

November 2018

ENVIRONMENTAL ASSESSMENT

**OPERATIONS AND MAINTENANCE DREDGING AND
DREDGED MATERIAL PLACEMENT FOR
INTRACOASTAL WATERWAY (IWW) BROWARD
COUNTY, REACH 1 AND PALM BEACH COUNTY,
REACH 4 (CUTS P-59 TO P-60)**

**BROWARD COUNTY, FLORIDA
PALM BEACH COUNTY, FLORIDA**



US Army Corps of Engineers
JACKSONVILLE DISTRICT



**US Army Corps of Engineers
JACKSONVILLE DISTRICT**

FINDING OF NO SIGNIFICANT IMPACT

ENVIRONMENTAL ASSESSMENT FOR OPERATIONS AND MAINTENANCE DREDGING AND DREDGED MATERIAL PLACEMENT FOR INTRACOASTAL WATERWAY BROWARD COUNTY, REACH 1 AND PALM BEACH COUNTY, REACH 4 (CUTS P-59 TO P-60) FEDERAL NAVIGATION PROJECT IN BROWARD COUNTY, FLORIDA AND PALM BEACH COUNTY, FLORIDA

The U.S. Army Corps of Engineers, Jacksonville District (Corps) has conducted an environmental assessment in accordance with the National Environmental Policy Act of 1969, as amended (NEPA). The Corps assessed the effects of the following actions in the Environmental Assessment (EA), dated November 2018, for the operations and maintenance (O&M) dredging and dredged material placement for the Intracoastal Waterway (IWW) Broward County, Reach 1 Federal Navigation Project in Broward County, Florida and Palm Beach County, Reach 4 (cuts P-59 to P-60) Federal Navigation Project in Palm Beach County, Florida. The final recommendation is contained in the EA and is incorporated herein by reference. The proposed work consists of the following:

- Routine O&M dredging on an “as needed” basis of an estimated 75,000 cubic yards (CY) of silt and silty sand from the IWW Broward County, Reach 1 Federal channel to maintain an authorized depth of twelve feet (ten feet required project depth plus up to two foot allowable over depth);
- Routine O&M dredging on an “as needed” basis of an estimated 7,000 CY of poorly graded sand from the shoal in the IWW Palm Beach County, Reach 4, cuts P-59 to P-60 to maintain an authorized depth of ten feet (nine feet required project depth plus one foot allowable over depth).
- Determination of the exact placement location(s) to use will be reliant upon available funds, location, and CY of sediments to be dredged as well as the placement site’s capacity, authorizations, and location in relation to the dredging. Dredged material is proposed for placement in the following locations:
 - Florida Inland Navigation District (FIND) owned property and/or previously authorized and approved upland dredged material management area (DMMA). (Sites MSA 726 and 641A are proposed to be used in the upcoming dredge cycle);
 - Nearshore environment north and/or south of the Hillsboro Inlet;
 - Beach approximately 300 linear feet (LF) north of the Hillsboro Inlet;
 - Beach approximately 500 LF south of the Hillsboro Inlet, between R-28 to R-

- o 32;
- o Hillsboro Inlet Impoundment Basin.

Congress originally authorized the project in the Rivers and Harbors Act of 1927 (Public Law 69-560), which was further modified by later acts of Congress. Construction of the project occurred in approximately 1965, prior to the implementation of NEPA. This particular reach has not needed operations and maintenance dredging since its original construction due to the low input of sediments and its ability to maintain the authorized depths. Based on available records, this NEPA assessment is the first one completed for the channel. In addition to the "No Action" and Preferred Alternative, the Corps evaluated a final array of seven placement option alternatives with varying levels of benefits and costs.

The Corps incorporated all practicable means to avoid and minimize adverse environmental effects into the recommended plan. The Corps will implement the environmental commitments as detailed in the EA to minimize impacts.

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, this project has been coordinated with National Marine Fisheries Service through the South Atlantic Regional Biological Opinion dated September 25, 1997, as amended. For potential effects to Federally listed threatened and endangered species under the U.S. Fish and Wildlife Services' jurisdiction, consultation was requested under the USFWS 2015 Statewide Programmatic Biological Opinion for Shore Protection Activities along the Coast of Florida and the USFWS 2013 Programmatic Piping Plover Biological Opinion. USFWS concurred with the Corps' determinations and coordination with the USFWS has been completed. Pertinent correspondence is found in Appendix A.

Pursuant to the Coastal Zone Management Act, a Federal Consistency Determination (FCD), found in Appendix B of the EA, was submitted to the Florida Department of Environmental Protection (FDEP) for the State of Florida's review and concurrence during the public and agency review and comment period. FDEP has concluded that the proposed project is consistent with the Florida Coastal Zone Management Program and its associated statutes. Maintenance dredging and placement into an upland FIND-owned site meets requirements of the exemption statute (Section 403.813, Florida Statutes) and will meet water quality standards per Chapter 62-302, State of Florida, Department of Environmental Protection. If at a future date, the Corps selects Hillsboro Inlet Impoundment Basin, the nearshore, and/or the beach for placement of dredged material, the Corps will obtain a water quality certification pursuant to Section 401 of the Clean Water Act from FDEP prior to construction. Conditions imposed by the exemption statute and/or water quality certification will be implemented in order to minimize adverse impacts to water quality.

The Corps determined that the discharge of dredged or fill material associated with the Preferred Alternative is compliant with Section 404(b)(1) Guidelines as required by the

Clean Water Act. The Clean Water Act Section 404(b)(1) Guidelines evaluation is found in Appendix C of the EA.

This project's dredging footprint is included in the project scope and description of the Regional General Permit SAJ-93 issued by the Corps' Regulatory Division on April 26, 2016. The Corps concluded the Essential Fish Habitat (EFH) consultation through the issuance of the permit and no additional EFH consultation is required. Placement of dredged material in upland sites does not require EFH consultation. Placement of dredged material in the proposed southern nearshore and beach placement areas is similar to the effects analyzed for the issuance of the Hillsboro Inlet permit and EFH consultation; therefore, no additional consultation is required. If at a future date, the Corps selects northern nearshore and/or beach placement areas for the placement of dredged material, that decision would require EFH consultation.

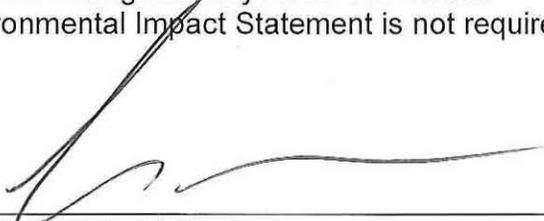
The Corps completed consultation with the Florida State Historic Preservation Officer and the appropriate federally-recognized Tribes pursuant to Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, and Appendix A contains the pertinent correspondence. The Corps has determined that the Preferred Alternative poses no effect to historic properties.

The Corps released the draft EA, Proposed Finding of No Significant Impact, and associated appendices for a 30-day public and agency review. The Corps responded to all comments submitted during the public comment period and included them in the final EA and Finding of No Significant Impact.

The Corps considered all applicable laws, executive orders, and regulations in the evaluation of the alternatives. Based on these reports, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the Preferred Alternative would not significantly affect the human environment; therefore, preparation of an Environmental Impact Statement is not required.

5 NOV 2018

Date



Andrew D. Kelly, Jr.
Colonel, Corps of Engineers
District Commander

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ENVIRONMENTAL ASSESSMENT
INTRACOASTAL WATERWAY BROWARD COUNTY, REACH 1 AND PALM BEACH
COUNTY, REACH 4 (CUTS P-59 TO P-60)
FEDERAL NAVIGATION PROJECT
OPERATIONS AND MAINTENANCE
DREDGING AND DREDGED MATERIAL PLACEMENT

1 PROJECT PURPOSE AND NEED

1.1 PROJECT DESCRIPTION

The U.S. Army Corps of Engineers, Jacksonville District (Corps) proposes to periodically maintain the Intracoastal Waterway (IWW) in Broward County, Reach 1 and cuts P-59 to P-60 of the IWW in Palm Beach County, Reach 4, on an “as needed” basis with the non-Federal sponsor, the Florida Inland Navigation District (FIND).

The Broward County reach of the IWW consists of approximately 25 miles of waterway, running the full length of the county. The IWW Broward County, Reach 1 is approximately five miles long (see **Figure 1**).

