and data collected from the OSV *Bold* site survey in May 2011 (ANAMAR 2012), indicate the bottom within the Alternative 1 expansion area is primarily a homogenous mix of sand and silt with scattered rubble, and minor amounts of clay.

Alternative 1 is the environmentally preferred alternative. Although Alternative 1 covers 0.32 nmi^2 (11%) more area than Alternative 2, it is estimated to impact less potential hardbottom based on photographic and sidescan sonar data for estimated hardbottom as presented in

Section 3.4. Alternative 1 is also the preferred alternative based on operational considerations. The strong northerly current of the Florida Current/Gulf Stream averages 1.3 m/s (2.5 knots); however, the current varies considerably with reported velocities from one to four knots (Taylor 2010; USEPA 2004). The USACE Operation Division has stated the north-south configuration of the disposal release zone in Alternative 1 will provide additional control and safety when unloading material. An elongated north-south disposal release zone configuration will permit a disposal vessel to orient parallel to the strong current allowing added control of the vessel. An analysis of dredged material disposal vessel tracks during the Miami Harbor Phase II construction dredging showed some vessels experienced an increased transit time from the Miami Harbor to the Miami ODMDS. This increased transit time was due to decreased vessel control and maneuverability. It was noted that early in the project, when vessels approached the ODMDS from the west/north-west, more re-approaches were required than later in the project when vessels approached directly from the north, parallel to the current (USACE 2012). This same strong Florida Current is experienced at the Miami ODMDS, which is located approximately 22 nmi south of the site location.

Prior survey work has indicated that fine material from prior disposal events may have exited the existing site. Due to this potential migration of sediments out of the site to the north, Alternative 1 is better suited to containing such movement in the future due to the north-south length of the proposed boundaries.

2.1.2 Alternative Site 2: East-West Release Zone

Alternative Site 2, a 2.89 sq. nmi. (2,449 acre) has a release zone which was modeled in an east-west orientation (Figure 5). The western edge of the site is located approximately 3.2 nmi (5.9 km) offshore and the center of the site is located approximately 3.9 nmi (7.2 km) offshore. Water depths range from 604 to 735 feet (184 to 224 meters). Previously collected sidescan sonar data (EPA 2004) and data collected from the OSV *Bold* site study in May 2011 (ANAMAR 2012), indicate the bottom within the Alternative Site 2 expansion area is primarily a homogenous mix of sand and silt and clay with scattered rubble.

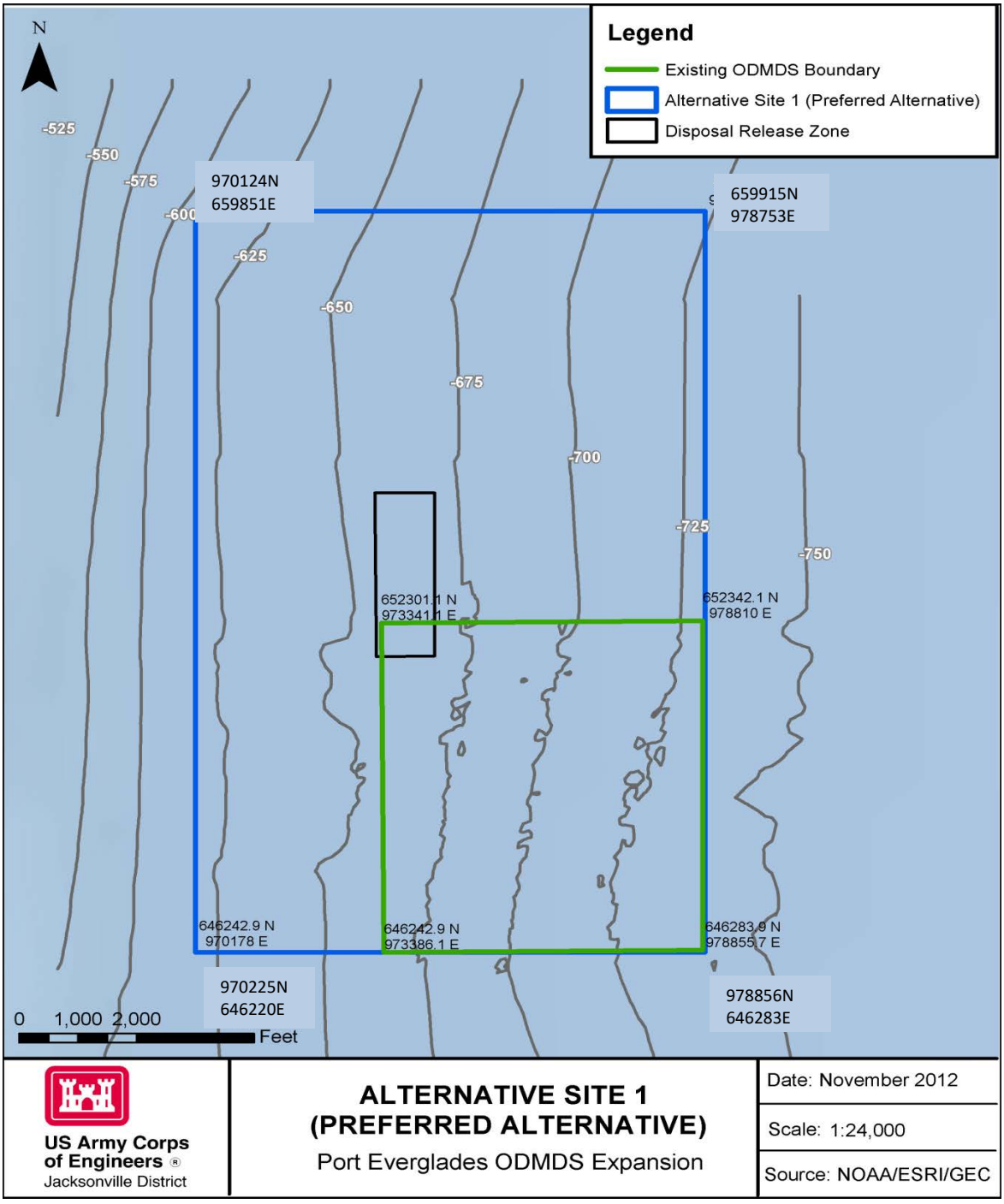


Figure 4 - Alternative Site 1 including potential disposal release zone developed based on modeling conducted in 2010.

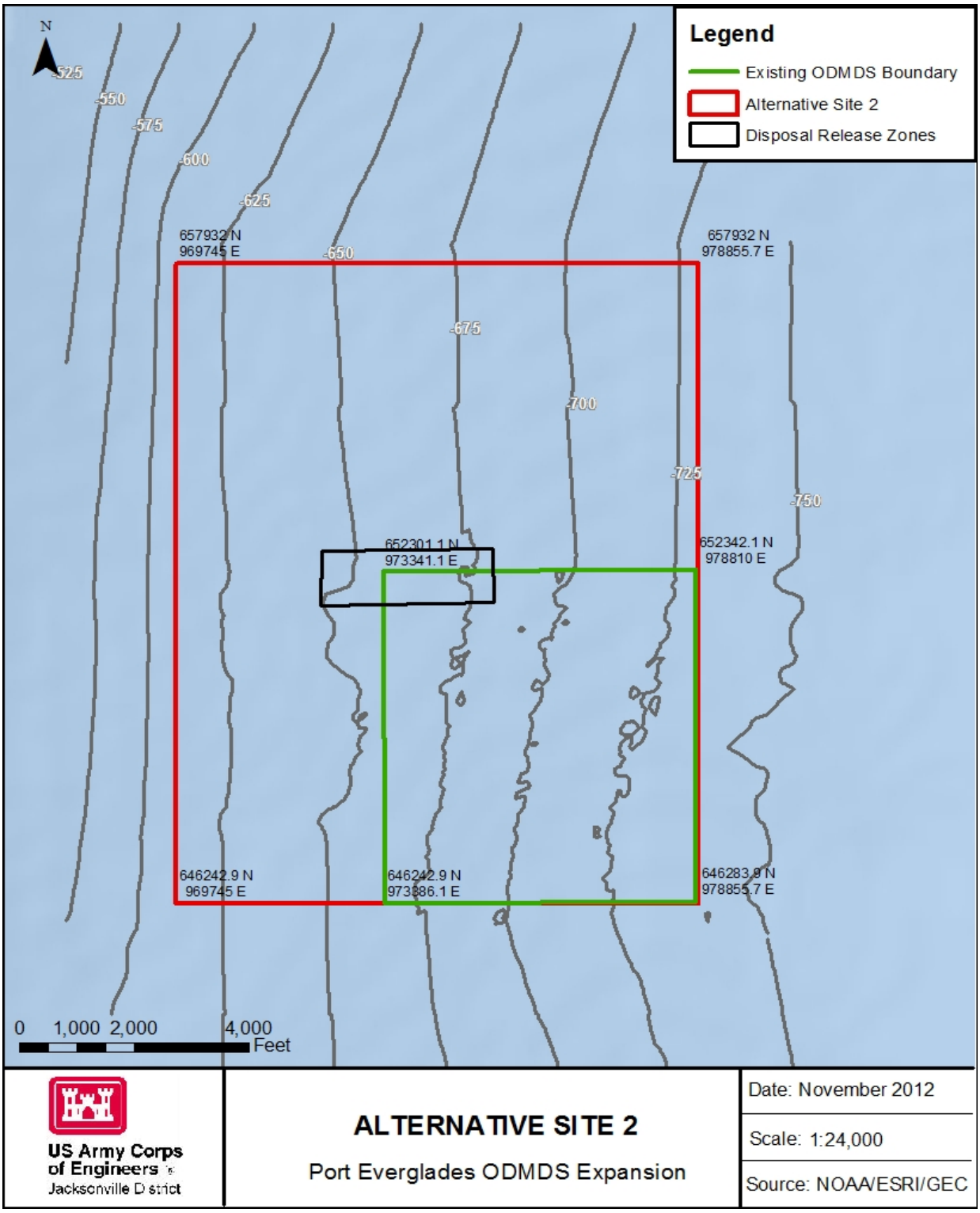


Figure 5. Alternative Site 2 including potential disposal release zone developed based on modeling conducted in 2010.

2.1.3 No Action Alternative (Status Quo)

The No-Action Alternative is defined as not designating an expanded ODMDS pursuant to Section 102 of the MPRSA. The existing site is limited to 500,000 cy of dredged material per dredging event without project specific capacity modeling studies to verify that material will be contained within the site appropriately. The existing ODMDS is not adequate for the proposed Port Everglades expansion project nor the upcoming Sand Bypass project nor disposal of dredged material from other non-federal dredging projects that would total more than 500,000 cy. Thus, the No-Action Alternative would not provide an acceptable USEPA-designated disposal site for use by the USACE or other entities for the disposal of large quantities of dredged material. Without an expanded disposal site, the expansion of Port Everglades Harbor would be adversely impacted with subsequent effects upon the national, regional and local economies (USACE, 2015).

2.2 ISSUES AND BASIS FOR CHOICE

The alternatives were evaluated based on their ability to provide the required capacity for disposing of dredged materials both for future O&M dredging operations and the proposed harbor expansion and sand bypass projects and their location in relation to other options.

2.3 PREFERRED ALTERNATIVE

Based on the analysis provided in this EA and the evaluation of the alternatives with respect to any potential issues identified, Alternative 1 is recommended as the Preferred Alternative based on environmental preference and operational constraints. Alternative 1 with the North-South disposal zone is found to affect less potential hardbottom in the project areas and also provides the most operationally favorable alternative by allowing disposal vessels to orient parallel to the current when necessary. This allows the vessel pilots the safest and most accurate approach to dispose of dredged material.

2.4 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

The initially proposed expansion area (Figure 6) was eliminated from detailed evaluation at the request of the U.S. Navy. The U.S. Navy has authority over the authorization of activities occurring in this area as a result of Federal Regulations (see NOS 2010 for limits and regulations). These regulations state, “(1) Anchoring, trawling, dredging, or attaching any object to the submerged sea bottom shall be prohibited in the above described area.” The initial modeling results indicated that using the existing release zone with the increased volumes would create an expanded ODMDS site that encroached upon the Navy Use Area (see Figure 6). Additionally, during the original site designation, in a letter dated June 30, 1995, the Navy requested that the EPA exclude the Navy Use Area to avoid impacting operations conducted by the Navy in the site. During the alternative review for the proposed expansion,

USACE and the EPA re-verified with the Navy that the Navy Use Area should be avoided, and the Navy concurred with that determination (USN, 2010). Therefore, this alternative was eliminated from detailed evaluation and options for expanding the ODMDS to the north were explored.

Alternatives to ocean disposal were considered, as required by Section 102 of the MPRSA and NEPA. Based on the current conditions and in consideration of the analyses conducted and discussed in the 2004 EIS for the ODMDS designation, the following alternatives were eliminated from detailed analysis in this EA:

Upland Disposal: Two potential sites, land belonging to Port Everglades and land belonging to the Ft. Lauderdale/Hollywood International Airport (FLL), were examined as potential upland dredged material disposal sites. Due to development within the Port and further evaluation of the FLL's runway expansion plans, both the Port and FLL have withdrawn the use of their upland properties as upland placement options.

Further, the potential upland disposal sites were considered environmentally valuable in their own right, and neither was more cost-effective than ocean disposal. There are currently no other known upland sites suitable for the placement of dredged materials in the project vicinity. As a result, upland disposal is not a viable option for the placement of dredged materials from the Port Everglades Harbor Federal Navigation Project (USACE, 2015).

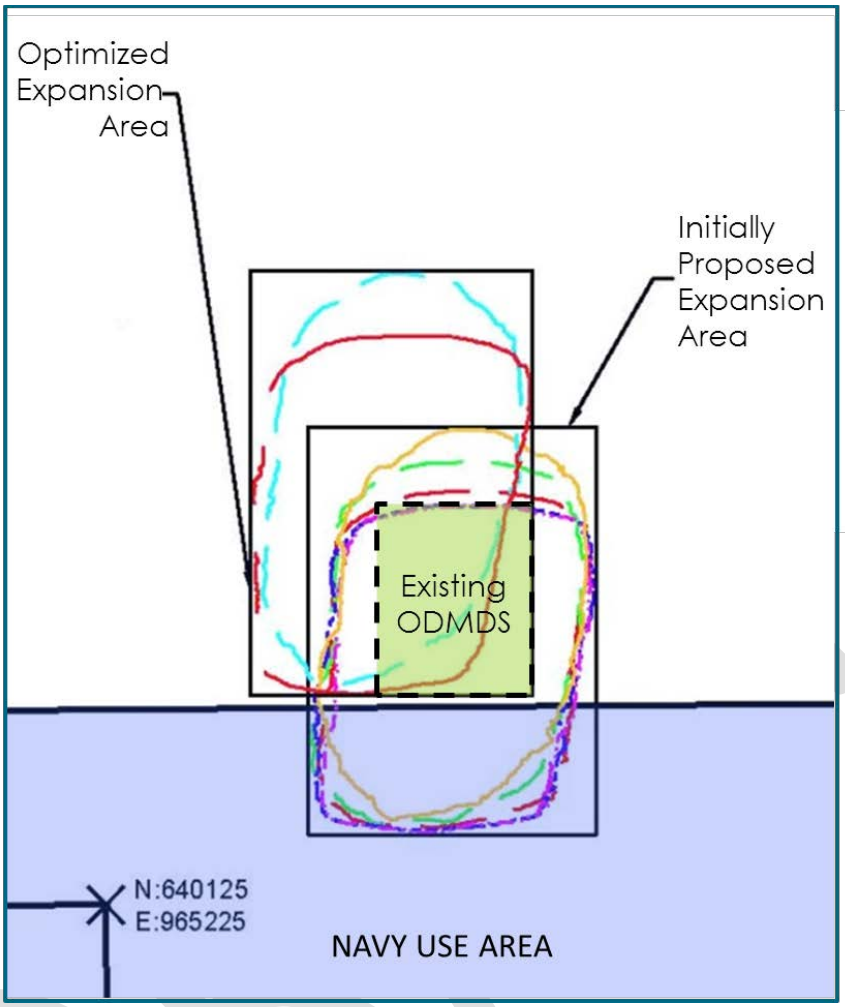


Figure 6. Graphic showing the location of the initially proposed expansion area that extends into the Navy Use Area. The optimized expansion area was shifted to the north and west to avoid the Navy Use Area. The figure shows the outlines encompassing resulting deposition areas from modeling. The optimized expansion area show resulting deposition areas from a north-south oriented disposal zone (blue) and an east-west oriented disposal zone (red). Alternative Site 1 fully encompasses the blue deposition area, while Alternative Site 2 fully encompasses the red deposition area.

Beach Placement: The issue of potentially reducing the opportunity for beneficial use of the dredged material, such as beach nourishment and placement, due to the availability of ocean disposal was addressed during the designation of the Port Everglades Harbor ODMDS (USEPA 2004). The Federal Standard is defined, by the USACE, as the least costly dredged material disposal or placement alternative identified by the USACE that is consistent with sound engineering practices and meets all Federal environmental requirements. Establishing the Federal Standard is not the same as selecting a disposal alternative, but rather establishes a base plan which defines the disposal or placement cost assigned to the navigation purpose of the project.

Beach placement is typically the least-cost disposal option when the dredged material meets the standards set by the Florida Department of Environmental Protection (FDEP) for beach or nearshore placement. The State of Florida's Beach Management Rule, Chapter 62B-41.007, Subsections 5(j)-5(k) defines beach quality material as material that maintains the general character and functionality of material occurring on a beach and in adjacent dunes and coastal systems. Such material is predominantly carbonate, quartz, or other similar material with a particle size distribution ranging from 0.062 millimeters (mm) and 4.76 mm, must be similar in color and grain size distribution to existing material at the placement site, and must not contain any of the following:

- Greater than 5 percent (%), by weight, silt, clay, or colloids passing the #230 sieve;
- Greater than 5%, by weight, fine gravel retained on the #4 sieve;
- Coarse gravel, cobbles, or material retained on the ¾-inch sieve in a percentage or size greater than that of material on the native beach;
- Construction debris, toxic material, or other foreign matter; and
- Any materials or characteristics that would result in cementation on the beach.

Sandy sediment derived from the maintenance of coastal navigation channels is deemed suitable for beach placement with up to 10 percent fine material passing the #230 sieve, provided that it meets the above criteria and appropriate water quality standards. Such material containing 10-20 percent fine material passing the #230 sieve and meeting all other sediment and water quality standards is considered suitable for placement on nearshore portions of beaches.

When beach or nearshore placement is the least-cost disposal option, the Federal Government is responsible for 100 percent of the disposal costs associated with placement. However, if some of the material does not meet the standards for beach placement or for other reasons beneficial use is not the base plan, the USACE has various legislative authorities to share the incremental costs of the beneficial use or beach placement above the base plan. The EPA and the USACE strongly support beneficial use projects. However, in some cases, beneficial uses will not be available and ocean disposal will be needed. The success of beneficial use projects depends on the creation of partnerships between Federal and non-Federal interests and requires local leadership and local financial commitments to succeed.

The majority of excavated materials from the planned Port Everglades Harbor expansion project will be silt, sand, gravel, cobble, and boulder-sized components. To separate beach compatible sand from the mixed sediments would require significant expense, plus

identification of a site where separation of beach compatible sand could be conducted. Considering that a majority of the dredged material found in the Port Everglades Navigation Project Harbor may not meet the standards for beach or nearshore placement, alternative disposal options to beach placement are needed. The USACE evaluated beach placement in an April 2005 EA (USACE 2005). Historically, shoal material from the entrance channel has consistently met the standards and is expected to be placed on Dr. Von D. Mizell-Eula Johnson State Park (USACE 2005) under the authorization of the Broward County SPP when capacity is available on the receiving beach.

2.5 ALTERNATIVES NOT WITHIN JURISDICTION OF LEAD AGENCY

Upland placement is not within the jurisdiction of the EPA. However, EPA strongly supports upland uses of dredged material where it adds value and conserves resources.

2.6 COMPARISON OF ALTERNATIVES

Table 2 provides a comparison of the proposed alternatives and compliance with the five general criteria for designation outlined in 40 CFR 228.5. Table 3 provides a comparison of the proposed alternatives and compliance with the eleven specific criteria for designation outlined in 40 CFR 228.6. Table 4 summarizes the major features and consequences of the alternatives that were considered. The primary difference between the two alternatives (other than the No Action Alternative) is that Alternative Site 1 allows for less potential hardbottom impacts and as well maximum operational efficiency and vessel safety. Section 4, Environmental Effects provides a more detailed discussion of the impacts of the alternatives considered.

Table 2. A comparison of the proposed alternatives and compliance with the general criteria for designation outlined in 40 CFR 228.5.

GENERAL CRITERIA	Compliance
40 CFR 228.5(a) The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.	The existing ODMDS does not support any exclusive commercial or recreational fishery, recreational boating, or specially designated shipping lanes (USEPA 2004). Alternative Sites 1 and 2 encompass and are adjacent to the existing ODMDS and are expected not to impact these activities.
40 CFR 228.5(b) Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.	The western edge of both alternative sites is approximately 3.25 nmi east of the nearest shoreline such that the prevailing current will not transport dredged material to reef. Temporary changes caused by the physical movement of sediment through the water column will be reduced to ambient conditions before reaching any environmentally sensitive area. The western edge of both alternatives are approximately 0.6 nmi west of the western edge of the existing ODMDS and are similarly expected not to impact any environmentally sensitive area.
40 CFR 228.5(c) If at any time during or after disposal site evaluations studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in Sections 228.5 through 228.6, the use of such sites will be terminated as soon as suitable alternate disposal sites can be designated.	[No longer in regulation.]
40 CFR 228.5(d) The sizes of ocean disposal sites will be limited in order to localize for identification, to control any immediate adverse impacts, and to permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.	The size and configuration of Alternative Sites 1 and 2 were designed using modeling studies that determined an area to contain all proposed dredged material deposition of a thickness of one centimeter or greater. This criterion was chosen to avoid dredged materials from being deposited outside of the designated boundaries of the disposal site. Both alternatives will allow for the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts.

40 CFR 228.5(e) USEPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.	The continental shelf in the vicinity of the proposed sites has a width of approximately 0.63 nmi (USEPA 2004). Alternative Sites 1 and 2 lay approximately 2.7 nmi beyond the edge of the shelf. The locations of the Alternative Sites were chosen to encompass the existing ODMDS which has been used previously.

Table 3. Comparison of the proposed alternatives and compliance with the specific criteria for designation outlined in 40 CFR 228.6

SPECIFIC CRITERIA	Alternative Site 1	Alternative Site 2	No Action Alternative
(1) Geographical position, depth of water, bottom topography and distance from coast;	The western edge of the site is approximately 3.3 nmi east of the nearest shoreline. The center of the site is approximately 4 nmi east of the nearest shoreline. Water depths within the site range from approximately 587 to 761 feet. Sediment within the site is predominantly sand (55.7–64.9% Sand) (ANAMAR 2012).	The western edge of the site is approximately 3.2 nmi east of the nearest shoreline. The center of the site is approximately 3.9 nmi east of the nearest shoreline. Water depths within the site range from approximately 587 to 761 feet. Sediment within the site is predominantly sand (55.7–64.9% Sand) (ANAMAR 2012).	The western edge of the site is approximately 3.8 nmi east of the nearest shoreline. The center of the site is approximately 4.3 nmi east of the nearest shoreline. Water depths within the site range from 587 to 76135 feet. Sediment within the site is predominantly sand (64.3% Sand) (ANAMAR 2012).
(2) Location in relation to breeding, spawning, nursery, feeding, or passage areas of living resources in adult or juvenile phases;	Same as No Action Alternative	Same as No Action Alternative	The existing ODMDS is not located in exclusive breeding, spawning, nursery, feeding, or passage areas for adult or juvenile phases of living resources.
(3) Location in relation to beaches and other amenity areas	The center of Alternative Site 1 is located approximately 4.0 nmi from the	The center of Alternative Site 2 is located approximately 3.9 nmi from the	The center of the existing ODMDS is located approximately 4.3 nmi from the nearest coastal beach.

such as natural and artificial reefs	nearest coastal beach. The site is approximately 0.68 nmi east of the nearest artificial reef (the Qualmann Barge). The natural reef tract lay 1.8 nmi inshore of the site. No significant impacts are expected to resources or amenity areas associated with Alternative 1. The project area does not support any significant recreational and commercial fisheries resource.	nearest coastal beach. The site is approximately 0.58 nmi east of nearest artificial reef (the Qualmann Barge). The natural reef tract lay 1.7 nmi inshore of the site. No significant impacts are expected to resources or amenity areas associated with Alternative 2. The project area does not support any significant recreational and commercial fisheries resource.	The site is approximately 1.68 nmi east of the nearest artificial reef (the Qualmann Barge). No significant impacts expected to resources or amenity areas associated with the existing ODMDS. The existing ODMDS was found to not support any significant recreational and commercial fisheries resource (USEPA 2004).
(4) Types and quantities of wastes proposed to be disposed of, and proposed methods of release, including methods of packing the waste, if any;	Only material that meets EPA Ocean Dumping Criteria 40 CFR 220-229 will be placed in the proposed site. Maintenance volumes are estimated to average approximately 30,000 cubic yards per year however yearly dredging is uncommon. Maintenance material typically consists of varying percentages of sand and silt. Additional volumes include up to an estimated 6.63 mcy of new work material. New work material will consist of silt, sand, gravel, cobble and	Same as Alternative 1.	Only material that meets EPA Ocean Dumping Criteria 40 CFR 220-229 will be placed in the proposed site. Maintenance volumes are estimated at approximately 30,000 cubic yards per year however yearly dredging is uncommon. Maintenance material typically consists of varying percentages of sand and silt. With the no action alternative, the existing ODMDS would continue to be available for maintenance and disposal of dredged material from projects not exceeding more than 500,000 cy per dredging event.

	potentially bolder size components.		
(5) Feasibility of surveillance and monitoring;	Same as No Action Alternative	Same as No Action Alternative	USEPA expects monitoring and surveillance at the existing ODMDS to be feasible. Due to the depths (>700 feet) and location on the edge of the Florida Current, larger survey vessels (coastal class or larger) are required.
(6) Dispersal, horizontal transport and vertical mixing characteristics of the area, including prevailing current direction and velocity, if any;	Similar to the No Action Alternative. Currents are expected to be slightly less as the western boundary of the site is closer to shore.	Same as Alternative 1	The strong northerly current of the Florida Current/Gulf Stream averages 1.3 m/s (2.5 knots), however varies considerably with reported current velocities from one to four knots (Taylor 2010; USEPA 2004). It was found that there is little possibility for sediment transport from the existing ODMDS, due to Florida current eddies, to impact any resource areas (USEPA 2004).
(7) Existence and effects of current and previous discharges and dumping in the area (including cumulative effects);	Same as No Action Alternative	Same as No Action Alternative	One previous disposal event has occurred at the existing site. Material was found to have moved beyond the northern boundary of the existing site. Chemical concentrations of many analytes were higher in sediments within the existing ODMDS than outside of the boundaries, but of no concern ecologically.

(8) Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean;	Same as No Action Alternative	Same as No Action Alternative	The existing ODMDS does not interfere with shipping, fishing, recreation or other legitimate uses of the ocean (USEPA 2004). This is not expected to change with the No Action Alternative.
(9) The existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys;	Same as No Action Alternative	Same as No Action Alternative	Water quality of the existing site is typical of the Atlantic Ocean. The location of the Florida Current determines whether the site waters are predominately coastal or oceanic. The site supports a benthic and epibenthic fauna characteristic of upper continental slope habitat.
(10) Potentiality for the development or recruitment of nuisance species in the disposal site;	Same as No Action Alternative	Same as No Action Alternative	There are no components in the dredged material or consequences of its disposal that are expected to attract or result in recruitment of nuisance species to the ODMDS.
(11) Existence at or in close proximity to the site of any significant natural or cultural features of historical importance.	Surveys conducted in 2011 and 2012 did not identify any cultural features of historical importance.	Same as Alternative 1	No significant cultural features were identified within the existing ODMDS.

Table 4. Summary of Direct and Indirect Impacts of Alternatives Considered.

ALTERNATIVE	Alternative Site 1 (Preferred Alternative)	Alternative Site 2	No Action Alternative(Status Quo)
ENVIRONMENTAL FACTOR			
VEGETATION	N/A		N/A
THREATENED AND ENDANGERED SPECIES	Designation of either alternative for the Port Everglades Harbor ODMDS would have no effect and therefore would not jeopardize the continued existence of any threatened or endangered species		No direct or indirect impacts
HARDBOTTOMS	Designation of Alternative 1 will impact less potential hardbottom – Total area of potential hardbottom affected by estimated material deposition of 10 cm thickness or greater for Alternative 1 is 1.36 acres (0.05% of total area.)	Designation of Alternative 2 will impact more potential hardbottom – Total area of potential hardbottom affected by estimated material deposition of 10 cm thickness or greater for Alternative 2 is 2.89 acres (0.12% of total area.)	No additional direct or indirect impacts

ALTERNATIVE	Alternative Site 1 (Preferred Alternative)	Alternative Site 2	No Action Alternative(Status Quo)
ENVIRONMENTAL FACTOR			
FISH AND WILDLIFE RESOURCES	Designation of either alternative would have only minor and temporary effects none of which would be greater than at the existing site. - Most larger fish species are highly mobile and can avoid the area during a disposal event; smaller benthic organisms have a prolific capacity to reproduce and any effect to the populations of these smaller species arising from the impacts resulting from a disposal event would be temporary and minor; and the benthic community is highly dynamic and capable of recovering from short term perturbations such as a temporally dispersed disposal event.		No additional direct or indirect impacts

ALTERNATIVE	Alternative Site 1 (Preferred Alternative)	Alternative Site 2	No Action Alternative(Status Quo)
ENVIRONMENTAL FACTOR			
ESSENTIAL FISH HABITAT	Expanding the Port Everglades Harbor ODMDS may temporarily affect EFH and Federally managed fisheries - Direct and indirect impacts to the water column and benthos will be mitigated through appropriate testing of the dredged material prior to disposal; Effects on Federally managed species include changes in habitat (sediment structure) for benthic organisms/ temporary and minimal impact on habitat/ not relevant due to absence of certain managed species in the expansion area. Alternative #1 includes area 2,701 acres in size, characterized by a homogenous mix sand/silt and clay. Alternative 1 covers less potential hardbottom within the project area (1.36 acres).	Expanding the Port Everglades Harbor ODMDS may temporarily affect EFH and Federally managed fisheries - Direct and indirect impacts to the water column and benthos will be mitigated through appropriate testing of the dredged material prior to disposal. Effects on Federally managed species include changes in habitat (sediment structure) for benthic organisms/ temporary and minimal impact on habitat/ not relevant due to absence of certain managed species in the expansion area. Alternative 2 includes an area 2,449 acres in size with more potential hardbottom habitats within the project area (2.89 acres).	No additional direct or indirect impacts

ALTERNATIVE	Alternative Site 1 (Preferred Alternative)	Alternative Site 2	No Action Alternative(Status Quo)
ENVIRONMENTAL FACTOR			
HISTORIC PROPERTIES	There is no potential for submerged historic properties to be adversely impacted by the proposed expansion areas - Two anomalies (one magnetic and two sidescan) were investigated. These anomalies were identified as debris and a modern, recent shipwreck.		No direct or indirect impacts
ECONOMICS	The selection of either alternative would not result in direct socio-economic impacts. Indirectly, selection of either alternative may have a positive socio-economic impact on marine transportation and military usage.		No direct or indirect impacts
RECREATION	The selection of either alternative would not have any impacts to recreation - Few activities occur in, and none is restricted to, the proposed ODMDS.		No direct or indirect impacts
COASTAL BARRIER RESOURCES	N/A		N/A
WATER QUALITY	The selection of either alternative will have only temporary and minor impacts to water quality and none greater than in the existing site. - During periods of dredged material disposal there will be temporary, localized increases in water column turbidity and concentrations of dissolved and particulate constituents. These effects will be dissipated by natural dispersion, mixing, and eventual sinking of particles.		No additional direct or indirect impacts
HAZARDOUS,TOXIC AND RADIOACTIVE WASTE	N/A		N/A

ALTERNATIVE	Alternative Site 1 (Preferred Alternative)	Alternative Site 2	No Action Alternative(Status Quo)
ENVIRONMENTAL FACTOR			
AIR QUALITY	The selection of either alternative will have temporary and minor impacts to air quality due to emissions from transport vessels.		N/A
NOISE	The selection of either alternative will have temporary and minor noise impacts due to transport vessels. However, there are no sensitive noise receptors in the vicinity of the ODMDS.		N/A
NAVIGATION	Selection of either proposed site would not impact navigation or public safety - There are no designated shipping lanes or travel corridors near the Alternatives. Adequate public notice to mariners will be issued in advance of disposal events.		No direct or indirect impacts
ENERGY REQUIREMENTS AND CONSERVATION	As the proposed sites are essentially in the same location, the selection of either alternative would require the same amount of energy.		No direct or indirect impacts
NATURAL OR DEPLEATABLE RESOURCES	N/A		No direct or indirect impacts
SCIENTIFIC RESOURCES	N/A		No direct or indirect impacts

3 AFFECTED ENVIRONMENT

The proposed ODMDS expansion area is at the edge of the Florida Current (also referred to as the Gulf Stream) and on the Florida-Hatteras Slope off the East Florida Escarpment. The Florida Current/Gulf Stream is formed by the merging of the Loop Current from the Gulf of Mexico and the Antilles Current from the Caribbean. The Florida Current/Gulf Stream flows northward (with intermittent reversals) through the Florida Straits to Cape Hatteras, North Carolina. The Florida Straits is a deep valley, approximately 75.6 nmi (140 km) wide, between Florida and the Bahamas Banks; the greatest depth is 4,921 ft (1,500 m) (Stommel 1965). Ocean currents tend to be driven by the Florida Current/Gulf Stream and cyclonic shear vorticity (circular wind-driven movement) along the western edge of the current. Frontal zones at the edge of the Florida Current/Gulf Stream are generally variable and unstable. The western Florida Current/Gulf Stream edge has horizontal wave-like meanders and submesoscale eddies with strong horizontal shear (Lee 1975; Shay *et al.* 1998). Figure 7 shows the project location in relation to major oceanic features that may affect the local currents and water quality.

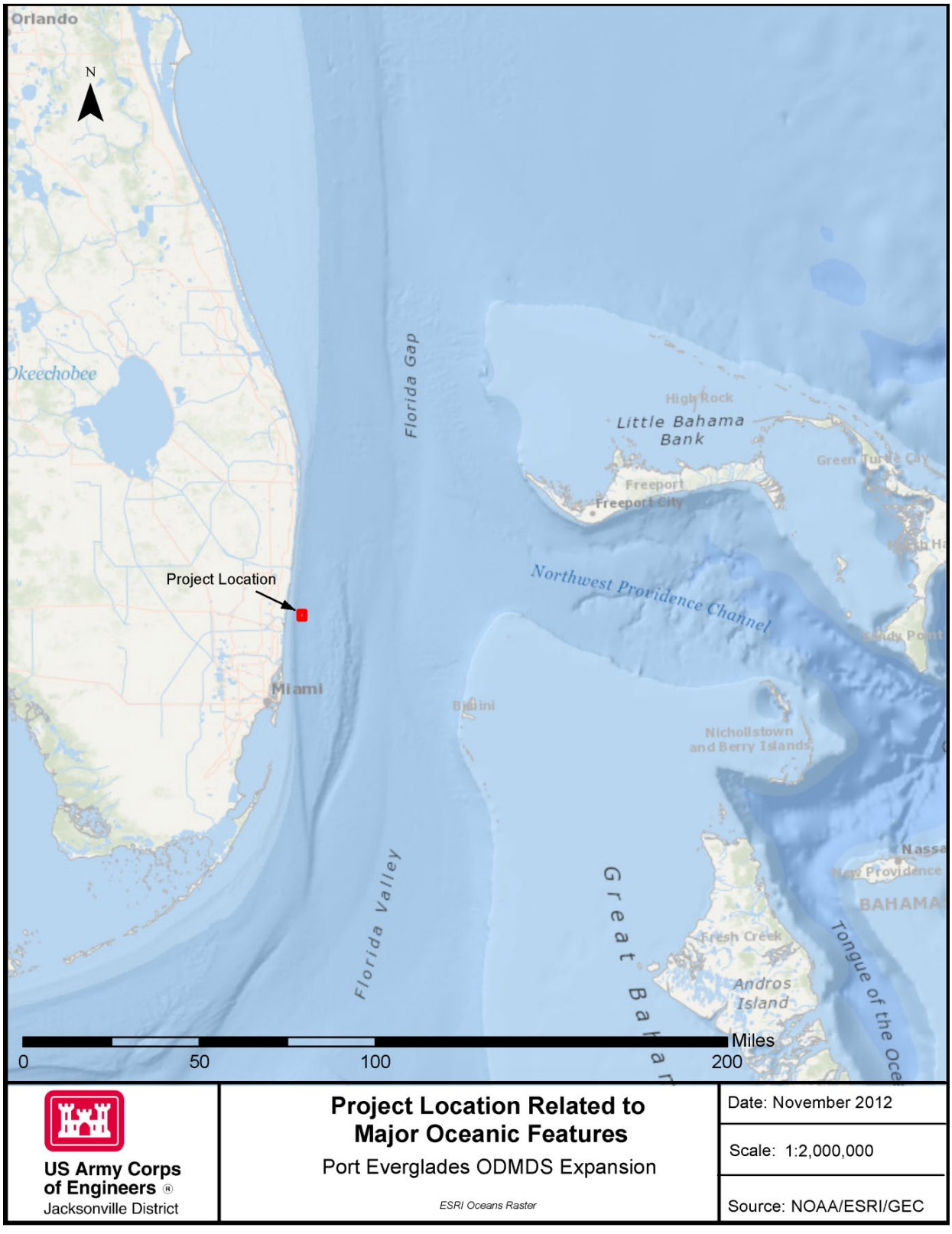


Figure 7. Project location in relation to major oceanic features.