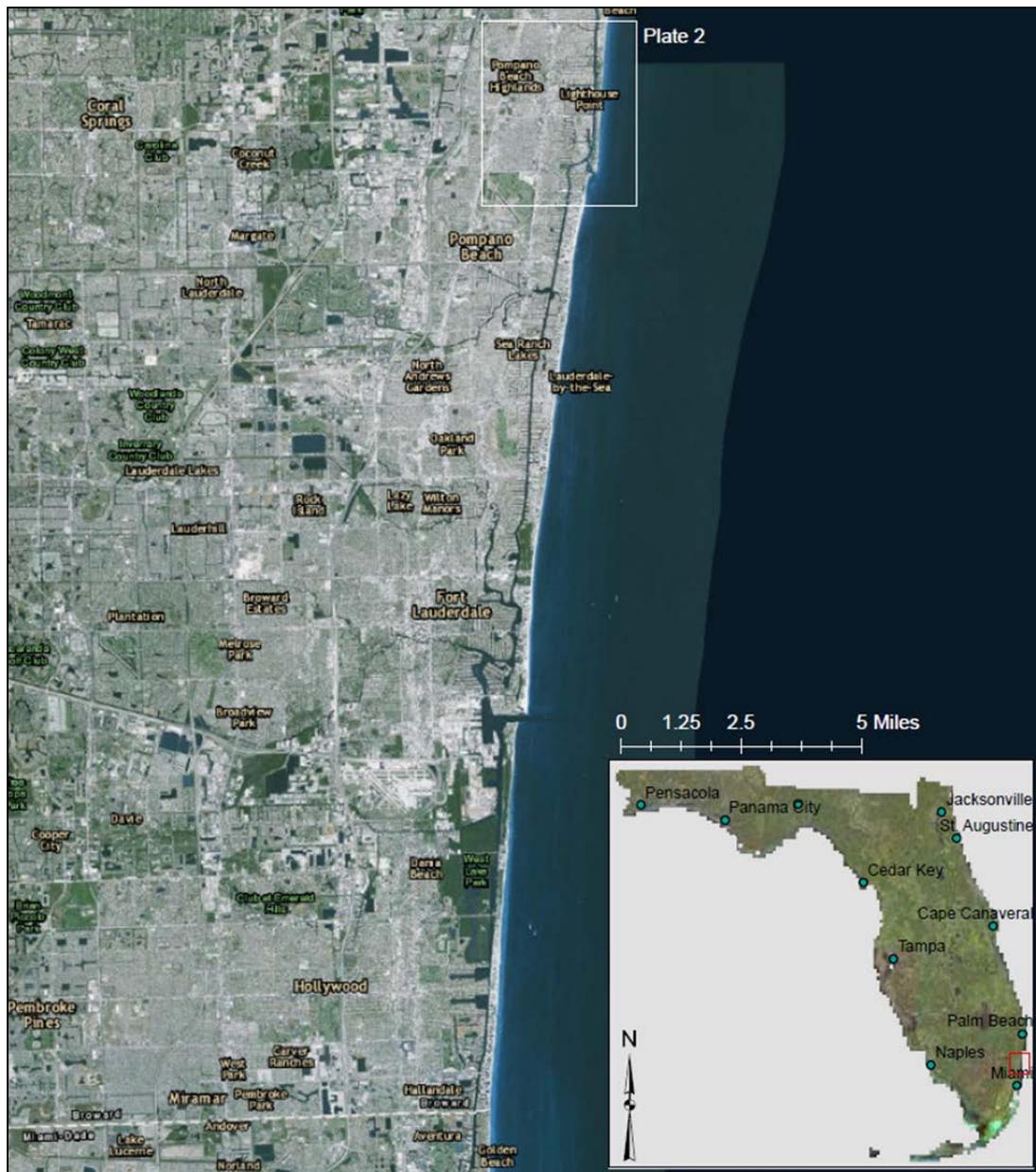


Figure 1. IWW Broward County, Reach 1 vicinity map.

The IWW within this reach is authorized at 10 feet deep by 125 feet wide. The Corps must dredge approximately 75,000 cubic yards (CY) of material in order to maintain the channel to the authorized depth. As defined in the Long-Range Dredged Material Management Plan for the Intracoastal Waterway in Broward County, Florida (Taylor et al., 2003): “Reach I, the northernmost reach in Broward County, extends from a point 650 feet south of the Palm Beach/Broward County line (IWW mile 309.24; cut BW-1, station 0+00) southward 4.74 miles to a point just south of Hillsboro Inlet (IWW mile 313.98; cut BW-22, station 0+00) approximately 1,600 feet north of the Northeast 14th Street Bridge” (see **Figure 2**).

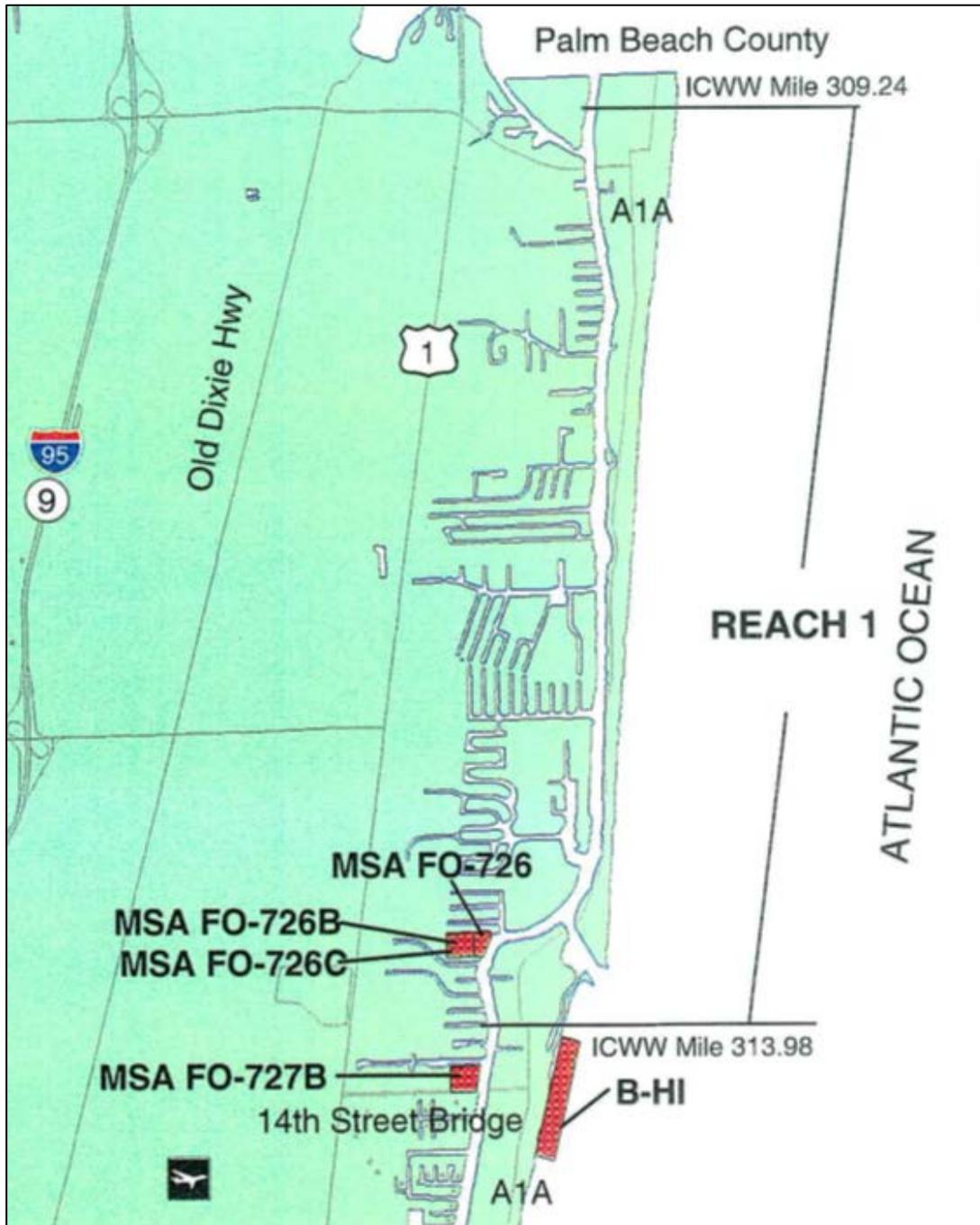


Figure 2. IWW Broward County, Reach 1 project location and adjacent FIND dredged material management areas (DMMAs). (Source: Taylor Engineering, Inc. 2003)

IWW Broward County, Reach 1 has not required maintenance dredging since its original construction in approximately 1965 due to low shoaling rates and its ability to maintain the authorized depths naturally. This reach of the IWW is located within close proximity of the Hillsboro Inlet setting basin/sand bypass system, which may contribute to the low shoaling rate. In addition to the proposed dredging of Reach 1 of the IWW in Broward County, there is an additional shoal requiring dredging in cuts P-59 to P-60 in Reach 4 of the IWW in Palm Beach

County. Approximately 7,000 CY of shoaled material, stretching perpendicular to the Federal Channel, currently requires dredging to maintain the channel to the depth of 10 feet (9 feet with 1 feet allowable overdepth) (see **Figure 3**). Similar to IWW Broward County, Reach 1, due to low shoaling rates, this portion of the IWW has also not required maintenance dredging since its original construction.

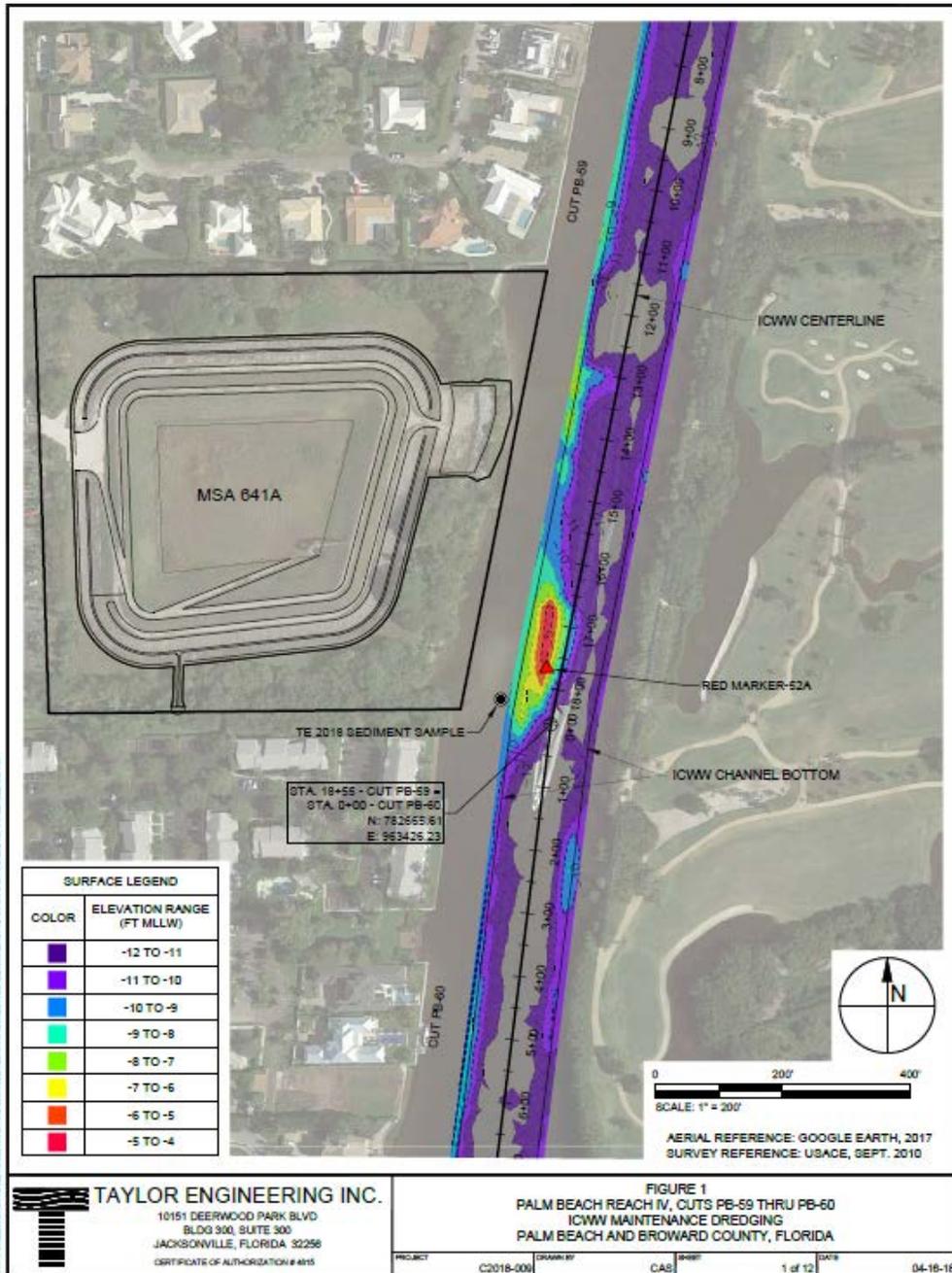


Figure 3. Shoaling at MSA 641A. (Source: Taylor Engineering, Inc. 2018)

1.2 PROJECT PURPOSE AND NEED

The purpose of the project is to continue to maintain safe and efficient vessel navigation through

the Federal channel. The accumulation of sediment, commonly referred to as shoaling, within the limits of the Federal channel created the need to complete this project. The shoaling has reduced channel depths, hindering safe, efficient vessel navigation. Shoaling within these areas is spotty and is not one long contiguous shoal. Periodic dredging is required to remove accumulated sediments and thus maintain the channel to its federally authorized dimensions. This environmental assessment (EA) evaluates the periodic operations and maintenance (O&M) dredging of Reach 1 of the IWW in Broward County, the shoal in cuts P-59 to P-60 of Reach 4 of the IWW in Palm Beach County, and placement of dredged material in several different potential placement locations, depending on the quality and quantity of the dredged material, time of year, and funding. This EA also completes the required analysis under National Environmental Policy Act (NEPA).

1.3 PROJECT AUTHORITY

Congress originally authorized the IWW Jacksonville to Miami in the Rivers and Harbors Act of 1927 (Public Law 69-560) at 8 feet deep and 75 feet wide. Congress authorized widening the channel to 100 feet in the Rivers and Harbor Act of 1930 (Public Law 71-520) and increased the channel depth to 12 feet in the Rivers and Harbor Act of 1945 (Public Law 79-14). On July 3, 1958, Congress authorized reducing the depth of the channel from Fort Pierce to Miami to 10 feet in the Rivers and Harbors Act of 1958 (Public Law 85-500). Finally, expansion of the waterway to its present dimensions of 10 feet deep and 125 feet wide from Fort Pierce to Miami was in 1960.

Typically O&M dredging is 100% federally funded. FIND has provided non-federal funding to supplement or pay for dredging when appropriated funds are not available. Broward County would benefit from the potential placement of sand on county beaches and is responsible for obtaining any real estate easements and rights-of-way required for potential beach placement of dredged material.

1.4 RELATED ENVIRONMENTAL DOCUMENTS

Related design and planning reports for the IWW Broward County, Reach 1 project includes the following documents, which are available on request:

- Chief's Report for the Intracoastal Waterway from Jacksonville, Florida to Miami, Florida. January 21, 1927.
- Chief's Report for Modifications to the Intracoastal Waterway from Jacksonville to Miami, Florida. January 30, 1930.
- Chief's Report for Modifications to the Intracoastal Waterway from Jacksonville to Miami, Florida. October 26, 1942.
- Survey-Review Report 80754 IWW, Fort Pierce to Miami, Florida. October 1978.
- Long Range Operation and Maintenance Study of the Atlantic Intracoastal Waterways Extending from Fernandina Harbor, Florida to Key West, Florida. January 1981.
- Environmental Assessment for the Construction of Dredged Material Disposal Areas along the Atlantic Intracoastal Waterway, at Sites MSA-641A and MSA-640/640A, Palm Beach County, Florida. May 2, 1994.

- Survey of Boating Activity along the Atlantic Intracoastal Waterway in Broward County. November 1998.
- Broward County, Florida Shore Protection Project. Segments II and III. General Reevaluation Report with Final Environmental Impact Statement. May 2004.
- Environmental Assessment and Finding of No Significant Impact for Flood Control and Coastal Emergency Placement of Sand on Broward County Segment II. Broward County, Florida. August 3, 2013.¹
- Broward County, Florida Shore Protection Project, Segment II, Limited Reevaluation Report with Environmental Assessment and Finding of No Significant Impact. October 27, 2015.²
- Regional General Permit SAJ-93² issued to FIND on April 26, 2016 for the East Coast Florida Maintenance Dredging of the Atlantic Intracoastal, Intracoastal, and Okeechobee Waterways.

1.5 DECISION TO BE MADE

There are three decisions to be made within this EA. The first decision is whether to conduct periodic maintenance dredging within the IWW to its authorized dimensions for Broward County, Reach 1 and cuts P-59 to P-60 of the IWW Palm Beach County, Reach 4. The second decision is where to place the dredged material during those maintenance events; and the third decision is to determine whether the continued O&M dredging of the IWW will result in significant effects on the human environment. The need for mitigation measures or best management practices (BMPs) to reduce any potentially adverse effects, particularly in regards to associated activities, will be determined based upon the analysis contained within this EA. The Corps will make the decision to sign the Finding of No Significant Impact (FONSI) and move forward with the Preferred Alternative if no significant impacts on the human environment are identified. If significant impacts are identified, the Corps will choose to implement mitigation measures to reduce the impacts to a lower-than-significant threshold, proceed with the Notice of Intent to prepare an Environmental Impact Statement (EIS), or not implement the Preferred Alternative.

1.6 SCOPING AND RELEVANT ISSUES

1.6.1 SCOPING

In a letter dated July 31, 2017, the Corps initiated the 30-day public scoping period for the IWW Broward County, Reach 1 maintenance dredging project. The letter was circulated to applicable Federal, state and local agencies and interested non-governmental organizations. The Corps received comments from the U.S. Environmental Protection Agency (USEPA), Miami Waterkeeper, Center for Biological Diversity, Diving Equipment and Marketing Association, and

² These reports are digitally available under “Broward County” on the Jacksonville District’s Environmental Documents library located at the following link: <http://www.saj.usace.army.mil/About/Divisions-Offices/Planning/Environmental-Branch/Environmental-Documents/>

² Regional General Permit SAJ-93 is digitally available under “Permitting” then “General Permits” on the Jacksonville District’s Regulatory Source Book located at the following link: <http://www.saj.usace.army.mil/Missions/Regulatory/Source-Book/>

Florida Fish and Wildlife Conservation Commission (FWC). These comments were considered and, where appropriate, were incorporated into this analysis. **Appendix E (Public and Agency Project Comments)** includes copies of the comments.

1.6.2 RELEVANT ISSUES

The Corps identified the following issues as relevant to the Preferred Alternative and appropriate for further evaluation: sediment characteristics, seagrasses, hardbottom communities, fish and wildlife resources, threatened and endangered species, essential fish habitat, air quality, water quality, noise, aesthetics, recreation, socioeconomics, navigation and public safety, cultural resources, energy requirements and conservation, natural or depletable resources, and cumulative effects. Section 2 (Alternatives) includes a summary of these reviews.

1.6.3 ISSUES ELIMINATED FROM FURTHER ANALYSIS

The Corps did not specifically identify any issues for elimination.

1.7 PERMITS, LICENSES, AND ENTITLEMENTS

Since there will be a discharge of dredged or fill material into waters of the United States (U.S.), the Preferred Alternative is subject to Section 404 of the Clean Water Act (CWA) (33 U.S.C. §1344). In addition, the Preferred Alternative is subject to Section 401 of the CWA (33 U.S.C. §1341) for certification of water quality by the State. Maintenance dredging and placement into an upland FIND-owned site meets requirements of the exemption statute (Section 403.813, Florida Statutes) and will meet water quality standards per Chapter 62-302, State of Florida, Department of Environmental Protection. If at a future date, the Corps selects Hillsboro Inlet Impoundment Basin, the nearshore, and/or the beach for placement of dredged material, the Corps will obtain a water quality certification pursuant to Section 401 of the Clean Water Act from FDEP prior to construction. Conditions imposed by the exemption statute and/or water quality certification will be implemented in order to minimize adverse impacts to water quality. The Corps will obtain the applicable authorizations under Section 401 prior to construction of the project. Section 6 (Environmental Commitments) and Section 7 (Compliance with Environmental Requirements) of this EA contains detailed coordination efforts and provides a detailed list of environmental compliance regulations, policies, and permits applicable to this project. **Appendix A (Environmental Correspondence)** includes pertinent correspondence.

The Corps, Regulatory Division (RD), issued Regional General Permit (Permit No. SAJ-93) (RGP SAJ-93) to FIND on April 26, 2016 for the O&M dredging of the entire length of the IWW from the Florida/Georgia state line south through the Miami-Dade/Monroe County line. The Federal government cannot permit itself, therefore, RD does not issue permits for Corps' civil works projects. However, the consultations and NEPA analysis associated with permits issued by RD are incorporated into this EA. In addition, this project will rely upon the provisions within RGP SAJ-93 for any O&M dredging to be conducted by the Corps instead of FIND. This NEPA analysis adopts the previously listed documents and permits and incorporates their analysis by reference within this EA.

The proposed O&M dredging is subject to the Coastal Zone Management Act (CZMA) and a

Federal Consistency Determination (FCD) was submitted to the Florida Department of Environmental Protection (FDEP) for the State of Florida's review during the public and agency review and comment period. FDEP concurred with the Corps' determination that the Preferred Alternative is consistent with the enforceable policies of the Florida Coastal Management Program. **Appendix B (CZMA FCD)** includes the FCD and pertinent correspondence.

1.7.1 PERMIT HISTORY

This portion of the IWW has not needed to be dredged since authorization; therefore, no permits for the applicable activities currently exist.

However, both the State of Florida and RD previously permitted one aspect of the project: the bypassing of sand by small cutterhead dredge from within Hillsboro Inlet and placement of this sand hydraulically on the beach south of the inlet. The state and federal permits are listed below:

- Florida Department of Environmental Protection (FDEP) Permit No. 0229394-001-JC was issued to the Hillsboro Inlet District (HID) on December 2, 2008 and expires December 2, 2018. The permit authorizes maintenance dredging of the Hillsboro Inlet and bypassing of the dredged, beach-compatible sand to the south side of the inlet. The excavated sand is placed on approximately 1.46 acres of the beach, seaward of the Erosion Control Line. Since its issuance, the permit has had multiple modifications, most recently in July 2014 to revise permit conditions pertaining to dredge area designations, turbidity monitoring, and commencement notification procedures.
- RD (Permit No. SAJ-1993-01995 (MOD-LCK), Modification-2) was issued to HID on July 31, 2015 and expires September 1, 2018. This permit authorizes the maintenance dredging and bypassing of sand from the Hillsboro Inlet and was modified on September 22, 2015, to reflect changes in the authorized project description.