3.1 SEDIMENT

Physical and chemical analyses were performed on sediment samples from the Port Everglades Harbor ODMDS and ODMDS proposed expansion area. Sediment data collected from 1984 and 1998 were discussed in the FEIS for the designation of the Port Everglades Harbor ODMDS and are incorporated by reference (USEPA 2004). Supplementary sediment samples from the proposed expansion area were collected in 2007, 2011, and 2014. Additionally, SPI and Planview (PV) photographs were taken throughout the expansion area in 2011. Results from the 2007 (ANAMAR 2010) and 2011 (ANAMAR 2012) sediment sampling and the 2011 photographic analysis (Newfields 2013) are included herein.

3.1.1 Physical Characteristics

In 2007, sediment samples were collected from three stations to the north of the existing ODMDS (Figure 8). Samples ranged from 26.1% sand to 79.5% sand. The remainder was found to be predominantly silt with some clay, with less than 1% gravel for each sample.

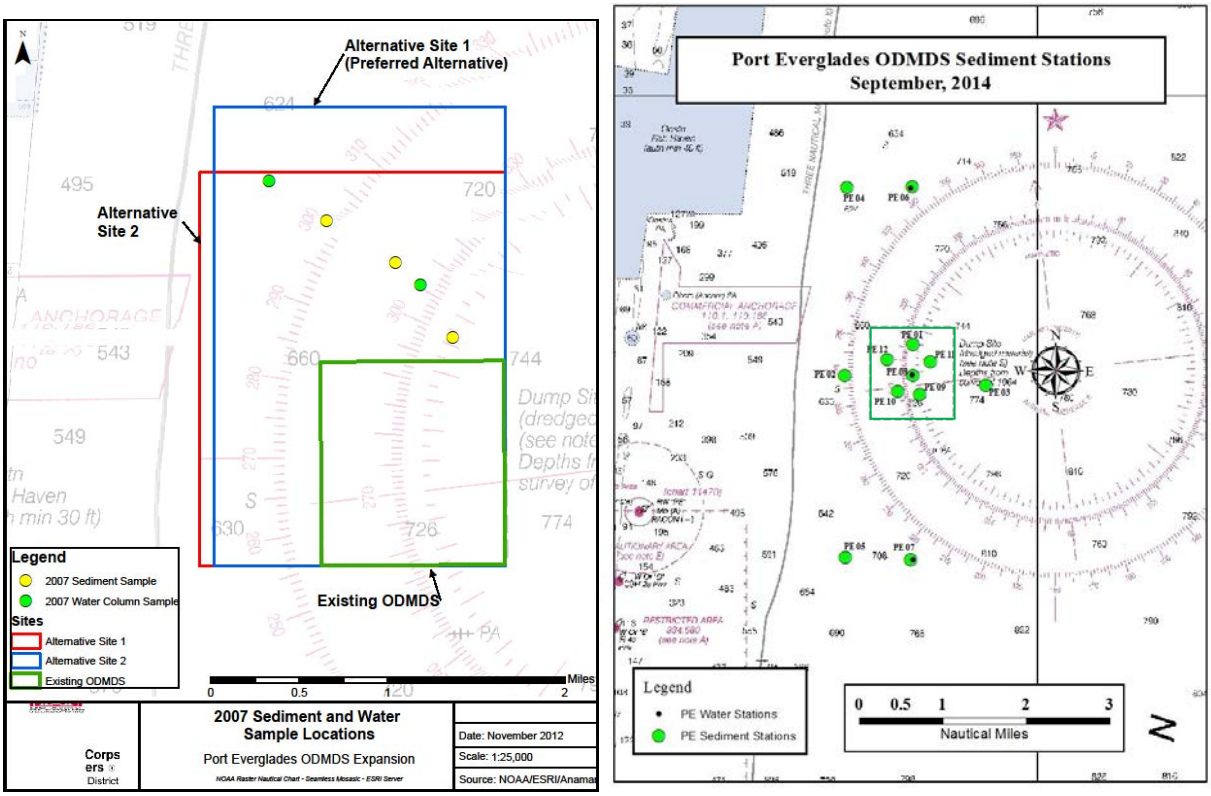


Figure 8. 2007, 2011 (left) and 2014 (right) Sediment and water sample locations.

Sediments collected during the 2011 survey from five stations (including inside the existing ODMDS and both inside and outside the proposed expansion areas) show surface sediments contained primarily sand (55.7 to 64.9 percent, by weight); 49 to 54.3 percent of this was fine

sand (Table 5). Silt and clay were also a major component of samples, representing 35.1 to 44.3 percent (ANAMAR 2012).

In 2014, sediments collected were finer inside the ODMDS than outside the ODMDS on average, primarily due to the higher percentage of fines at three stations located near the center of the site. These three locations contained higher percentages of fines (53%, 33.9% and 39.4% respectively) than other stations both inside and outside. This is due to prior use of the site to dispose of approximately 314,000 cubic yards of material. However, all areas have the same USCS classification code (Table 5).

Table 5. Summary of Sediment Grain Size Analysis in Relation to the Expansion Areas.

Location of Pooled Samples[1]	Percent Gravel[2] (Range)	Percent Sand[2] (Range)	Percent Silt and Clay[2] (Range)	USCS[3] Classification(s)
Inside ODMDS	0.0	64.3	35.7	SC-CS
Inside Expansion Area 1	0.0–0.0	55.7–64.9	35.1–44.3	SC-CS (all samples)
Outside Expansion Area 1	0.0–0.0	58.3–63.6	36.4–41.7	SC-CS (all samples)

[1]Results of the ODMDS sample (Station PE11-1) were averaged with the field split sample.
[2]Particle sizes: gravel ≥4.750 mm, sand = 0.075–4.749 mm, silt and clay <0.075 mm
[3]USCS (Unified Soil Classification System) codes are: SC = clayey sand, SM = silty sand
Source: ANAMAR 2012

The SPI/PV image analysis was consistent with the sediment sampling results. The SPI and PV results within the proposed expanded ODMDS show the presence of compact fine to very fine sandy sediments throughout the site as well as in the existing ODMDS. Ambient sediments based on the 2011 survey and previous surveys (Germano & Associates 2006) consist of a grain size major mode of very fine sand (4 to 3 phi), which was observed throughout the expanded ODMDS. The presence of asymmetrical sand ripples on the sediment surface suggested active bedload sediment transport in some areas of the expanded ODMDS due to bottom currents (Newfields 2013). Benthic habitat categories were assigned to each SPI/PV station based on sediment type and biological features. The benthic habitat categories observed at the proposed expanded Port Everglades Harbor ODMDS are presented in Figure 9 and consist of three categories:

1. Hard Sand Bottom – Very Fine Sand (SA.VF)

2. Hard Sand Bottom – Fine Sand (SA.F)

3. Hard Rock/Gravel Bottom (HR)

Hard sand bottom with very fine sand (SA.VF) was observed throughout the proposed expanded ODMDS with the exception of four stations in the northeast portion of the site (PE-

08, PE-11, PE-12, and PE-15) which exhibited slightly coarser grained sediments (fine sand; SA.F). Station PE-11 was also classified with hard rock/gravel bottom (HR) based on the apparent presence of gravels and shell particles observed in the co-located PV image (Newfields 2013). Additional discussion of potential hard bottom within the proposed expanded ODMDS is provided in Section 3.4.

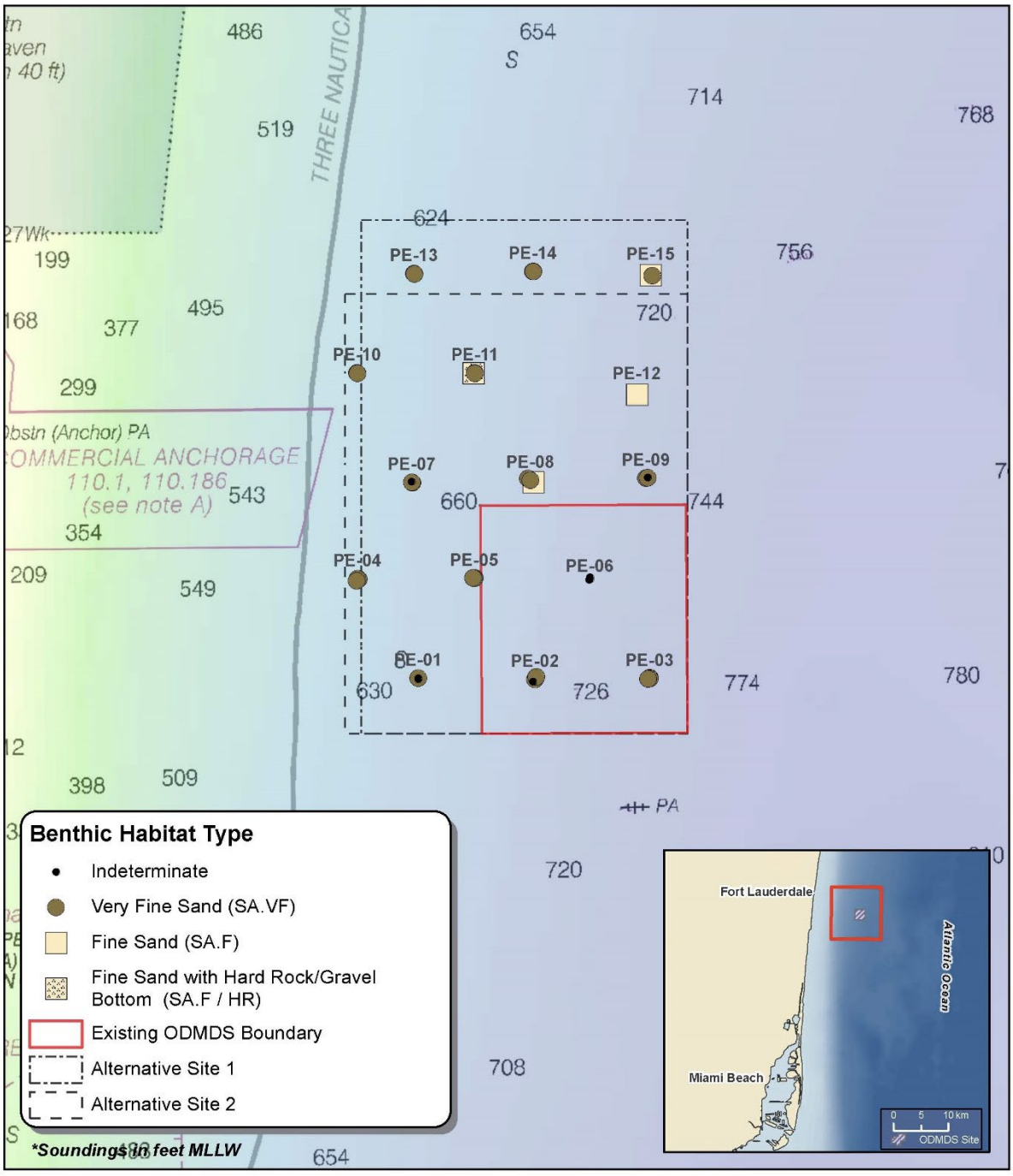


Figure 9 - Proposed Expanded Port Everglades ODMDS Habitat Types (Newfields 2013)

3.1.2 Chemical Characteristics

When available, sediment chemistry results were compared to the Threshold Effects Level (TEL), which represents the concentration below which adverse effects are expected to occur only rarely, and the Effects Range-Low (ERL), which represents the value at which toxicity may begin to be observed in sensitive species. Results were also compared to the Apparent Effects Thresholds (AET), when available, which represent the concentration above which adverse biological impacts would always be expected by that biological indicator due to exposure to that contaminant alone (Buchman 1999). The Method Reporting Limit (MRL) is the threshold value below which the laboratory reports a given result as non-detected (ANAMAR 2012). A summary of organotin, metal and total organic carbon concentrations within the expansion alternatives is given in

Table **6**.

3.1.2.1 Organotins, Metals, and Total Organic Carbon

Metals were detected but no metal exceeded the TEL or ERL in any sample. Sample concentrations for total organic carbon (TOC) ranged from 3.58% to 3.92% (ANAMAR 2010).

Samples collected in 2011 showed that the samples within the existing ODMDS had the highest detected concentration of all organotin as compared to inside and outside of the proposed expansion areas (ANAMAR 2012). The maximum detected concentration of chromium was observed outside the expansion areas. No sample approached the TEL, ERL, or AET values. The maximum detected concentration of total organic carbon was from inside the expansion area at 0.87% (ANAMAR 2012).

The 2014 sampling event indicated detectable levels of metals are low, with the exception of copper at one station, which was above the TEL for marine sediments but below the Probable Effects Level (PEL). Organotins were detected at fairly high levels in sediment inside the ODMDS. Tributyltin ranged from approximately 159 ug/kg to 400 ug/kg. Tributyltin breaks down within 1-2 months in an aerobic environment but may persist for several years in an anaerobic environment. There is no published TEL for tributyltin (US EPA 2014).

Table 6. Summary of Organotin, Metal and Total Organic Carbon Concentrations within the Expansion Alternatives.

Analyte	Range of Values (mg/kg)
Arsenic	1.62–2.41
Cadmium	0.075–0.092
Chromium	10.7–12.4
Copper	2.24–2.70

Lead	1.720–2.080
Mercury	0.014–0.020
Nickel	10.1–13.6
Selenium	0.17–0.25
Silver	0.012–0.012
Zinc	3.9–4.3
	(%)
Carbon, Total Organic	0.309–0.868
	(µg/kg)
Tri-n-butyltin Cation	<0.64–0.81
Di-n-butyltin Cation	<0.28–<0.29
N-butyltin Cation	<0.39–<0.39
Total Organotins (as Sn)	0.67–0.74

3.1.2.2 Organochlorine Pesticides

Pesticides were not detected in any sample collected in 2007 (ANAMAR 2010).

Samples collected in 2011 contained detectable amounts of pesticides inside the existing ODMDS but none were at or above any level of expected effect (TEL). No detectable pesticide was found inside or outside the expansion area (ANAMAR 2012).

Pesticides were detected inside, but not outside, the ODMDS in 2014. However, none of the detected pesticides were at or above TEL (US EPA, 2014) which is consistent with prior evaluations.

3.1.2.3 Polynuclear Aromatic Hydrocarbons (PAHS)

Samples taken in 2007 showed most PAHs were detected in at least some of the samples however no detected PAH exceeded the TEL or ERL (ANAMAR 2010).

In the 2011 sampling event only five PAH congeners were detected in total (inside and outside the expansion areas). All PAHs were present only in concentrations below the MRL (ANAMAR 2012).

3.1.2.4 Polychlorinated Biphenyl (PCB) Congeners

No PCB congener was detected above the MRL in any sample collected in 2007 (ANAMAR 2010).

In 2011, the single sample taken from inside the existing ODMDS site had detection of 14 of the 26 PCB congeners (ANAMAR 2012). In contrast, none of the 26 PCB congeners tested were

detected inside the expansion areas or in the surrounding area. No PCB concentrations exceeded the TEL, ERL, or AET in any sample (ANAMAR 2012).

In 2014, The EPA/NOAA PCB summation concentration was above the TEL, but well below the PEL. There are analytical uncertainties concerning the detected concentrations during this sampling event primarily because no PCBs were detected in a field split sample even after multiple extractions and analyses, however, based on prior evaluations on the site, there is no expected environmental impact due to the presence of low quantities of PCBs inside the existing site.

3.2 VEGETATION

The proposed project involves only deepwater submerged habitat and the water column above it. There is no vegetation in the proposed ODMDS expansion area.

3.3 THREATENED AND ENDANGERED SPECIES

The Endangered Species Act (ESA) of 1973 (16 USC § 1531–1534) establishes protection and conservation of threatened and endangered species and the ecosystems upon which they depend. The U.S. Fish and Wildlife Service (USFWS) and the NOAA Fisheries Service (NOAA Fisheries) administer the ESA and may designate critical habitat for each species protected under the ESA. Under the ESA, an endangered species is defined as a species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as a species likely to become an endangered species in the foreseeable future. Section 7 of the ESA requires all Federal agencies to consult with the USFWS or NOAA Fisheries, as applicable, before initiating any action that could affect a listed species. No effects to any listed species are expected based on available information. Historical use of the existing site, since it was designated in 1995, includes no reports of incidents regarding any listed species.

Critical habitat is a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. It is designated separately by the USFWS or NOAA Fisheries under the ESA. Critical habitat may include an area that is not currently occupied by the species, but that will be needed for its recovery. Critical habitat for the loggerhead sea turtle was designated by NOAA Fisheries on July 10, 2014 (79 FR 39856). Unit *LOGG–N–19—"Southern Florida Constricted Migratory Corridor; Southern Florida Concentrated Breeding Area; and Six Nearshore Reproductive Areas: Martin County/Palm Beach County line to Hillsboro Inlet, Palm Beach and Broward Counties, Florida; Long Key, Bahia Honda Key, Woman Key, Boca Grande Key, and Marquesas Keys, Monroe County, Florida*" will split the preferred project area, as it follows the 200m depth contour. Areas within the preferred site that are in waters shallower than 200m would be considered to be in the designated critical habitat area, while waters deeper than 200m would not be considered in the designated critical habitat area. The ESA consultation with NOAA

Fisheries for the designation of the expanded site included a determination that expansion of the ODMDS will not adversely modify designated critical habitat for the loggerhead sea turtle (letter from NOAA Fisheries, 2014).

No other critical habitat has been identified in the preferred Alternative 1.

Table 7. Threatened (T) and Endangered (E) Species in the Project Vicinity (Source: NOAA Fisheries 2012; USFWS 2012).

Common Name	Scientific Name	Federal Status
Sea Turtles		
Green Turtle	*Chelonia mydas*	E
Loggerhead	*Caretta caretta*	T
Leatherback	*Dermochelys coriacea*	E
Kemp's Ridley	*Lepidochelys kempii*	E
Hawksbill	*Eretmochelys imbricate*	E
Marine Mammals		
North Atlantic Right Whale	*Eubalaena glacialis*	E
Humpback Whale	*Megaptera novaeangliae*	E
Finback Whale	*Balaenoptera physalus*	E
Sei Whale	*Balaenoptera borealis*	E
Blue Whale	*Balaenoptera musculus*	E
Sperm Whale	*Physeter macrocephalus*	E
Florida Manatee	*Trichechus manatus latirostris*	E
Fish		
Smalltooth Sawfish	*Pristis pectinata*	E
Giant Manta Ray	*Manta birostris*	T
Invertebrates		
Staghorn coral	*Acropora cervicornis*	T
Elkhorn coral	*Acropora palmata*	T
Pillar coral	*Dendrogyra cylindrus*	T
Rough cactus coral	*Mycetophyllia ferox*	T
Lobed star coral	*Orbicella annularis*	T
Mountainous star coral	*Orbicella faveolata*	T
Boulder star coral	*Orbicella franksi*	T

3.3.1 Sea Turtles

Five of the six species of sea turtles in U.S. waters can be found in the proposed ODMDS expansion area and are federally protected under the ESA. These species include the green, loggerhead, leatherback, Kemp's ridley, and hawksbill sea turtles.

All sea turtles migrate at different times in their life, generally between feeding and nesting grounds. Sea turtles mate along the migratory corridor, at breeding stations, or near the nesting beach (Meylan and Meylan 1999). Females typically nest more than once per season, although generally not during consecutive years. Hatchlings migrate to the ocean, where they live for several years (Meylan and Meylan 1999). Growth rates are typically slow, and juveniles of most species migrate from the open ocean to coastal waters once they reach a certain size (Spotila 2004). Designated critical habitat for sea turtles is not found in the project vicinity.

Broward County is within the normal nesting and foraging area for loggerhead, green, and leatherback sea turtles; Kemp's ridleys and hawksbills nest in scattered locations and forage on adjacent reefs and nearshore hardbottoms (Meylan et al. 1995). In 2010, 2,283 loggerhead, 268 green turtle, and 14 leatherback nests were documented on Broward County beaches (FWRI 2011). A total of 2,565 nests were documented in 2010, the highest number of nests recorded since 2000 (Burney and Wright 2011). The beach and dune areas of Dr. Von D. Mizell-Eula Johnson State Park (previously John U. Lloyd Beach State Park) have long been recognized as important sea turtle nesting areas. In 2010, sea turtle nests in the park included: loggerhead (202; density 51 nests/km), green (34; density 8.7 nests/km), and leatherback (2; 0.5 density nests/km) (Burney and Wright 2011).

3.3.1.1 Loggerhead Turtle

Loggerhead sea turtle (*Caretta caretta*). Adult loggerhead turtles average 3 feet in length and 250 pounds in weight. These highly migratory turtles can be found worldwide, inhabiting continental shelves, bays, estuaries, and lagoons in temperate, subtropical, and tropical waters. They are the most abundant sea turtle found in U.S. coastal waters. The loggerhead's range in the Atlantic is from Newfoundland south to Argentina

3.3.1.2 Green Turtle

Green sea turtle (*Chelonia mydas*). Adult green sea turtles can measure about 3 feet in length and weigh up to 350 pounds. Green sea turtles are globally distributed within tropical and subtropical waters. Along the Atlantic and Gulf coasts of the US, they can be found from Texas to Massachusetts and around the U.S. Virgin Islands and Puerto Rico. This species utilizes beaches for nesting, coastal areas for feeding and open ocean convergence zones. Threats to green turtles in the open waters associated with the proposed ODMDS sites include entanglement in trawl nets, longlines and lines associated with traps and pots. Green sea

turtles may be present within the waters of the proposed expansion areas at various times of the year. Because this species is known to be an agile swimmer, individuals should be capable of avoiding the effects associated with a disposal event in either of the alternative ODMDS sites.

3.3.1.3 Leatherback Turtle

Leatherback sea turtle (*Dermochelys coriacea*). The leatherback is the largest living turtle and reptile in the world. Adult turtles average 5 feet in length but can grow to 6.5 feet and weigh up to 2,000 pounds. Their wide range includes tropical, subtropical and temperate waters of all major oceans where they feed on jellyfish and other soft-bodied prey. A minor nesting area is located along the southeast coast of Florida and individuals are observed in the adjacent offshore waters. There are mixed reports on the overall status of this species.

3.3.1.4 Kemp's Ridley Turtle

Kemp's Ridley sea turtle (*Lepidochelys kempii*). Kemp's Ridley sea turtle is the smallest of the sea turtles with adults are typically weighing up to 100 pounds in weight and are about 2 feet in length. They can be found mainly in the Gulf of Mexico and along the U.S. Atlantic coast. The Kemp's Ridley sea turtle has been in decline many years, but an increase in the population has recently been noted. In one day of nesting in 1947, approximately 42,000 females were counted on a beach in Mexico. From 1973 to 1991 the number of nests declined to approximately 200 per year. In 2011, a total of 20,570 nests were documented in Mexico, 81 percent of these nests were documented along the 18.6 miles of coastline patrolled at Rancho Nuevo. In addition, in the United States, 199 nests were recorded in 2011, primarily in Texas (USFWS 2015). This species is found in submerged habitats where there is muddy or sandy substrate where they feed on crabs, fish and mollusks.

3.3.1.5 Hawksbill Turtle

Hawksbill sea turtle (*Eretmochelys imbricata*). Hawksbill sea turtles are small to medium sized. Nesting females average 2 to 3 feet in length and typically weigh up to 200 pounds. The hawksbill sea turtle occurs in the tropical and sub-tropical waters of the Atlantic, Pacific, and Indian Oceans. They are most commonly associated with coral reefs however juveniles are thought to spend time in the pelagic environment. They are observed with regularity on the reefs off of Palm Beach, Broward, Miami-Dade and Monroe Counties where the warm Florida Current/Gulf Stream current passes close to shore. Population estimates and trends are difficult to determine due to its habit of solitary nesting.

3.3.2 Marine Mammals

Six cetaceans that may occur in the vicinity of the proposed ODMDS expansion area are Federally listed as endangered: North Atlantic right whale, fin whale, sei whale, blue whale,

and sperm whale. Currently, the humpack whale is listed as endangered throughout its range. However, NOAA Fisheries has been recently proposed to reclassify the whale into 14 separate distinct population segments (DPS). The DPS found in the waters offshore of southeast Florida is the West Indies DPS, which is currently proposed for de-listing under the ESA (NOAA Fisheries 2015).

Although the Florida manatee is found in inshore waters of Broward County, due to the depths of the ODMDS expansion areas and distance from shore, manatees are unlikely to be found in the ODMDS expansion areas.

3.3.3 Marine Fishes

The smalltooth sawfish is one of only two federally listed fish species potentially occurring in the vicinity of the proposed ODMDS expansion area. This species matures at 10 years of age and can reach 25 ft. in length and an age of 30 years. This species is relatively common in the Everglades region of Florida, but the population has been restricted to peninsular Florida. Sawfish inhabit shallow coastal waters and are generally found very close to shore in muddy and sandy bottoms, seldom descending to depths greater than 10 m. Current records from the east coast of Florida remain relatively scarce compared to the west coast, Florida Bay, and the Florida Keys. Encounter data have also demonstrated that smaller smalltooth sawfish occur in shallower water, and larger sawfish occur regularly at depths greater than 32 ft (10 m), frequently between 200 to 400 ft (70 to 122 m) (NOAA Fisheries 2010.)

Giant manta rays were listed in 2018 as Threatened. Giant manta rays occur worldwide in tropical, subtropical, and temperate bodies of water and are commonly found offshore, in oceanic waters, and near productive coastlines. Regional population sizes are small, ranging from around 100 to 1,500 individuals, and in areas subject to fishing, have significantly declined. The giant manta ray is the world's largest ray with a wingspan of up to 29 feet. They are filter feeders and eat large quantities of zooplankton. Giant manta rays are slow-growing, migratory animals with small, highly fragmented populations that are sparsely distributed across the world (NOAA Fisheries 2018.)

3.3.4 Listed Coral and Designated Critical Habitat

Currently there are seven stony corals species listed as threatened in the waters offshore of Broward County: *Acropora palmata; Acropora cervicornis; Orbicella annularis; Orbicella faveolata; Orbicella franksi; Dendrogyra cylindrus and Mycetophyllia ferox.*

All seven species are found in shallow water (< 50 meters) on reefs throughout the Bahamas, southeast Florida and the Caribbean where water temperatures range from 66 to 86°F (Brainard *et al.* 2011). Corals depend on symbiotic zooxanthellae for food; zooxanthellae need

sunlight to photosynthesize. The ODMDS is far below the depth threshold for any listed species of coral.

Critical habitat for both *Acropora* species in the Florida Unit was designated in 2008 and includes the Atlantic Ocean offshore of Broward County (Figure 10). Within these water depths, NOAA Fisheries has defined that, ‘‘substrate of suitable quality and availability’’ is equivalent to consolidated hardbottom or dead coral skeleton that is free from fleshy macroalgae cover and sediment cover (NOAA Fisheries 2008).

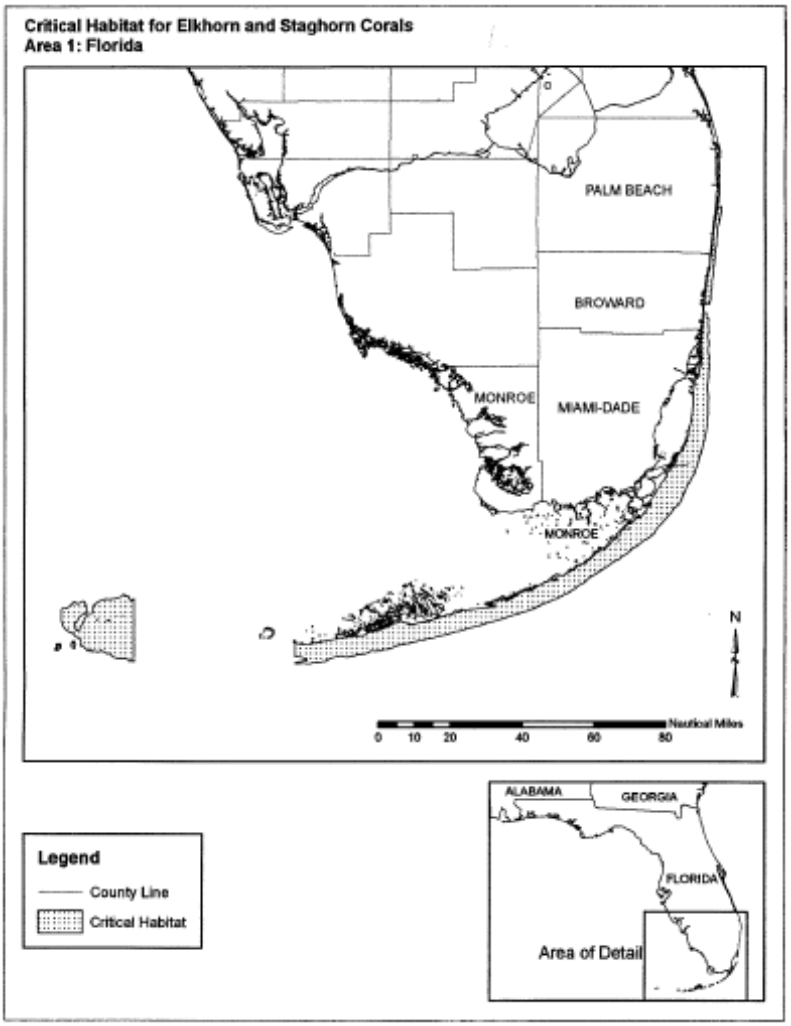


Figure 10. Designated critical habitat for Elkhorn and staghorn corals in the Florida Area

The ODMDS expansion areas are located 1.8 nmi east of the nearest *Acropora* critical habitat edge (Figure 11).

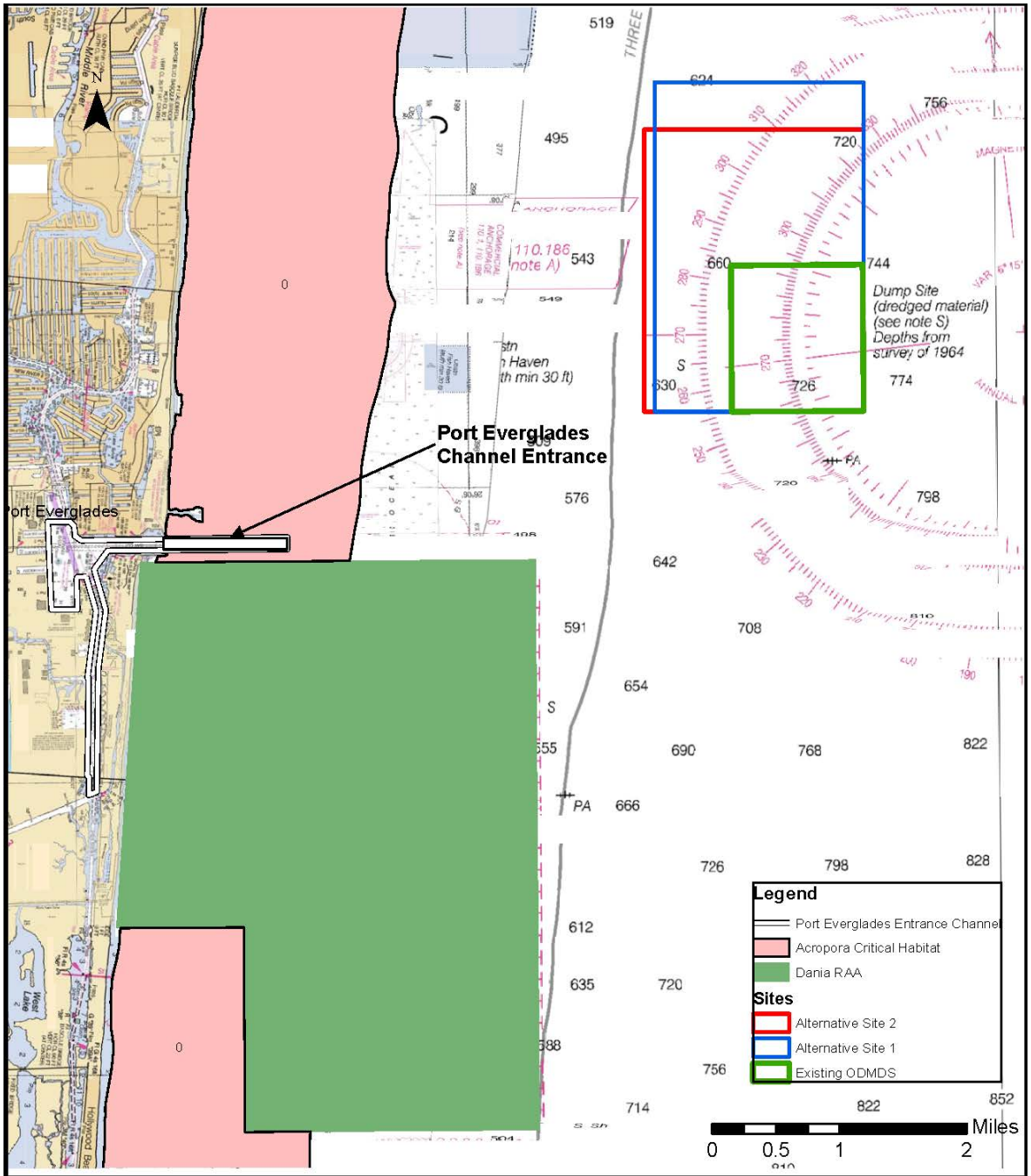


Figure 11. Project Vicinity in reference to Acropora Critical Habitat and Exclusion Areas

3.4 HARDBOTTOM HABITATS

Hardbottom habitats (hardgrounds or live bottoms) are areas of rock or consolidated sediment that can be distinguished from surrounding unconsolidated sediments. These habitats can vary in topography from a relatively flat, smooth surface to a scarped ledge with stepped relief. The extent and diversity of colonization also vary according to topography, habitat diversity, currents, light availability, and location on the shelf. Hardbottom habitats provide habitat, food, and shelter to a large variety of organisms, including sponges, mollusks, crustaceans, sea worms, echinoderms, sea turtles, and many species of fishes (CSA International, Inc. 2009). Although uncolonized hardbottom habitats do not support attached faunal organisms, they are biologically important as fish refuge habitat. Hardbottoms also provide substrate for corals. Corals and coral reefs are managed by the South Atlantic Fisheries Management Council (SAFMC). Coral and coral reef EFH and Coral Habitat Areas of Particular Concern (CHAPCs) are discussed in more detail in Section 3.6.

The classic reef distribution pattern described for southeast Florida reefs (north of Key Biscayne) consists of an inner reef in approximately 15 to 25 ft (4.6 to 8 m) of water, middle patch reef zone in about 30 to 50 ft (9 to 15 m) of water, and an outer reef in approximately 60 to 100 ft (18 to 30 m) of water (Duane and Meisburger 1969; Goldberg 1973; Courtenay *et al.* 1974; Lighty et al. 1978; Jaap 1984). These reef zones are separated by areas of sand or sand and rubble. The overall hardground assemblage of hard corals, soft corals, and sponges along southeast Florida's offshore reefs is very consistent (Blair and Flynn 1989). However, the hard coral species density decreases northward from Dade County to Palm Beach County. Broward County had 21 species of stony coral in 2010 reef surveys (Gilliam 2011).

Stony corals can be divided into corals containing zooxanthellae (dinoflagellate algae of the genus *Symbiodinium*) in their tissues (zooxanthellate corals) and corals without zooxanthellae (azooxanthellate corals). Zooxanthellate species are restricted to the photic zone and are typically found in tropical-subtropical regions at depths that rarely exceed 230 ft.