2 ALTERNATIVES

The alternatives section is perhaps the most important component of this EA. It describes the No Action Alternative, the Preferred Alternative, and other reasonable alternatives that were evaluated. **Table 1** presents the beneficial and adverse environmental effects of the project alternatives and placement options in comparative form. Section 4 (Environmental Effects) discusses the alternatives and placement options in more detail, providing a clear basis for choice to the decision maker and the public. The project's Preferred Alternative best meets the project objectives and constraints, has the least environmental concerns, and is economically justified.

2.1 POTENTIAL DREDGING METHODOLOGIES

As the Corps does not dictate contractor methods to perform the required dredging, the Corps has evaluated a wide range of potential dredge techniques within this EA. Dredging methods for the project may include dredging via hydraulic cutterhead, mechanical, or Corps-owned special purpose small hopper dredges (*Murden* or *Currituck*). Hydraulic and hopper dredges suction sediments from the channel bottom. A hydraulic cutterhead dredge will pump the material via pipeline to a nearby placement site or to a scow to transport the material to an offsite location. Offsite locations may include beach placement, nearshore placement, or upland dredged material management areas (DMMA). A hopper dredge discharges the material into the storage hoppers on the dredge, which are opened for a controlled-release in the nearshore environment. Mechanical dredging involves using scow mounted or shoreline based heavy equipment and excavators. Dredged material is removed via a bucket (clamshell or excavator) and transported for placement via scows or trucks. Mechanical dredging is less precise than hydraulic cutterhead or hopper dredging; however, mechanical dredges can be used in smaller navigation channels due to increased maneuverability. A more detailed description of types of dredging equipment and their characteristics can be found in Engineer Manual, EM 1110-2-5025, Engineering and Design - Dredging and Dredged Material Disposal. This Engineer Manual is available on the internet at <http://www.usace.army.mil/publications/eng-manuals/em1110-2-5025/toc.htm>. Pertinent sections of Section 4 (Environmental Effects) discuss the effects of dredging methods.

2.2 DESCRIPTION OF ALTERNATIVES

2.2.1 NO ACTION ALTERNATIVE

NEPA regulations refer to the No Action Alternative as the continuation of existing conditions of the affected environment without implementation of, or in the absence of, the Preferred Alternative. 40 CFR §6.205 requires an agency to assess the No Action Alternative in an EA. Under this alternative, Reach 1 of the IWW in Broward County and the shoal in cuts P-59 to P-60 of Reach 4 of the IWW in Palm Beach County would not be subject to periodic O&M events. These areas would likely continue to experience low shoaling rates and depths would be maintained naturally. The No Action Alternative eliminates environmental effects to the human environment associated with dredging and placement; however, continued shoaling of the project areas would result in continued reduction of operational depths. The channel would eventually reach hydrodynamic equilibrium, eliminating the benefits of the waterway, as it would be expected that shoaling would create a hazard to safe navigation and cause a potential human

health and safety issue.

2.2.2 ALTERNATIVE 1 (PREFERRED ALTERNATIVE) – O&M DREDGING OF BROWARD COUNTY, REACH 1 AND PALM BEACH COUNTY, REACH 4 (CUTS P-59 TO P-60) WITH DREDGED MATERIAL PLACEMENT OPTIONS

The Preferred Alternative, Alternative 1, is to conduct periodic maintenance dredging (via hydraulic, mechanical, or hopper dredge) on an as needed basis. All of the dredged material placement options considered in this EA are environmentally acceptable and may be used in future cycles. Determination of the exact placement site to use will be reliant on available funds, location and CY of sediments to be dredged as well as placement site capacity, authorizations/approvals, and location(s) in relationship to the dredging location(s).

PLACEMENT OPTION A: DMMA

Dredged material from the implementation of Alternative 1 (O&M Dredging) will be placed in a FIND owned, previously authorized and approved upland DMMA. Determination of the exact DMMA to use will be reliant on available funds, location and cubic yards of sediments dredged, DMMA capacity, DMMA authorizations/approvals, and DMMA location(s) in relationship to the dredging location(s). Placement of dredged material into FIND owned property and/or previously authorized and approved upland DMMA is currently the least cost, environmentally acceptable placement option; therefore, Alternative 1A is the Preferred Alternative and placement option for this upcoming dredge cycle.

In the upcoming dredge cycle, dredged material from the shoal in cuts P-59 to P-60 in the IWW Palm Beach County, Reach 4 is proposed for placement in MSA 641A, which is adjacent to the shoal's location (see **Figure 4** and **Figure 5**). The Corps completed an EA assessing the effects of placing dredged material in the MSA 641A DMMA and signed a FONSI for the DMMA on May 2, 1994, which is incorporated by reference.



Figure 4. MSA 641A location.

For the upcoming dredge cycle, dredged material from the IWW Broward County, Reach 1 is proposed to be pumped into geotubes that will be dewatered and stored in MSA 726, which is adjacent to the southern portion of the channel, near Hillsboro Inlet (see **Figure 5**). A DMMA has not yet been constructed at the MSA 726 site; however, the site is owned and maintained by FIND and has undergone clearing and landscaping to prepare for use as a permanent, long range DMMA. Beach compatible material stored in the geotubes at this site may be transported for use in beach nourishment projects at a later date.

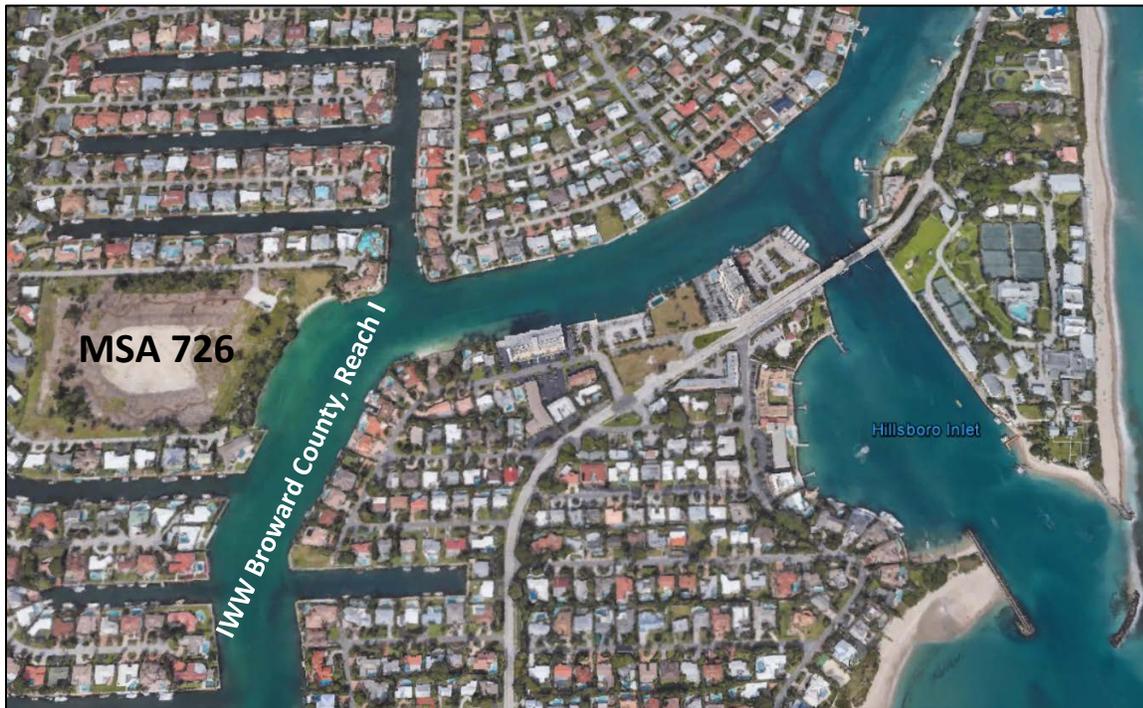


Figure 5. MSA 726 location.

PLACEMENT OPTION B: HILLSBORO INLET IMPOUNDMENT BASIN

This option proposes to place dredged material from the implementation of Alternative 1 (O&M Dredging) in the Hillsboro Inlet Impoundment Basin (see **Figure 6** and **Figure 13** for basin location). Placement of dredged material from IWW Broward County, Reach 1 does not currently meet HID's current management plan; however, HID could modify the plan if future conditions necessitate usage of the impoundment basin.

PLACEMENT OPTION C: NEARSHORE ENVIRONMENT SOUTH OF THE INLET

This option proposes to place dredged material from the implementation of Alternative 1 (O&M Dredging) in the nearshore environment, south of the inlet (see **Figure 6**). Based on geotechnical investigations conducted in 2014, the existing sediments in Reach 1 are too dark for nearshore placement. Although some mixing of sediments is expected, placement of sand in the nearshore could result in a change in the nature of the beach as the nearshore sand migrates into the beach template. Changes to the color of the sand on the beach could potentially result in a temperature change of the beach, which could impact sea turtle nesting sex ratios. A nearshore hardbottom area is located near the proposed placement site and has been extensively monitored by the HID.

If future geotechnical investigations determine sediment color is light enough for nearshore placement, the dredged material could be used to augment the littoral drift system in this area during future dredge cycles.

PLACEMENT OPTION D: NEARSHORE ENVIRONMENT NORTH OF THE INLET

This option proposes to place dredged material from the implementation of Alternative 1 (O&M Dredging) north of the inlet in the nearshore environment (see **Figure 7**). Placement in this location would not require any additional real estate interests; however, this placement option would have the same sediment color challenges as previously mentioned in Placement Option C. In addition, placement in this area could result in the HID paying to bypass the material as it migrates south and shoals into the inlet.

PLACEMENT OPTION E: BEACH SOUTH OF THE INLET

This option proposes to place dredged material from the implementation of Alternative 1 (O&M Dredging) on the beach south of the inlet (see **Figure 6**) and is similar in nature to the current beach placement operations conducted by the HID. This placement option has the same constraints as mentioned in Placement Option C. If future geotechnical investigations determine sediments are light enough for beach placement, the dredged material could be potentially used to nourish the beach system in this area during future dredge cycles.

PLACEMENT OPTION F: BEACH NORTH OF THE INLET

This placement option proposes dredged material placement on the beach north of the inlet (see **Figure 6**). This alternative has similar constraints as mentioned in Placement Option D. Beach property in this area is privately owned, which may result in real estate challenges to obtain easements to place dredged material on the beach landward of the erosion control line.



Figure 6. Proposed northern beach placement site, southern beach placement site, and southern nearshore placement site. (Source: Corps' project scoping letter 2017)



Figure 7. Proposed northern nearshore placement area. (Source: Corps' project scoping letter 2017)

2.3 COMPARISON OF ALTERNATIVES

Table 1 summarizes the major features and consequences of the each alternative and placement options, including the Preferred Alternative and the No Action alternatives. Refer to Section 4 (Environmental Effects) for a more detailed discussion of effects of alternatives and placement options.

Table 1. Comparison of alternatives and placement options.

<i>Environmental Factor (Section of EA)</i>	<i>No Action Alternative</i>	<i>Alternative 1A</i>	<i>Alternative 1B</i>	<i>Alternative 1C</i>	<i>Alternative 1D</i>	<i>Alternative 1E</i>	<i>Alternative 1F</i>
Sediment Characteristics 4.1	No effect to native sediment characteristics would occur within the navigation channels. The channel will continue to fill with sediments brought in on the flood tide each day and in association with weather events.	Long-term impacts to bathymetry, typical of a dredging project (i.e. deeper depths due to the removal of sediments), are expected with continued O&M dredging. Due to low shoaling rates, it is reasonable to assume that these events may be analogous to a large-scale environmental perturbation and could potentially increase diversity of flora and fauna communities. No effect or change to sediments is expected from placement in a DMMA.	Long-term impacts to bathymetry, typical of a dredging project, (e.g. deeper depths, removal of sediments and benthic community), are expected with continued O&M dredging. Due to low shoaling rates, it is reasonable to assume that these events may be analogous to a large-scale environmental perturbation and could potentially increase diversity of flora and fauna communities. Some mixing of sediments would be expected with placement in the Hillsboro Inlet Impoundment Basin, which could result in the dredged material becoming light enough for future use on the nearby beaches.	Long-term impacts to bathymetry, typical of a dredging project, (e.g. deeper depths, removal of sediments and benthic community), are expected with continued O&M dredging. Due to low shoaling rates, it is reasonable to assume that these events may be analogous to a large-scale environmental perturbation and could potentially increase diversity of flora and fauna communities. Some mixing of sediments would be expected with placement in the nearshore.	Same as Alternative 1C.	Long-term impacts to bathymetry, typical of a dredging project, (e.g. deeper depths, removal of sediments and benthic community), are expected with continued O&M dredging. Due to low shoaling rates, it is reasonable to assume that these events may be analogous to a large-scale environmental perturbation and could potentially increase diversity of flora and fauna communities. FDEP would likely not approve beach placement due to the dredged material being darker in color than the Broward County beaches.	Same as Alternative 1E.
Hazardous, Toxic, and Radioactive Waste (HTRW) 4.2	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.

Environmental Factor (Section of EA)	No Action Alternative	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 1D	Alternative 1E	Alternative 1F
Fish and Wildlife 4.3	As the channel fills in with sediment, the area available to macroinfaunal benthos already in the sediment will increase. The number of benthic invertebrates may increase in proportion to the available substrate. Additionally, the shoaling of the channel may result in the colonization of the channel by seagrasses as more light reaches the bottom of the channel.	Dredging will result in temporary increases in turbidity and sedimentation, removal and burial of benthic species, and displacement of fish and marine mammals. Temporary displacement and noise related to use of heavy construction equipment during placement activities could disturb nesting and foraging birds, marine mammals, and other wildlife. Seagrass beds were previously documented by FWC along the shorelines adjacent to MSA 641A and MSA 726. The Corps will include language in the project plans and specifications prohibiting spudding and/or anchoring in seagrass beds. Return water from the DMMAs could temporarily increase turbidity, which could adversely affect seagrasses. However, these elevated turbidity levels would be limited to the duration of construction.	Dredging will result in temporary increases in turbidity and sedimentation, removal and burial of benthic species, and displacement of fish and marine mammals. Temporary displacement and noise related to use of heavy construction equipment during placement activities could disturb nesting and foraging birds, marine mammals, and other wildlife.	Dredging will result in temporary increases in turbidity and sedimentation, removal and burial of benthic species, and displacement of fish and marine mammals. Temporary displacement and noise related to use of heavy construction equipment during placement activities could disturb nesting and foraging birds, marine mammals, and other wildlife. A hardbottom coral reef system is located immediately south of the mouth of the Hillsboro Inlet and is adjacent to the proposed placement site. Potential temporary effects due to short-term turbidity during nearshore placement, similar to ongoing activities at the Hillsboro Inlet Sand Bypass project, is expected.	Dredging will result in temporary increases in turbidity and sedimentation, removal and burial of benthic species, and displacement of fish and marine mammals. Temporary displacement and noise related to use of heavy construction equipment during placement activities could disturb nesting and foraging birds, marine mammals, and other wildlife.	Same as Alternative 1D.	Same as Alternative 1D.

Environmental Factor (Section of EA)	No Action Alternative	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 1D	Alternative 1E	Alternative 1F
Threatened and Endangered Species 4.4	Continued shoaling may result in shallow channel depths that enable the expansion of seagrasses into the previously dredged areas. This will benefit to the seagrass species found adjacent to the channel. The increase in seagrass may also attract manatees and sea turtles into the channel area to forage on the grasses. As the channel shallows, there may be an increase in vessel strikes of sea turtles and manatees that are unable to avoid vessels continuing to transit the channel, due to decrease in available area for the animals use of the channel footprint.	Dredging may affect, but is not likely to adversely affect, sea turtles, smalltooth sawfish, American crocodile, Florida manatee, and Johnson's seagrass. Construction activities at the placement site may affect but are not likely to adversely affect, piping plovers and rufa red knot. All terms and conditions of applicable U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions will be implemented.	Same as Alternative 1A.	Dredging may affect, but is not likely to adversely affect, sea turtles, smalltooth sawfish, American crocodile, Florida manatee, and Johnson's seagrass. Construction activities at the placement site may affect, but are not likely to adversely affect, the species previously listed as well as listed corals. All terms and conditions of applicable USFWS and NMFS biological opinions will be implemented.	Dredging and placement activities may affect, but are not likely to adversely affect sea turtles, smalltooth sawfish, American crocodile, Florida manatee, and Johnson's seagrass. All terms and conditions of applicable USFWS and NMFS biological opinions will be implemented.	Dredging may affect, but is not likely to adversely affect, sea turtles, smalltooth sawfish, American crocodile, Florida manatee, and Johnson's seagrass. Beach placement may affect sea turtles during early or late season if nest relocation is required. Construction activities may affect, but are not likely to adversely affect, piping plovers and rufa red knot. The beach placement site is located within USFWS loggerhead terrestrial designated critical habitat (DCH) and NMFS nearshore reproductive DCH. Beach placement would be unlikely to adversely modify DCH provided all terms and conditions of applicable USFWS and NMFS biological opinions are implemented.	Same as Alternative 1E.

Environmental Factor (Section of EA)	No Action Alternative	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 1D	Alternative 1E	Alternative 1F
Essential Fish Habitat (EFH) 4.5	As the channel shoals, any non-motile organisms that have colonized inside the channel could be buried in in sand. The shoaling of the channel may also result in the colonization of the channel by seagrasses as the channel shallows and more light reaches the bottom of the channel. This would be a beneficial effect to seagrasses, both of which are designated as EFH.	There will be a temporary increase in turbidity levels at the dredge areas during construction. Effects to EFH include temporary effects to the water column through turbidity. Seagrasses are not located within the channel but may be near the project vicinity. No significant effects to seagrasses that are in the project vicinity are expected to occur. Hardbottoms are not located within the channel.	Same as Alternative 1A.	There will be a temporary increase in turbidity levels at the dredge areas during construction. Effects to EFH include temporary effects to the water column through turbidity. Seagrasses are not located within the channel or placement area but may be near the project vicinity. No significant effects to seagrasses that are in the project vicinity are expected to occur. Hardbottoms are not located within the channel or placement site but are located near the placement site. No significant effects to hardbottoms are expected to occur.	There will be a temporary increase in turbidity levels at the dredge areas during construction. Effects to EFH include temporary effects to the water column through turbidity. Seagrasses are not located within the channel but may be near the project vicinity. No significant effects to seagrasses that are in the project vicinity are expected to occur. Hardbottoms are not located within the channel or near the placement site.	Same as Alternative 1C.	Same as Alternative 1D.
Air Quality 4.6	No effect.	Minor, temporary degradation of air quality will occur due to emissions from dredging and placement operations.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.

Environmental Factor (Section of EA)	No Action Alternative	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 1D	Alternative 1E	Alternative 1F
Water Quality 4.7	Ongoing shoaling will result in shallow channel depths. Due to the heavy recreational and commercial vessel use, it is likely that transit through the shallow depths would stir up the bottom sediments, resulting in increased turbidity.	There will be a temporary increase in turbidity levels at the dredge areas during construction and at upland dewatering sites. These elevated turbidity levels will be temporary and are not expected to be significant. Dredging and dewatering will meet state water quality turbidity requirements. No long-term adverse effects to water quality are expected.	Same as Alternative 1A.	There will be a temporary increase in turbidity levels at the dredge areas during construction. Placement in the nearshore would temporarily reduce water quality due to increased turbidity; however, water quality will quickly return to pre-construction conditions after placement.	Same as Alternative 1C.	Same as Alternative 1C.	Same as Alternative 1C.
Noise 4.8	No effect.	A temporary increase in the noise level in the project area would occur during dredging and placement operations.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.
Aesthetic Resources 4.9	No effect.	Equipment used for dredging and placement will be visible during construction, resulting in a temporary reduction in the aesthetic value in the construction area.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.