Azooxanthellates (ahermatypic corals) do not have an obligate relationship with zooxanthellae (symbiotic algae) and can live in deep water. Ahermatypic coral are widespread, but are most common in cooler, deep water (down to 20,669 ft) or in cryptic, shallow-water environments such as caves and the undersurfaces of rock ledges (Wells 1956). Ahermatypic corals require hard substrate to settle and survive. Two types of deepwater coral reefs, *Oculina* and *Lophelia*, are found off the coast of the southeastern U.S., primarily between Florida and North Carolina. The geomorphology and functional structure of these deepwater coral reefs are similar, but they occur at different depths. Deepwater ivory tree coral (*Oculina varicosa)* coral reefs are found at depths of 230 to 328 ft (70 to 100 m) along the shelf edge of central eastern Florida (Reed and Farrington 2010). *Lophelia/Enallopsammia* coral mounds are found from north Florida to Miami at depths of 1,312 to 2,624 ft (400 to 800 m) (Reed and Farrington 2010). The

most widespread deepwater stony coral, white coral *(Lophelia pertusa)* forms reefs in 1,640 to 2,854 ft (500 to 870 m) depths in the Straits of Florida (Reed 2001). The Port Everglades Harbor ODMDS was sited to avoid hardbottom (USEPA 2004), and the nearest nearshore hardbottom is 1.08 nmi west of the ODMDS expansion areas (Figure 12).

Previous studies have suggested that hardbottom may be present in portions of the ODMDS expansion area. A survey was done for the now-defunct Tractebel Calypso Pipeline Project in 2004 of the area to the west of the proposed ODMDS expansion area. The overlap of the ODMDS expansion area and the Calypso Pipeline survey area (USCG 2008) was primarily soft bottom; however, a small area of hardbottom was reported north of the expansion area (Figure 13). Additionally, two other surveys collected video and photo-documentation within the proposed expanded ODMDS (Figure 14). Multiple transects were surveyed to a depth of 200 meters (Messing et al, 2003) and a single transect from 200 meters extending east beyond the proposed expanded ODMDS boundaries (Messing et al, 2006). The 2003 study identified two benthic habitat zones in the western portion of the proposed expanded ODMDS: 1) The White Cerianthid Zone named after an abundant burrowing anemone; and 2) the Textured Sediment Zone where the sediment surface develops a finely grainy, or textured, appearance that may be due to dense concentrations of small tubes, probably constructed by polychaete worms, that protrude just above the sediment surface (Messing et al, 2003). This study also concluded that some assemblages associated with hard substrate appear to occur in progressively deeper water from north to south with anemone/rubble assemblages occurring deeper than 181 meters (Messing et al, 2003). The 2006 study identified two locations with confirmed hardbottom within the alternative ODMDS boundaries (Figure 15). The two locations were described as 1) isolated small patch of rock rubble with anemones and hydroids; and 2) isolated small patch of barren rock rubble.

Navy multibeam bathymetry data in 2001 within the proposed expansion area indicated some areas with low relief that gave the appearance of hardbottom. However, none of these areas were confirmed (B.K. Walker, National Coral Reef Institute, letter dated April 18, 2011). NSU scientists evaluated more recent sidescan data and identified several areas with either a high or medium probability of supporting hardbottom features inside the expansion area (Figure 14) (NOAA Fisheries 2011). The areas of suspected hardbottom identified by NSU in the ODMDS expansion areas were photographed during the site designation study , in May 2011 (Newfields 2013). The survey included taking sediment profile and plan view images of the seafloor at 49 stations, with specific focus on the areas identified as having a high or medium potential for being hardbottom based on the NSU analysis.

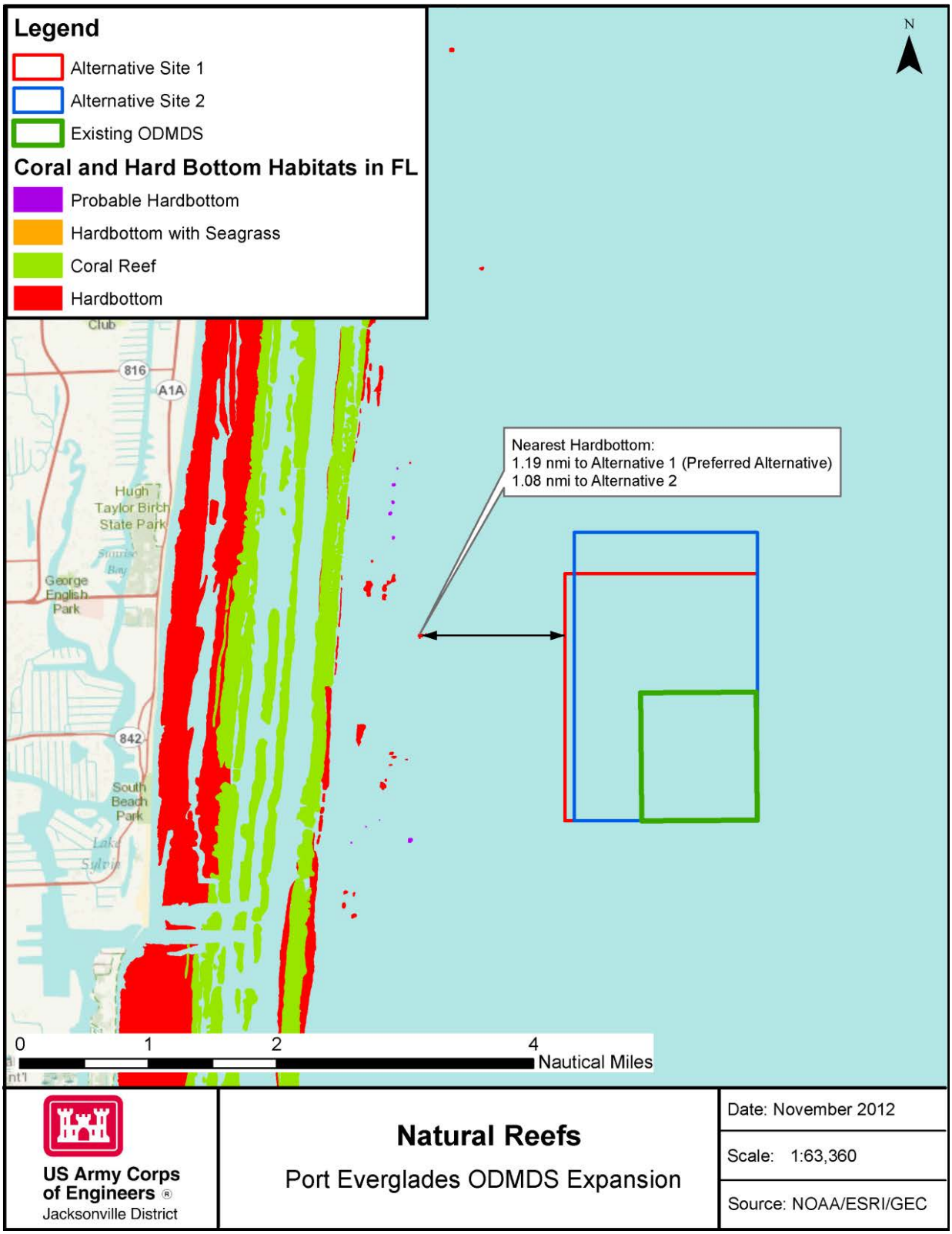


Figure 12. Natural reefs, including both coral reefs and hardbottom, in the project vicinity. The closest hardbottom habitat as mapped by Broward County is approximately 1.08 nautical miles from Alternative 2, the Alternative located furthest west.

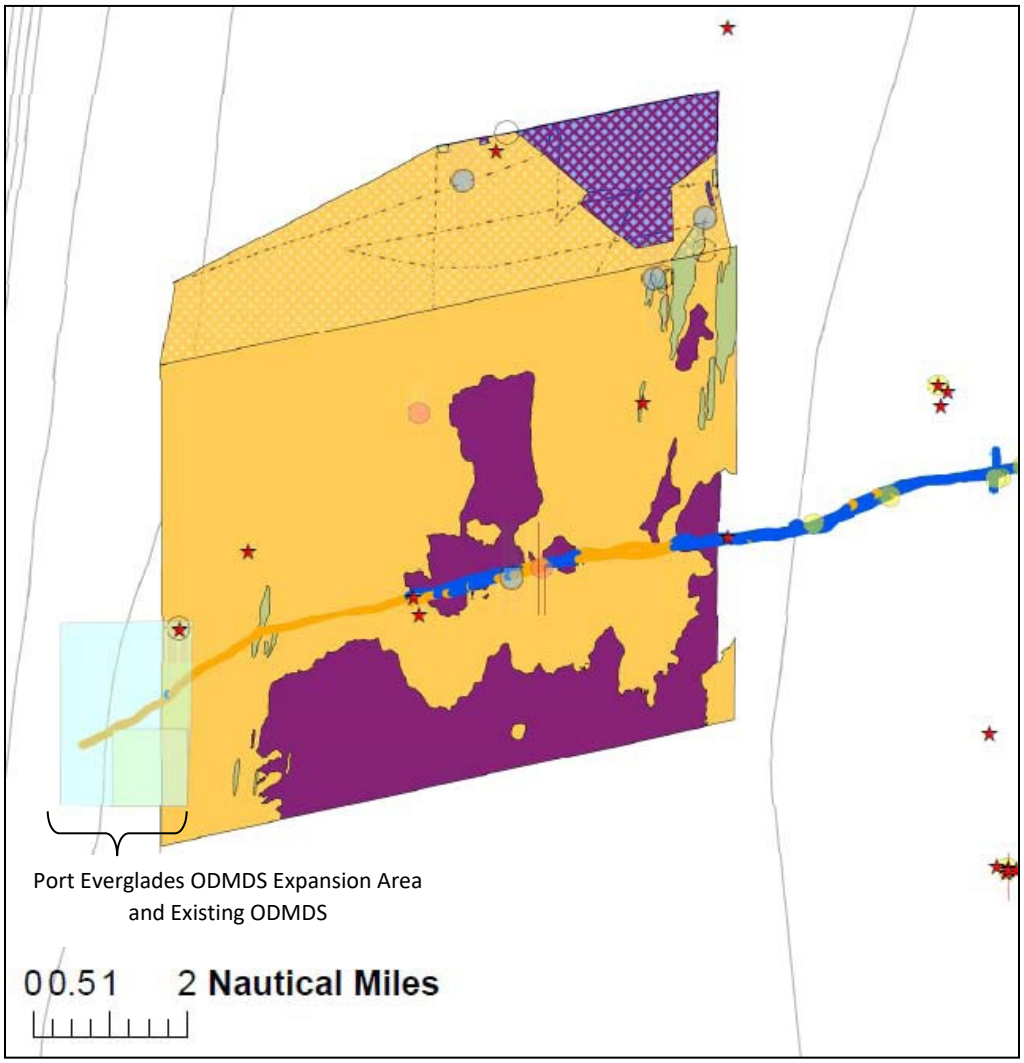


Figure 13. Hardbottom Adjacent to ODMDS Expansion Areas. The existing ODMDS and proposed expansion area are shown in light blue; the tan polygons and lines indicate soft bottom; purple indicates areas of rock or hardbottom; the red stars note tilefish; and the red star in the upper right corner of the ODMDS expansion area is a possible modern shipwreck. Figure provided by Mr. John Reed (HBOI/FAU) (NOAA Fisheries 2011).

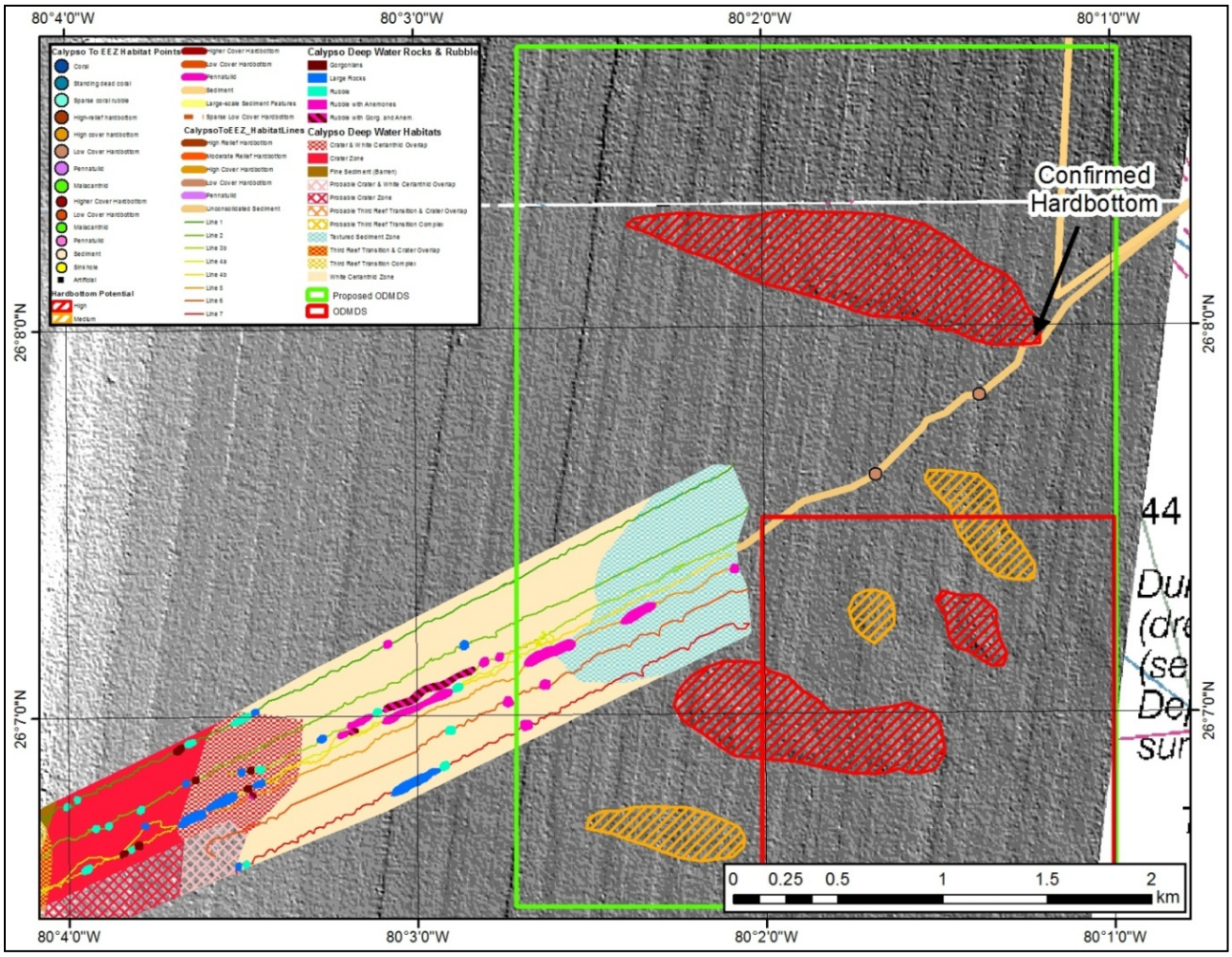


Figure 14 - Areas of Suspected Hardbottom in the ODMDS Expansion Areas as identified by NSU (NMFS 2011)

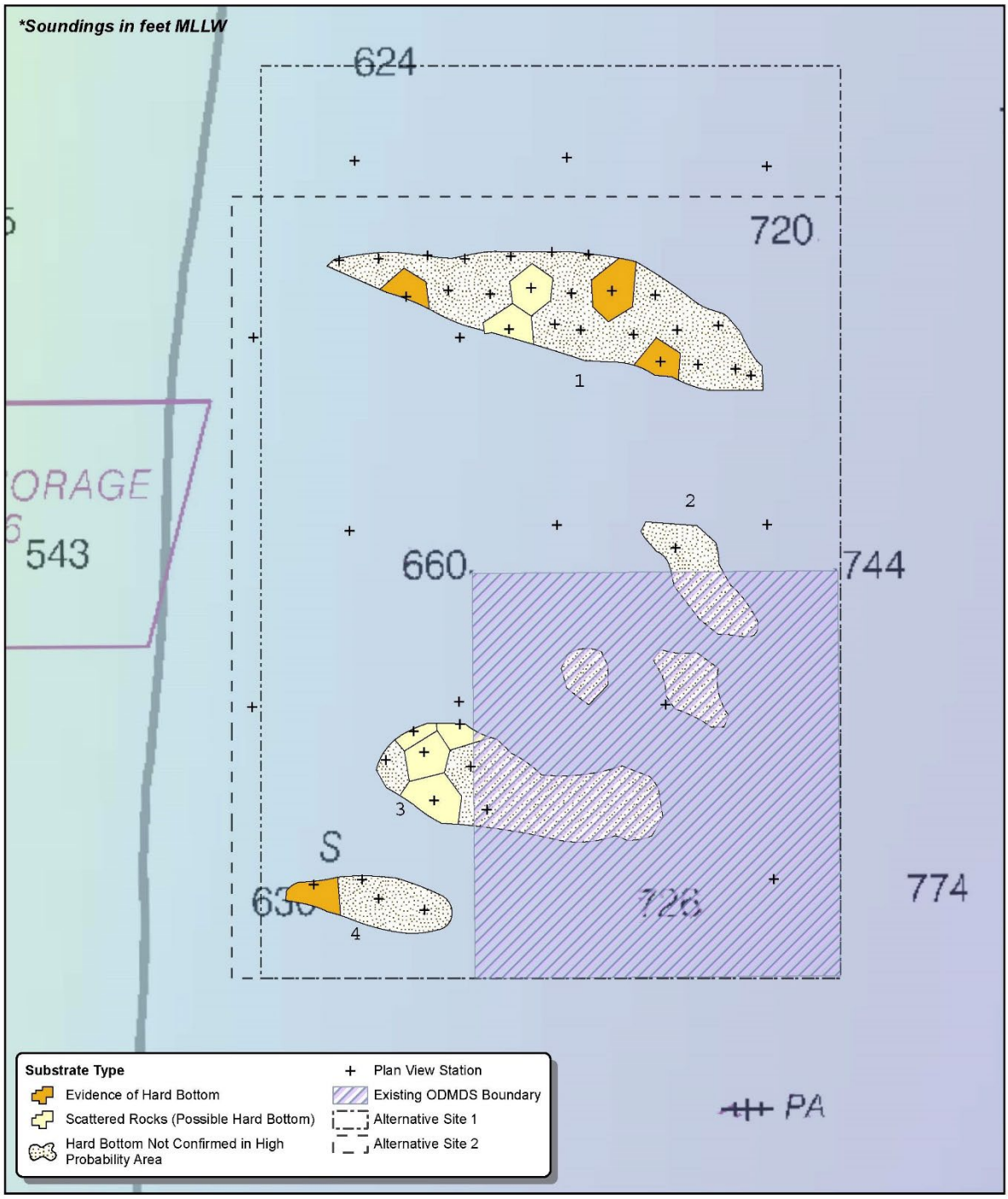


Figure 15 – Substrate type within areas of suspected hardbottom in the ODMDS expansion areas (Newfields, 2013) Expanded view of the inset (light blue) in Figure 13 showing imaging locations (+) performed in Alternative 1 and 2.

A total of 84 photographs were taken from the 33 stations within the areas identified as potentially containing hardbottom by NSU. Each photograph covered an area approximately 300 cm long by 200 cm wide for a total coverage of 504 m^2. Low relief natural hardbottom structures (limestone rocky outcrops) were observed in five images from four stations. The rocky outcrops consisted of limestone rock formations up to 1.3 meters in diameter and were inhabited by larger and more diverse congregations of fish and invertebrates compared to non-hardbottom areas (Figure 16, Figure 17, Figure 18). Images showing small carbonate rock or coral fragments on the seabed (5 to 10 cm in diameter) were identified at six stations. Bryozoans and anemones were sometimes attached to the small rock fragments on the surface. The area of hardbottom was calculated using thiessen polygons. Outcrops were calculated at 28.6 acres and rocks on the seafloor at 39.7 acres. These values represent regions where hardbottom was identified but do not provide a density of the habitat in these regions (Newfields, 2013).

In addition, epifaunal trawl samples were taken inside and outside the ODMDS expansion areas. One trawl sample in the ODMDS expansion area included cobble-sized carbonate rocks and several pieces of rose coral (*Manicina* sp.) that had apparently been dead for a long period. No live hard corals (Scleractinia) were found in any trawl samples (ANAMAR 2012).

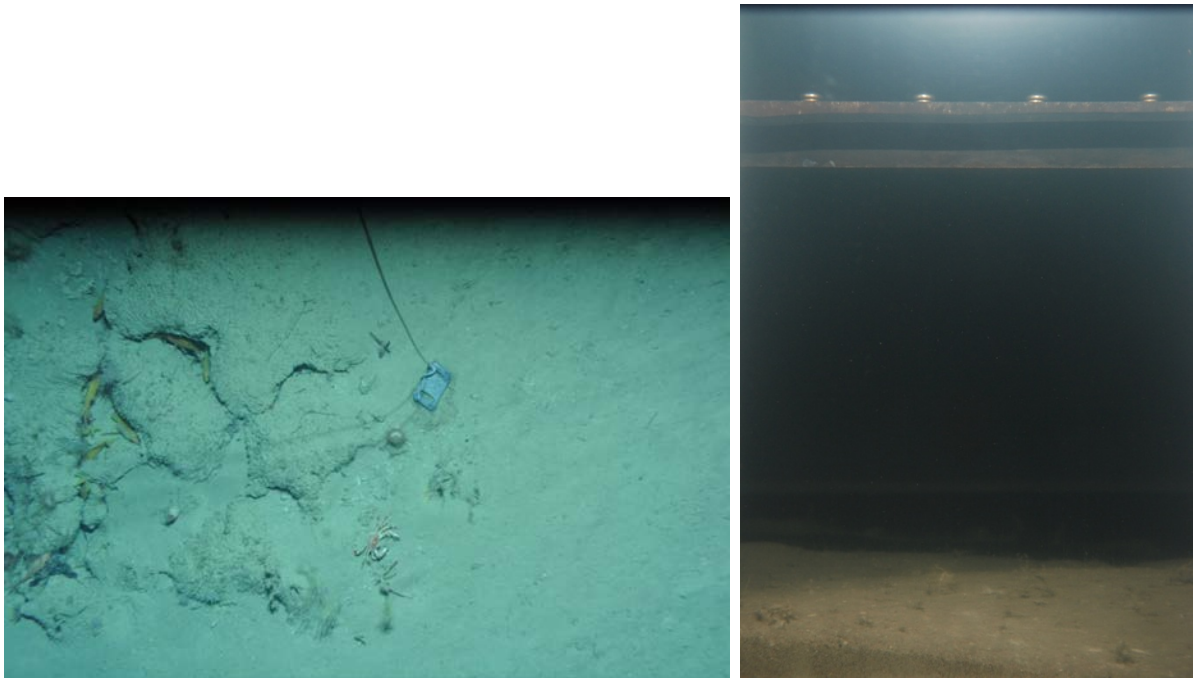


Figure 16 - Plan and profile views of hardbottom at sampling station (evidence of rubble hardbottom) in suspected hardbottom area in the alternative ODMDS expansion area.

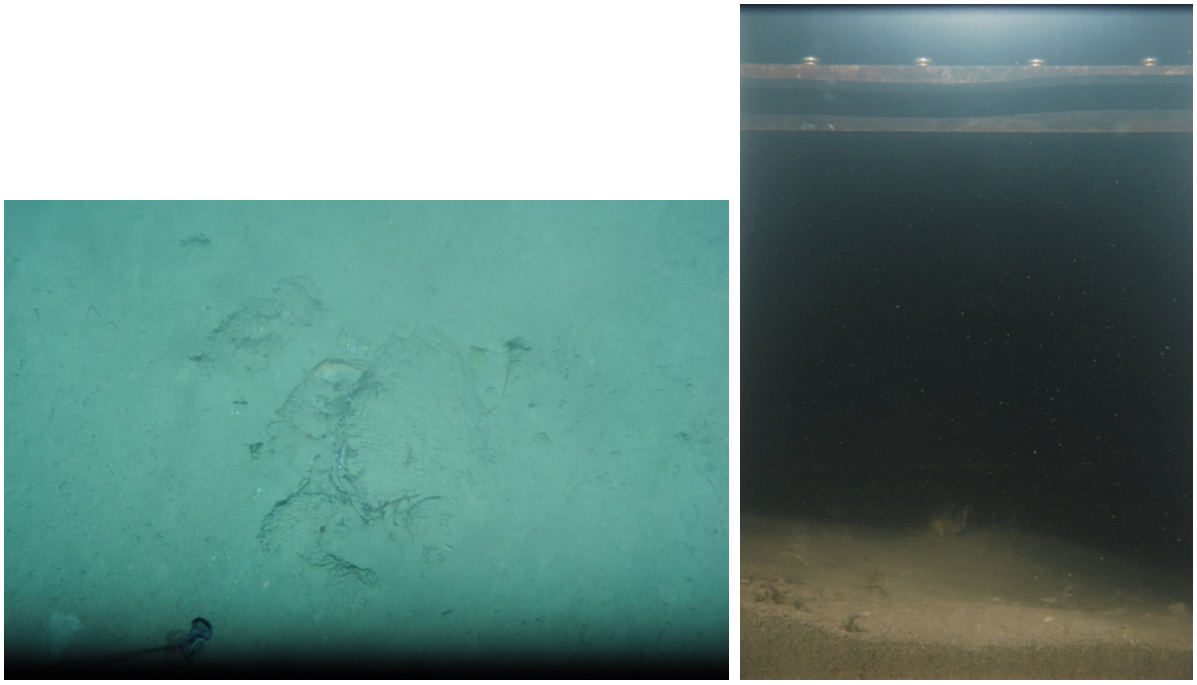


Figure 17 - Plan and profile views of hardbottom at sampling station (evidence of hardbottom) in suspected high probability area in the alternative ODMDS expansion area.

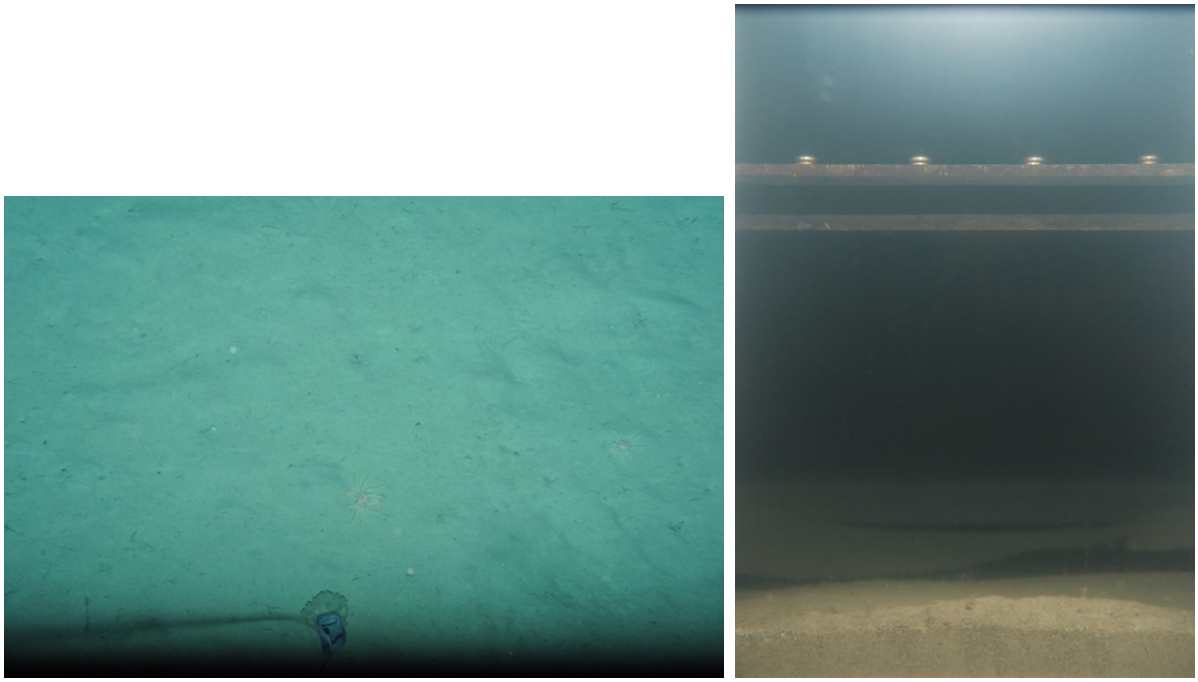


Figure 18 - Plan and profile views of hardbottom at sampling station (Evidence of Scattered Rock) in suspected high probability area in the alternative ODMDS expansion area.

In an effort to review all potential data sources to identify hardbottoms, the sidescan sonar data collected for the cultural resource assessment was reviewed to determine if any features were notable on the bottom. Data was collected using at a frequency of 100 kilohertz and 150 meter range. To be as conservative as possible, the USACE and the EPA classified all non-manmade targets detected in the survey as “hardbottom” (Figure 19 and Figure 20). The size of each target was calculated and the total area of potential hardbottom tabulated for both alternatives. Based on this analysis, Alternatives 1 and 2 each contain 12.85 acres of potential hardbottom within the total footprint of the expansion areas.

Figure 19 - Potential Hardbottom Targets in Alternative 1

Figure 20. Potential Hardbottom Targets in Alternative 2

3.5 FISH AND WILDLIFE RESOURCES

3.5.1 Marine Habitats

3.5.1.1 Water Column

Detailed discussions about the water column, including flora and fauna that reside in the water column, are included in Sections 3.5.1; 3.5.2 and 3.5.4 of the Designation FEIS and are incorporated by reference.

The water column provides habitat for small (such as plankton) and larger (such as fish, marine mammals, and sea turtles) marine life. Temperature, salinity, density, nutrient, and light

gradients in the water column create distinct habitats (Barnette 2001; SAFMC 1998), providing environments suitable for various life stages of different species (SAFMC 1998). On the east coast of Florida, these distinctions are influenced by the Florida Current, which flows along the continental shelf edge throughout the region and dominates the physical attributes over the entire shelf (see Figure 7; SAFMC 1998). The western edge of the Florida Current meanders from far offshore onto mid-shelf. The existing ODMDS is located about 3.8 nmi (7 km) from the average position of the western boundary of the Florida Current (USACE 2001). Characteristics of the water column are discussed in Section 3.8.

Pelagic species of the brown seaweed *Sargassum* are an important habitat in the water column and near-surface waters. Most pelagic *Sargassum* circulates between 20°N and 40°N latitude, and between 30°W longitude and the western edge of the Florida Current. Pelagic *Sargassum* generally consists of two species, *S. natans* (primarily) and *S. fluitans* (less common). Large quantities of *Sargassum* are frequently found on the continental shelf off the southeastern U.S. *Sargassum* supports a diverse assemblage of marine organisms, including fungi, macro- and micro-epiphytes, at least 145 species of invertebrates, over 100 species of fish, 4 species of sea turtles, and numerous marine birds. *Sargassum* provides refuge from predators for small species and early life stages; these organisms also feed on the *Sargassum* and associated invertebrates. *Sargassum* provides an abundant food source, attracting larger species. *Sargassum* is a habitat type managed by the SAFMC as EFH (Section3.6; SAFMC 1998). Pelagic *Sargassum* was frequently observed during recent surveys of the ODMDS expansion area (ANAMAR 2012).

3.5.1.2 Benthic Habitat

Benthic habitats are characterized by physical or structural features, including topography, substrate type, sediment grain size, and water depth, and by the presence of emergent biogenic structures (formed by plants or animals), including coral reefs, mussel beds, and tube assemblages (Tyrrell 2005). Recent bottom surveys conducted in the alternative ODMDS expansion areas (ANAMAR 2012) determined that the area was primarily soft bottom, with isolated areas of scattered rubble (see Section 3.4).

The structural foundation of sand and mud in soft bottom (sedimentary) areas can be enhanced by sand waves or shell aggregations created by physical processes, and by tube assemblages, burrows, or depressions created by plants or animals (Lindholm *et al*. 1998). Soft bottom habitats contain epifaunal (organisms that live on the sediment), infaunal (organisms that live within the sediment), and pelagic (free-swimming organisms that migrate in and out of the area) assemblages, whereas hardbottom habitats typically contain only epifaunal and pelagic assemblages.

3.5.2 Areas of Special Concern

3.5.2.1 Marine Protected Areas (MPA)

The existing ODMDS and the proposed expansion area are located in a Fishery Management Area called the East Florida Coast Closed Area (MPA;Figure 21). MPAs are defined under Executive Order (EO) 13158 as *any area of the marine environment that has been reserved by Federal, state, tribal, territorial, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein*. MPAs are generally defined where natural or cultural resources are given greater protection than the surrounding waters; and they include a range of habitats, restrictions, and management approaches (NMPAC 2006). The East Florida Coast Closed Area is a Federal Fishery Management Zone and is not restricted to vessels or to anchoring. However, pelagic longline fishing is prohibited in accordance with 50 CFR 622.274. A number of other MPAs are located in the vicinity of the project area, as shown on Figure 21.

3.5.2.2 Reef Tracts

There are no reefs within the proposed ODMDS expansion areas (Section 3.4). The *continental Southeast Florida reef tract* extends 67.5 nmi (125 km) from Biscayne Bay in Miami-Dade County (25°34'N) northward to West Palm Beach in northern Palm Beach County (26°43'N). It is composed of a complex of limestone ridges and shelf-edge and mid-shelf reefs (Banks *et al.* 2008). The *Florida Reef Tract* includes the region south of Soldier Key to the Dry Tortugas (Vaughan 1914).

3.5.2.3 Critical Habitat and Habitat Areas of Particular Concern

Designated critical habitat is discussed in Section 3.3 (Threatened and Endangered Species). Habitat Areas of Particular Concern (HAPCs) are discussed in Section 3.6 (EFH).

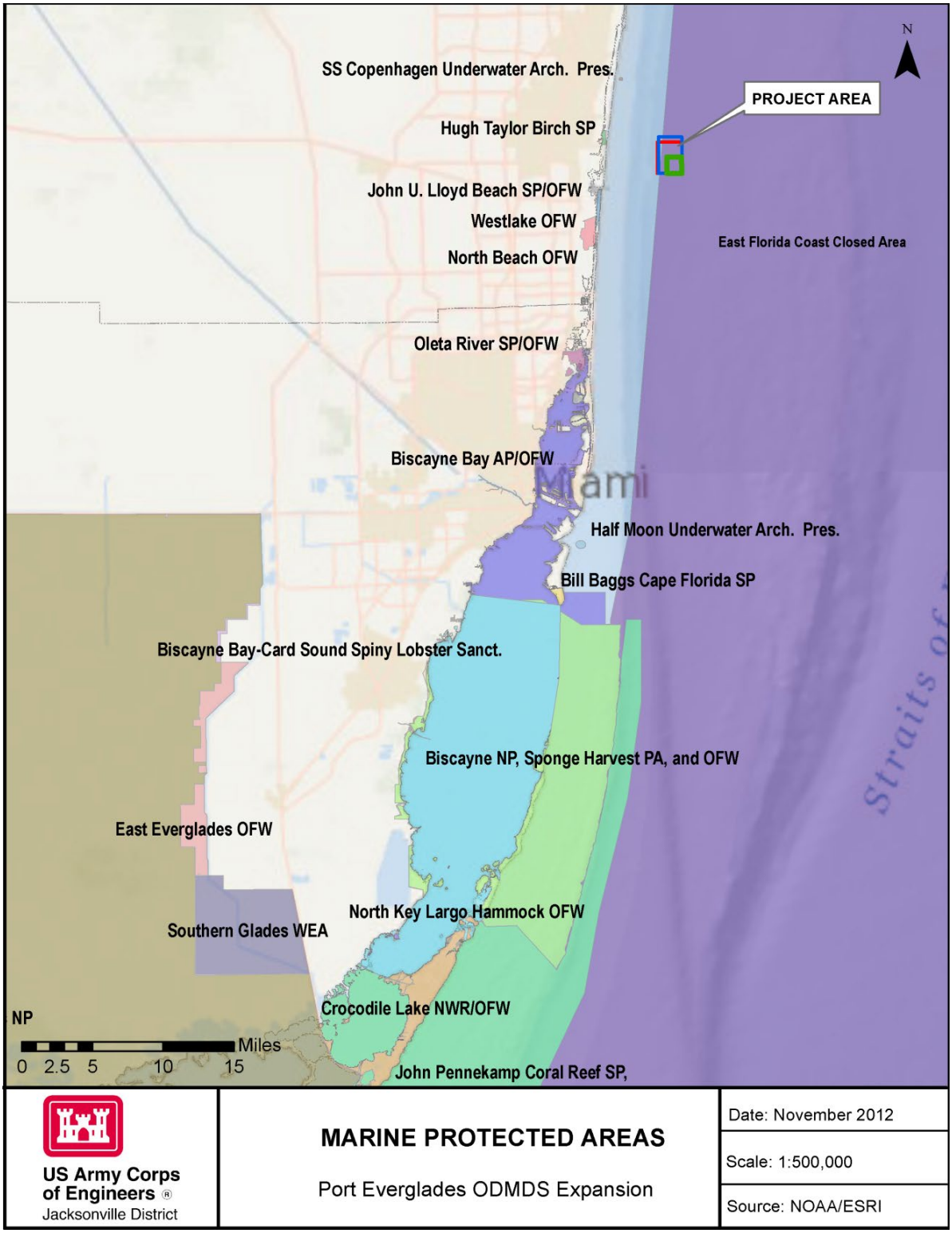


Figure 21. Marine Protected Areas (MPAs) in the Southeast Florida region. The East Florida Coast Closed Area, a Federal Fishery Management Zone, is located within the project boundaries.