Environmental Factor (Section of EA)	No Action Alternative	Alternative 1A	Alternative 1B	Alternative 1C	Alternative 1D	Alternative 1E	Alternative 1F
Recreational Resources 4.10	Failure to maintain the channel will result in negative long-term effects on recreational use of the IWW, as it may prevent use of the channel by recreational vessels navigating the length of these reaches of the IWW.	Dredging and placement operations may cause minor, temporary restrictions in recreation during operations. Boat traffic will be temporarily interrupted due to dredging. Any recreational use of the DMMA's would be restricted or ceased entirely during operations for safety purposes.	Dredging and placement operations may cause minor, temporary restrictions in recreation during operations. Boat traffic will be temporarily interrupted due to dredging.	Dredging and placement operations may cause minor, temporary restrictions in recreation during operations. Boat traffic will be temporarily interrupted due to dredging. Nearshore placement may temporarily restrict beach use or impede immediate offshore use due to equipment in the area.	Same as Alternative 1C.	Dredging and placement operations may cause minor, temporary restrictions in recreation during operations. Boat traffic will be temporarily interrupted due to dredging. Beach placement may temporarily restrict beach use or impede immediate offshore use due to equipment in the area.	Same as Alternative 1E.
Economic Resources 4.11	Limitations to or loss of navigation would occur as the channel shoals to depths that are not navigable by recreational or commercial vessels. This loss of navigation will result in adverse effects on recreation and tourism outputs.	Economic benefits that are based on navigation associated with the project would continue.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.	Same as Alternative 1A.
Navigation and Public Safety 4.12	As shoaling continues, the channel will cease to provide safe navigation for commercial and recreational vessels, which would decrease public safety for vessels transiting the area.	O&M dredging of the IWW assures safe navigation for the public. Dredging operations may temporarily restrict vessel access/transit. Use of recreational access points at the DMMA's may be temporarily restricted to ensure public safety during placement operations.	O&M dredging of the IWW assures safe navigation for the public. Dredging operations may temporarily restrict vessel access/transit.	O&M dredging of the IWW assures safe navigation for the public. Dredging operations may temporarily restrict vessel access/transit. Use of the nearshore environment may be temporarily restricted to ensure public safety during placement operations.	Same as Alternative 1C.	O&M dredging of the IWW assures safe navigation for the public. Dredging operations may temporarily restrict vessel access/transit. Use of the beach may be temporarily restricted to ensure public safety during placement operations.	Same as Alternative 1E.

<i>Environmental Factor (Section of EA)</i>	<i>No Action Alternative</i>	<i>Alternative 1A</i>	<i>Alternative 1B</i>	<i>Alternative 1C</i>	<i>Alternative 1D</i>	<i>Alternative 1E</i>	<i>Alternative 1F</i>
Native Americans 4.13	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.	No effect.
Cultural Resources 4.14	No effect on historic properties listed or eligible for listing in the National Register of Historic Places (NRHP) contingent on maintaining a 200-foot buffer at site 8BD6446 until the site is evaluated for listing in the NRHP.	No effect on historic properties listed or eligible for listing in the NRHP contingent on maintaining a 200-foot buffer at site 8BD6446 until the site is evaluated for listing in the NRHP.	No effect on historic properties listed or eligible for listing in the NRHP for dredging contingent on maintaining a 200-foot buffer at site 8BD6446 until the site is evaluated for listing in the NRHP. Additional cultural surveys and consultation may be required prior to use of this placement area.	Same as Alternative 1B.			

<i>Environmental Factor (Section of EA)</i>	<i>No Action Alternative</i>	<i>Alternative 1A</i>	<i>Alternative 1B</i>	<i>Alternative 1C</i>	<i>Alternative 1D</i>	<i>Alternative 1E</i>	<i>Alternative 1F</i>
<p style="text-align: center;">Unavoidable Adverse Environmental Effects 4.15</p>	<p>Shallow depths in the IWW could result in adverse effects if vessels collide or run aground and spill fuel or other fluids.</p>	<p>Marine animals (including fishes, reptiles, and mammals) may experience increased noise and turbidity associated with dredging; however, this is no different from the typical activities already occurring in the project area. Infaunal resources that live inside the boundaries of the channel will be lethally affected but will recolonize shortly after dredging operations have ceased. Migratory birds may also be affected by the construction activities through avoidance of nesting or foraging areas. Effects are expected to be short-term and minor.</p>	<p>Same as Alternative 1A.</p>	<p>Marine animals (including fishes, reptiles, and mammals) may experience increased noise and turbidity associated with dredging; however, this is no different from the typical activities already occurring in the project area. Infaunal resources that live inside the boundaries of the channel and placement area will be lethally affected but will recolonize shortly after dredging operations have ceased. Effects are expected to be short-term and minor.</p>	<p>Same as Alternative 1C.</p>	<p>Same as Alternative 1C.</p>	<p>Same as Alternative 1C.</p>

<i>Environmental Factor (Section of EA)</i>	<i>No Action Alternative</i>	<i>Alternative 1A</i>	<i>Alternative 1B</i>	<i>Alternative 1C</i>	<i>Alternative 1D</i>	<i>Alternative 1E</i>	<i>Alternative 1F</i>
Cumulative Effects 4.16	Continued shoaling in the IWW will result in long-term adverse effects to human health and safety, navigation, and socioeconomic resources on the IWW. Reduced depths will eventually adversely affect Broward County's recreation and tourism economic inputs.	O&M dredging and placement of dredged material will result in long-term benefits to human health and safety, navigation, and socioeconomic resources. Adverse effects associated with dredging and placement activities will be temporary and minor. No long-term adverse effects are expected.	Same as Alternative 1A.				

2.4 PLACEMENT OPTIONS ELIMINATED FROM FUTURE EVALUATION

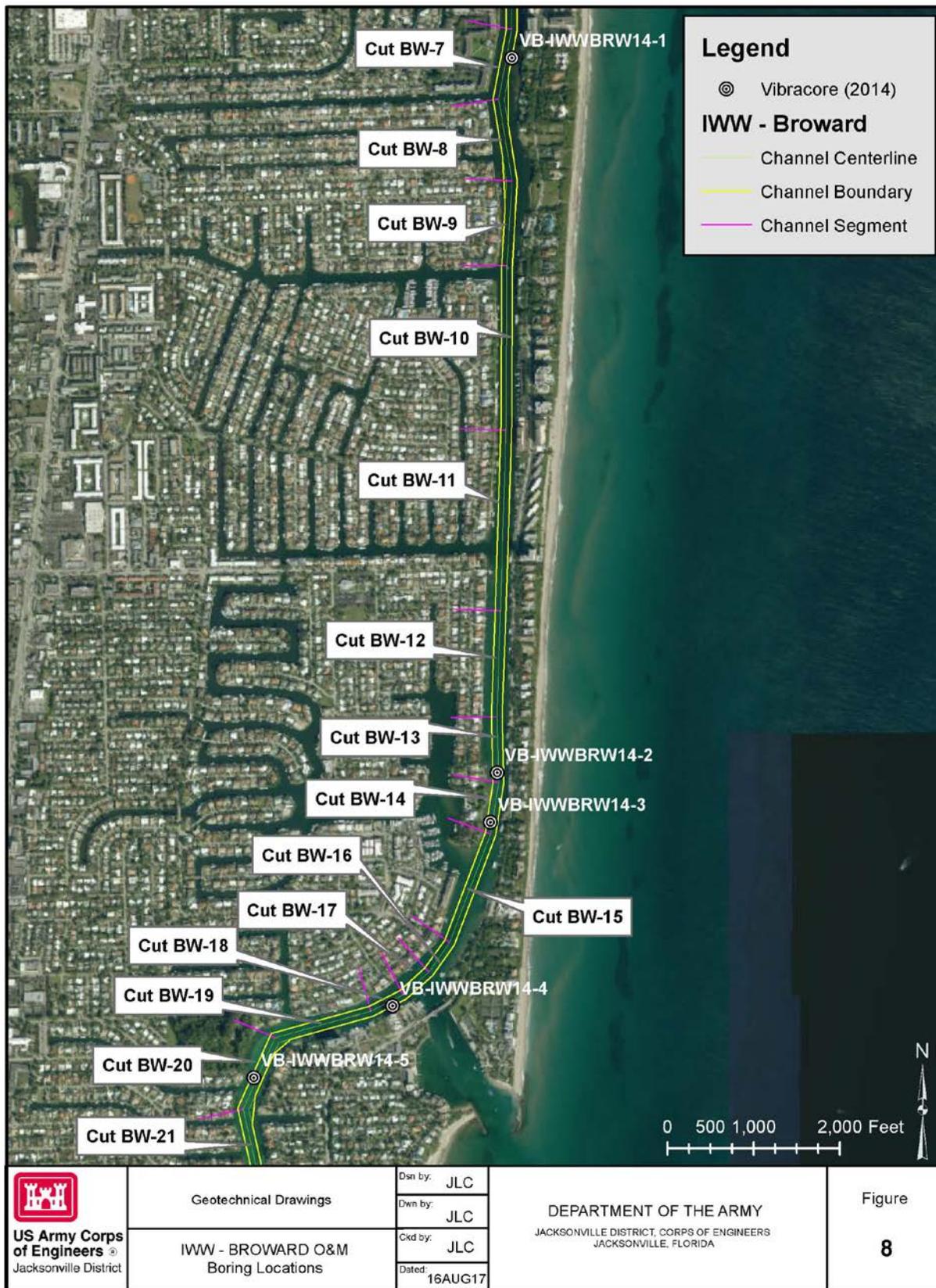
In addition to the previously described alternatives and placement options, two additional placement options were considered but eliminated from further evaluation: truck haul of dredged material for placement in an upland landfill or DMMA and placement of dredged material in an ocean dredged material disposal site (ODMDS). These options were eliminated from further evaluation as they are cost prohibitive for the project. In addition, placement of dredged material in an ODMDS was also eliminated because there are no ocean placement sites authorized to accept material from the channels.

3 EXISTING ENVIRONMENT

The Existing Environment section describes the existing environmental resources of the areas that would be affected if any of the alternatives were implemented. This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, but only those environmental resources that will affect or that will be affected by the alternatives if they were implemented. This section, in conjunction with the description of the “No Action Alternative,” forms the baseline conditions for determining the environmental effects of the reasonable alternatives.

3.1 SEDIMENT CHARACTERISTICS

Geotechnical investigations of the material to be dredged from IWW Broward County, Reach 1 were conducted in 2014 by the Corps (see **Figure 8** for vibrocore locations). The material consists of sand (SP) and silty sand (SP-SM), with some sand sized shell. The color of the material ranges from a Munsell color value of 3 to 5 (very dark gray, dark greenish gray, and olive gray). Taylor Engineering, Inc. collected one representative sample from the shoal adjacent to MSA 641A in March 2018 (see **Figure 9**). The material to be dredged is poorly graded sand (SP) and has Munsell color values ranging from three to five (Taylor Engineering, Inc. 2018). Nearshore and beach material in Broward County is generally in the Munsell color range of 5 to 7 (gray to light gray), which is lighter than the proposed dredged material (Taylor Engineering, Inc. 2018).



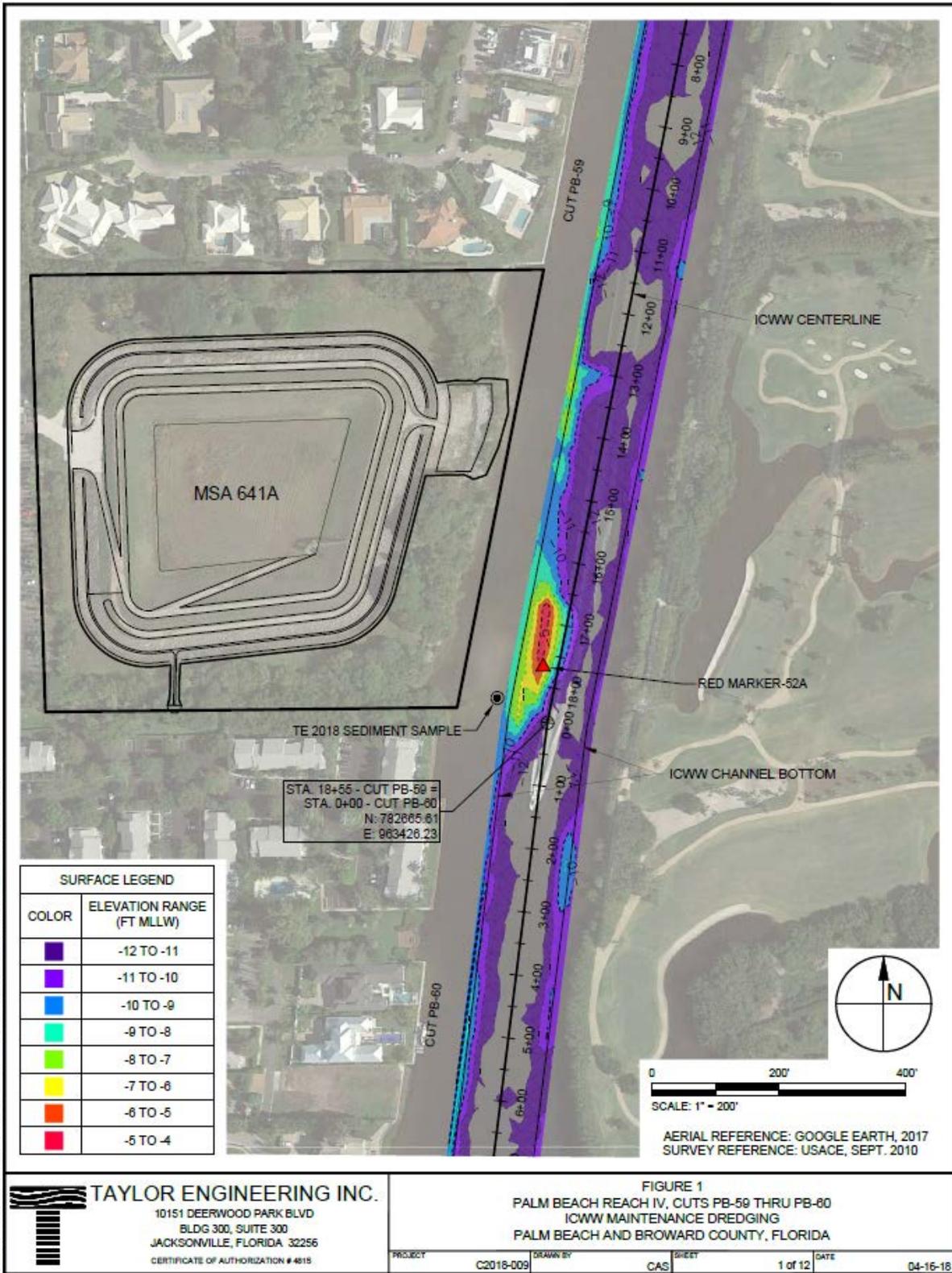


Figure 9. Location of sediment sample collected by Taylor Engineering, Inc. in 2018 from IWW Palm Beach County, Reach 4. (Source: Taylor Engineering, Inc. 2018)

3.2 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

In response to the HTRW concerns received from Miami Waterkeeper, the Corps' geotechnical hazardous waste section conducted an investigation on existing HTRW conditions in the project area. The records of FDEP contaminated sites and active Resource Conservation and Recovery Act (RCRA) facilities near the IWW Broward County, Reach 1 and cuts P-59 to P-60 of IWW Palm Beach County, Reach 4 were examined to evaluate potential impact to the dredging project from groundwater plume discharge and/or the accumulation of contaminated sediment.

IWW Palm Beach County, Reach 4 (cuts P-59 to P-60)

The IWW Palm Beach County, Reach 4 search found one petroleum contaminated site almost one mile from the project area (see **Figure 10**). All other sites were located more than one mile from the project area.

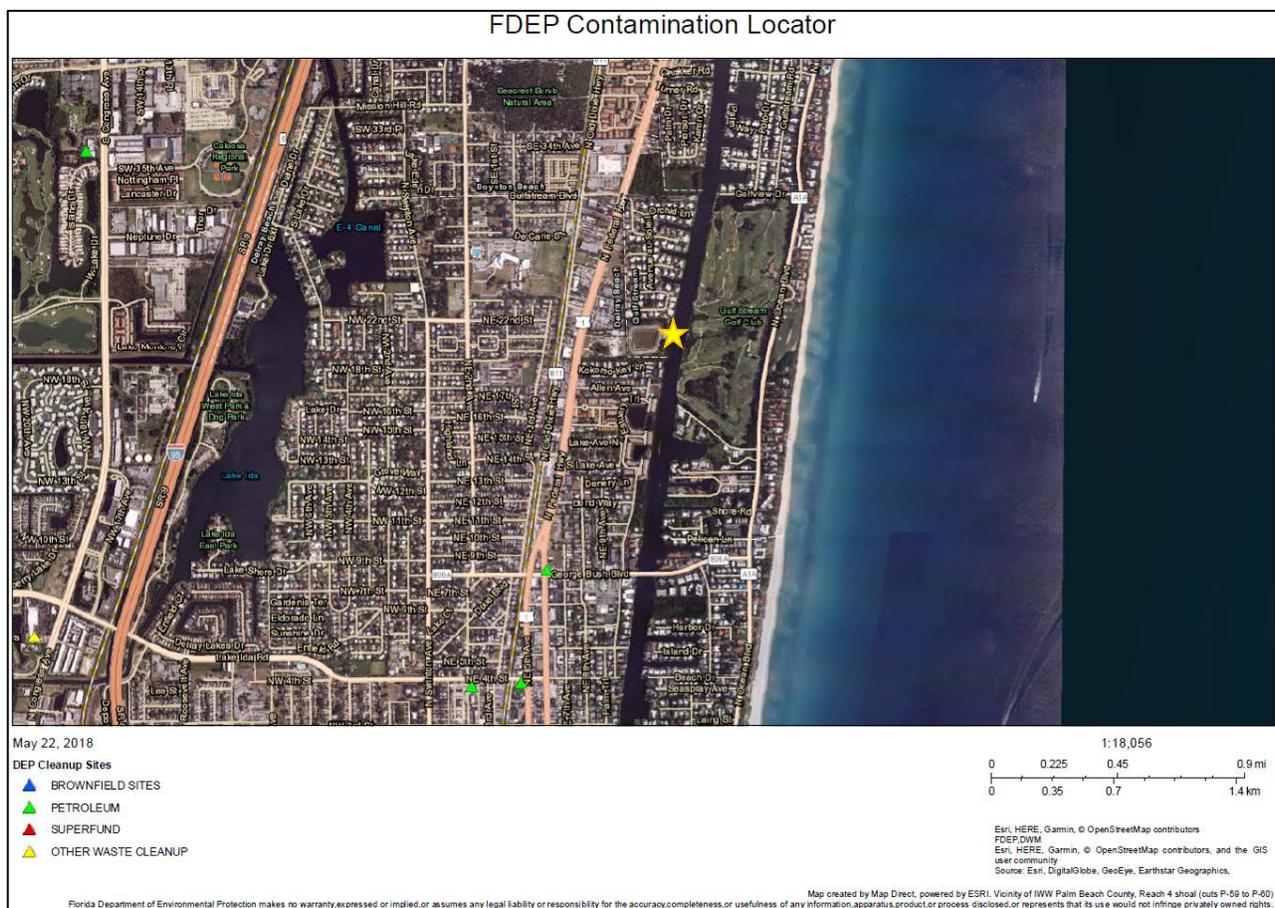


Figure 10. FDEP listed contamination sites located in the vicinity of IWW Palm Beach County, Reach 4 shoal. (Source: <https://ca.dep.state.fl.us/mapdirect/?focus=contamlocator>)

IWW Broward County, Reach 1

The IWW Broward County, Reach 1 search area covered four municipalities: Deerfield Beach, Hillsboro Beach, Lighthouse Point, and Pompano Beach. The search found a total of one Superfund Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site, eight dry cleaning sites, and seventeen petroleum-contaminated sites. The most extensive groundwater plume was associated with the Flash Cleaners Superfund site that is undergoing active remediation

at the source property. The center of the plume has been remediated and remaining groundwater and sediment pore water concentrations discharging to the Grand Canal pose no harm to aquatic species. This plume discharge area will not affect dredging, as it is located more than 0.5 mile from the IWW dredging project. The remaining contaminated sites have documented small areas of impact or score too low to receive funding for current investigation. The majority of sites are located too far away from the IWW to affect the project. Most of the sites are located along U.S. 1, a distance of 0.5 - 0.75 mile from the proposed dredging section. One of the objectives of contaminated site investigation is to establish the area of groundwater impacts and, for petroleum sites; this plume extent is generally restricted to the immediate property lines of the gas station or the dry cleaner. Such plumes of contaminated groundwater are no longer migrating or expanding in size. Flash Cleaners was the only expansive plume identified and its concentrations reaching the west end of the Grand Canal were less than the Surface Water Cleanup Target Levels of Chapter 62-777, F.A.C., i.e. this plume discharge area was 0.75 mile from the IWW project. For the four contaminated sites located close to the IWW project area, three sites score too low to have investigation data and one has a small area of impacted groundwater restricted to the source property (an active petroleum site). The closest sites to the IWW project are located 300-500 feet away with the distance either occupied by land or a canal connected to the IWW. These four sites are unlikely to be of a concern. None of these contaminated sites are projected to affect either surface water, sediment, or elutriate water quality within the dredging footprint. None of the active RCRA sites posed a potential impact to the IWW dredging project. **Appendix D (Geotechnical Investigations)** includes maps as well as more detailed information on the specific IWW Broward County, Reach 1 sites.