3.5.3 Marine Mammals

Although 24 species of marine mammals could potentially occur in the proposed ODMDS expansion area (Table 8), many are considered rare or uncommon in Florida's Atlantic marine waters (ASM 2012). All marine mammals that may be found near the project area are protected under the Marine Mammal Protection Act (MMPA) of 1972 and/or the ESA. The north Atlantic right whale, humpback whale (the distinct population segment of humpback whales found in the project area are currently proposed to be removed from the protections of the ESA, yet remain protected by the MMPA), fin whale, sei whale, blue whale, and the sperm whale are the six federally listed marine mammals that could occur in the area. Federally listed threatened and endangered species were discussed in Section3.3.

The bottlenose dolphin and the Atlantic spotted dolphin are the two marine mammals most likely to occur in the proposed ODMDS expansion areas (NOAA 2005). Other species are listed in Table 8 and will not be discussed. Many of these stocks are managed as depleted under the MMPA. Numbers of whales and dolphins reported stranded in Broward County from 1978 to 2011 include: bottlenose dolphin (12), pygmy sperm whale (9), dwarf sperm whale (6), Risso's dolphin (5), Gulf stream beaked whale (3), Atlantic spotted dolphin (4),Pan-tropical spotted dolphin (2), Cuvier's beaked whale (1), sperm whale (3), humpback whale (1) and rough-toothed dolphin (1) (NOAA Fisheries, 2012).

Table 8. Marine Mammal Species that May Occur in the Project Area.

Common Name	Scientific Name	Occurrence
North Atlantic right whale	*Eubalaena glacialis*	Uncommon
Humpback whale	*Megaptera novaeangliae*	Rare
Fin whale	*Balaenoptera physalus*	Rare
Sei whale	*Balaenoptera borealis*	Rare
Blue whale	*Balaenoptera musculus*	Unknown
Bryde's whale	*Balaenoptera brydei*	Rare
Sperm whale	*Physeter macrocephalus*	Rare
Atlantic spotted dolphin	*Stenella frontalis*	Rare
Bottlenose dolphin	*Tursiops truncatus*	Common
Minke whale	*Balaenoptera acutorostrata*	Rare
Pygmy sperm whale	*Kogia breviceps*	Uncommon
Dwarf sperm whale	*Kogia simus*	Rare
Short-finned pilot whale	*Globicephala macrorhynchus*	Uncommon
False killer whale	*Pseudorca crassidens*	Rare
Gervais' beaked whale	*Mesoplodon europaeus*	Rare
True's beaked whale	*Mesoplodon mirus*	Rare
Blainville's beaked whale	*Mesoplodpon densirostris*	Rare
Cuvier's beaked whale	*Ziphius cavirostris*	Rare
Rough-toothed dolphin	*Steno bredanensis*	Rare
Pantropical spotted dolphin	*Stenella attenuata*	Rare
Atlantic spotted dolphin	*Stenella frontalis*	Rare
Spinner dolphin	*Stenella longirostris*	Rare
Striped dolphin	*Stenella coeruleoalba*	Rare
Killer whale	*Orcinus orca*	Rare
Pygmy killer whale	*Freesa attenuata*	Uncommon
Risso's dolphin	*Grampus griseus*	Rare
Harbor seal	*Phoca vitulina*	Rare
Hooded seal	*Cystophora cristata*	Rare

Bottlenose dolphins are common in the coastal marine areas along the Atlantic Coast south of Long Island and around the Florida peninsula (Waring *et al*. 2006). In 2009, the Western North (W.N.) Atlantic Coastal bottlenose dolphin stock was split into multiple stocks, including the Western North Atlantic Central Florida Coastal Stock. The Central Florida Coastal stock is

present in coastal Atlantic waters from 29.4°N south to the western end of Vaca Key (about 24.69°N – 81.11°W) where the stock boundary for the Florida Keys stock begins (NOAA Fisheries 2010). There is no obvious boundary defining the offshore extent of this stock. In waters less than 10 m depth, 70 percent of the bottlenose dolphins were of the coastal morphotype. Between 10 and 20 m depth, the percentage of animals of the coastal morphotype dropped, and at depths greater than 40 m, nearly all (over 90 percent) were of the offshore morphotype. These spatial patterns may not apply in the Central Florida Coastal stock, as there is a significant change in the bathymetric slope and a close approach of the Florida Current/Gulf Stream to the shoreline south of Cape Canaveral. The best estimate for the Central Florida Coastal stock is 6,318 and the resulting minimum population estimate is 5,094 (NOAA Fisheries 2010). The offshore form is distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic Ocean; however, the offshore morphotype has been documented to occur relatively close to shore over the continental shelf south of Cape Hatteras, NC. The minimum population estimate for western North Atlantic offshore bottlenose dolphin is 70,775 (Waring et al. 2011).

There are two species of spotted dolphin in the Atlantic Ocean, the Atlantic spotted dolphin (*Stenella frontalis),* formerly *S. plagiodon*, and the pantropical spotted dolphin (*S. attenuate)*. The Atlantic spotted dolphin is distributed from southern New England, south through the Gulf of Mexico and the Caribbean to Venezuela (Waring *et al*. 2005). Although considered rare in waters off southeast Florida, they have been observed off Miami and Pompano Beach and would likely occur in the area (ASM 2007; NOAA 2005). Atlantic spotted dolphins are generally found over the continental shelf, but they can inhabit deep oceanic waters (OBIS SEAMAP 2007). The Atlantic spotted dolphin occurs in two forms which may be distinct sub-species: the large, heavily spotted form which inhabits the continental shelf and is usually found inside or near the 200 m isobath; and the smaller, less spotted island and offshore form which occurs in the Atlantic Ocean but is not known from the Gulf of Mexico (NOAA Fisheries 2007a). Where they co-occur, the offshore form of the Atlantic spotted dolphin and the pantropical spotted dolphin can be difficult to differentiate (NOAA Fisheries 2007a).

The western North Atlantic population is genetically separate and is provisionally being considered a separate stock from the Gulf of Mexico stock(s) for management purposes (NOAA Fisheries 2007a). Western North Atlantic dolphins may be genetically separated into two stocks around Cape Hatteras, NC, but these are not currently recognized as distinct management units. The best abundance estimate of Atlantic spotted dolphins is 50,978 (NOAA Fisheries 2007a). The minimum population estimates based on the combined abundance estimates is 36,235. The best recent abundance estimate for pantropical spotted dolphins is 4,439 (NOAA Fisheries 2007b).

3.5.4 Aquatic Resources

3.5.4.1 Benthos

Benthic organisms are important components of the habitat and provide an important food source for many species. Temporal and spatial variations in benthic communities affect the distribution and abundance of bottom-feeding fish. The abundance and species composition of benthic communities are affected by environmental factors, including temperature, sediment type, and the availability of organic matter (Stevenson *et al.* 2004).

The infaunal community in the ODMDS expansion area is complex and diverse (ANAMAR 2012). At least 141 taxa were identified in the Site Designation Study (ANAMAR 2012); approximately 75.5 percent of the total species were annelid worms. Tubificid oligochaete worms, polychaetes (*Prionospio* sp., *Levinsenia reducta*, *Cirrophorus* (= *Paradoneis*) *lyra*, and *Spiophanes kroeyeri),* bivalve mollusks (*Nuculana carpenteri*, *Cardiomya costellata)* and Philomedid Ostracod crustaceans were abundant. Pyramidellid gastropods, sea cucumbers *(Leptosynapta* sp.), acorn worms (*Balanoglossus* sp.), ribbon worms (nemerteans), sea anemones (actiniaria), horseshoe worms (*Phoronis* sp.), and turbellarian flatworms (platyhelminthes) were less abundant (ANAMAR 2012).

Previous surveys of benthic infauna in the area were conducted in November 1984 (Barry A. Vittor & Associates, Inc., 1985) as well as in May and August 1998 (USEPA 1999). Analyzes of these surveys was included in Section 3.5.4 of the FEIS for site designation and is incorporated by reference.

3.5.4.2 Plankton

There are three main groups of plankton: bacterioplankton, phytoplankton, and zooplankton (Knox 2001). Plankton communities have important roles in marine waters. Bacterioplankton are primarily decomposers. Phytoplankton are the primary producers of the water column and form the base of the estuarine food web. Zooplankton are faunal components of the plankton. A detailed discussion concerning plankton is included in Section 3.5.1 of the FEIS for site designation and is incorporated by reference.

The total zooplankton volume in an area near the Port Everglades ODMDS expansion area for the Calypso LNG Deepwater Port project area ranged from 0.12 to 1.73 ml/m^3, with an average of 0.70 ml/m^3 (USCG 2008). The most abundant zooplankton taxa encountered in the USCG (2008b) study are presented in Table 9.

Table 9. Zooplankton Taxa and Densities Represented in the Calypso LNG Deepwater Port Project Area during Two Sampling Events.

Taxa		Density (number/m^3)		
Scientific Name	Common Name	February	March	Average
Calanoida	Copepods	0.55	2.38	1.47
Sagittoidea	Chaetognaths (Arrow worms)	0.28	0.86	0.57
Pleocyemata	Crabs, lobsters	0.49	0.47	0.48
Other Maxillopoda	Ostracods, copepods, barnacles	0.11	0.83	0.47
Dendrobrachiata	Prawns, shrimp	0.37	0.28	0.33
Hyperiidea	Hyperiidean amphipods	0.00	0.61	0.30
Sergestoidea	Prawns	0.23	0.30	0.27
Euphausiacea	Krill	0.27	0.11	0.19
Mysida	Opossum shrimp	0.11	0.06	0.09
Hydrozoa	Hydroids	0.00	0.13	0.06
Notes: a. Density values presented represent the average of all bongo net samples (all mesh sizes, all depths, all stations). b. Values are considered to be the minimum densities as not all non-target taxa were counted. c. Density values presented represent the average of all life stages encountered (i.e., nauplii, megalopa, phyllosoma, and juveniles).				

Source: USCG 2008

Ichthyoplankton are the planktonic stages (eggs and larvae) of fish with limited or no ability to swim that is dispersed mainly transported by currents. Eggs and/or larval stages of most estuarine and marine fishes, with benthic or pelagic adults, are part of the planktonic community (Leiby 1984).

Currents provide a transport mechanism to move fish eggs and larvae to or from areas conducive to survival and directly influence recruitment and subsequent year-class success (Norcross and Shaw 1984). Many organisms spawn near circular currents (gyres), upwelling, or other directional circulations that frequently are associated with major current systems.

The Florida Current/Gulf Stream, near the proposed ODMDS expansion area, is the beginning of the Florida Current/Gulf Stream and stretches from the Florida Straits to Cape Hatteras in North

Carolina (Gyory *et al.* 2005). The Florida Current/Gulf Stream provides a mechanism to disperse larvae and is considered EFH for various species of managed fish. Eggs and larvae spawned within the productive Florida Straits would be transported north through the project area by currents. The intensity and magnitude, and the distance from shore, of the Florida Current front are highly variable. Eddies associated with the frontal edge can have the potential to transport eggs and larvae offshore; however, ichthyoplankton are generally retained in nearshore waters because the strength of the Florida Current prevents their mixing into the northbound Florida Current water (USCG 2008). The average egg density in samples collected near the ODMDS was 1,069 eggs/million gallons (0.0011 eggs per gallon or 28 per 100 m^3) (USCG 2006). The average larval density was 1,102 larvae/million gallons (0.0011 larvae per gallon or 29 per 100 m^3), representing at least 33 (identified) taxa (USCG 2008).

3.5.5 Fisheries Resources

Federally managed species and non-managed species are found in the proposed ODMDS expansion area. This section describes general finfish and shellfish resources in the Project area, as well as species observed in the area.

3.5.5.1 Finfish

Finfish species that could potentially occur in the proposed ODMDS expansion area can be categorized as reef, demersal, coastal pelagic, oceanic pelagic or mesopelagic species, depending on habitat utilization. The Florida Current/Gulf Stream and associated eddies provide valuable fish habitat. Species and life-stage-specific patterns vary between the inshore and offshore Florida Current/Gulf Stream fronts. Anchovies and mackerels use inshore fronts, whereas dolphin and swordfish utilize offshore fronts (SAFMC 2002). Most swordfish were reported along the oceanic front between nearshore waters and the Florida Current/Gulf Stream, which may meander as close as five miles offshore.

In April 2006, a benthic video survey was conducted near the ODMDS expansion area for the Calypso LNG Deepwater Port project area to evaluate the habitat present (Figure 13) (Messing et al. 2006). Although the purpose of this study was not to identify local fish species, at least 16 species were observed during the survey.

Table 10. Fish Species Identified during Calypso Pipeline Survey (Source:Messing et al. 2006)

Common Name	Species or Taxa	Common Name	Species
Blind torpedo	*Benthobatis marcida*	Gulf Stream flounder	*Citharichthys arctifrons*
Shortnose greeneye	*Chlorophthalmus agassizi*	Great northern tilefish	*Lopholatilus chamaeleonticeps*
Armored searobin	*Peristedion sp.*	Spiny eel	*Notcanthidae*
Blueline tilefish	*Caulolatius microps*	Tripod fish	*Bathypterois sp.*
Frogmouth (gaper)	*Chaunax pictus*	Rattail	*Nezumai sp.*
Blackbelly rosefish	*Helicolenus dactylopterus*	Blacktail codling	*Laemonema melanurum*
Unknown skate	*Rajidae*	Catshark	*Scyliorhinidae*
Unidentified eels	*Synaphobranchidae*	Rattail	*Coelorhynchus sp.*
Unidentified scorpionfishes	*Scorpaenidae*		

In May 2011, as part of the site designation survey, the EPA conducted epibethic and infaunal surveys. Table 11 lists the finfish species collected during that survey. A total of 15 families (representing 10 orders) were collected in the trawl samples in the ODMDS expansion areas during the site designation study (Figure 22; ANAMAR 2012). Four species of Perciformes represented 22 percent of all fish species collected; however, the bar jack and the rainbow runner, are pelagic species. The most abundant fish species caught in trawls in the ODMDS expansion area during the site designation study was the Gulf Stream flounder (*Citharicthys arctifrons*). Other abundant species included the highfin scorpionfish (*Pontinus rathbuni*) and the fawn cusk-eel (*Lepophidum profundorum*) (ANAMAR 2012). The spotted hake may forage for benthic invertebrates and fishes in the area. The blind torpedoes and rosette skates captured during the trawl survey likely use the area for foraging. Many of the invertebrates and the fishes are potential prey for deepwater apex predators such as the sharpnose sevengill shark (*Heptranchias perlo*) and bluntnose sixgill shark *(Hexanchus griseus)* (ANAMAR 2012).

Although not captured during the EPA site designation surveys, blueline tilefish were documented within the upper northeast corner of the proposed ODMDS expansion area near a modern sailboat shipwreck during a remotely operated vehicle (ROV) (NOAA Fisheries, 2011).

Table 11. Fish Species Observed during Trawling

Common Name	Species or Taxa	Common Name	Species
Rosette skate	*Leucoraja garmani*	Fourspot flounder	*Paralichthys oblongus*
Blind torpedo	*Benthobatis marcida*	Deepwater flounder	*Monolene sessilicauda*
Argentine	*Argentina georgei*	Highfin scorpionfish	*Pontinus rathbuni*
Shortnose greeneye	*Chlorophthalmus agassizi*	Rimspine searobin	*Peristedion thompsoni*
Shortbeard codling	*Laemonema barbatulum*	Blackmouth bass	*Synagrops bellus*
Metallic codling	*Physiculus fulvus*	Bar jack	*Caranx ruber*
Spotted hake	*Urophycis regia*	Rainbow runner	*Elagatis bipinnulata*
Fawn cusk-eel	*Lepophidium profundorum*	Spotfin dragonet	*Foetorepus agassizii*
Blackfin goosefish	*Lophius gastrophysus*	Gulf Stream flounder	*Citharichthys arctifrons*

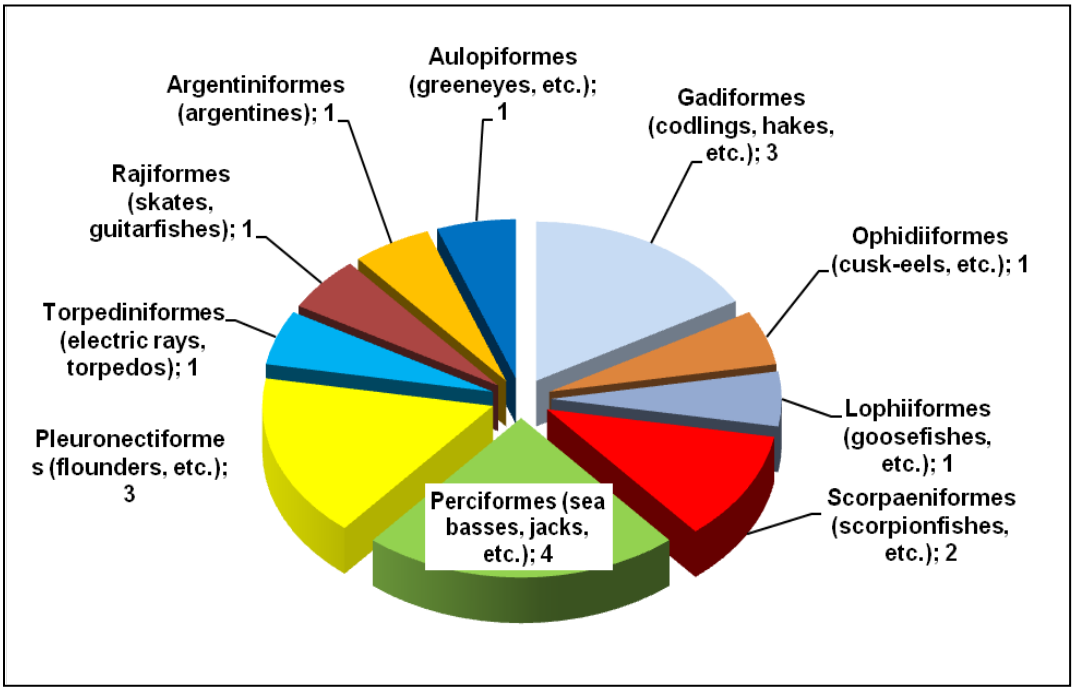


Figure 22. Eighteen trawled fish species, by order, collected in epifaunal trawl samples Source: USACE 2011.

3.5.5.2 Epifauna

Epifaunal taxa collected in trawls during the site designation study were primarily fishes and arthropods (Figure 23). The highest total epifaunal density (87.79 individuals per 1,000 m^3) was

observed west of the ODMDS expansion area during the site designation study (Table 12) (ANAMAR 2012).

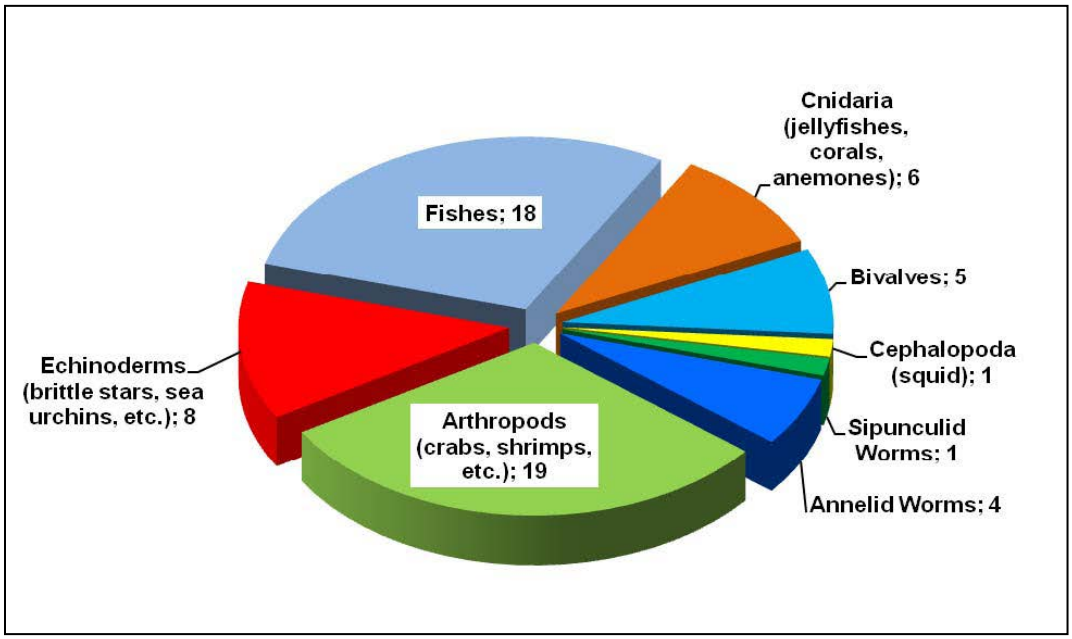


Figure 23. Sixty-two trawled epifaunal taxa by major taxonomic group (includes all epifaunal trawl samples) (source ANAMAR 2012).

Table 12. Total Epifaunal Density per Station, by Rank.

Total Epifaunal Density per Station, by Rank		
Station Number	Relationship to Expansion Areas	Total Epifaunal Density (individuals/1,000 m^3)
PE11-6	Inside Expansion Areas	57.86
PE11-7	Inside Expansion Areas	30.47
PE11-8	Outside (south of) Expansion Areas	31.27
PE11-9	Outside (west of) Expansion Areas	87.79

Source: ANAMAR 2012

3.5.5.3 Shellfish

The commercially important species potentially occurring in the proposed ODMDS expansion area generally prefer soft bottom habitat. They include one shrimp species (royal red shrimp) and the golden crab. Several squid and octopus species are found at depths similar to that of the proposed ODMDS expansion area (Carpenter 2002). In addition, 20 species of brachyuran crabs are known from depths greater than 656 ft (200 m) on the continental slope and margin of the northern Florida Straits (Soto 1985). The golden crab is found along a variety of soft substrate in water depths ranging from 675 to 3,300 ft (205.7 to 1005.8 m) (NOAA Fisheries 2007c). Deepwater shrimp, such as the royal red shrimp and the seabob shrimp (Xiphopenaeus

kroyeri) are found in the south Atlantic at depths up to 1,500 ft (457 m) (SAFMC 1998). Royal red shrimp occur over mud, sand, muddy sand, and white calcareous mud, typically in depths between 820 and 1,558 ft (18.3 to 474.9 m) (NOAA Fisheries 2007d). The rock shrimp occurs in water deeper than 600 ft (182.9 m), but prefer sandy bottoms in depths between 60 and 240 ft (18.3 and 73.1 m) (Hill 2005).

Various other species of shellfish were observed during benthic surveys in the area during the site designation study, including the lesser bobtail squid (*Semirrosia tenera*), the bathyal swimming crab (*Bathynectes longispina*), the inflated spiny crab (*Rochinia crassa*), a deepwater crab (*Eumunida picta*), the Jonah crab (*Cancer borealis*), a symmetrical hermit crab (Family Pylochelidae), a right-handed hermit crab (Family Paguridae), and an unidentified shrimp (ANAMAR 2012).

3.5.5.4 Invasive Species

No invasive species were reported in the ODMDS expansion areas for the site study (ANAMAR 2012). Invasive species that have been observed in the Atlantic Ocean off Broward County include a coral species with an established population, the orange cup coral *(Tubastrea coccinea)*, and a single specimen of the crustacean Asian tiger shrimp *(Penaeus monodon)* (USGS 2011). Invasive fish species with established populations in the vicinity of the proposed ODMDS expansion area include the venomous lionfish (*Pterois* volitans/miles complex), fairy basslet (Gramma loreto), and tessellated blenny (Hypsoblennius invemar) (USGS 2011; Hare and Whitfield 2003; Semmens et al. 2004). Small numbers of the following species have been collected in the area: sohal surgeonfish (Acanthurus sohal), sailfin tang (Zebrasoma desjardinii), yellow tang (Z. flavescens), brown tang (Z. scopas), orbiculate batfish (Platax orbicularis), blue ringed angelfish (Pomacanthus annularis), Arabian angelfish (P. asfur), emperor angelfish (P. imperator), yellowbar angelfish (P. maculosus), semicircle angelfish (P. semicirculatus), bluefaced angelfish (P. xanthometapon), peacock hind (Cephalopholis argus), and panther grouper (Chromileptes altivelis) (USGS 2011; Semmens et al. 2004).

3.6 ESSENTIAL FISH HABITAT

The Port Everglades Harbor ODMDS expansion areas fall under the jurisdiction of the South Atlantic Fishery Management Council (SAFMC). The SAFMC has identified and described EFH for hundreds of marine species covered by eight Fishery Management Plans (FMPs). In addition, the NOAA Fisheries has prepared a FMP for Highly Migratory Species (tunas, billfishes, sharks, and swordfish) which includes associated EFH. A list of species managed by the SAFMC and South Atlantic species managed under Federally-Implemented Fishery Management Plans that could potentially be affected by the project is provided in

Table **13**. EFH Assessment for the designation of the original ODMDS is found in Appendix I of the FEIS. EFH consultation is ongoing and any conservation recommendations will be presented in the final EA.

The categories of EFH for managed species which could potentially be found in the ODMDS expansion area are: artificial/manmade reefs; coral and coral reefs, live/hard bottoms, *Sargassum*; and water column. The Habitat Areas of Particular Concern (HAPCs) for managed species which may be found in the ODMDS include: Hermatypic (reef-forming) coral habitat and reefs, hard bottom, and *Sargassum* habitat. Maps of all EFH boundaries are available on the National Oceanic and Atmospheric Administration's website through the use of the EFH Mapper, found at http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html.

According to a letter from NOAA Fisheries "Deepwater hard and soft bottom habitats within, and in close proximity, to the ODMDS expansion area are designated EFH for species managed under the Snapper-Grouper, Golden Crab, and Shrimp Fisheries" (NOAA Fisheries, 2011). In addition, species from the Highly Migratory Pelagic Fisheries may be present in the area (

Table **13**).

Areas which meet the criteria for HAPCs for coral, coral reefs, and live/hard bottom in east Florida include the *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; nearshore (0-4 meters; 0-12 feet) hard bottom off the east coast of Florida from Cape Canaveral to Broward County); and offshore (5-30 meter; 15-90 feet) hard bottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida (SAFMC 1998).

The Stetson-Miami Terrace HAPC was established by the SAFMC in 2009 and is the largest deepwater coral HAPC off the coast of east Florida; this HAPC follows the1,312 ft (400m) depth contour and covers a large area north to south of 22,876 square miles (SAFMC/ NOAA Fisheries 2009). The Miami Terrace is a 40-mile-long carbonate platform between Boca Raton and South Miami in depths of 656 to 1,312 ft (200 to 400 m) (Reed *et al.* 2006). The Miami Terrace provides high-relief rocky habitat for rich communities of benthic invertebrates and fishes, as well as various species of coral. This HAPC is located approximately 0.5 nmi east of the southeastern corner of the proposed ODMDS expansion area. The expanded ODMDS overlays the SE corner of the existing ODMDS, thus there is no change to the existing condition.

The Florida Current/Gulf Stream and associated eddies provide valuable fish habitat. Species and life-stage-specific patterns vary between the inshore and offshore Florida Current/Gulf Stream fronts. Anchovies and mackerels use inshore fronts, whereas dolphin and swordfish utilize offshore fronts (SAFMC 2002). Most swordfish were reported along the oceanic front between nearshore waters and the Florida Current/Gulf Stream, which may meander as close as five miles offshore.

Table 13. EFH Species for Marine Waters Managed by the South Atlantic Fishery Management Council and within the Atlantic Highly Migratory Species (HMS) Fishery Management Plan with Potential for EFH within the ODMDS Expansion Area

Species	Scientific Name	Life stage Ecotype	EFH Description
Shrimp Fishery Management Plan			
Royal Red Shrimp	*Pleoticus robustus*	adults	Upper regions continental slope 180-730m, mud/sand substrate; Florida Current/Gulf Stream
Snapper-Grouper Fishery Management Plan (representative species)			
Snowy grouper	*Epinephelus niveatus*	eggs/larvae adults	Coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 182.8 m where the annual water temperature range is sufficiently warm to maintain adult populations. Water column above adult habitat and pelagic environment, including *Sargassum*, Florida Current/Gulf Stream
Yellowedge grouper	*Epinephelus flavolimbatus*	eggs/larvae adults	
Warsaw grouper	*Epinephelus nigritus*	eggs adults	
Speckled hind	*Epinephelus drummondhayi*	adults	
Wreckfish	*Polyprion americanus*	adults	Above description to at least 609 m
Vermilion snapper	*Rhomboplites aurorubens.*	juvenile adults	Coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 182.8 m where the annual water temperature range is sufficiently warm to maintain adult populations. Water column above adult habitat and pelagic environment, including *Sargassum*, Florida Current/Gulf Stream
Blackfin snapper	*Lutjanus buccanella*	adults	
Silk snapper	*Lutjanus peru*	juvenile adults	
Greater amberjack	*Seriola dumerilii*	juvenile adults	
Blueline tilefish	*Caulolatilus bermudensis*	eggs adults	
Golden tilefish	*Lopholatilus chamaeleonticeps*	adults	
Golden Crab Fishery Management Plan			
Golden crab	*Chaceon fenneri*	adults	Continental shelf; foraminiferan ooze, dead coral mounds, ripple habitat, dunes, black pebble habitat, low outcrop, soft-bioturbated habitat 320-567 m, Florida Current/Gulf Stream

Coral, Coral Reef, and Live/Hardbottom Habitat Fishery Management Plan			
Coral		all stages	Ahermatypic stony corals, extends to outer shelf depths. For *Antipatharia* (black corals) includes rough, hard, exposed, stable substrate, offshore in high salinity waters in depths exceeding 18 m, not restricted by light penetration on the outer shelf; octocorals except the order Pennatulacea (sea pens and sea pansies) includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths; Pennatulacea includes muddy, silty bottoms in subtidal to outer shelf depths
Highly Migratory Species Fishery Management Plan			
Atlantic bluefin tuna	*Thunnus thynnus*	eggs/larvae	Florida Straits north to waters off South Carolina
Atlantic skipjack tuna	*Katsuwonus pelamis*	eggs/larvae juvenile to adult	Portions of the Florida Straits; continuous EFH from the southern east coast of Florida through the Florida Keys.
Atlantic yellowfin tuna	*Thunnus albacares*	eggs/larvae	Portions of the Florida Straits
Swordfish	*Xiphias gladius*	eggs/larvae juvenile to subadult adult	From NC extending south around peninsular Florida through the Gulf from the 200 m isobath to the EEZ boundary; associated with the western edge of the Florida Current/Gulf Stream
Blue marlin	*Makaira nigricans*	eggs/larvae juvenile adult	Off Florida; Florida Keys to southern Cape Cod
White marlin	*Tetrapturus albidus*	juvenile	Florida Keys to mid-east coast of Florida

		adult	
Sailfish	*Istiophorus platypterus*	eggs/larvae juvenile adult	Florida Straits from 5 mi offshore out to the EEZ boundary; Atlantic east coast from the Florida Keys to past north Florida
Longbill spearfish	*Tetrapturus pfluegeri*	juvenile adults	Florida Keys to the mid-east coast of Florida
Bignose shark	*Carcharhinus altimus*	juvenile adult	East coast of Florida
Caribbean reef shark	*Carcharhinus perezi*	all stages	Atlantic coastal areas from the southern to mid-Florida coast
Night shark	*Carcharhinus signatus*	all stages	Southern and mid-east coast of Florida
Silky shark	*Carcharhinus falciformis*	all stages	Atlantic east coast from Florida to NJ
Longfin mako shark	*Isurus paucus*	all stages	Atlantic from southern Florida through SC
Blue shark	*Prionace glauca*	adult	Atlantic off Florida
Oceanic whitetip shark	*Carcharhinus longimanus*	all stages	Atlantic from southern Florida to southern New England
Bigeye thresher shark	*Alopias superciliosus*	all stages	Atlantic east coast from southern to the mid-Florida coast
Great hammerhead shark	*Sphyrna mokarran*	all stages	Atlantic east coast from the Florida Keys to NJ
Nurse shark	*Ginglymostoma cirratum*	juvenile	Atlantic east coast of Florida
Blacktip shark	*Carcharhinus limbatus*	adult	In the Atlantic from the mid-east coast of Florida to the mid-coast of SC
Bull shark	*Carcharhinus leucas*	juvenile	East coast of Florida to SC in the Atlantic

		adult	
Lemon shark	*Negaprion brevirostris*	juvenile	Atlantic east coast of Florida
Scalloped hammerhead shark	*Sphyrna lewini*	juvenile adult	Atlantic east coast of Florida through NJ/NY
Dusky shark	*Carcharhinus obscurus*	neonate juvenile adults	Atlantic east coast of Florida
Spinner shark	*Carcharhinus brevipinna*	juvenile adult	Atlantic east coast of Florida to GA
Tiger shark	*Galeocerdo cuvier*	juvenile	Atlantic east coast from Florida to New England

3.7 COASTAL BARRIER RESOURCES

The proposed project involves only deep-water submerged habitat and the water column above it. Figure 24 lists the designated Coastal Barrier Resource Units in Broward County.

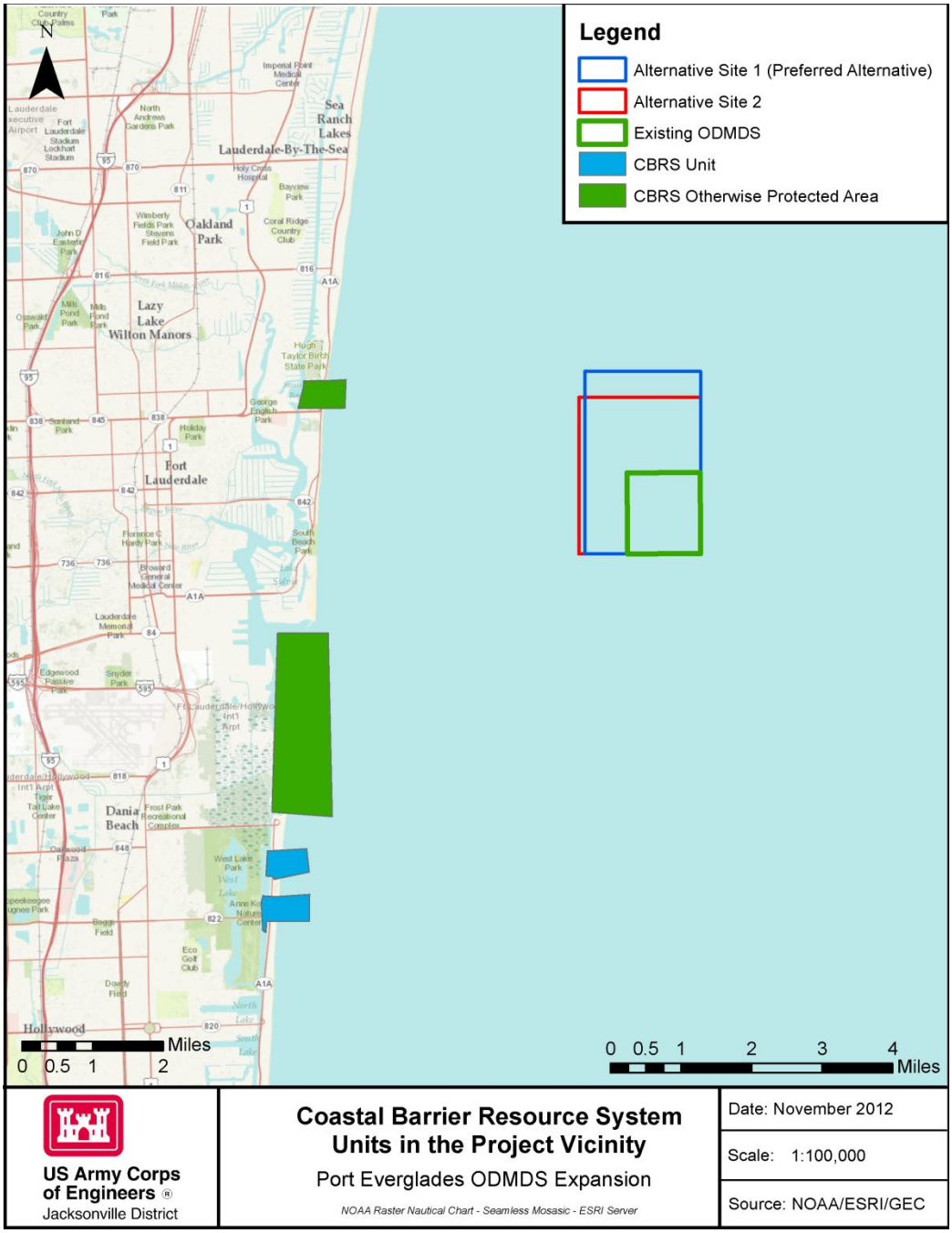


Figure 24. CBRS units in the vicinity of the project area.

3.8 WATER QUALITY

Section 3.8 of the 2004 EIS for designation of the Port Everglades ODMDS provides a detailed analysis about water quality in the vicinity of the ODMDS that is incorporated into this EA by reference. Water quality data collected since site designation is included below.

3.8.1 Salinity

Surface water salinity in the Atlantic Ocean ranges from approximately 34 to 37 parts per thousand (ppt). The subsurface core waters of the Florida Current are characterized by salinities of approximately 36.2 to 36.6 ppt (Suez 2006). Salinity recorded in the ODMDS expansion areas just north of the existing ODMDS during an October 2007 survey was nearly constant (35.9 to 36.6 ppt) with water depth (ANAMAR 2010) and during a May 2011 survey was also nearly constant (35.0 to 36.4 ppt) at both stations sampled (ANAMAR 2012).

3.8.2 Water Temperature

Water temperatures in the area tend to be warmer further offshore on the surface; this is attributed to the influence of the Florida Current. Water column profiles were examined in the ODMDS expansion areas just north of the existing ODMDS in 2007, 2011, and 2014. In October 2007, temperatures ranged from a high of 29^{o}C at the surface to a low of 15^{o}C near the bottom. A thermocline existed between 230 and 560 ft (70 and 170 meters) (ANAMAR 2010). Two water column profiles were examined during the site study in May 2011; results were similar (ANAMAR 2012). Water temperatures ranged from 8.1 near the seafloor to 26.7°C in an isothermic layer extending from the water's surface to about 70 ft (21.3 m) deep at both stations. The mean temperature change was about 0.4°C per 16 ft (4.9 m) of water depth at both stations. A thermocline of 1.0°C or more temperature decrease per 16 ft (4.9 m) was observed between about 180 and 280 ft (54.9 to 85.3 m) deep at both stations (ANAMAR 2012). In September 2014, the range was 29°C at the surface and 8°C at the bottom with a deep thermocline at 145 meters depth (US EPA, 2014).

3.8.3 Dissolved Oxygen

Dissolved oxygen is an important indicator of water quality and is critical to ecosystem health. Dissolved oxygen concentrations of 5 parts per thousand or higher are considered optimal. Fish and other animals become stressed when the concentration of dissolved oxygen dips below 2 ppt. Dissolved oxygen concentrations can vary seasonally due to wind mixing and levels of primary productivity (algae growth). Dissolved oxygen levels in the ODMDS expansion areas just north of the existing ODMDS during the site designation study in May 2011 ranged from 6.6 mg/l to 7.3 mg/l in the surface waters extending to 180 ft (55m) below the surface. Below this surface layer, dissolved oxygen concentrations decreased steadily to 4.4 mg/l at 330 feet (100m) and remained relatively constant to the seafloor (ANAMAR 2012). In October 2007, remained consistently around 5.7 to 6.0 mg/l in the upper 330 feet (100m) then dropped to a

range of 4.0 to 4.2 mg/l at depths of 460 ft (140m) and below (ANAMAR 2010). DO in September 2014 was nearly the same as in 2011 with a surface concentration near 6 mg/l and a bottom concentration of 4.4 mg/l.

3.8.4 Turbidity

Turbidity is a measure of water clarity and how much the material suspended in water decreases the passage of light through the water. Suspended materials include soil particles (clay, silt, and sand), algae, plankton, microbes, and other substances. High levels of turbidity and total suspended solids (TSS) can negatively affect water quality by reducing light penetration, limiting the ability of aquatic organisms to find food, degrading available habitat, and fouling the gills of fish and invertebrates. TSS levels in the existing ODMDS varied between 3 and 26 mg/L throughout the water column. Maximum TSS levels coincided with the depth of the thermocline, where particulates generally accumulate (USEPA 2004). Turbidity levels are consistently low with a majority of readings below 0.5 FTU (Formazin Turbidity Unit). TSS levels in the ODMDS expansion areas during the site designation study in May 2011 ranged from a low of 6.0 mg/L in 213 ft (64.9 m) of water within a thermocline to a high of 13.0 mg/L in 410 ft (125 m) of water within an isotherm (ANAMAR 2012). Measured TSS levels are presented in Table 14 (ANAMAR 2012).

The photic zone can be defined as greater than or equal to 2 percent of surface photosynthetically active radiation (PAR) values. The photic zone was found to be within approximately 200 ft (61 m) of the water's surface in the ODMDS expansion areas during the site designation study in May 2011 (ANAMAR 2012). Similarly, the photic zone was identified within the upper 180 ft (55m) in October 2007 (ANAMAR 2010).

Table 14. Total Suspended Solids in the Water Column in the ODMDS Expansion Areas just Northwest (PE11-6) of the Existing ODMDS in May 2011

Position within Water Column	Depth of Sample (ft)	Depth of Sample (m)	Total Suspended Solids (mg/L)	Turbidity (FTU)
Near surface	16.4	5.0	8.5	0.2
Within thermocline	213.2	65.0	6.0	0.3
Within lower isotherm	410.0	125.0	13.0	0.2
Near bottom	623.2	190.0	7.0	0.2

Source: (ANAMAR 2012)

3.8.5 Water Chemistry

Chemical analyses were performed on site water samples taken from the ODMDS proposed expansion area in 2007 (ANAMAR 2010). Water samples were collected at four depths; near

the surface, above the thermocline, below the thermocline and near the bottom. Samples were analyzed for general chemistry parameters including ammonia, cyanide, nitrogen, phosphorus, and sulfate, as well as total organic carbon, metals, organochlorine pesticides, PAHs, pentachlorophenol, organic tins and PCBs. No organic tins or PCBs were detected in any of the water samples. Only the pesticides beta-BHC, 4,4'DDT, and gamma-Chlordane were detected at quantifiable concentrations with 4,4'DDT exceeding federal water quality criteria (criteria continuous concentration [CCC]) in two samples at concentrations of 0.0017 to 0.0023 µg/l. Benzo(g,h,i) perylene, indeno (1,2,3-cd) pyrene and naphthalene were the only PAHs detected at quantifiable concentrations. These PAHS were at low levels below federal water quality criteria. No analytes were detected above the federal water quality criteria for the criteria maximum concentration [CMC]). Water chemistry parameters are summarized in Table 14 below (ANAMAR 2010).

Table 15. Quantifiable Analytes and General Chemistry Parameters in the Water Column in the ODMDS Expansion Areas in October 2007

Analyte	Maximum Detected Concentration	Federal Water Quality Criteria CCC[1]/CMC[2]
	µg/l	
Arsenic	1.54	36/69
Cadmium	0.021	8.8/40
Chromium	0.18	Na
Copper	0.18	3.1/4.8
Lead	0.027	8.1/210
Mercury	<0.20	0.94/1.8
Nickel	0.28	8.2/74
Selenium	<1.0	71/290
Silver	<0.050	na/1.0
Zinc	1.10	81/90
Beta-BHC	0.0022	Na
4,4'DDT	0.0023	0.001/0.13
Gamma-Chlordane	0.00041	Na
Benzo(g,h,i) perylene	0.0032	Na
Indeno (1,2,3-cd) pyrene	0.0029	Na
Naphthalene	0.0035	Na
	mg/l	
Ammonia as Nitrogen	0.08	Na
Cyanide, Total	0.013	Na
Nitrate+Nitrite as Nitrogen	0.21	Na
Total Kjedahl Nitrogen (TKN)	1.1	Na
Orthophosphate as Phosphorus	0.04	Na
Phosphorus, Total	0.16	Na
Sulfate	2790	Na
Sulfide, total	<0.05	Na
Total Organic Carbon	1.4	Na

Source: (ANAMAR 2010)

[1]CCC=Criteria Continuous Concentration

[2]CMC=Criterion Maximum Concentration

3.8.6 Human-Related Discharges

The western edge of proposed ODMDS expansion area Alternative 1 would be located approximately 3.5 nmi northeast from Port Everglades. Port Everglades is a busy commercial and recreational port adjacent to the Florida cities of Fort Lauderdale, Dania Beach, and Hollywood, with 4,183 ship calls for the 2011-2012 fiscal year (Port Everglades 2012). Port Everglades is one of the largest cruise ship ports in the United States. Port Everglades is the busiest container port in Florida with over 25 million tons of cargo moved, over 3.8 million multi-day cruise passengers, and most of South Florida's petroleum. (Port Everglades 2019).

Potential sources of human-related discharges in the Port Everglades area include vessels. A single cruise ship with 3,000 passengers can generate 25,000 gallons of raw sewage and 143,000 gallons of sanitary wastewater every day (Oceana 2007). Ships can discharge raw sewage to the ocean once they are at least 3 miles from the coastline. The impact of this discharge to water quality in the vicinity of the ODMDS expansion area depends on the current regime at any given time. The sea buoy for Port Everglades is approximately two miles southwest of the existing ODMDS. Vessels frequent the area directly south of the proposed expansion area and could therefore affect water quality in the vicinity (BOEM 2012).

3.9 OCEAN OUTFALL

In 2008, the state of Florida signed legislation that prohibits the construction of any new ocean outfall pipes in Florida, eliminates the six (now five) ocean outfall pipes in Palm Beach, Dade, and Broward Counties, requires these counties meet advanced wastewater treatment guidelines and prohibits ocean discharge after 2025. Broward County currently has one ocean outfall. The remaining Broward County outfall is located more than 10 nmi from the proposed expansion area and therefore not expected to affect the area.

3.10 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

Hazardous, toxic or radioactive materials cannot be disposed of in the ODMDS. Surveys of the proposed ODMDS did not indicate the presence of any hazardous, toxic or radioactive waste in the proposed expansion area (ANAMAR 2012).

3.11 AIR QUALITY

The EPA, in accordance with the Clean Air Act, set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The Clean Air Act identified two types of NAAQS. Primary standards set limits to protect public health, including the health of *sensitive* populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

Broward County is currently in attainment for all criteria pollutants. Air quality in the proposed ODMDS expansion area is good due to either onshore or offshore breezes. The EPA has authority over OCS sources in the area. Under the EPA rules, OCS sources within 25 miles of the state's boundaries are subject to the same Federal and state requirements that would apply if the source were located onshore. The air over the OCS water is not classified, but it is presumed to be better than the NAAQS for all criteria pollutants. Air quality in adjacent onshore areas may be affected by releases of air pollutants from OCS sources.

3.12 NOISE

Section 3.11 of the designation FEIS is incorporated by reference. Ambient noise levels offshore are generally low. Noise in this area is limited to that of the vessels passing through the area. Recreational boaters contribute minimally to the amount of noise in the area. Noise levels fluctuate during the year, the highest levels usually occur during the spring and summer months due to increased coastal activities. The proposed ODMDS expansion area does not encompass any noise-sensitive institutions, structures or facilities and will not cause more noise than currently exists at the site.

3.13 RECREATION RESOURCES

Recreational resources are natural or man-made lands or waters designated or managed by local, state, or Federal agencies for leisure use by visitors and local residents. Offshore recreational resources include recreational fishing, sailing, and boating areas, diving areas, and other water sport areas. Section 3.13 of the 2004 designation FEIS provides a detailed analysis on recreational resources and is incorporated by reference. Expansion of the ODMDS will not affect recreation and has no more effect than the existing site.

3.14 NAVIGATION AND PUBLIC SAFETY

Marine transportation includes all vessels that access the ocean via channels or navigable waterways. In the waters off of Broward County, marine vessels currently participate in a variety of activities, including commercial, recreational, Federal, and state operations. There are two primary traffic routes offshore Port Everglades, an inshore north-south route and an offshore north-south route. The inshore route is located approximately 6 to 8 nmi offshore and east of the proposed ODMDS expansion area (FAU 2012). Additionally, in 2009 Bureau of Ocean Energy Management (BOEM) analyzed US Coast Guard Automated Identification System (AIS) data to determine levels of vessel traffic offshore Port Everglades (BOEM 2012). The proposed ODMDS expansion area is located in an area of relatively low vessel activity.

3.15 HISTORIC AND CULTURAL RESOURCES

The earliest widely accepted date of occupation by aboriginal inhabitants of Florida dates from around 12,000 years ago (Milanich 1994). This earliest cultural period, called the Paleo-Indian

period, lasted until about 10,000 YBP (years before present). Sea level was lower and the continental shelves were exposed - an area almost twice the width of the current size of the state. Few Paleo-Indian archeological sites are recorded in south Florida. Known sites are clustered along the Atlantic coast and inland waterways.

There is no potential for submerged prehistoric archeological sites to exist within the ODMDS project area. The ODMDS project area is located off the continental shelf in water depths of 600 to 700 feet, which was never available for human occupation at any time.

This area of the Florida coastline was the scene of numerous wrecks throughout the eighteenth and nineteenth centuries. Southbound ships hugged the coast to avoid the northward flowing Florida Current/Gulf Stream and northbound ships often found themselves in danger from large storms and hurricanes. Many ships were wrecked off the coast of south Florida. The Florida Master Site File (FMSF) lists 16 historic shipwrecks within the vicinity of the alternative ODMDS sites. One of these, the *USS Copenhagen* is listed on the National Register of Historic Places (NRHP) and three others, including the *Robert Edminster*, have been determined potentially eligible for the NRHP.

On August 25, 2011, the Florida Division of Historical Resources (DHR) concurred with the USACE's recommendations for the necessity of a submerged cultural resources survey of the ODMDS alternative project areas (DHR Project File No. 2011-03638). This survey was conducted in November, 2011, and resulted in the report titled, *Submerged Cultural Resources Remote Sensing Survey of the Port Everglades Channel and Ocean Dredge Material Disposal Site (ODMDS), Broward County, Florida* (PCI 2011). PCI identified a total of two potentially significant anomalies that may be associated with historic properties within the ODMDS alternatives. These anomalies consisted of one magnetic target with an associated sidescan image and one sidescan image. In July 2012, the USACE conducted a refinement survey of the two anomalies and was able to determine that one was debris and the other was a modern, recent shipwreck.

3.16 MILITARY USAGE

Broward County is home to the USN's Naval Surface Warfare Center, Carderock Divisions South Florida Ocean Measurement Facility (SFOMF), located just south of Port Everglades at Dania Beach, Florida. This site has been a continuously operating Navy range for over fifty years. The SFOMF performs electromagnetic signature tests of Navy assets. The range is the Navy's only deep and shallow water magnetic research and development ranges (NAVSEA 2012). During naval activities, surface ships and submarines operate in nearby waters as part of testing and exercises. During fiscal year 2011, a total of 26 military ships called at Port Everglades, generating $358,551 for the port (Broward County 2012). Figure 7 shows the location of the proposed ODMDS expansion areas relative to the Navy Use Area. This area is adjacent to the

expanded footprint of the ODMDS, but no boundary was extended to the south so there will be no changes in operation related to the Naval operations.

4 ENVIRONMENTAL EFFECTS

This section is the scientific and analytic basis for the comparisons of the alternatives (see Table 4 in Section 2 Alternatives, for summary of impacts). The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects.

4.1 GENERAL ENVIRONMENTAL EFFECTS

General environmental effects of disposal of dredged material at this location are discussed in Chapter 4 of the EIS for Designation of the Palm Beach Harbor ODMDS and the Port Everglades Harbor ODMDS (EPA 2004). The two Alternatives considered here are very similar. They have approximately 86 percent of their submerged bottom in common, as is seen in, and both fully contain the existing ODMDS.

Based on an analysis of existing data and the results of the *OSV Bold* site study in May 2011, many of the environmental parameters analyzed are the same for both Alternatives however Alternative 1 will affect less potential hardbottom in the project area. Alternative 1 was chosen as the Preferred Alternative as it is the environmental preferred site and allows for increased operational safety.

Under the no-action alternative, the ODMDS will not be expanded and there will be no additional environmental effects. However, ocean disposal of the anticipated larger quantities of dredged material could occur on a limited basis pursuant to Section 103 of the MPRSA (see Section 2.1.3). The impacts to the marine environment associated with a Section 103 site selection and its limited use would be evaluated by the USACE at the time of selection.

4.2 VEGETATION

Since there is no vegetation located in the existing ODMDS, vegetation would not be affected by either of the Alternatives, nor the No-Action Alternative.

4.3 THREATENED AND ENDANGERED SPECIES

The 2004 EIS for the Port Everglades Harbor ODMDS designation details the environmental impacts of the current ODMDS and concludes that designation of this ODMDS would not adversely affect or threaten the continued existence of any threatened or endangered species. The proposed expanded ODMDS has similar biological and physical parameters.

No evidence of impacts to listed species from the use of the existing site have been identified, therefore, as with the original designation of the Port Everglades Harbor ODMDS, selection of either expanded ODMDS (east-west release zone or north-south release zone) will not affect listed species.

None of the seven species of listed corals are found in waters exceeding 50 meters (NOAA Fisheries, 2005 and Brainard et al 2011) and therefore are not proximate to the expanded ODMDS aerial footprints.

All additional species which may be present in the area of the ODMDS are motile and capable of moving away from any short-term disturbance which may occur.

4.4 HARDBOTTOM HABITATS

Hardbottom habitats potentially affected by this action include coral reefs located west of the alternatives (Figure 12) and non-reef hardbottom habitats within the proposed expansion areas (Figure 15).

Presence of hardbottom associated with rubble areas within the proposed ODMDS expansion areas is possible. Direct impacts are limited to these areas. Any present rubble areas could be significantly affected by burial. Multi-dump fate (MDFATE) modeling was conducted on the 6.63 mcy of dredged material estimated to come from the proposed Port Everglades Harbor deepening project as a maximum impact scenario. This is the largest project anticipated to utilize the ODMDS. The model estimated the area and thickness of material deposition when disposed from a pre-determined disposal release zone within Alternative 1 and Alternative 2. Contours were developed to show the estimated area covered by more than five but less than ten cm and ten or greater cm dredged material thickness layers (Figure 2). The amount of seafloor expected to be covered by more than five but less than ten cm of dredged material for Alternative 1 is approximately 0.36 nmi^2 (230 acres). The amount of seafloor expected to be covered by 10 or greater cm for Alternative 1 is approximately 1.06 nmi^2 (678 acres) (Table 16). For Alternative 2, the amount of seafloor expected to be covered by more than five but less than ten cm is approximately 0.39 nmi^2 (250 acres). The amount of seafloor expected to be covered by 10 or greater cm for Alternative 2 is approximately 1.33 nmi^2 (851 acres) (Table 16). Both alternatives include a portion of the existing site in the coverage estimate.

Table 16. Estimated area of dredged material deposition.

	Total Site Size (ac)	Estimated area (ac) covered by 5 to less than 10 cm material	Estimated area (ac) covered by ≥10 cm material
Alternative 1	2,721	230 (8.5%)	678 (25%)
Alternative 2	2,449	250 (10.0%)	851 (34.7%)

The contours were overlaid on the cultural resources sidescan sonar mosaic to examine the number of targets covered by the more than five but less than ten cm of dredged material and greater than 10 cm layers for Alternative 1 (Figure 25) and Alternative 2 (Figure 26). To be as conservative as possible, we classified all non-manmade targets detected in the survey as

"hardbottom". The size of each target was calculated and the total area of potential hardbottom affected by the estimated material deposition tabulated for both alternatives (Table 17).

Table 17. Total area of potential hardbottom affected by the estimated material deposition

	Total Site Size (ac)	Targets (ac) covered by 5 to less than 10 cm of material	Targets (ac) covered by ≥10 cm of material	Targets (ac) covered by ≥ 5cm material
Alternative 1	2,721	1.33 (0.05%)	1.36 (0.05%)	2.69 (0.10%)
Alternative 2	2,449	1.41 (0.06%)	2.89 (0.12%)	4.30 (0.18%)

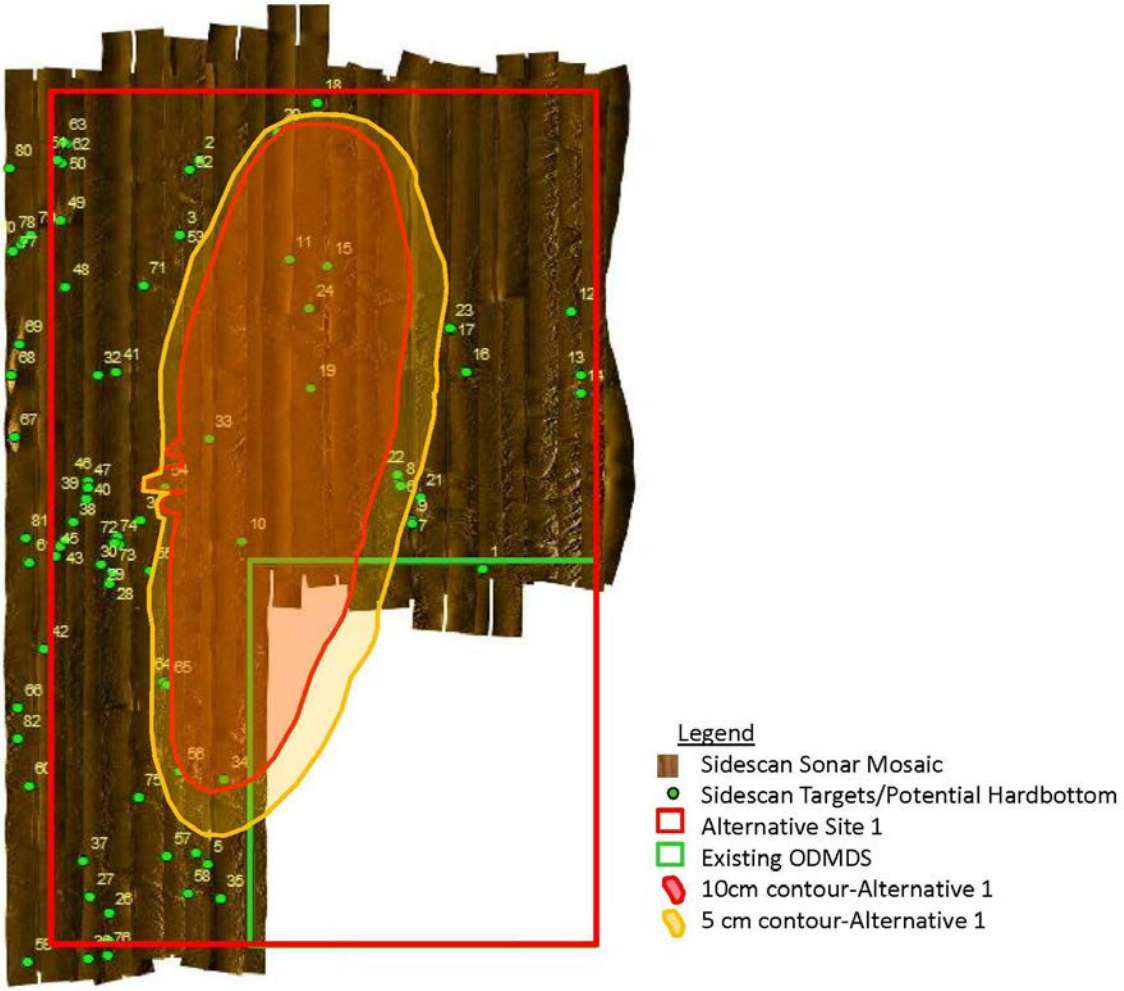


Figure 25. Overlay of predicted disposal footprint for Alternative 1 on potential hardbottom targets as identified from sidescan sonar mosaic. 10 and 5 cm contours indicate dredged material layer thickness

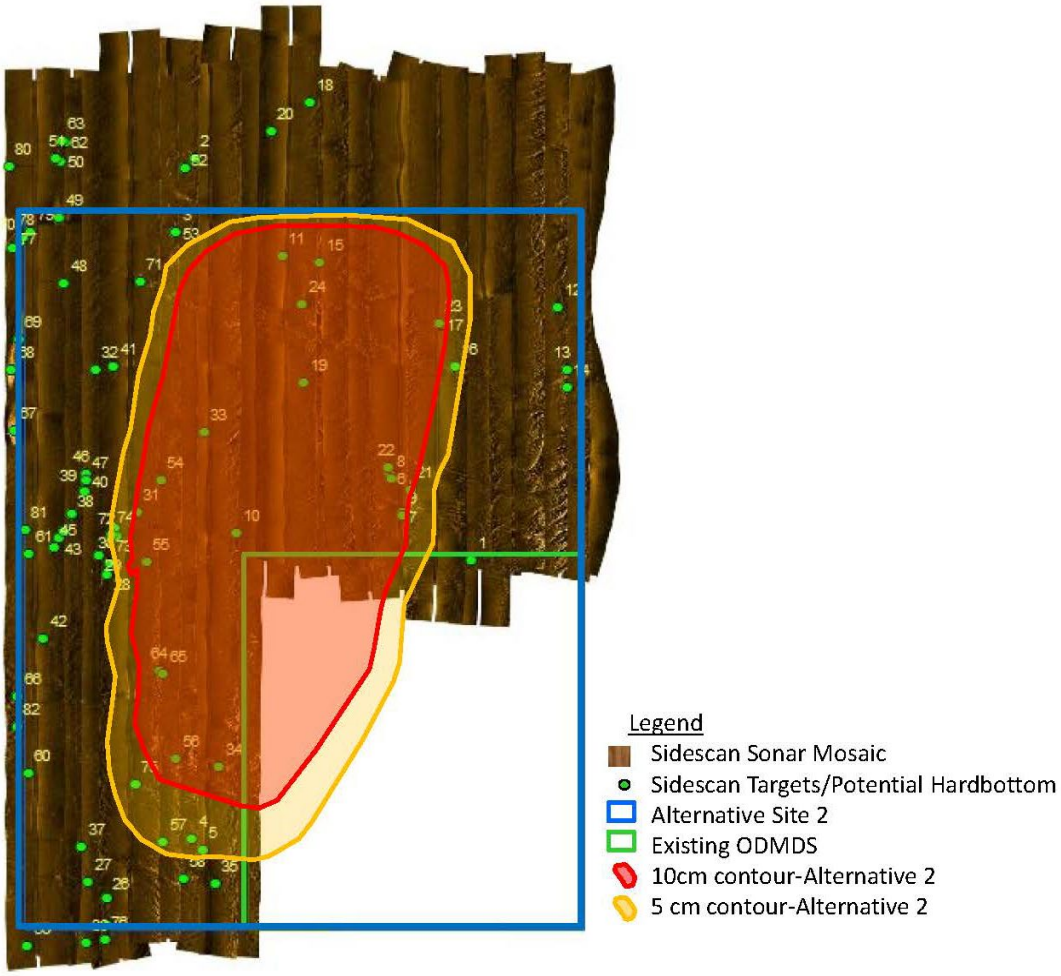


Figure 26. Overlay of predicted disposal footprint for Alternative 2 on potential hardbottom targets as identified from sidescan sonar mosaic. 10 and 5 cm contours indicate dredged material layer thickness.

Based on the photographic and side scan sonar data for estimated hardbottom as presented in Section 3.4 and above, Alternative 1 will have less impact on potential hardbottom within the project area.

4.5 FISH AND WILDLIFE RESOURCES

Breeding, spawning, and feeding activities of fish undoubtedly occurs in the proposed expansion areas; however, these activities are not believed to be confined to, or concentrated in, the proposed expansion areas. Most of the larger species are highly mobile and can avoid the area during a short duration disposal event. Thus, these populations will not be impacted by disposal events

Smaller organisms inhabiting the water column such as phyto-, icthyo- and zooplankton have limited mobility and some of these individuals may be impacted during a disposal event. However these species have a prolific capacity to reproduce and any effect to the populations

of these smaller species arising from the impacts resulting from a disposal event would be temporary and minor.

Benthic organisms inhabiting the soft bottom habitats in the proposed expansion areas include epifaunal (organisms that live on the sediment) and infaunal (organisms that live within the sediment). Disposal events will cover some portion of a proposed expansion area and may result in minor and temporary impacts to the benthic community. The degree to which these species are affected depends on the amount of material deposited and the composition (sediment structure) of this material. Model results of the amount of material deposited are discussed in Section 4.3 above and summarized in Table 16.

The benthic community is highly dynamic and capable of recovering from short term perturbations such as a disposal event. Some species are capable of burrowing back to the surface if covered by sediment while individuals of other species will re-occupy the newly created habitat. Depending on whether the sediment composition changes, species composition may also change as some benthic species have a preference for a particular range of grain sizes.

Slow-moving epifaunal invertebrates may be buried and smothered as dredged material is deposited. Recolonization of a disposal mound can begin within a few days after dumping (Germano and Rhoades 1984). Adult infaunal organisms buried under thin overburden layers (<10cm) have an upward escape response. The thicker part of the deposit is primarily recolonized through larval recruitment or immigration of organisms from adjacent, undisturbed areas. Macroinfaunal recolonization occurs in three stages: (1) small opportunistic polychaetes; (2) dense aggregations of tubiculous amphipods and tellinid bivalves; and (3) deep burrowing polychaetes, caudate holothurians, infaunal ophiuroids, or burrowing urchins (Rhoads and Germano 1986). Larval recruitment and establishment by all stages following disposal can require several years (Rhoads *et. al* 1978). However, tropical soft-bottom macrobenthic assemblages can respond quickly (three months) to the disturbance associated with the dumping of dredged material (Cruz-Motta and Collins 2004). In 2006, the EPA conducted a study of the recovery of the benthic communities at the existing Port Everglades Harbor ODMDS. Approximately nine months after disposal of 60,000 cubic yards of material at the existing ODMDS, Stage 2 and increasing numbers of Stage 3 communities recolonized the area; this largely represented a return to ambient conditions relatively soon following disposal (Germano & Associates, Inc. 2006). Germano & Associates, Inc. (2006) suggested that the native benthic communities in the ODMDS are subjected to high current velocities and are adapted to frequent physical disturbance, thus displaying rapid recolonization.

Therefore, designation of either alternative for the Port Everglades Harbor ODMDS would only have minor and temporary effects and would not have any long-term adverse effects on the

continued existence of fish and wildlife resources. Effects will be monitored consistent with the SMMP (Appendix A).

4.6 ESSENTIAL FISH HABITAT

Section 3.6 describes the existing conditions of the Essential Fish Habitat (EFH), Federally managed fisheries, and associated species such as major prey species, including affected life history stages. The following describes the individual and cumulative impacts of the proposed alternatives on EFH, Federally managed fisheries, and associated species such as major prey species, including affected life history stages.

Expanding the Port Everglades Harbor ODMDS may temporarily affect EFH and Federally managed fisheries. Impacts such as increased turbidity, and the release of sediment-bound contaminants, may have a minor and short-term impact on the water column following the discharge of solids and solutes from a barge (Gordon 1974). The latter will be minimized as all material will be evaluated for compliance with the Limiting Permissible Concentrations and be determined suitable for ocean disposal (not toxic in multiple tests) per the MPRSA. Thus dredged material is not expected to have an impact on EFH or local fauna.

Direct and indirect impacts to the water column and benthos will be mitigated through appropriate testing of the dredged material prior to disposal. The greatest potential for impact would likely occur as a result of accumulation of dredged material and associated changes in sediment characteristics that may cause impacts to benthic-dwelling organisms and the burial of rubble zones within the proposed ODMDS boundaries. However, the benthic community in the area of the proposed ODMDS expansion is adapted to frequent physical disturbance due to high current velocities in the general area.

Effects of the expanded ODMDS to Federally managed species are as follows:

- The Royal Red Shrimp – Royal red shrimp EFH includes the upper regions continental slope in 590 -2,395 ft (180-730 m) depths, over mud/sand substrate and the Florida Current/Gulf Stream as it provides a dispersal mechanism for larvae. Dredged material disposal may bury the bottom habitat and less-motile fauna and affect feeding. Disposal may temporarily increase turbidity levels. Deposition of material with higher silt content could alter the bottom type in the disposal areas. Royal red shrimp can utilize a variety of bottom types including muddy sand or sand, and any effects on royal red shrimp within the project area would vary. Depending upon the volume of dredged material placed on the habitat, local recovery may not occur or the impacts may only be minimal and temporary. Based on the EPA's 2006 monitoring of the 2005 disposal event, bottom sediments had recovered to approximately pre-project conditions within a year. Adverse impacts to the Florida Current are not expected.

- Golden Crab – EFH for golden crab includes the U.S. Continental Shelf through the Florida Straits; in addition, the Florida Current is EFH because it provides a mechanism for larval dispersal. Dredged material disposal may bury the bottom habitat and less-motile fauna and affect feeding. Disposal may temporarily increase turbidity levels. Deposition of material with higher silt content could alter the bottom type in the disposal areas. Golden crabs can utilize a variety of bottom types including substrates containing a mixture of silt-clay and foraminiferan shell, unconsolidated bottom, including ripple habitat, dunes, soft bioturbated habitat, and low relief and any effects on golden crab within the proposed ODMDS expansion area would vary. Depending upon the volume of dredged material placed on the habitat, recovery may not occur or the impacts may only be minimal and temporary. Based on the EPA's 2006 monitoring of the 2005 disposal event, bottom sediments had recovered to approximately pre-project conditions within a year.

- Snapper-Grouper Complex – Areas which meet the criteria for EFH-HAPC in the vicinity of the proposed ODMDS expansion area include live/hardbottom, artificial reefs and medium-to-high profile offshore outcroppings on and around the shelf break zone from shore to at least 600 ft (183 m) [but to at least 2,000 ft (610 m) for wreckfish]. EFH also includes the water column above the adult habitat and the additional pelagic environment, including *Sargassum* and the Florida Current/Gulf Stream as it provides a dispersal mechanism. Surveys at the ODMDS expansion areas indicate that little potential exists for these habitats, with the exception of the limited rubble areas, to exist in the proposed expansion areas. Disposal could increase turbidity levels,. Adverse impacts to the water column, Florida Current, and/or *Sargassum* are not expected.

- Highly Migratory Species - EFH in the vicinity of the proposed ODMDS expansion for highly migratory species is limited to the water column, the Florida Current/Gulf Stream in particular, and *Sargassum*. Highly migratory species are very motile and would be unlikely to be buried by dredged material disposal. Disposal may temporarily increase turbidity levels, potentially altering behavior patterns and feeding. Adverse impacts to the water column, Florida Current/Gulf Stream, and/or *Sargassum* are not expected.

- Coral, Coral Reefs, and Live/Hardbottom Habitat - EFH for ahermatypic stony corals, which are not light restricted, extends to outer shelf depths. EFH for black corals includes rough, hard, exposed, and stable substrate that is located offshore in high salinity waters in depths exceeding 18 meters. EFH for octocorals includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinities and light penetration. Only small areas of hardbottom were observed in the ODMDS expansion areas, primarily in the northernmost suspected hardbottom area, and cobble-sized carbonate rocks and several pieces of dead rose coral were only found

in one trawl sample. No live hard corals were observed in the ODMDS expansion areas. Although a small amount of hardbottom may become buried by dredged material, live corals are unlikely to be affected. Some of the dredged material will contain rock that may increase the amount of hardbottom in the ODMDS expansion areas. MDFATE modeling has suggested that most (1-cm contour) of the dredged material would remain within the ODMDS expansion areas. Depending on prevailing current patterns at the time of disposal, there is a slight chance that hardbottom areas outside the ODMDS expansion areas could be temporarily affected by turbidity from disposal.

4.7 COASTAL BARRIER RESOURCES

The proposed ODMDS expansion will occur in offshore waters approximately 4 nmi from the mainland and will have no impact on coastal barrier resources.

4.8 WATER QUALITY

Water quality impacts are expected to be temporary and minor.

During periods of dredged material disposal there will be temporary, localized increases in water column turbidity and concentrations of dissolved and particulate constituents. Chemically reduced inorganic compounds associated with particles sinking through the upper water column may be oxidized, causing a transient increase in the chemical oxygen demand. Oxidation of labile organic material may consequently reduce dissolved oxygen concentrations in the water column temporarily. However, because the water column is well oxygenated, offsite impacts are not expected and any onsite impacts should be of short duration. Plumes of suspended sediments will result in increases in turbidity levels, suspended particulate concentrations, and decreased light transmittance. These effects will be dissipated by natural dispersion, mixing, and eventual settling of particles. Based on dispersion modeling conducted for the Port Everglades Harbor ODMDS, any temporary perturbations in water quality resulting from disposal of dredged material would be reduced to ambient or undetectable levels within a short distance of the release point (USEPA 2004).

Only dredged material evaluated and found acceptable in accordance with the joint USEPA/USACE guidance (USEPA/USACE, 1991 and USEPA/USACE, 2008) can be disposed in the ocean. The testing evaluates the potential for unacceptable effects such as toxicity and bioaccumulation of contaminants. These required tests reduce the possibility of unacceptable water column and benthic effects caused by dredged material contaminants. Additionally, Federal marine water quality criteria (CMC) will not be exceeded at any time outside the ODMDS boundaries or after 4 hours of disposal within the ODMDS. All dredged material must be evaluated and shown that no undesirable effects will occur due to chronic toxicity (40 CFR 227.6).

High-level radioactive wastes are prohibited from ocean disposal (40 CFR 227.5) and low-level radioactive waste disposal requires congressional approval for ocean disposal (33 U.S.C. 1414). ODMDS use will be limited to dredged material disposal.

4.9 AIR QUALITY

Selection of either expansion site will result in short-term impacts from increased dredge, barge, or scow traffic associated with transporting disposal material. However, no significant impacts to regional air quality are expected as a result of the transport and disposal of dredged materials to any of the proposed alternative sites. Air quality impacts at dredging sites associated with the dredge plant during dredging operations were not assessed in this EA as they will be assessed on a project-specific basis. Emissions from the tug vessels and hopper dredges include particulate matter (PM), nitrogen oxides (NOx), sulfur dioxide (SO2), carbon monoxide (CO), and volatile organic carbons (VOCs; hydrocarbons). Estimated emission rates for the existing ODMDS were presented in Section 4.15 of the FEIS (USEPA, 2004) and are not expected to differ for the expanded ODMDS. Emissions associated with the dredging of material in Port Everglades are not a part of this action. Thus, the impacts will be minor and temporary.

4.10 NOISE

The noise at either expansion site would increase during disposal of dredged material however the impacts will be minor and temporary. Surface noise for a tugboat is expected to be 82 dB at 50 ft. (Port of Oakland and the USACE San Francisco District 1998). Noise from the tugboats hauling barges or from hopper dredges to and from the ocean disposal sites would be too far from shore to have any meaningful noise impact on noise-sensitive land uses.

Subsurface noise would also increase during disposal and monitoring activities in the vicinity of the proposed expansion sites. This elevated noise level will be temporary and would not be expected to result in any significant adverse impacts to wildlife or aquatic organisms in the areas. Additional discussion of noise issues at the alternative sites is found in the 2004 EIS for the ODMDS designation (USEPA 2004). Normal shipping traffic operations far exceed the minor increases expected during disposal operations at the ODMDS.

4.11 RECREATION RESOURCES

The coastal waters of Broward County are used for a variety of recreational activities including swimming, water skiing, sailing, boating, surfing, skin diving, and SCUBA diving. Few of these activities occur in, and none is restricted to, the proposed ODMDSs because of depth of water and distance offshore are not where these activities typically occur. Thus, the selection of either alternative would not have any impacts to recreation.

4.12 NAVIGATION AND PUBLIC SAFETY

Selection of either proposed site is unlikely to impact navigation or public safety. The expansion areas lie inshore of the two primary offshore north-south traffic patterns and in an area of relatively low vessel activity (see Section 3.13). Both alternatives are not located in any restricted passage areas, precautionary zones, or anchorages. Adequate public notice to mariners will be issued by the U.S. Coast Guard in advance of such disposal events. Furthermore, because the ultimate purpose of dredging operations is to provide adequate water depths and access to vessel traffic for channels and berths within Port Everglades Harbor, the proposed action could be considered a beneficial impact.

4.13 HISTORIC AND CULTURAL RESOURCES

A submerged cultural resources survey, incorporating the use of a magnetometer and sidescan sonar, was conducted in November 2011, within the Port Everglades ODMDS project alternative areas pursuant to the Florida Division of Historic Resources Performance Standards for Submerged Remote Sensing Surveys (Florida DHR, Version 2.1). The resulting report, *Submerged Cultural Resources Remote Sensing Survey of the Port Everglades Channel and Ocean Dredge Material Disposal Site (ODMDS), Broward County, Florida* (PCI, 2011) recommended one magnetic and two sidescan anomalies that possessed characteristics of potentially significant historic resources (shipwrecks) for avoidance or further investigation. USACE conducted a refinement investigation of the three, potentially significant anomalies in July, 2012, to determine if they represented significant historic properties. The anomalies were identified as debris and a modern, recent shipwreck. Therefore, there are no effects to historic properties.

According to the 2004 EIS for the ODMDS designation, there are no natural or cultural features of historical importance in or near the existing ODMDS. No portion of the proposed project exists within or adjacent to any Native American properties.

4.14 ENERGY REQUIREMENTS AND CONSERVATION

The energy requirements for this activity are limited to fuel for transportation of the dredged material to the disposal site. As the proposed sites are essentially in the same location, the selection of either alternative would require the same amount of energy.

4.15 NATURAL OR DEPLETABLE RESOURCES

In this case, the depletable resources would be the fuel for the transportation of the dredged material to the disposal site equipment and human energy required for the project. As the proposed sites are essentially in the same location, the selection of either alternative would require the same amount of natural or depletable resources.

4.16 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7)."

4.16.1 Past Projects

4.16.1.1 Previous Interim Designated ODMDSs

Dredged material disposal occurred at an interim designated ODMDS nearer to shore. The interim site for Port Everglades Harbor was discontinued after a 1984 EPA survey indicated that some damage to nearby inshore, hard bottom areas may have occurred due to the movement of fine material associated with disposed dredged material. This resulted in the designation of the existing ODMDS in 2004 further offshore.

4.16.2 Current Projects

4.16.2.1 Maintenance of Port Everglades Federal Navigation Project

This project will continue to require periodic dredging to maintain adequate depths for access and safe navigation. Ocean dredged material disposal will continue to be required for this project. The need for ocean disposal is based primarily on the lack of economically, logistically, and environmentally feasible alternatives for the disposal of the projected quantities of dredged material deemed unsuitable for beach nourishment or other beneficial uses (USACE 2005).

4.16.2.2 Wastewater Outfalls

No wastewater outfalls are active in the project vicinity.

4.16.3 Reasonably Foreseeable Future Projects

4.16.3.1 Offshore Wind and Hydrokinetic Facilities

The BOEM issues leases and grants for both offshore wind and hydrokinetic projects and permits the construction and operation of offshore wind farms; however, the Federal Energy Regulatory Commission (FERC) permits the development of hydrokinetic facilities. BOEM has prepared an EA for the proposed lease of OCS blocks 7003, 7053, and 7054 (77 FR 24735). However, those areas were determined to be outside of the ODMDS expansion area. Florida Atlantic University (FAU) is requesting leases for additional OCS blocks (blocks 7040 and 7001) that could overlap with the ODMDS expansion area (Figure 27).

FAU has applied to BOEM for a lease to deploy an experimental demonstration device about 17 miles off the coast of Fort Lauderdale. The Southeast National Marine Renewable Energy Center, operated by FAU, is exploring the potential for harnessing the Florida Current. A single-anchor mooring and buoy would be used to test equipment that could generate electricity from the Florida Current. Devices to be deployed would be limited to 100 kilowatts of capacity and 23-foot-diameter rotors.

According to BOEM (2013) the primary impact-producing activity associated with hydrokinetic activities is vessel traffic. Additional vessel strikes to marine mammals and sea turtles and conflicts with navigation are expected to be insignificant. Impacts from vessel discharges and potential spills are not expected to cause a significant impact to water quality. The impacts of the proposed action to the benthic resources are expected to be minimal to non-existent and limited to periods during the actual deployment of the mooring system, and periodic impacts to the seafloor from contact of the shock chain with the seafloor (e.g. chain sweep). FAU intends to deploy three single-anchor moorings attached to a mooring and telemetry buoy (MTB) for use in testing various Ocean Current Technologies in the Florida current. The three MTBs will be moved to various sites within the lease over the five-year lease period resulting in up to 13 separate deployments. The BOEM notes in the Revised EA that up to 1.638 square kilometers (0.632 square miles) of habitat will be affected over the 5-year lease period which is a negligible percentage of the total benthic habitat on the Miami Terrace. (BOEM 2013)

4.16.3.2 Navigation Improvements to the Federal Project at Port Everglades Harbor

In 2015 (USACE 2015), a feasibility study and FEIS was completed for navigation improvements to the Federal Navigation Project at Port Everglades Harbor, including channel and basin deepening and widening, that may be required to increase safety for the existing and future fleet and more efficiently handle current and future shipping demands. The Preferred Alternative is for an Outer Entrance Channel 55 ft deep (plus one ft of required overdredge and one foot of allowable overdredge for a total dredge depth of -57 ft MLLW) 0.25 west of the sea buoy to the jetties then transitioning to an Inner Entrance Channel at 48 ft deep (plus one foot required overdredge and one foot allowable overdredge for a total dredge depth of -50 ft MLLW). The channel depth of 48 ft (-50 ft total dredge depth) continues into the Main Turning Basin, Widener, Southport Access Channel, and deepening approximately 1,500 linear ft of the Turning Notch from 42 ft to 48 ft (plus one foot of required overdredge and one foot of allowable overdedge for a total dredge depth of -50 ft MLLW) after the expansion by Broward County discussed in Section 1.3.

The Preferred Alternative is expected to generate approximately 5.47 million cubic yards of dredged material. A small portion of the material will be utilized for construction of mitigation measures with the remaining portion of the material being placed in the ODMDS (Jerry W. Scarborough, USACE, personal communication, letter dated Apr. 27, 2010). Impacts from ocean

disposal would be similar to that as described in Section 4.0; however, the total seafloor area to be impacted would be a function of the total volume of material for disposal.

Subsequent to the release of the USACE 2015 FEIS, the USACE is reinitiating NEPA for navigation improvements to the Federal Navigation Project at Port Everglades Harbor, due to new information resulting from dredging activities at Miami Harbor. It is the EPA's understanding that the Preferred Alternative identified in the 2015 FEIS will remain the same.

4.16.3.3 Port Everglades Master Plan (Turning Notch Improvements)

The Turning Notch has been deepened and expanded by Port Everglades to provide a depth of -42 feet to accommodate larger ships and create additional berth space for the current class cargo ships calling at Port Everglades. This project was included in the Port's five-year Capital Improvement Program from the 2006 Port Everglades Master/Vision Plan.

4.16.3.4 Broward County Storm Damage Reduction/Shore Protection Project

The Federal storm damage reduction/shore protection project allows for the restoration of beaches to a general width of 100 ft with a berm elevation of 10 ft above mean low water, and periodic nourishment thereafter. Dredged material from Port Everglades harbor that is beach quality may be used for these projects. The storm damage reduction/shore protection project is a nearshore activity, and would not likely result in impacts to offshore environments. Small amounts of rock screened from the sand may be placed in the ODMDS.

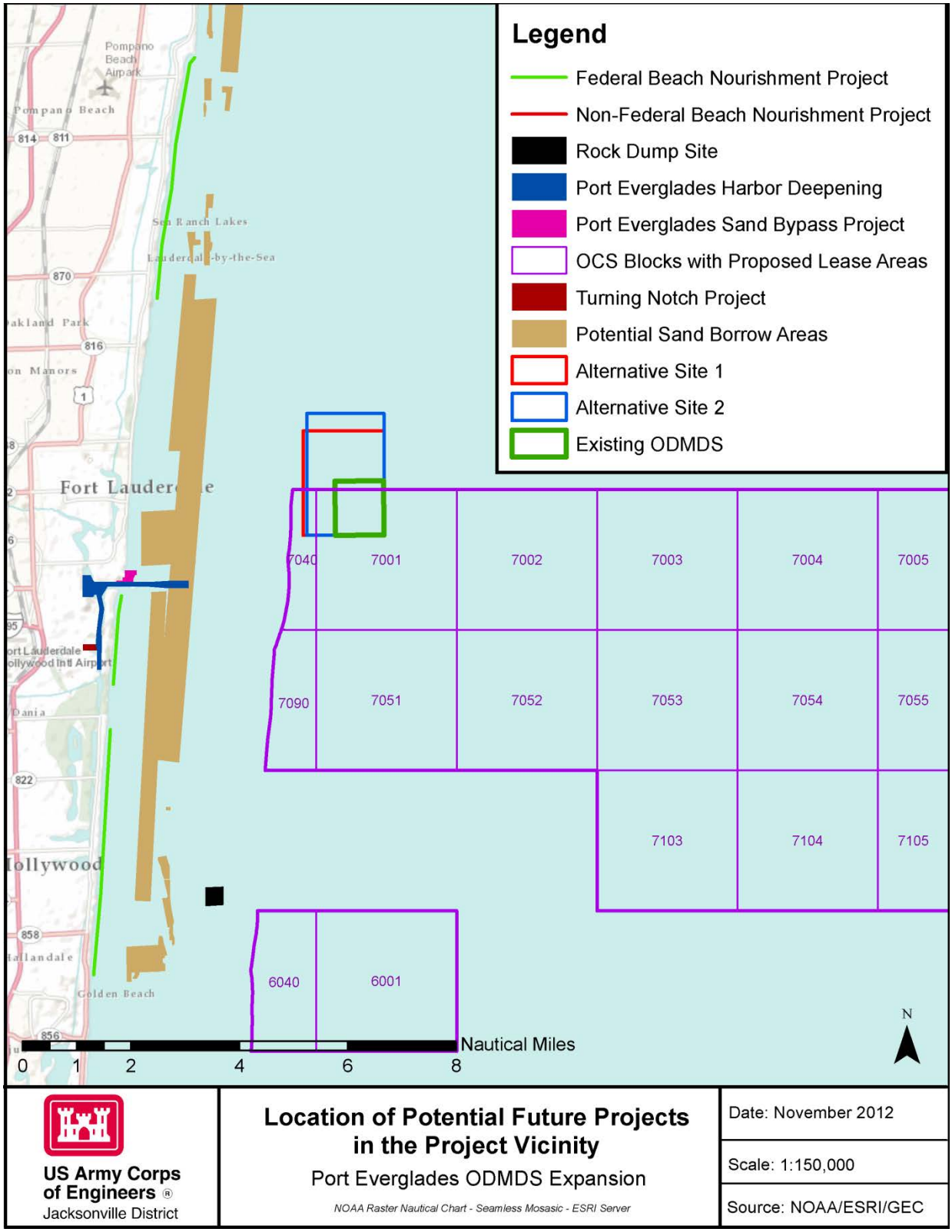


Figure 27. Reasonably Foreseeable Future Projects

4.16.3.5 Port Everglades Entrance Sand Bypass Project

The Port Everglades Sand Bypass Project proposes to create and modify inlet infrastructure on the north side of the inlet sufficient to facilitate the economical collection of littoral materials that will be available for future mechanical bypassing to the beaches south of the inlet. The project will include the creation of a sand trap, modification to and improvement of the existing north jetty, removal of a portion of the rubble spoil shoal north of the inlet, construction of a rock rubble barrier at the western extent of the remaining rubble shoal, and construction of a small interior groin on the western end of the north jetty notch. Disposal events will be managed per the attached SMMP (Appendix A).

A primary component of the sand bypass project will be a 7.1 acre (2.87 hectare) sand trap excavated to an elevation of -49 ft (-14.9 meters), NAVD88. The sand trap will be located on the north side of the Port Everglades Entrance channel immediately adjacent to the north jetty. Creation of the sand trap will include the excavation of approximately 325,000 cubic yards (248,500 cubic meters) of sand, rubble, and rock. Of this, it is expected that up to 45,000 cubic yards (34,400 cubic meters) of the material is a mixture of beach compatible sand and rock rubble. The balance of the material is limestone (carbonate) rock of varying characteristics and granite boulders and granite stone debris from the old jetty. An attempt will be made to recover and re-use some if not all of the collected boulders along sections of the planned jetty improvements. Otherwise, it is expected that these materials will be disposed of in the ODMDS.

This project would also include removal of approximately 125,000 cy (95,600 cubic meters) of rubble from the rubble spoil shoal located approximately 800 ft (243 m) north of the north jetty down to natural hardbottom or a maximum depth of about -20 ft (-6.1 m) NAVD88. The material will be loaded onto scows and towed offshore to the ODMDS for disposal. Impacts from ocean disposal would be similar to that as described in Section 3; however, the total seafloor area to be impacted would be a function of the total volume of material for disposal.

4.16.4 Conclusions

The designation of an expanded ODMDS is not expected to introduce new human activities in the project vicinity. Commercial shipping and recreational and commercial fishing are expected to continue. Temporary increased vessel traffic associated transportation of dredge material may lead to an increased risk of collisions with vessels transiting to and from the ODMDS expansion area. The increased vessel traffic associated with these projects may also affect water quality at a greater frequency than existing circumstances. These effects are expected to be temporary.

The proposed expansion areas are not expected to contribute to any cumulative impacts of the past, present and reasonably foreseeable future actions described above. Except for possible impacts to a limited amount of hardbottom, the impacts of the proposed expansion areas and expected to be temporary and minor to threatened and endangered species, water quality, fish and wildlife resources and essential fish habitat.

4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.17.1 Irreversible

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource.

Designation of either proposed expansion area will not result in the irreversible ability to use and/or enjoy any resources.

4.17.2 Irretrievable

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction.

Designation of either proposed expansion area will not result in the irretrievable commitment of resources. Other than creating a potential for altering the structure of benthic communities by possibly changing the characteristics of the substrate, no irretrievable loss of resources is expected.

4.18 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Unavoidable adverse environmental effects are not expected to differ from the original site designation for either alternative. See Section 4.3.6 of the 2004 FEIS (USEPA, 2004).

4.19 LOCAL SHORT-TERM USES AND MAINTENANCE/ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Use of the proposed ODMDS in the manner described should have no effect on long-term productivity. Effects are not expected to differ from that presented in the original site designation FEIS. See Section 4.6 of the 2004 FEIS (USEPA 2004).

4.20 INDIRECT EFFECTS

The proposed action may facilitate area dredging projects by providing a disposal option and thereby increase the associated environmental impacts of dredging (water quality degradation, wetland losses). The proposed action would benefit the shipping industry and economy.

Potential, but unlikely, indirect effects to the coral reefs include transport of disposal plumes shoreward towards the nearshore reefs located in less than 30 meters (100 ft) of water. The outermost reefs are located approximately 2.5 nmi (4,630 meters) west of the center [1.8 nmi (3,333 meters) west of western edge] of the proposed ODMDS expansion area. By expanding the sites with either alternative, the western edge of the expanded ODMDS will be approximately 0.5 nmi (926 meters) closer to the third reef line than it is with the existing ODMDS boundaries. The potential for turbidity plumes to reach these areas was evaluated. Extreme (99 percentile) westerly currents were modeled and silt-clay concentrations were predicted to diminish rapidly to less than 1 mg/l within 1,500 meters of the disposal location. Sand concentrations were predicted to diminish to less 1 mg/l within 2,400 meters (CERC 1998). As part of the monitoring efforts associated with the Miami ODMDS, located a similar distance offshore and with a similar relationship to the Florida Current, currents were monitored for exceedance of a 12 cm/sec (1 hour average) shoreward threshold. The 12cm/sec threshold was determined as the velocity necessary to transport plumes to the nearshore reefs (Proni *et al.* 1998). Evaluation of more than a year's worth of records determined that the 12 cm/sec threshold was only exceeded 2.5 percent of the time (Proni *et al.* 1998). Most of these exceedances were only short duration (<2 hrs) and only 11 exceeded five hours. Therefore, the potential for indirect effects on the nearshore reefs is minimal.

4.21 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The proposed action is expected to be consistent with Federal, State and local plans and objectives.

The proposed project was proposed by the USEPA and USACE Jacksonville District and is compatible with federal objectives. The project is being reviewed by the state of Florida for consistency with the state's coastal zone management plan. Local government (Broward County) is the originator of the plan to expand Port Everglades.

4.22 CONFLICTS AND CONTROVERSY

No known conflicts or controversy have been identified from the public or government agencies related to the expansion of the Port Everglades ODMDS.

4.23 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

The EIS for the designation of the existing ODMDS (USEPA, 2004) did not identify any uncertain, unique or unknown risks associated with designation of the existing ODMDS. No new risks have been identified that are associated with either proposed expansion sites.

4.24 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

Designation of an expanded ODMDS would create a larger ODMDS in the Atlantic Ocean to be used for the disposal of dredged material associated with port expansion activities and future maintenance dredged material from the Port Everglades Harbor Federal Navigation Project and other local projects.

4.25 ENVIRONMENTAL COMMITMENTS

The USACE and the EPA commit to the following:

- Disposal of dredge material will meet the Ocean Dumping Criteria established by MPRSA and the standards set by USEPA and USACE in guidance; and
- Environmental monitoring of the expanded ODMDS as set out in the SMMP for the expanded site (dependent upon available funding).

Please refer to the SMMP for additional information.

4.26 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.26.1 National Environmental Policy Act of 1969

Environmental information on the project has been compiled and this EA has been prepared. The project is in compliance with NEPA.

4.26.2 Endangered Species Act of 1973

Currently, NMFS is finalizing a Biological Opinion for the South Atlantic District that incorporates all aspects of the transport and disposal of dredged material. As a result of the ongoing consultation, this project will be fully coordinated under the Endangered Species Act. Any items specific to transport and disposal of dredged material provided in the Biological Opinion will be incorporated into the final Site Management and Monitoring Plan.

4.26.3 Fish and Wildlife Coordination Act of 1958

The Act, and its amendments, was established to assure that fish and wildlife resources have equal consideration with other values when planning water resources development projects. Coordination is not required because this project does not fall under the types of projects requiring coordination under the Act.

4.26.4 National Historic Preservation Act of 1966 (*inter alia*)

Consultation with the Florida State Historic Preservation Officer (SHPO) was initiated in August, 2011, and with additional information in a letter dated October 15, 2012, and is ongoing in accordance with the National Historic Preservation Act of 1966, as amended, and as part of the requirements and consultation processes contained within the NHPA implementing regulations of 36 CFR 800. The Florida State Historic Resources Officer responded to the determination made by the Corps for EPA with a concurrence dated February 4, 2013. This project is also in compliance, through ongoing consultation, with the Archeological Resources Protection Act (96-95), the Abandoned Shipwreck Act of 1987 (PL 100-298; 43 U.S.C. 2101-2106); American Indian Religious Freedom Act (PL 95-341), Executive Orders (E.O) 11593, 13007, & 13175 and the Presidential Memo of 1994 on Government to Government Relations. Consultation is ongoing with the SHPO and appropriate federally recognized tribes.

4.26.5 Clean Water Act of 1972

As the proposed expansion areas are located outside of the jurisdictional limits of this Act, a Section 404(b) evaluation is not applicable to this project and was not prepared.

4.26.6 Clean Air Act of 1972

Designating an expanded ODMDS boundary does not cause any impacts to air quality. Air emissions associated with the projects utilizing the ODMDS are evaluated under the respective NEPA document for that project. No air quality permits would be required for this project.

4.26.7 Coastal Zone Management Act of 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C will be included in the final EA. The State consistency review was performed during the coordination of the draft EA and the State's final consistency determination is dated November 6, 2013. However, due to the intervening time consultation is being revisited.

4.26.8 Farmland Protection Policy Act of 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

4.26.9 Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

4.26.10 Marine Mammal Protection Act of 1972

Incorporation of the safe guards used to protect threatened and endangered species during disposal operations would protect any marine mammals in the area and not result in a "take;"

therefore, this the designation is in compliance with the Act. As previously stated in Section 3.5.2, marine mammals are expected to be rare in the vicinity of the ODMDS with the exception of the bottlenose dolphin. USACE and USEPA do not anticipate the take of any marine mammal during any activities associated with the ODMDS designation or utilization. A trained and government-certified sea turtle and marine mammal observer will be stationed on hopper dredges during disposal operations. Appropriate actions will be taken to avoid marine mammal species during disposal operations. If a marine mammal is noted to be in the vicinity of disposal operations, the contractor will be advised to avoid interactions with the animal to the maximum extent practicable, while maintaining safe vessel operations.

4.26.11 Estuary Protection Act of 1968

No designated estuary would be affected by project activities. This act is not applicable.

4.26.12 Fishery Conservation and Management Act of 1976

The Draft EA is being coordinated with the NOAA Fisheries. This project is in compliance with the Act.

4.26.13 Submerged Lands Act of 1953

The project would not occur on submerged lands of the State of Florida. The project has been coordinated with the State and is in compliance with the act.

4.26.14 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

4.26.15 Rivers and Harbors Act of 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action has been subject to the public notice, public hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

4.26.16 Anadromous Fish Conservation Act

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the Act.

4.26.17 Migratory Bird Treaty Act and Migratory Bird Conservation Act

No migratory birds would be affected by project activities. The project is in compliance with these Acts.

4.26.18 Marine Protection, Research and Sanctuaries Act

The MPRSA regulates the transportation and subsequent disposal of materials, including dredged materials, into ocean waters. The proposed ODMDS expansion is being designated pursuant to Section 102 of the MPRSA. The five general (40 CFR 228.5) and eleven specific (40 CFR 228.6) criteria for the selection of sites have been discussed and included in Section 2.6.

4.26.19 Magnuson-Stevens Fishery Conservation and Management Act

Consultation was initiated with NOAA Fisheries by USEPA with the Essential Fish Habitat Assessment is underway. This project will be fully coordinated under the Magnuson-Stevens Fishery Conservation and Management Act and therefore, in full compliance with the Act.

4.26.20 E.O. 11990, Protection of Wetlands

No wetlands would be affected by project activities. This project is in compliance with the goals of this Executive Order.

4.26.21 E.O. 11988, Flood Plain Management

This project does not occur in any floodplain; therefore, this Executive Order does not apply to project activities.

4.26.22 E.O. 12898, Environmental Justice

The proposed activity would not result in adverse human health or environmental effects or exclude persons from participating in, deny persons the benefits of, or subject persons to discrimination because of their race, color, or natural origin. Further, the proposed activity would not impact "subsistence consumption of fish and wildlife." The proposed project complies with this Executive Order.

4.26.23 E.O. 13089, Coral Reef Protection

Executive Order 13089 (E.O. 13089) on Coral Reef Protection, signed by the President on June 11,1998, recognizes the significant ecological, social, and economic values provided by the Nation's coral reefs and the critical need to ensure that Federal agencies are implementing their authorities to protect these valuable ecosystems. E.O. 13089 directs Federal agencies, including USEPA and the USACE whose actions may affect U.S. coral reef ecosystems, to take the following steps:

1. Identify their actions that may affect U.S. coral reef ecosystems;

2. Utilize their programs and authorities to protect and enhance the conditions of such ecosystems; and

3. To the extent permitted by law, ensure that any actions they authorize, fund, or carry out will not degrade the conditions of such ecosystems.

It is the policy of USEPA and the USACE to apply their authorities under the MPRSA to avoid adverse impacts on coral reefs. Protection of coral reefs have been carefully addressed through the application the site designation criteria which require consideration of the potential site's location in relation to breeding, spawning, nursery, feeding, and passage areas of living marine resources and amenity areas (40 C.F.R. 228.6[a][2] and [3]), interference with recreation and areas of special scientific importance (40 C.F. R. 228.6[a][8]), and existence of any significant natural or cultural features at or in close proximity to the site (40 C.F.R. 228.6[a][11]) (see Section 2.6, Table 3). Based on application of these criteria and the analysis in Sections 3.5.2.2, the proposed expansion sites should not have adverse effects on coral reefs.

4.26.24 E.O. 13112, Invasive Species

The proposed action will not positively or negatively affect the status of invasive species.

5 PUBLIC INVOLVEMENT

5.1 SCOPING AND DRAFT EA

A scoping letter dated March 11, 2011, was issued for this action and a scoping meeting was held on March 31, 2011. The Draft EA was originally made available to the public by notice of availability dated August 28, 2013. This EA is being released due to the significant intervening time between the original release and the current need to expand the site.

5.2 AGENCY COORDINATION

A Coastal Zone Consistency (CZC) Determination was requested for concurrence from Florida Department of Environmental Protection to ensure that the proposed federal project is consistent with Florida's Coastal Zone Program. Concurrence from the State was received on November 6, 2013. Concurrence from SHPO was dated February 4, 2013. These consultations are being revisited and will be part of the final EA.

EFH Coordination on EFH is ongoing and will be completed before finalization. All coordinations will also be revisited during this process to review for new information that may be relevant to this expansion.

5.3 COMMENTS RECEIVED AND RESPONSE

Comments received in response to the scoping meeting and any other agency coordination letters will be included in Appendix B and a summary of the comments and the response will be included in the Final EA in Appendix C.

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APPENDIX A.

DRAFT SITE MANAGEMENT AND MONITORING PLAN

DRAFT PORT EVERGLADES HARBOR

OCEAN DREDGED MATERIAL DISPOSAL SITE

SITE MANAGEMENT AND MONITORING PLAN

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1.0 INTRODUCTION

It is the responsibility of the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) under the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 to manage and monitor each of the Ocean Dredged Material Disposal Sites (ODMDSs) designated by the EPA pursuant to Section 102 of MPRSA. Section 102(c)(3) of the MPRSA requires development of a Site Management and Monitoring Plan (SMMP) for each ODMDS and review and revision of the SMMP not less frequently than every 10 years. The 1996 document, *Guidance Document for Development of Site Management Plans for Ocean Dredged Material Disposal Sites* (EPA/USACE, 1996) and the EPA Region 4 and USACE South Atlantic Division Memorandum of Understanding (EPA/USACE, 2017) have been used as guidance in developing this SMMP.

A SMMP was originally developed as part of the designation process and was published in November 2004 as part of, *Final EIS for Designation of the Palm Beach Harbor Ocean Dredged Material Disposal Site and the Port Everglades Harbor Ocean Dredged Material Disposal Site,* (EPA, 2004), with SMMP revisions in May 2009. The current revision to the Port Everglades Harbor ODMDS SMMP incorporates the expanded boundaries of the ODMDS. The SMMP provisions shall be requirements for all dredged material disposal activities at the site. All MPRSA Section 103 ocean disposal permits or contract specifications shall be conditioned as necessary to assure consistency with the SMMP.

1.1 SITE MANAGEMENT AND MONITORING PLAN TEAM

An interagency SMMP team was established to assist the EPA and USACE in developing the 2004 Port Everglades ODMDS SMMP. The team consisted of the following agencies and their respective representatives:

- Jacksonville District USACE
- EPA Region 4
- Port of Port Everglades
- State of Florida (Coastal Zone Management Office)
- National Oceanographic and Atmospheric Administration (NOAA)
- U.S. Coast Guard, Station Fort Lauderdale

These agencies will continue to be consulted in revisions to the Port Everglades Harbor ODMDS SMMP and will be asked to participate where appropriate. The team will assist the EPA and USACE on deciding on appropriate disposal practices, appropriate monitoring techniques, the level of monitoring, the significance of results and potential management options.

Specific responsibilities of the EPA and the Jacksonville District Corps of Engineers respectively are as follows:

> The EPA is responsible for designating/de-designating, management of MPRSA Section 102 Ocean Dredged Material Disposal Sites, for evaluating environmental effects of disposal of dredged material at these sites, and for reviewing and concurring, concurring with conditions, or not concurring on dredged material suitability determinations.
>
> The USACE is responsible for evaluating dredged material suitability, issuing MPRSA Section 103 permits, regulating site use and developing and implementing disposal monitoring programs.

2.0 SITE MANAGEMENT

Section 228.3 of the Ocean Dumping Regulations (40 CFR 220-229) states: "Management of a site consists of regulating times, rates, and methods of disposal and quantities and types of materials disposed of; developing and maintaining effective ambient monitoring programs for the site; conducting disposal site evaluation studies; and recommending modifications in site use and/or designation." This plan may be modified if it is determined that such changers are warranted as a result of information obtained during the monitoring process.

2.1 DISPOSAL SITE CHARACTERISTICS

The regulatory designation language for the expanded Port Everglades Harbor ODMDS can be found in 40 CFR Section 228.15(h)(22). The western edge of the expanded Port Everglades Harbor ODMDS (figure 1) is located 3.3 nautical miles (nmi) offshore and is 2.25 nmi by 1.43 nmi in size (3.21 nmi^2). As of 2013, it had a depth range of -179 to -232 meters (-587 to -761 feet), with an average depth of 207 meters (-678 feet). The site is centered at approximately 26°07.625'N latitude and 80°01.789'W longitude (NAD 83) or state plane coordinates 653067 ft N and 974489 ft E (NAD83). The site coordinates are as follows:

Table 18. Port Everglades ODMDS Corner Coordinates

Vertices	Geographic NAD 83		State Plane (Florida East 0901 U.S. Ft) NAD 83	
	Latitude (North)	Longitude (West)	Easting	Northing

NE	26°08.750'N	80°01.000'W	978,753 E	659,915 N
NW	26°08.750'N	80°02.578'W	970,124 E	659,851 N
SW	26°06.500'N	80°02.578'W	970,225 E	646,220 N
SE	26°06.500'N	80°01.000'W	978,856 E	646,283 N

Physical and biological conditions at the existing and expanded ODMDS are described in, *Final Environmental Impact Statement for Designation of the Palm Beach Harbor Ocean Dredged Material Disposal Site and the Port Everglades Harbor Ocean Dredged Material Disposal Site,* (EPA 2004) and the *Environmental Assessment on Expansion of the Port Everglades Ocean Dredged Material Disposal Sites (ODMDS) Broward County, Florida* (EPA 2019).

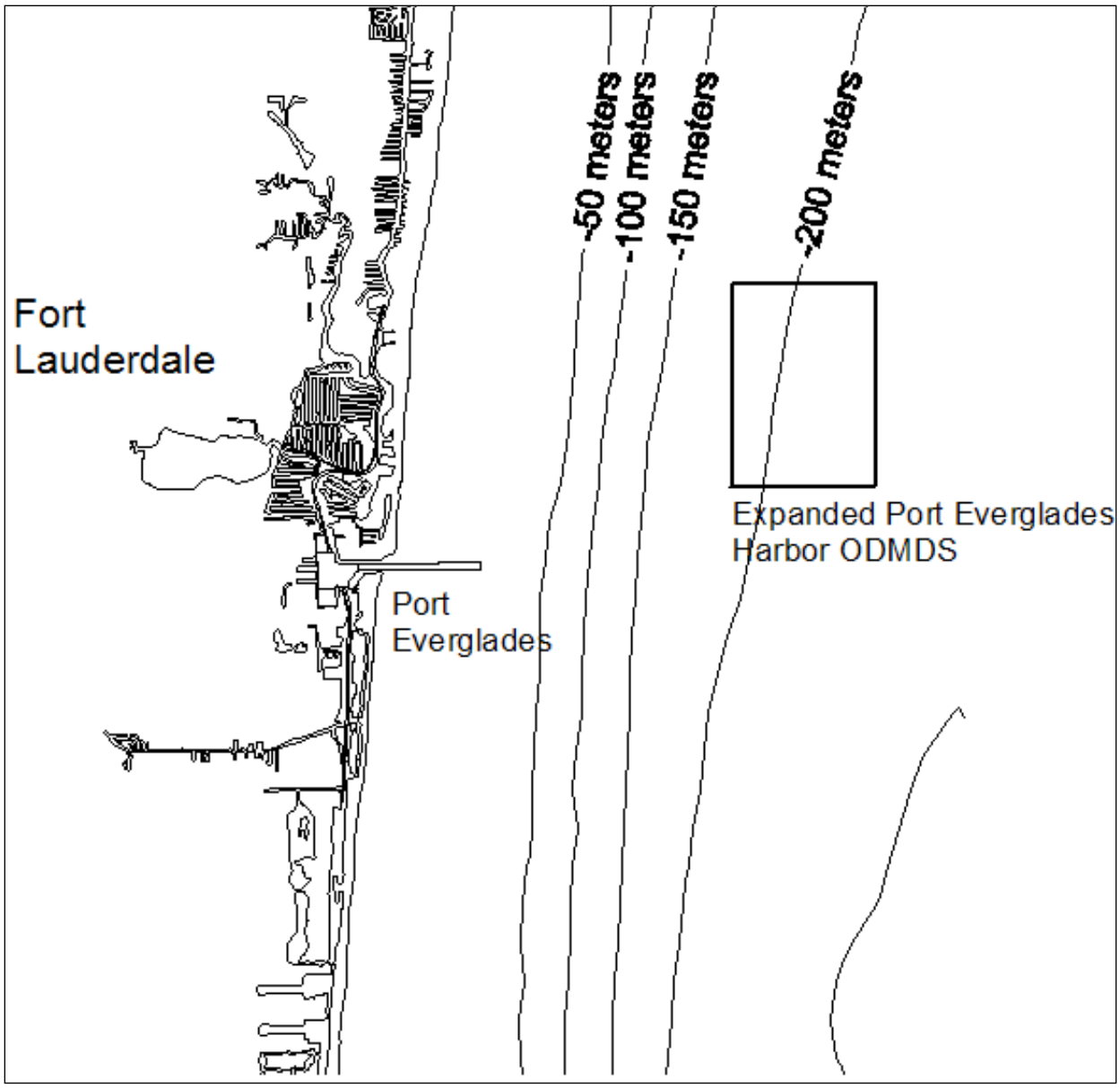

Figure 28. Expanded Port Everglades Harbor ODMDS Location Map.

2.2 MANAGEMENT OBJECTIVES

Appropriate management of an ODMDS is aimed at assuring that disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment or economic potentialities (MPRSA §103(a)). The primary objectives in the management of the Port Everglades Harbor ODMDS are:

- Protection of the marine environment;
- Documentation of disposal activities and compliance; and
- Maintenance of a long-term disposal alternative for dredged material generated in the Port Everglades, Florida vicinity

The following sections provide the framework for meeting these objectives to the extent possible.

2.3 DISPOSAL HISTORY AND DREDGED MATERIAL VOLUMES

The expanded Port Everglades Harbor ODMDS is intended to be used for the disposal of dredged material from both maintenance and new work projects from the greater Broward County, Florida vicinity. The primary user of the Port Everglades Harbor ODMDS is the USACE for the Port Everglades Federal Navigation Project, including material from the Entrance Channel, Main, North, and South Turning Basins, South Access Channel and the Turning Notch. A secondary user is the Port Everglades Port Authority, including material from the South Turning Basin beyond Civil Works authorized depths, Port Slips, and Port Berthing Areas. Broward County has also proposed using the ODMDS for disposal material from the Port Everglades Sand Bypass Project (permit application number SAJ-2008-2034). The U.S. Navy and U.S. Coast Guard also have facilities in the area that may require use of the ODMDS although no need has currently been identified.

Historically, an ocean site approved for ocean dumping on an interim basis (interim MPRSA disposal site) located approximately 1.6 nautical miles from shore was used for ocean disposal of dredged material from Port Everglades Harbor. Use of this site was discontinued in the 1980s. This former site has been documented to contain various amounts of man-made debris including concrete pilings, steel and concrete frameworks, and tires (Messing, 2003).

Due to the lack of an ODMDS in the vicinity of Port Everglades after the interim site was discontinued, the Port Everglades Harbor ODMDS was designated in 2005 approximately 4.3 nmi offshore. The ODMDS, 1 nmi^2 in size, was designated to accommodate dredged material from periodic maintenance events from the Port Everglades Harbor. The Jacksonville District Corps of Engineers estimated an annual average disposal rate of approximately 30,000 cubic yards of material. In 2005, 46,686 cubic yards of dredged material from Port Everglades Harbor was disposed in this site. In 2013, 413,932 (*in situ*) cubic yards of dredged material was disposed at the site (USACE, 2013). Potential navigation improvements may generate up to 6.63 million cubic yards of material requiring disposal at the ODMDS. MDFATE and STFATE modeling show the expanded 3.21 nmi^2 site is sufficient to contain all of the estimated material from this construction project and continuing maintenance events. Maintenance volumes from the Port Everglades Federal Navigation Project are not expected to significantly increase and are expected to average approximately 300,000 cy over a ten-year period. No other maintenance events have taken place except those listed below since 2005.

Table 19. Dredged Material Disposal Projects placed into the ODMDS (2005-2013)

Year	Volume (cy) *in situ*	Dredge Area[1]	Dredge Method	Disposal Location	Sponsor
2005	46,686	NTB	Hopper	ODMDS	Civil Works
2013	353,243	MTB, NTB, SAC, TN (federal)	Clam Shell	ODMDS	Civil Works
2013	60,689	STB, Berth 19, 30 (port)	Clan Shell	ODMDS	Port Everglades

[1] MTB (Main Turning Basin); NTB (North Turning Basin); STB (South Turning Basin); SAC (South Access Channel); TN (Turning Notch).

2.4 DREDGED MATERIAL CHARACTERISTICS

2.4.1 Previously Disposed Materials

Materials disposed in the Port Everglades Harbor ODMDS have historically consisted of sand, silt, clay, and a small amount of gravel from Port Everglades Harbor and entrance channel. Material from the Harbor that was found to be suitable for beach nourishment was placed on nearby beaches in accordance with State of Florida standards and not evaluated under MPRSA as disposal material.

2.4.2. Anticipated Materials

Two basic sources of material are expected to be disposed at the site; new work dredged material and maintenance material from Port Everglades harbor and entrance channel. These materials will consist of mixtures of silt, sand, gravel, cobble, and boulder sized components in varying percentages. Maintenance material is expected to be silty sands with some small rock and shell. New work material is expected to be more variable. The geotechnical boring analysis conducted as part of the disposal modeling conducted by Taylor Engineering (Taylor, 2010) for the Port Everglades Deepening Project estimates approximately 34% of the 6.63 million cubic yards of material to be dredged is either hard rock (requiring blasting for pre-treatment), medium rock or soft rock (can be excavated without pre-treatment). Depending on dredging method the size of the rock disposed could be as large as 30 inches in diameter for cutterhead dredges (Herbich, 1992) and 3 to 10 feet in diameter for mechanical dredges (USACE, 2003). The remaining material is expected to be sand (56%) and silt (12%).

2.4.3 Associated Beach Quality Materials

USACE Beneficial Use of Dredged Material EM 1110-2-5026 requires that the beneficial use of dredged material be maximized within the coastal system. Dredged materials that qualify for beach or near-shore placement per the Florida Department of Environmental Protection's (FDEP) 'Sand Rule' shall be beneficially placed in such location under CWA Section 404

authorities, to the maximum extent practicable. It is expected that the State of Florida will exercise its authority and responsibility, regarding beach nourishment, to the full extent during any future permitting activities. Beneficial use of beach compatible dredged material for beach nourishment is strongly encouraged and supported by the EPA.

2.4.4 Dredge Material Quality Verification

The suitability of dredged material for ocean disposal must be verified by the USACE and agreed to via written concurrence from the EPA prior to disposal. Verification will be valid for three years from the most current verification.

Verification process:

1) Case-specific evaluation against the exclusion criteria (40 CFR 227.13(b))
2) Determination of testing requirements for non-excluded material based on the potential of sediment contamination since last verification.
3) When applicable, execute testing and determination of suitability of non-excluded material for ocean disposal.

Verification documentation for suitability will be completed prior to use of the Port Everglades Harbor ODMDS. Documentation will be in the form of a MPRSA Section 103 Evaluation. Potential testing and the Evaluation will follow the procedures outlined in the 1991 EPA/USACE Dredged Material Testing Manual and 2008 Southeast Regional Implementation Manual (SERIM) or the appropriate updated versions. This includes how dredging projects will be subdivided into project segments for sampling and analysis. The MPRSA Section 103 Evaluation will be in the form outlined in Appendix C of the SERIM. Water Quality Compliance determinations will be made using the STFATE (ADDAMS) model and the input parameters provided in Appendix A of this document. Only material determined to be suitable through the verification process by the USACE and the EPA will be placed at the Port Everglades Harbor ODMDS.

2.5 TIME OF DISPOSAL

At present no restrictions have been determined to be necessary for disposal related to seasonal variations in ocean current or biotic activity. As monitoring results are compiled, should any such restrictions appear necessary, disposal activities will be scheduled so as to avoid adverse impacts. Additionally, if new information indicates that endangered or threatened species are being adversely impacted, restrictions may be incurred.

Transportation of dredged material shall only be allowed when weather and sea state conditions, and scow loading level, will not interfere with safe transportation and will not create risk of spillage, leak or other loss of dredged material during transit. No disposal trips shall be initiated when the National Weather Service has issued a gale warning for local waters during the time

period necessary to complete dumping operations. Transportation for the purposes of ocean dumping begins when the vessel is full and begins transiting to the ODMDS.

2.6 DISPOSAL TECHNIQUE

Disposal shall be initiated within the specified disposal release zone and shall be completed (doors closed) prior to departing the ODMDS. While in route to the ODMDS, the disposal vessel must remain within the navigation channel while west of the buoy G"3". No dredged material shall not be leaked or spilled from vessels while west of the G"3" buoy. Leakage or spillage of material east of the sea buoy is limited to 1.5' of draft loss (average between forward and aft sensors) during transit to the ODMDS. Transit to the ODMDS begins as soon as dredged material loading into the disposal vessel is completed and the vessel begins moving to the ODMDS. All appropriate measures to avoid spillage during transit must be taken. Appropriate measures may include but are not limited to: up-to-date U.S. Coast Guard and/or American Bureau of Shipping certification of all disposal-related vessels; maintenance (inspection and/or replacement) of gaskets on barge doors, pre-transit testing of barge door hydraulics, and pre-transport verification of appropriate weather and sea state conditions. Additionally, for large projects (greater than 500,000 cubic yards), disposal scow operators will be required to utilize a Scow Certification Checklist (Appendix B). Standard surveillance and evasive measures to protect sea turtles and marine mammals shall also be employed during all disposal operations at the Port Everglades Harbor ODMDS.

2.7 DISPOSAL LOCATION

40 CFR §227.28 requires that disposal occur no less than 330 feet (100 meters) inside the designated site boundaries. Release zones have been established to satisfy this criterion as well as manage dredged material disposal and contain impacts to within the ODMDS boundaries. Two release zones have been developed based on computer modeling and field monitoring. One is for new work projects that contain significant rock, which is subdivided into Zones 1-5, and the other for maintenance projects. The release zones will be specified as part of the dredged material quality verification process and included in the EPA's MPRSA Section 103 concurrence letter. The release zones are described below in Tables 3 and 4 and shown in Figure 2. Utilization of the ODMDS for projects greater than 50,000 cy requires a plan for disposal distribution to be approved by USACE Jacksonville and US EPA Region 4 prior to commencement.

New Work material is to be disposed of in the New Work Zones 1-5 (table 4 and figure 2.) Specifically, any load containing a majority of rock larger than 12" diameter should be placed into zones 4 and 5.

Table 20. Port Everglades Harbor ODMDS Disposal Maintenance Material Release Zone

Vertices	Geographic NAD 83	State Plane (Florida East 0901 U.S. Ft) NAD 83

	Latitude (North)	Longitude (West)	Easting	Northing
NW	26° 06.9280'N	80° 01.8150’W	974,362	648,843
NE	26° 06.9280'N	80° 01.2720’W	977,348	648,866
SW	26° 06.7660'N	80° 01.8150’W	974,386	647,862
SE	26° 06.7660'N	80° 01.2720’W	977,356	647,884

Table 21. New Work Release Zones 1-5

Vertices	Geographic NAD 83		State Plane (Florida East 0901 U.S. Ft) NAD 83	
	Latitude (North)	Longitude (West)	Easting	Northing
ZONE 1 NE	26° 07.8942’N	80° 02.0004’W	654689.246	937321.117
Zone 1 NW	26° 07.8942’N	80° 01.8342’W	654696.010	974229.988
Zone 1 SE	26° 07.9000’N	80° 02.0004’W	653929.544	973326.762
Zone 1 SW	26° 07.7688’N	80° 01.8342’W	653936.307	974235.650
Zone 2 NE	26° 07.9000’N	80° 02.0004’W	653929.544	973326.762
Zone 2 NW	26° 07.7688’N	80° 01.8342’W	653936.307	974235.650
Zone 2 SE	26° 07.6434’N	80° 02.0004’W	653169.841	973332.407
Zone 2 SW	26° 07.6434’N	80° 01.8342’W	653176.605	974241.311
Zone 3 NE	26° 07.6434’N	80° 02.0004’W	653169.841	973332.407
Zone 3 NW	26° 07.6434’N	80° 01.8342’W	653176.605	974241.311
Zone 3 SE	26° 07.518’N	80° 02.0004’W	652410.139	973338.052
Zone 3 SW	26° 07.518’N	80° 01.8342’W	652416.902	974246.972
Zone 4 NE	26° 07.518’N	80° 02.0004’W	652410.139	973338.052
Zone 4 NW	26° 07.518’N	80° 01.8342’W	652416.902	974246.972
Zone 4 SE	26° 07.3926’N	80° 02.0004’W	651650.438	973343.696
Zone 4 SW	26° 07.3926’N	80° 01.8342’W	651657.200	974252.632
Zone 5 NE	26° 07.3926’N	80° 02.0004’W	651650.438	973343.696
Zone 5 NW	26° 07.3926’N	80° 01.8342’W	651657.200	974252.632
Zone 5 SE	26° 07.2672’N	80° 02.0004’W	650890.736	973349.340
Zone 5 SW	26° 07.2672’N	80° 01.8342’W	650897.498	974258.292

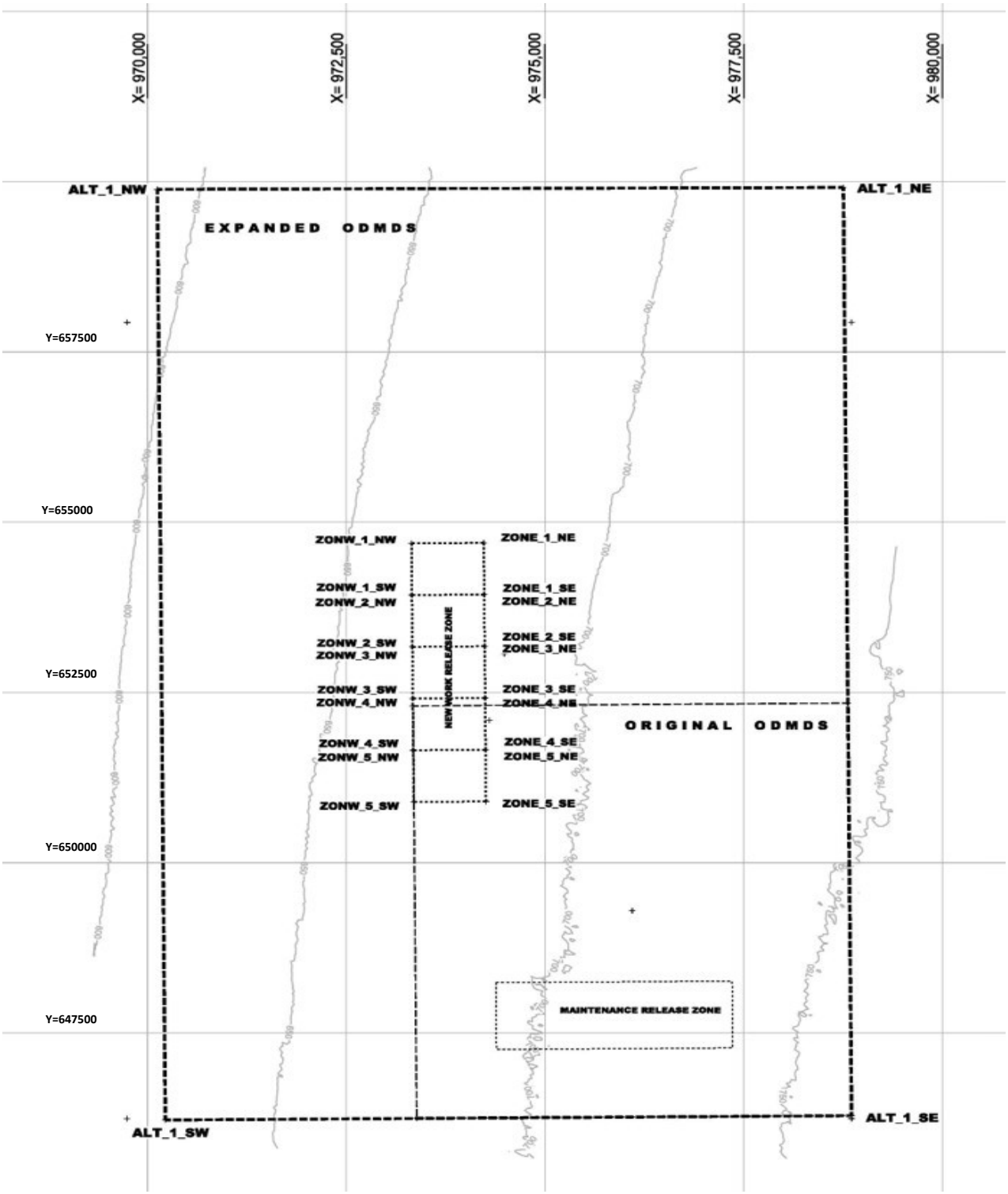

Figure 29. Depth contours and release zones within Port Everglades ODMDS

2.8 PERMIT AND CONTRACT CONDITIONS

The disposal monitoring and post-disposal monitoring requirements described under Site Monitoring will be included as permit conditions on all MPRSA Section 103 permits and will be incorporated in the contract language for all federal projects. A summary of the management and monitoring requirements to be included are listed in Table 3. Template language that can be used is included in appendices (see Appendix C and D).

2.9 PERMIT PROCESS

All disposal of dredged material in the ocean, with the exception of Federal Civil Works projects, requires an ocean dumping permit issued by the USACE pursuant to Section 103 of the MPRSA. Permitting procedures are outlined in 33 CFR Parts 320, 324 and 325. Additional guidance is available in the SERIM.

2.10 INFORMATION MANAGEMENT OF DREDGED MATERIAL PLACEMENT ACTIVITIES

As discussed in the following sections, a substantial amount of diverse data regarding use of the Port Everglades Harbor ODMDS and effects of disposal is required from many sources. If this information is readily available and in a useable format it can be used to answer many questions typically asked about a disposal site such as:

- What is being dredged?
- How much is being dredged?
- Where did the dredged material come from?
- Where was the dredged material placed?
- Was dredged material dredged and disposed correctly?
- What will happen to the environment at the disposal site?

To streamline data sharing, EPA Region 4 and USACE South Atlantic Division have agreed on an eXtensible Markup Language (XML) standard for sharing of disposal monitoring data (see also Section 3.5). Additional standards will continue to be investigated for sharing of other disposal site related information (e.g. environmental monitoring data, testing data, etc.).

3.0 SITE MONITORING

The MPRSA establishes the need for including a monitoring program as part of the Site Management Plan. Site monitoring is conducted to ensure the environmental integrity of a disposal site and the areas surrounding the site and to verify compliance with the site designation criteria, any special management conditions, and with permit requirements. Monitoring programs should be flexible, cost effective, and based on scientifically sound procedures and methods to meet site-specific monitoring needs. The intent of the program is to provide the following:

(1) Information indicating whether the disposal activities are occurring in compliance with the permit and site restrictions;

(2) Information indicating the short-term and long-term fate of materials disposed of in the marine environment; and

(3) Information concerning the short-term and long-term environmental impacts of the disposal.

The main purpose of a disposal site monitoring program is to determine whether dredged material site management practices, including disposal operations, at the site need to be changed to avoid significant adverse impacts. A monitoring program, under MPRSA, also establishes an empirical basis for site designation/de-designation, assesses trends in environmental condition changes due to dredge disposal operations, determining if dumping shall be prohibited (MPRSA 103((c)(2)), and in support of future modifications to site management and monitoring plans as required under MPRSA 102((c)(3)).

3.1 BASELINE MONITORING

Site characterization surveys of the ODMDS were conducted by EPA and the USACE as part of the designation process. Results from these surveys can be used in part as baseline data for the monitoring of impacts associated with use of the Port Everglades Harbor ODMDS. The results of investigations presented in the Final Environmental Impact Statement for designation of Palm Beach Harbor (EPA 2004), Environmental Assessment for the Expansion of the Port Everglades Harbor ODMDS (EPA, in press), and subsequent surveys are listed in Table 4 will serve as the main body of data for the monitoring of the impacts associated with the use of the Port Everglades Harbor ODMDS. In addition, a baseline hard-bottom habitat study will be conducted prior to use of the expanded portion of the ODMDS for disposal of new work material (Appendix E).

Table 22. Surveys and Studies Conducted at the Port Everglades Harbor ODMDS

Survey/Study Title	Conducted By:	Date	Purpose	Results
Benthic Macroinfaunal Analysis of the Port Everglades and Palm Beach, Florida ODMDS Surveys	Battelle for U.S. EPA Region 4	1984	Characterization Survey (sediment analysis, benthic biota)	Characterization of benthos for February & November 1984.
Field Studies in Nearshore Areas at Port Everglades, Palm Beach County, and Brevard County, Florida	Continental Shelf Associates for U.S. EPA Region 4	1986	Benthic characterization of one square mile candidate site (4-mile candidate site) through sidescan and bathymetry.	No high relief ledges, rock outcrops or steep slopes detected. Occasional rubble or cobbles and some low relief rock outcrop.
Video, Still Camera, and Side Scan Sonar Survey of the Seafloor Within and Downcurrent of a Tentative Alternative ODMDS off Port Everglades, Florida	Continental Shelf Associates for U.S. EPA Region 4	1986	Look for presence of natural resources (critical habitat) and presence of manmade obstruction on the bottom and down current of site.	Data showed a predominately fine-to-course sediment covered bottom with scattered rocks, areas of rock rubble and sand ripples.
Sediment & Water Quality of Candidate Ocean Dredged Material Disposal Sites for Port Everglades and Palm Beach, Florida	U.S. EPA Region 4	1999	CHARACTERIZATION SURVEY (WATER COLUMN PROFILES, WATER QUALITY, SEDIMENT CHARACTERISTICS, BENTHIC BIOTA)	Conditions at the site are relatively pristine. Water column is clear with low suspended sediment concentrations (2-20mg/l). Sediments consists of mostly fine sand (70%) and have low level of contaminants.
Sidescan Survey of Candidate Ocean Dredged Material Disposal Sites for	U.S. EPA Region 4	1999	Look for presence of natural resources (critical habitats) and presence of manmade obstructions on the bottom.	The side-scan sonar data indicated a fine sandy bottom with scattered rubble zones throughout the site and areas 2 miles to the north and 2 miles south of the site. No areas of rock outcrops or potential wrecks were

Table 22. Surveys and Studies Conducted at the Port Everglades Harbor ODMDS

Survey/Study Title	Conducted By:	Date	Purpose	Results
Port Everglades and Palm Beach, Florida				identified through the side-scan record within the site or north or south of the site.
Pre-Disposal Bathymetry	USACE	July 2005	Pre-disposal survey	Established baseline condition for post-disposal bathymetry
Post-Disposal Bathymetry	USACE	December 2005	Post-disposal survey	No changes were observable from the pre-disposal survey.
Rapid Seafloor Reconnaissance and Assessment of Southeast Florida Ocean Dredged Material Disposal Sites Utilizing Sediment Profile Imaging – Post Disposal SPI Mapping at the Port Everglades ODMDS	Germano & Associates for U.S. EPA Region 4	May 2006	Map the spatial distribution of disposed dredged material on the seafloor, characterize physical changes in the seafloor resulting from disposal, and evaluate the extent of benthic infaunal recolonization through the mapping of infaunal successional stages.	Dredged material formed an elliptical deposit on the seafloor with the upper half of the elliptical deposit occurring to the north of the disposal site. The main physical change resulting from disposal appeared to be a subtle shift in sediment texture. Overall, at the majority of stations within the dredged material footprint and in surrounding areas, it did not appear that there had been any adverse changes in oxygen demand, redox state, or other geochemical properties as a result of disposal. Local benthic communities are rapidly recolonizing the sandy dredged material that had been deposited at the Port Everglades Harbor ODMDS and are at an intermediate stage of recolonization. The release zone was moved in 2009 to keep future disposal deposits within the ODMDS boundaries.

Table 22. Surveys and Studies Conducted at the Port Everglades Harbor ODMDS

Survey/Study Title	Conducted By:	Date	Purpose	Results
Site Expansion Preliminary Characterization Study	EPA Region 4 / Water & Air Research / ANAMAR	October 2007	Characterize the grain size, chemistry, and biology of the benthos and the physiochemical properties of the water column for future potential site expansion.	Water column is well mixed over the upper 70 meters. Photic zone extends to 55 meters. DO is low (<5mg/l) below 140 meters. No chemicals were found above federal water quality criteria. Sediments ranged from sandy silt to silty sand. Organic tins, metals and PAHs were detected at low levels in the sediments.
Site Designation Study for the Port Everglades Harbor Ocean Dredged Material Disposal Site Expansion	ANAMAR Environmental Consulting for USACE	May 2011	Characterization survey (water column profiles, water quality, sediment characteristics, benthic biota)	Water column is well mixed over the upper 20 meters. Photic zone extends to 65 meters. DO is low (<5mg/l) below 100 meters. Total suspended solids ranged from 6 to 13 mg/l. Sediments were silt/clay & med/fine sand. Sediments in the expansion area had lower levels of metals, organic tins, PAHs, pesticides and PAHs than the within the ODMDS.
Pre-Disposal Photographic Mapping for the Port Everglades Harbor Ocean Dredged Material Disposal Site Expansion	EPA Region 4 and Newfields	May 2011	Baseline SPI data for future SPI surveys and to photograph areas identified as having potential for hard bottom habitats.	Sediments consisted of compact fine to very fine sand throughout the site. Stage III organisms present throughout the site in low densities. Exposed limestone rocky outcrops present in some locations. Carbonate rocks also present. The rocky outcrops provide habitat for fish, crab, sea anemones, and other epibenthic organisms. The area of rocky outcrops was estimated

Table 22. Surveys and Studies Conducted at the Port Everglades Harbor ODMDS

Survey/Study Title	Conducted By:	Date	Purpose	Results
				from point data using thiessen polygons at 28.6 acres, and rocks at 39.7 acres.
Pre-Disposal Bathymetry	USACE	Feb 2012	Pre-disposal survey	The shallowest portion of the site is the northwest corner (~180meters); the deepest the southeast corner (~230meters)
Post-Disposal Bathymetry	USACE	May 2013	Post-disposal survey	No discernable change in bathymetry. (see figure 2)
Benthic Mapping Survey of the Port Everglades Harbor ODMDS	EPA Region 4 and Battelle	September 2014	Map footprint of 2013 maintenance event and document changes to the benthic habitat	The revised release zone was effective at containing almost all of the dredged material disposal impact within the ODMDS boundaries. Only one station (50 meters south of the ODMDS) had any measurable amount of dredged material in excess of 5 cm. The sea star *Coronaster briareus*, a species managed by the SAFMC, was the only species to show a benthic habitat preference being almost twice as abundance on unconsolidated soft sediment dredged material relative to native soft sediment and dredged material hard carbonate bottoms. Given the estimated successional stage, OSI, and high level of bioturbation, it appeared that infaunal communities have successfully recolonized the dredged material within 17 months of completion of the 2013 disposal event.

3.2 DISPOSAL MONITORING

For all disposal activities, an electronic tracking system (ETS) must be utilized. The ETS will provide surveillance of the transportation and disposal of dredged material. The ETS will be maintained and operated to continuously track the horizontal location and draft condition (accuracy± 0.1 foot) of the disposal vessel (i.e. hopper dredge or disposal scow) from the point of dredging or loading to the disposal site and return to the point of dredging or loading. Data shall be collected at least every 0.25 nautical mile or every 4 minutes during travel to and from the ODMDS and twelve seconds or every 30 feet of travel, while the hull status is open within the ODMDS. In addition to the continuous tracking data, the following trip information shall be electronically recorded for each disposal cycle:

a. Load Number;
b. Disposal Vessel Name and Type (e.g. scow);
c. Estimated volume of Load;
d. Description of Material Disposed;
e. Source of Dredged Material; and
f. Date, Time and Location at Initiation and Completion of Disposal Event.

It is expected that disposal monitoring will be conducted utilizing the Dredge Quality Management (DQM) system for Civil Works projects [see http://dqm.usace.army.mil/Specifications/Index.aspx], although other systems are acceptable. Disposal monitoring and ETS data will be reported to EPA Region 4 on a weekly basis (within one week of disposal) utilizing the eXtensible Markup Language (XML) specification and protocol per Section 3.5. More frequent reporting may be required on a project specific basis. EPA Region 4 and the USACE Jacksonville District shall be notified within 24 hours if disposal occurs outside of the ODMDS or specified disposal zone or if any apparent leaking or spilling of dredged material occurs as indicated by a loss of disposal vessel draft. The draft change threshold for notification will be determined at the time of project authorization under Section 103 of the MPRSA.

3.3 POST DISPOSAL MONITORING

The USACE or other site user will conduct a bathymetric survey within 30 days after disposal project completion. Surveys will not be required for projects less than 50,000 cubic yards. Bathymetric surveys will be used to monitor the disposal mound to assist in verification of material placement, to monitor bathymetry changes and trends and to ensure that the site capacity is not exceeded, i.e., the mound does not exceed the site boundaries. Surveys will conform to the minimum performance standards for Corps of Engineers Hydrographic Surveys as described in the USACE Engineering Manual, EM1110-2-1003, *Hydrographic Surveying*

dated November 30, 2013 [http://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1003.pdf] or updates. The number and length of transects required will be sufficient to encompass the release zone and a 500 foot-wide area around it. Single beam surveys will be taken along lines spaced at 200-foot intervals or less. Multibeam surveys will provide 100% coverage. The minimum performance standards from Table 3-1 in *Hydrographic Surveying* shall be followed. Horizontal location of the survey lines and depth sounding points will be determined by an automated positioning system utilizing a differential global positioning system. The vertical datum will be referenced to prescribed NOAA Mean Lower Low Water (MLLW) datum. The horizontal datum should be referenced to the local State Plane Coordinate System (SPCS) for that area or in Geographical Coordinates (latitude-longitude). The horizontal reference datum should be the North American Datum of 1983 (NAD 83).

3.4 MATERIAL TRACKING AND DISPOSAL EFFECTS MONITORING

Surveys can be used to address possible changes in bathymetric, sedimentological, chemical, and biological aspects of the ODMDS and surrounding area as a result of the disposal of dredged material at the site. A summary of available technologies is provided in USACE (1990). Techniques anticipated to be utilized at the Port Everglades Harbor ODMDS include, but is not limited to:

- Multibeam Sonar: Mapping disposed dredged material; identifying hard bottom.
- Sidescan Sonar: Mapping disposed dredged material; identifying hard bottom.
- Sediment Profile Imaging: Mapping disposed dredged material; characterizing physical, chemical and biological seafloor processes; evaluating benthic infaunal recolonization through the mapping of infaunal successional stages.
- Planview Image Acquisition and Analysis: enumeration of biological features (biogenic mounds, burrows, tracks, feeding pits/furrows and epifauna); enumeration of physical sedimentary features (rocks, hard bottom, sand ripples), and apparent presence/absence of dredged material.
- Benthic infauna sampling: document and quantify benthic infauna communities; identify absence of any pollution sensitive organisms.
- Benthic chemical sampling: document changes in sediment chemistry and identify any contaminant concentrations that may pose a threat to the environment or human health.
- Benthic grain size sampling: document changes in the grain size of the benthos that could affect benthic populations.
- Water quality sampling: document any changes in the chemical and physical properties of the water column that may adversely affect the marine environment or human health; collect data for risk assessment models for evaluating the effects of dredged material disposal.

3.4.1 Summary of Results of Past Monitoring Surveys

Surveys conducted at the Port Everglades Harbor ODMDS are listed in Table 4. Two disposal events have occurred since site designation. After the first event, no measurable change in bathymetry was detectable. A post disposal benthic assessment using Sediment Profile Imaging (SPI) showed that dredged material disposal formed an elliptical deposit on the seafloor within the northern portion and extending north of the original ODMDS. This resulted in a shift to a slightly sandier substrate at the ODMDS. There was no indication of any adverse changes in oxygen demand, redox state, or other geochemical properties as a result of disposal. Results suggested that while benthic communities over the dredged material deposit were rapidly approaching those on the ambient seafloor relatively soon after disposal, this process was still ongoing at the time of the survey and not yet complete. Limited sampling conducted as part of the site expansion survey in 2011 indicated that concentrations of metals, organic tins, PAHs, PCBs and pesticides within the original ODMDS are above background levels. However, they remain below levels found in the dredged material tested and accepted for ocean disposal and therefore no adverse effects are expected.

As a result of the post-disposal SPI survey referenced above, the release zone was modified. The 2013 maintenance dredging project utilized the new release zone. In 2014, a SPI and trend assessment study was conducted. The SPI results demonstrated that the revised release zone was effective at containing almost all of the material within the ODMDS boundaries. Only one station about 50 meters south of the ODMDS boundary was impacted by more than 5 cm of dredged material (6 cm). The main physical change in benthic habitats resulting from dredged material disposal was a subtle shift in sediment texture and redox state of surface sediments with grain size slightly coarse, establishment of hard bottom within the ODMDS boundary, a higher proportion of fine shell hash, and apparent shallowing of the aRPD layer depth relative to native sediments. Most of the difference between dredged material and native sediment was likely due to elevated percentages of silt clay in the dredged material. High levels of biogenic activity were found at the majority of unconsolidated soft sediment stations, including stations composedof either dredged material or native sediments. Except for there being fewer feeding mounds at dredged material stations than observed at native sediment stations, there were no other patterns in density and spatial distribution of biogenic features across the area. The sea star *Coronaster briareus* was the only species to show a benthic habitat preference being almost twice as abundant on unconsolidated soft sediment dredged material relative to native soft sediment and dredged material hard carbonate bottoms. It appears that infaunal communities have successfully recolonized the dredged material within 17 months of completion of the 2013 disposal event.

Macroinfauna sampling as part of the 2014 trend assessment study showed that annelids, primarily polychaetes, comprised the majority of the taxa assemblages, both inside (62.5%) and

outside (67.4%) of the Port Everglades ODMDS. The mean number of individual organisms and taxa density was over 50% greater outside the ODMDS was also greater than inside the ODMDS. The mean number of taxa was also greater outside the ODMDS versus inside. However, due the large variability between stations, there was statistically no difference inside versus outside the Port Everglades ODMDS in regard to benthic assemblages.

3.4.2 Future Monitoring Surveys

Based on the type and volume of material disposed and impacts of concern, various monitoring surveys can be used to examine if material is leaving the site, the direction the disposed dredged material is moving, and what environmental effect the material is having on the site and adjacent areas.

It is expected that changes in sediment composition within the ODMDS due to disposed dredged material will likely alter the benthic community structure. However, based on previous benthic studies, it is unlikely that permanent or long-term adverse impacts will result due to changes in sediment composition (see section 3.4.1).

A Trend Assessment study is planned for 2024. Additionally, an SPI study will be conducted following the next major new work project to evaluate the effectiveness of the new work release zone on maintaining material within the ODMDS.

Table 23. Port Everglades Harbor ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Trigger/ Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Characterize Existing Hard bottom (quantity and quality)	pending	Site User or USACE/ EPA	Determine baseline for impact assessment	Prior to use of expansion area	N/A	N/A	N/A
Quantify the amount of natural hard-bottom habitats buried and the quantity and quality of hard-bottom habitat created	Same as above	USACE and EPA	Determine the net effect of ODMDS use on EFH	Within 2 years of project completion and 10 years thereafter	Functional assessment shows net decrease in function	Monitor once more at a future time further removed from site usage.	-Modify disposal practices -Continue Monitoring -Alter site utilization

Table 23. Port Everglades Harbor ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Trigger/ Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Trend Assessment (40CFR228.9)	Water and Sediment Quality, Benthic Community Analysis (40CFR228.13)	EPA	Periodically evaluate the impact of disposal on the marine environment (40CFR 228.9)	Approximately every 10 years or as warranted due to heavy use.	-Absence from the site of pollution sensitive biota -Progressive non-seasonal changes in water or sediment quality	Continue Monitoring Regularly	-Conduct Environmental Effects Monitoring or Advanced Environmental Effects Monitoring -Review dredged material evaluation procedures

Table 23. Port Everglades Harbor ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Trigger/ Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Environmental Effects Monitoring	Chemical Monitoring	EPA	Determine if chemical contaminants are significantly elevated[1] within and outside of site boundaries	If disposal footprint extends beyond the site boundaries or if results of monitoring or other information warrant.	Contaminants are found to be elevated	Discontinue monitoring	- Implement case specific management options (i.e., Remediation, limits on quantities or types of material). -Perform biological testing of site material -Consider isolating dredged material (capping) - Institute Advanced Environmental Effects Monitoring
	Benthic Monitoring	EPA	Determine whether there are adverse changes in the benthic populations outside of the site and evaluate recovery rates		Adverse changes observed outside of the site that may endanger the marine environment		

Table 23. Port Everglades Harbor ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Trigger/ Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Advanced Environmental Effects Monitoring	Tissue Chemical Analysis	EPA/ USACE	Determine if the site is a source of adverse bioaccumulation which may endanger the marine environment	Implement if Environmental Effects Monitoring (chemistry) warrants.	Benthic body burdens and/or risk assessment models indicate potential for food chain impacts.	Discontinue monitoring	-Discontinue site use - Implement case specific management options (i.e. Remediation, limits on quantities or types of material).
	Benthic Monitoring		Determine if the site is a source of adverse sub-lethal[2] changes in benthic organisms which may endanger the marine environment		Sub-lethal effects are unacceptable.		
Monitor Bathymetric Trends	Bathymetry	User/ USACE	Determine the extent of the disposal mound and major bathymetric changes	Pre and post disposal for significant projects (>50,000cy)	Disposal mound occurs outside ODMDS boundaries	Continue Monitoring for each utilization	-Modify disposal method/placement -Restrict disposal volumes -Enlarge site

Table 23. Port Everglades Harbor ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Trigger/ Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Short and Long-term Fate of Disposed Dredged Material	Sediment Profile Imaging	User/ EPA	Confirm aerial extent of disposal mound and benthic impact.	Following change in release zone and major new work projects	Measurable deposition (>5cm) outside of site boundaries	-Continue site use without restrictions	-Increase buffer as needed. -Restrict disposal volumes. -Create berms to retard dredged material transport.
Compliance	Disposal Site Use Records in EPA Region 4's XML format	Site User	-Ensure management requirements are being met -To assist in site monitoring	Weekly during the project	Disposal records required by SMMP are not submitted or are incomplete	Continue Monitoring	-Restrict site use until requirements are met

[1] Significantly elevated: Concentrations above the range of contaminant levels in dredged sediments that the Regional Administrator and the District Engineer found to be suitable for disposal at the ODMDS.

[2] Examples of sub-lethal effects include without limitation the development of lesions, tumors, development abnormality, and/or decreased fecundity.

3.5 REPORTING AND DATA FORMATTING

3.5.1 Project Initiation and Violation Reporting

The USACE or other site user shall notify EPA 15 days prior to the beginning of a dredging cycle or project disposal. The user is also required to notify the USACE and the EPA within 24 hours if a violation of the permit and/or contract conditions related to MPRSA Section 103 or SMMP requirements occur during disposal operations.

3.5.2 Disposal Monitoring Data

Disposal monitoring data shall be provided to EPA Region 4 electronically on a weekly basis. In some cases, reporting may be required on a more frequent basis. Data shall be provided per the EPA Region 4 XML format and delivered as an attachment to an email to DisposalData.R4@epa.gov. The XML format is available from EPA Region 4.

3.5.3 Post Disposal Summary Reports

A Post Disposal Summary Report shall be provided to EPA within 90 days after project completion. These reports should include: dredging project title; permit number and expiration date (if applicable); contract number; name of contractor(s) conducting the work, name and type of vessel(s) disposing material in the ODMDS; disposal timeframes for each vessel; volume disposed at the ODMDS (as paid *in situ* volume, total paid and un paid *in situ* volume, and gross volume reported by dredging contractor), number of loads to ODMDS, type of material disposed at the ODMDS; identification by load number of any misplaced material; dates of pre and post disposal bathymetric surveys of the ODMDS and a narrative discussing any violation(s) of the 103 concurrency and/or permit (if applicable). The narrative should include a description of the violation, indicate the time it occurred and when it was reported to the EPA and USACE, discuss the circumstances surrounding the violation, and identify specific measures taken to prevent reoccurrence. The Post Disposal Summary Report should be accompanied by the bathymetry survey results (plot and X, Y, Z ASCII data file), a summary scatter plot of all disposal start locations, and a summary table of the trip information required by Section 3.2 with the exception of the disposal completion data. If all data is provided in the required XML format, scatter plots and summary tables will not be necessary.

3.5.4 Environmental Monitoring

Material tracking, disposal effects monitoring, and any other data collected shall be provided to federal and state agencies as appropriate. Data will be provided to other interested parties requesting such data to the extent possible. Data will be provided for all surveys in a report generated by the action agency.

The report should:

1) Indicate how the survey relates to the SMMP and previous surveys at the Port Everglades Harbor ODMDS
2) Provide data interpretations, conclusions, and recommendations; and
3) Project the next phase of the SMMP and any management alterations. required for future site use

Monitoring results will be summarized in subsequent revisions to the SMMP.

4.0 MODIFICATION OF THE PORT EVERGLADES HARBOR ODMDS SMMP

Should the results of monitoring surveys or reports from other sources indicate that continued use of the ODMDS would lead to unacceptable effects as determined by EPA and USACE; the ODMDS SMMP will be modified to mitigate the adverse impacts. The SMMP will be reviewed and revised at a minimum of every ten years. The SMMP will be reviewed and updated as necessary if site use changes significantly. For example, the SMMP will be reviewed if the quantity or type of dredged material placed at the site changes significantly or if conditions at the site otherwise indicate a need for revision.

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APPENDIX A

WATER COLUMN EVALUATIONS
NUMERICAL MODEL (STFATE) INPUT PARAMETERS

Water Column Evaluations

Numerical Model (STFATE) Input Parameters

Port Everglades Harbor ODMDS

SITE DESCRIPTION

Parameter	Value	Units
Number of Grid Points (left to right)	40	
Number of Grid Points (top to bottom)	60	
Spacing Between Grid Points (left to right)	400	ft
Spacing Between Grid Points (top to bottom)	400	ft
Constant Water Depth	645	ft
Roughness Height at Bottom of Disposal Site	.005[1]	ft
Slope of Bottom in X-Direction	0	Deg.
Slope of Bottom in Z-Direction	1.0	Deg.
Number of Points in Ambient Density Profile Point[2]	5	
Ambient Density at Depth = 0 ft	1.0237	g/cc
Ambient Density at Depth = 65 ft	1.0238	g/cc
Ambient Density at Depth = 164 ft	1.0246	g/cc
Ambient Density at Depth = 328 ft	1.0272	g/cc
Ambient Density at Depth = 645 ft	1.0282	g/cc

AMBIENT VELOCITY DATA[3]

Parameter	Value	Units
Profile	2-Point at constant depth	

Parameter	Value	Units
X-Direction Velocity = 33 feet	-2.7	ft/sec
Z-Direction Velocity = 33 feet	1.1	ft/sec
X-Direction Velocity = 197 feet	-2.2	ft/sec
Z-Direction Velocity = 197 feet	0.9	ft/sec

DISPOSAL OPERATION DATA

Parameter (New Work Zone)	Value	Units
Location of Disposal Point from Top of Grid	13,307	ft
Location of Disposal Point from Left Edge of Grid	7,078	ft
Dumping Over Depression	0	

Parameter (Maintenance Zone)	Value	Units
Location of Disposal Point from Top of Grid	18,173	ft
Location of Disposal Point from Left Edge of Grid	9,157	ft
Dumping Over Depression	0	

INPUT, EXECUTION AND OUTPUT

Parameter	Value	Units
Location of the Upper Left Corner of the Disposal Site - Distance from Top Edge	6636	ft
Location of the Upper Left Corner of the Disposal Site - Distance from Left Edge	3461	ft

Parameter	Value	Units
Location of the Lower Right Corner of the Disposal Site - Distance from Top Edge	20282	ft
Location of the Lower Right Corner of the Disposal Site - Distance from Left Edge	12139	ft
Duration of Simulation	14,400	sec
Long Term Time Step	600	sec

COEFFICIENTS

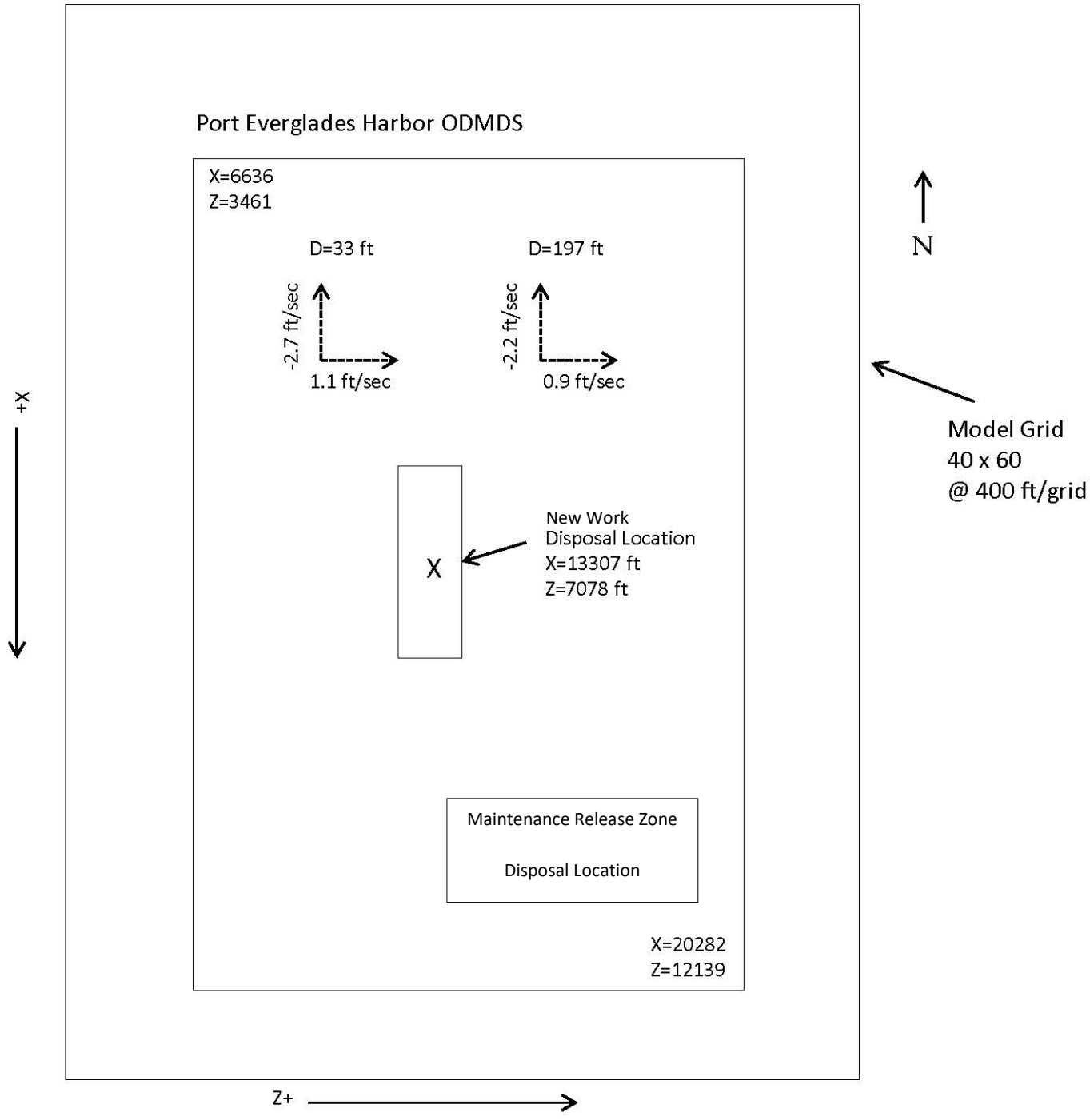
Parameter	Keyword	Value
Settling Coefficient	BETA	0.000[1]
Apparent Mass Coefficient	CM	1.000[1]
Drag Coefficient	CD	0.500[1]
Form Drag for Collapsing Cloud	CDRAG	1.000[1]
Skin Friction for Collapsing Cloud	CFRIC	0.010[1]
Drag for an Ellipsoidal Wedge	CD3	0.100[1]
Drag for a Plate	CD4	1.000[1]
Friction Between Cloud and Bottom	FRICTN	0.010[1]
4/3 Law Horizontal Diffusion Dissipation Factor	ALAMDA	0.001[1]
Unstratified Water Vertical Diffusion Coefficient	AKYO	Pritchard Expression
Cloud/Ambient Density Gradient Ratio	GAMA	0.250[1]
Turbulent Thermal Entrainment	ALPHAO	0.39[4]
Entrainment in Collapse	ALPHAC	0.100[1]
Stripping Factor	CSTRIP	0.003[1]

[1] Model Default Value

[2] Profile from EPA 2011 measurements (ANAMAR 2012)

[3] Velocity data represents average conditions. Determined from WES 1998 analysis of ADCP data offshore Ft. Lauderdale, FL.

[4] Calculated from NOAA Field Work at Miami (1991)


Port Everglades Harbor ODMDS
X=6636
Z=3461
D=33 ft
D=197 ft
-2.7 ft/sec
1.1 ft/sec
-2.2 ft/sec
0.9 ft/sec
N
+X
Model Grid
40 x 60
@ 400 ft/grid
X
New Work
Disposal Location
X=13307 ft
Z=7078 ft
Maintenance Release Zone
Disposal Location
X=20282
Z=12139
Z+

Port Everglades ODMDS Background Water Concentration.	
Compounds	Background Concentration Levels (µg/l)
Arsenic	1.54 [1]
Cadmium	0.021 [1]
Chromium (VI)	0.15 [1]
Copper	0.16 [1]
Lead	0.012 [1]
Mercury	0.1[1,2]
Nickel	0.25 [1]
Selenium	0.5 [1,2]
Silver	0.01[1,2]
Zinc	0.88[1]
Cyanide	1.0 [1,2]
Tributyltin (TBT)	0.025 [1,2]
Aldrin	0.0043 [1,2]
Chlordane	0.1 [1,2]
DDT	0.0017 [1]
Dieldrin	0.0043 [1,2]
alpha - Endosulfan	0.0043 [1,2]
beta - Endosulfan	0.0043 [1,2]
Endrin	0.0043 [1,2]
gamma-BHC (Lindane)	0.0043 [1,2]
Heptachlor	0.0043 [1,2]

Heptachlor Epoxide	0.0043 [1,2]
Toxaphene	.24 [1,2]
Pentachlorophenol	0.47 [1,2]

[1] *Samples collected by EPA, Region 4, October 2007 at the Port Everglades ODMDS (USACE 2010) – Values taken from near bottom samples.*

[2] *Analyte not detected. Value based on one half the reporting limit.*

APPENDIX C
SCOW CERTIFICATION TEMPLATE

SCOW CERTIFICATION CHECKLIST

USACE PERMIT or CONTRACT #

4/17/2015

[PROJECT NAME]

DATE:

CHECKLIST ITEM	RECORD DATA TO BE FILLED OUT AND SIGNED WITHIN 1 HOUR PRIOR TO DEPARTURE TIME IN NO. 3.	INITIALS CONTRACTOR	 Permittee or Authorized Representative
1. OCEAN DISPOSAL TRIP NUMBER			
2. DEPARTURE DATE TO ODMDS			
3. DEPARTURE TIME TO ODMDS			
4. DEPARTURE LOCATION (dredge, berth, etc.)			
5. SCOW NAME			
6. SCOW CAPACITY (CY)			
7. TUG NAME			
8. TUG CAPTAIN'S NAME			
9. DREDGED MATERIAL SOURCE (area, reach, berth, etc.)			
10. CUBIC YARDS HAULED			
11. SCOW FORE DRAFT / AFT DRAFT / AVG AND TIME			
12. SCOW FORE DRAFT / AFT DRAFT / AVG AND TIME (must be at least one hour prior to time in No. 11)			
13. DRAFT CHANGE (No 12 - No. 11)			
14. FREEBOARD OF MATERIAL AND/OR WATER SURFACE			
15. NWS COASTAL MARINE FORECAST (out to 20 nm)	DATE / TIME OF REPORT		
[area]	_____ WAVE HT (FT)		
WRITE-IN APPROPRIATE FORECAST PERIODS (ie, TODAY, TONIGHT, TOMORROW)	_____ WIND SPEED (KTS) PERIOD (SEC)		
	COMMENTS:		
16. SCOW TRACKING SYSTEM FUNCTIONING?	☐ YES ☐ NO		
17. HELMSMAN DISPLAY FUNCTIONING ON TUG?	☐ YES ☐ NO		
18. GPS FUNCTIONING ON TUG?	☐ YES ☐ NO		
19. COMMENTS			
20. CONTRACTOR'S SIGNATURE	PRINT NAME:	TIME / DATE:	
21. PERMITTEE/REPRESENTATIVE'S SIGNATURE	PRINT NAME:	TIME / DATE:	
22. THE DECISION TO PROCEED TO THE OCEAN DISPOSAL SITE, BASED UPON ALL AVAILABLE DATA INCULDING THE RECORDING AND CALCULATIONS ON THIS FORM, IS ALSO SUBJECT TO THE PROFESSIONAL JUDGEMENT OF THE TUG CAPTAIN AS TO THE SAFETY OF THE CREW AND VESSEL.			
TUG CAPTAIN'S SIGNATURE:	PRINT NAME:	TIME / DATE:	

DATE/TIME OF DUMP: _____

BARGE X OR LONGITUDE: _____

BARGE Y OR LATITUDE: _____

TUG X OR LONGITUDE: _____

TUG Y OR LATITUDE: _____

DATE/TIME OF DISPOSAL VESSEL CLOSURE: _____

BARGE X OR LONGITUDE: _____

BARGE Y OR LATITUDE: _____

TUG X OR LONGITUDE: _____

TUG Y OR LATITUDE: _____

ADDITIONAL COMMENTS, PROBLEM DESCRIPTIONS, ETC.

APPENDIX C

GENERIC SPECIAL CONDITIONS FOR MPRSA SECTION 103 PERMITS PORT EVERGLADES HARBOR, FL ODMDS

GENERIC SPECIAL CONDITIONS

FOR MPRSA SECTION 103 PERMITS

I. DISPOSAL OPERATIONS

A. For this permit, the term disposal operations shall mean: navigation of any vessel used in disposal of operations, transportation of dredged material from the dredging site to the Port Everglades Harbor ODMDS, proper disposal of dredged material at the disposal area within the Port Everglades Harbor ODMDS, and transportation of the hopper dredge or disposal barge or scow back to the dredging site.

B. The Port Everglades Harbor ODMDS is defined as the rectangle with 26°07.00'N latitude and 80°01.50'W longitude (NAD 83) or state plane coordinates 649292.4 ft N and 976098.2 ft E (NAD83). The site coordinates are as follows:

Vertices	Geographic NAD 83		State Plane (Florida East 0901 U.S. Ft) NAD 83	
	Latitude (North)	Longitude (West)	Easting	Northing
NE	26°07.50'N	80°02.00'W	973341.1 E	652301.1 N
NW	26°07.50'N	80°01.00'W	9788810.0 E	652342.1 N
SW	26°06.50'N	80°02.00'W	973386.1 E	646,242.9 N
SE	26°06.50'N	80°01.00'W	978,855.7 E	646,283.9 N

C. No more than [NUMBER] cubic yards of dredged material excavated at the location defined in [REFERENCE LOCATION IN PERMIT] are authorized for disposal at the Port Everglades Harbor ODMDS.

D. The permittee shall use an electronic positioning system to navigate to and from the Port Everglades Harbor ODMDS. For this section of the permit, the electronic positioning system is defined as: a differential global positioning system or a microwave line of site system. Use of LORAN-C alone is not an acceptable electronic positioning system for disposal operations at the Port Everglades Harbor ODMDS. If the electronic positioning system fails or navigation problems are detected, all disposal operations shall cease until the failure or navigation problems are corrected.

E. The permittee shall certify the accuracy of the electronic positioning system proposed for use during disposal operations at the Port Everglades Harbor ODMDS. The certification shall be accomplished by direct comparison of the electronic positioning system's accuracy with a known fixed point.

F. The permittee shall not allow any water or dredged material placed in a hopper dredge or disposal barge or scow to flow over the sides or leak from such vessels during transportation to the Port Everglades Harbor ODMDS prior to the sea buoy G"3". No more than 1.5 feet of draft loss is allowable while east of sea buoy G"3".

G. A disposal operations inspector and/or captain of any tug boat, hopper dredge or other vessel used to transport dredged material to the Port Everglades Harbor ODMDS shall insure compliance with disposal operation conditions defined in this permit.

1. If the disposal operations inspector or the captain detects a violation, he shall report the violation to the permittee immediately.

2. The permittee shall contact the U.S. Army Corps of Engineers, Jacksonville District's Regulatory Division [TELEPHONE NUMBER] and EPA Region 4 at (404) 562-8082 (cc: OceanDumpingR4@epa.gov) to report the violation within twenty-four (24) hours after the violation occurs. A complete written explanation of any permit violation shall be included in the disposal summary report.

H. When dredged material is disposed, no portion of the hopper dredge or disposal barge or scow shall be outside of the boundaries of the Port Everglades Harbor ODMDS as defined in Special Condition B. Additionally, disposal shall be initiated within the disposal release zone defined by the following coordinates:

Vertices	Geographic NAD 83		State Plane (Florida East 0901 U.S. Ft) NAD 83	
	Latitude (North)	Longitude (West)	Easting	Northing
NW				
NE				
SW				
SE				

I. During transit to the Port Everglades Harbor ODMDS, the disposal vessel shall remain within the navigation channel until east of the buoy "G3". Transit begins when the vessel is full and begins to proceed to the ODMDS.

J. The permittee shall use an electronic tracking system (ETS) that will continuously track the horizontal location and draft condition of the disposal vessel (hopper dredge or disposal barge or scow) to and from the Port Everglades Harbor ODMDS. Data shall be collected at least every 500 feet during travel to and from the ODMDS and every minute or every 200 feet of travel, whichever is smaller, while approaching within 1,000 feet and within the ODMDS. The permittee shall use Florida State Plane or latitude and longitude coordinates (North American Datum 1983). State Plane coordinates shall be reported to the nearest foot and latitude and longitude coordinates shall be reported as decimal degrees out to 6 decimals. Westerly longitudes are to be reported as negative. Draft readings shall be recorded in feet out to 2 decimals.

K. The permittee shall record electronically for each load the following information:

a. Load Number
b. Disposal Vessel or Scow Name
c. Estimated volume of Load
d. Description of Material Disposed
e. Source of Dredged Material
f. Date, Time and Location at Start at Initiation and Completion of Disposal Event
g. The ETS data required by Special Condition I.J.

L. The permittee shall conduct a bathymetric survey of the Port Everglades Harbor ODMDS within 30 days following project completion.

1. The number and length of the survey transects shall be sufficient to encompass the release zone specified in Special Condition H and a 500 foot wide area around the site. The transects shall be spaced at 500-foot intervals or less.

2. Vertical accuracy of the survey shall be ±0.5 feet. Horizontal location of the survey lines and depth sounding points will be determined by an automated positioning system utilizing either microwave line of site system or differential global positioning system. The vertical datum shall be mean lower low water (m.l.l.w) and the horizontal datum

shall use Florida State Plane or latitude and longitude coordinates (North American Datum 1983). State Plane coordinates shall be reported to the nearest 0.10 foot and latitude and longitude coordinates shall be reported as decimal degrees to 6 decimal points.

M. Enclosed is the Regional Biological Opinion (RBO) dated [INSERT DATE], for swimming sea turtles, whales, and sturgeon. The RBO contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the RBO. Your authorization under the Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with the incidental take of the attached RBO, which terms and conditions are incorporated by reference in the permit. Failure to comply with the terms and conditions associated with the incidental take of the RBO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. However, depending on the affected species NMFS is the appropriate authority to determine compliance with the terms and conditions of its RBO and with the Endangered Species Act (ESA). For further clarification on this point, you should contact the appropriate agency. Should they determine that the conditions of the RBO have been violated; normally they will enforce the violation of the ESA, or refer the matter to the Department of Justice.

II. REPORTING REQUIREMENTS

A. All reports, documentation and correspondence required by the conditions of this permit shall be submitted to the following addresses: U.S. Army Corps of Engineers (Corps), Regulatory Division, Enforcement Section, P.O. Box 4970, Jacksonville, Florida 32232-0019 and U. S. Environmental Protection Agency (EPA) Region 4's Oceans Wetlands Streams Protection Branch, 61 Forsyth Street, Atlanta, GA 30303 (OceanDumpingR4@epa.gov). The Permittee shall reference this permit number, [INSERT PERMIT NUMBER], on all submittals.

B. At least 15 days before initiating any dredging operations authorized by this permit, the Permittee shall provide to the Corps and EPA Region 4 a written notification of the date of commencement of work authorized by this permit, including permit/contract numbers, start date, expected end date, and other pertinent information.

C. Electronic data required by Special Conditions I.J and I.K shall be provided to EPA Region 4 on a weekly basis. Data shall be submitted as an eXtensible Markup Language (XML) document via Internet e-mail to DisposalData.R4@epa.gov. XML data file format specifications are available from EPA Region 4.

D. The permittee shall send one (1) copy of the disposal summary report to the Jacksonville District's Regulatory Division and one (1) copy of the disposal summary report to EPA Region 4 documenting compliance with all general and special conditions defined in this permit. The disposal summary report shall be sent within 90 days after completion of the disposal operations authorized by this permit. The disposal summary report shall include the following information:

1. The report shall indicate whether all general and special permit conditions were met. Any violations of the permit shall be explained in detail.

2. The disposal summary report shall include the following information: dredging project title; dates of disposal; permit number and expiration date; name of contractor(s) conducting the work, name and type of vessel(s) disposing material in the ODMDS; disposal timeframes for each vessel; volume disposed at the ODMDS (as paid *in situ* volume, total paid and un paid *in situ* volume, and gross volume reported by dredging contractor), number of loads to ODMDS, type of material disposed at the ODMDS; identification of any misplaced material (outside disposal zone or the ODMDS boundaries); dates of pre and post disposal bathymetric surveys of the ODMDS and a narrative discussing any violation(s) of the 103 permit. The disposal summary report should be accompanied by the bathymetry survey results (plot and X,Y,Z ASCII data file).

III. PERMIT LIABILITY

A. The permittee shall be responsible for ensuring compliance with all conditions of this permit.

B. The permittee and all contractors or other third parties who perform an activity authorized by this permit on behalf of the permittee shall be separately liable for a civil penalty for each violation of any term of this permit they commit alone or in concert with the permittee or other parties. This liability shall be individual, rather than joint and several, and shall not be reduced in any fashion to reflect the liability assigned to any civil penalty assessed against the permittee or any other third party as defined in 33 U.S.C. Section 1415(a).

C. If the permittee or any contractor or other third party knowingly violates any term of this permit (either alone or in concert), the permittee, contractor or other party shall be individually liable for the criminal penalties set forth in 33 U.S.C. Section 1415(b).

APPENDIX D

TYPICAL CONTRACT LANGUAGE FOR IMPEMENTING SMMP REQUIREMENTS

3.3 DISPOSAL OF DREDGED MATERIAL

3.3.1 General

All material dredged shall be transported to and deposited in the disposal area(s) designated on the drawings. The approximate maximum and average distance to which the material will have to be transported are as follows:

Disposal Area	Maximum Distance Statute Miles	Average Distance Statute Miles
Port Everglades Harbor ODMDS		
[INSERT DISPOSAL ZONES [XX miles]	[XX miles] AREA 2]	

[IF MATERIAL FROM DIFFERENT PROJECT AREAS GO TO DIFFERENT DISOSAL AREAS, IT SHOULD BE SPECIFIED HERE]

3.3.2 Ocean Disposal Notification

a. The Corps or the contractor shall notify EPA Region 4 's Oceans, Wetlands, and Stream Protection Branch (61 Forsyth Street, Atlanta, GA 30303) at least 15 calendar days and the local Coast Guard Captain of the Port at least 5 calendar days prior to the first ocean disposal. The notification will be by certified mail with a copy to the Contracting Officer. The following information shall be included in the notification:
   (1) Project designation; Corps of Engineers' Contracting Officer's name and contract number; and, the Contractor's name, address, and telephone number.
   (2) Port of departure.
   (3) Location of ocean disposal area (and disposal zone(s)).
   (4) Schedule for ocean disposal, giving date and time proposed for first ocean disposal.

3.3.3 Ocean Dredged Material Disposal Sites (ODMDS)

The material excavated shall be transported to and deposited in the Port Everglades Harbor ODMDS as shown on the drawings. When dredged material is disposed, no portion of the hopper dredge or disposal barge or scow shall be outside of the boundaries of the Port Everglades Harbor ODMDS. Additionally, disposal shall be initiated within the disposal release zone(s) defined by the following coordinates:

[insert coordinates for appropriate release zone(s)]

Vertices	Geographic NAD 83		State Plane (Florida East 0901 U.S. Ft) NAD 83	
	Latitude (North)	Longitude (West)	Easting	Northing
NW				
NE				
SW				

SE				

During transit to and from the Port Everglades Harbor ODMDS, the disposal vessel shall remain within the navigation channel until east of the buoy G"3". Dredged material shall not be leaked or spilled from vessels while west of the G"3" buoy. Leakage or spillage of material east of the sea buoy is limited to 1.5' of draft loss (average between forward and aft sensors) during transit to the ODMDS. Transit to the ODMDS begins as soon as dredged material loading into the disposal vessel is completed and the vessel begins moving to the ODMDS.

3.3.4 Logs

The Contractor shall keep a log for each load placed in the Port Everglades Harbor ODMDS. The log entry for each load shall include:

g. Load Number
h. Disposal Vessel or Scow Name
i. Estimated volume of Load
j. Description of Material Disposed
k. Source of Dredged Material
l. Date, Time and Location (coordinates) at Start of Initiation and Completion of Disposal Event

At the completion of dredging and at any time upon request, the log(s) shall be submitted in paper and electronic formats to the Contracting Officer for forwarding to the appropriate agencies.

3.3.5 Overflow, Spills and Leaks

Water and dredged materials shall not be permitted to overflow or spill out of barges, hopper dredges, or dump scows while filling or during transport to the disposal site(s) while within the Federal channel (west of Sea Buoy G"3"). Loss of dredged material during transit east of the sea

buoy (G”3”) is limited to 1.5’ (average of forward and aft sensors.) Failure to repair leaks or change the method of operation which is resulting in overflow or spillage will result in suspension of dredging operations and require prompt repair or change of operation to prevent overflow or spillage as a prerequisite to the resumption of dredging.

3.3.6 Electronic Tracking System (ETS) for Ocean Disposal Vessels

The Corps shall use Dredge Quality Management (DQM) to monitor dredging and dredge material disposal. The contractor shall use an Electronic Tracking System (ETS) to navigate to and from the harbor to the ODMDS. This ETS shall be established, operated and maintained by the contractor to continuously track in real-time the horizontal location and draft condition of the disposal vessel (hopper dredge or disposal barge or scow) for the entire dredging cycle, including dredging area and disposal area. The ETS shall be capable of displaying and recording in real-time the disposal vessel’s draft and location per the DQM specifications. If the electronic positioning system fails or navigation problems are detected, all disposal operations shall cease until the failure or navigation problems are corrected. The contractor shall certify the accuracy of the electronic positioning system proposed for use during disposal operations. The certification shall be accomplished by providing current certification documentation from the National DQM Program for scow and hopper dredge instrumentation systems. The National DQM certification is valid for one year from the date of certification

---

[USE LANGUAGE BELOW FOR NON DQM PROJECTS]

The Contractor shall furnish an ETS for surveillance of the movement and disposition of dredged material during dredging and ocean disposal. This ETS shall be established, operated and maintained by the Contractor to continuously track in real-time the horizontal location and draft condition of the disposal vessel (hopper dredge or disposal barge or scow) for the entire dredging cycle, including dredging area and disposal area. The ETS shall be capable of displaying and recording in real-time the disposal vessel’s draft and location.

3.3.6.1 ETS Standards

The Contractor shall provide automated (computer) system and components to perform in accordance with COE EM 1110-1-2909. A copy of the EM can be downloaded from the following web site: http://www.usace.army.mil/inet/usace-docs'eng-manuals/em.htm. Horizontal location shall have an accuracy equal to or better than a standard DGPS

system, equal to or better than plus/minus 10 feet (horizontal repeatability). Vertical (draft) data shall have an accuracy of plus/minus 0.5 foot. Horizontal location and vertical data shall be collected in sets and each data set shall be referenced in real-time to date and local time (to nearest minute), and shall be referenced to the same state plane

coordinate system used for the survey(s) shown in the contract plans. The ETS shall be calibrated, as required, in the presence of the Contracting Officer at the work location before disposal operations have started, and at 30-day intervals while work is in progress. The Contracting Officer shall have access to the ETS in order to observe its operation. Disposal operations will not commence until the ETS to be used by the Contractor is certified by the Contracting Officer to be operational and within acceptable accuracy. It is the Contractor's responsibility to select a system that will operate properly at the work location. The complete system shall be subject to the Contracting Officer's approval.

3.3.6.2 ETS Data Requirements and Submissions

a. The ETS for each disposal vessel shall be in operation for all dredging and disposal activities and shall record the full round trip for each loading and disposal cycle. (NOTE: A dredging and disposal cycle constitutes the time from commencement of dredging to complete discharge of the material.) The Contracting Officer shall be notified immediately in the event of ETS failure and all dredging operations for the vessel shall cease until the ETS is fully operational. Any delays resulting from ETS failure shall be at the Contractor's expense.

b. Data shall be collected, during the dredging and disposal cycle, every 500 feet (at least) during travel to the disposal area, and every minute or every 200 feet, whichever is smaller, while approaching within 1,000 feet and within the disposal area.

c. Plot Reporting (2 types):

a. Tracking Plot - For each disposal event, data collected while the disposal vessel is in the vicinity of the disposal area shall be plotted in chart form, in 200-foot intervals, to show the track and draft of the disposal vessel approaching and traversing the disposal area. The plot shall identify the exact position at which the dump commenced.
b. Scatter Plot - Following completion of all disposal events, a single and separate plot will be prepared to show the exact disposal locations of all dumps. Every plotted location shall coincide with the beginning of the respective dump. Each dump shall be labeled with the corresponding Trip Number and shall be at a small but readable scale.
c. Summary Table – A spreadsheet which contains all of the information in the log(s) above shall be prepared and shall correspond to the exact dump locations represented on the Scatter Plot.

d. ETS data and log data required by Section 3.3.4 shall be provided to EPA Region 4 on a weekly or more frequent basis. Data shall be submitted to EPA Region 4 as an eXtensible Markup Language (XML) document via Internet e-mail to DisposalData.R4@epa.gov. XML data file format specifications are available from EPA Region 4. All digital ETS data shall be furnished to the Contracting Officer within 24 hours of collection. The digital plot files should be in an easily readable format such as Adobe Acrobat PDF file, Microstation DGN file, JPEG, BMP, TIFF, or similar. The hard copy of the ETS data and tracking plots shall be both maintained onboard the vessel and submitted to the Contracting Officer on a weekly basis.

[FOR DQM PROJECTS]

See: http://dqm.usace.army.mil/Specifications/Index.aspx

For scows, the monitoring profile, TDS profile or Ullage profile shall be used.

3.3.6.3 Misplaced Materials

Materials deposited outside of the disposal zone specified in 3.3.3 will be classified as misplaced material and will result in a suspension of dredging operations. Redredging of such materials will be required as a prerequisite to the resumption of dredging unless the Contracting Officer, at his discretion, determines that redredging of such material is not practical. If redredging of such material is not required then the quantity of such misplaced material shall be deducted from the Contractor's pay quantity. If the quantity for each misplaced load to be deducted cannot initially be agreed to by both the Contractor and Contracting Officer, then an average hopper/scow load quantity for the entire contract will be used in the determination. Misplaced loads may also be subject to penalty under the Marine, Protection, Research and Sanctuaries Act. Materials deposited above the maximum indicated elevation or outside of the disposal area template shown will require the redredging or removal of such materials at the Contractor's expense. In addition, the Contractor must notify the Contracting Officer and the Environmental Protection Agency Region 4 's Oceans Estuary and Marine Management Section (61 Forsyth Street, Atlanta, GA 30303) within 24 hours of a misplaced dump or any other violation of the Site Management and Monitoring Plan for the Port Everglades Harbor ODMDS. Corrective actions must be implemented by the next dump and the Contracting Officer must be informed of actions taken.

ENVIRONMENTAL ASSESSMENT ON THE EXPANSION OF THE PORT EVERGLADES HARBOR

OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)

BROWARD COUNTY, FLORIDA

APPENDIX B.

PERTINENT COMMUNICATIONS (placeholder)

APPENDIX C

COMMENTS AND RESPONSES TO COMMENTS

ENVIRONMENTAL ASSESSMENT ON THE EXPANSION OF THE PORT EVERGLADES HARBOR

OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)

BROWARD COUNTY, FLORIDA