3.3 FISH AND WILDLIFE

3.3.1 MIGRATORY BIRDS

A number of seabirds and shorebirds may occur along the beach and offshore the project area, including a number of species considered birds of conservation concern by the Migratory Bird Treaty Act of 1918 (MBTA). Species reported to the Florida Shorebird Database since 2011 include Wilson's plover, least terns, black skimmers, and killdeer. Additionally, the Cornell Laboratory of Ornithology (eBird) lists multiple species of ibis, ducks, gulls, and terns as being sighted in Broward County and Palm Beach County (eBird 2018a, 2018b). The Florida Shorebird Database contains documentation of least terns nesting annually on beaches in Palm Beach and Broward Counties since at least 2013 (Florida Shorebird Database 2018a, 2018b). These species all use sandy beaches for foraging and/or nesting and, therefore, could occur along the project area both onshore and offshore.

3.3.2 MARINE MAMMALS

The Marine Mammal Protection Act of 1972 (MMPA) protects all marine mammals from harvesting within the borders of the U.S., regardless of status. One cetacean (whales/dolphins) species and one sirenian (manatees/dugongs) species are known to or may occur in the IWW and off the Southeast Atlantic coastline (see **Table 2** below). The only marine mammal in the project area listed under the Endangered Species Act (ESA) is the West Indian (Florida) manatee (*Trichechus manatus latirostris*), which is listed as threatened. The West Indian manatee in Florida and U.S. waters is managed by the U.S. Fish and Wildlife Service (USFWS). Specific information on the life history of

each of these species is available in National Marine Fisheries Service’s (NMFS) “Annual Reports to Congress under the MMPA” located at <http://www.nmfs.noaa.gov/pr/sars/species.htm#fws>.

Table 2. Habitat and conservation status of marine mammals potentially within the proposed project area.

Species	Habitat	ESA	MMPA
Odontocetes			
Bottlenose dolphin (<i>Tursiops truncatus</i>)	Offshore, inshore, coastal, estuaries	NL	D (Western North Atlantic Central Florida Coastal)
Sirenians			
West Indian (Florida) manatee (<i>Trichechus manatus latirostris</i>)	Coastal, rivers and estuaries	TH	D

EN – Endangered; TH – Threatened; NL – Not Listed; D – Depleted; NC – No Concern; S – Strategic;

Of the two species listed above, the Corps believes that only the Florida manatee and the bottlenose dolphin Western North Atlantic Central Florida Coastal stocks are likely to be in the vicinity of the project area. A stock assessment for the Western North Atlantic Central Florida Coastal stock is located at:

http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/atlantic/2015/f2015_bodocfl.pdf. This assessment is incorporated by reference. Bottlenose dolphins have been documented in the shallow nearshore waters offshore of Broward County.

3.3.3 CHANNEL BENTHOS

Sedimentary habitats such as sand shoals support a variety of invertebrates and demersal fishes. Invertebrate species using the shoals include infaunal and epifaunal species represented primarily by annelid worms, gastropods, bivalves, crustaceans, and echinoderms. Demersal feeding fishes prey on most of these species. The adjacent shorelines in the project area are almost 100% manmade bulkheads with few areas of non-bulkhead shoreline.

3.3.4 SEAGRASSES

FWC Florida Fish and Wildlife Research Institute (FWRI) has documented approximate seagrass locations in the IWW within the project area (see **Figure 11** and **Figure 12**) (FWRI 2017). Five species of seagrasses may occur in the project area: Cuban shoal grass (*Halodule wrightii*), paddle grass (*Halophila decipiens*), Johnson’s seagrass³ (*Halophila johnsonii*), manatee grass (*Syringodium filiforme*), and turtle grass (*Thalassia testudium*).

³ Johnson’s seagrass (*Halophila johnsonii*) was listed as a threatened species by NMFS on September 14, 1998 (63 FR 49035) and the final rule for critical habitat designation for *H. johnsonii* was published April 5, 2000 (Federal Register, vol. 65, No. 66). This species is discussed in more detail in section 3.4.7 of this EA.

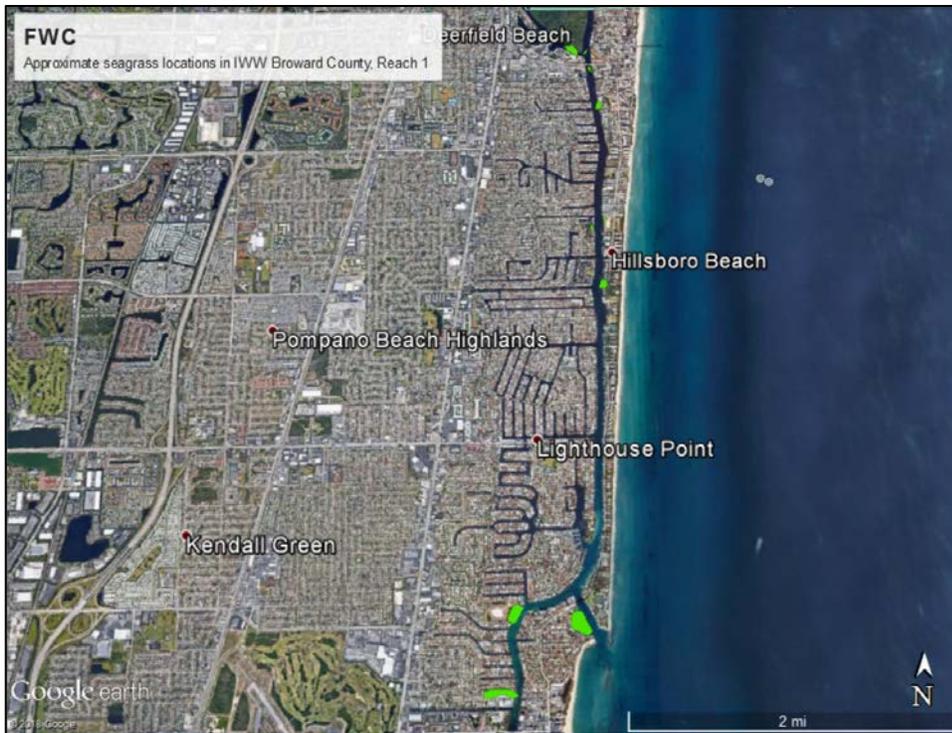


Figure 11. FWC documented approximate seagrass locations in IWW Broward County, Reach 1. (Source: FWC Quick Maps)

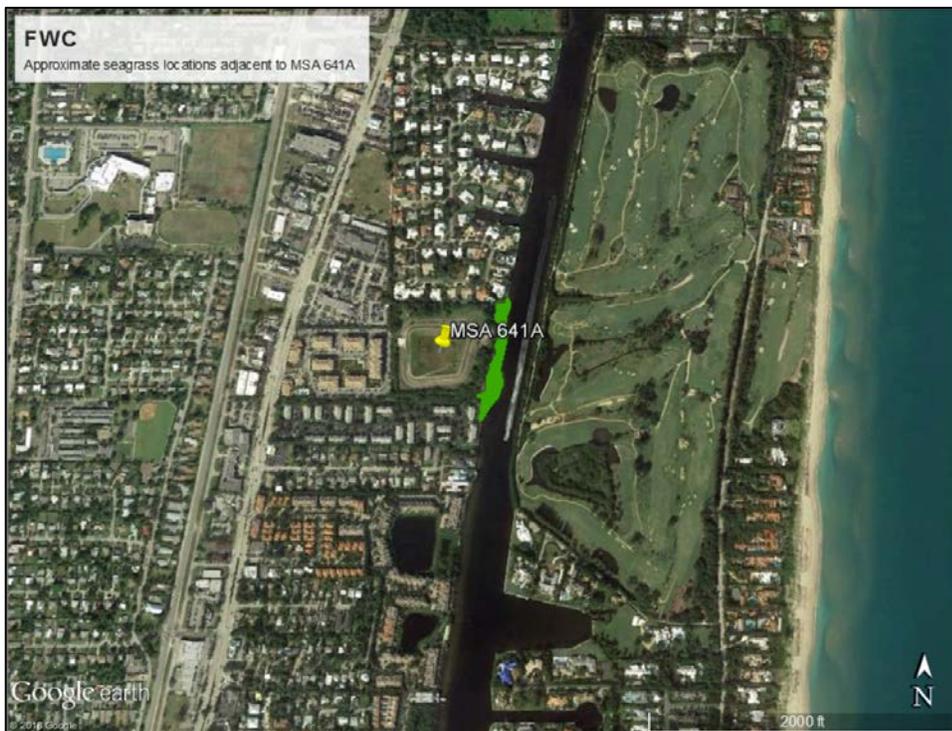


Figure 12. FWC documented approximate seagrass locations adjacent to MSA 641A vicinity in IWW Palm Beach County, Reach 4. (Source: FWC Quick Maps)

A Corps staff site visit in August 2017 confirmed through a visual inspection that although few discontinuous patches of seagrasses are present within the shoal areas to the east and west of IWW Broward County, Reach 1 channel no seagrasses are located within the channel. This finding is consistent with previous findings associated with the issuance of RPG SAJ-93 to FIND. Historically, FWC has documented seagrasses in the vicinity of MSA 641A. Those seagrass locations would need to be confirmed prior to dredging (see **Figure 12**).

3.3.5 BEACH PLACEMENT AREA RESOURCES

Resources on Broward County beaches have been extensively reviewed in the 2004 Final EIS for the Broward County Shore Protection Project Segments II and III and the 2015 EA for Renourishment of Segment II of the Broward County Shore Protection Project. In summary, the beach located north and south of the inlet is comprised mainly of sandy bottoms that serve as habitat to benthic and infaunal organisms, as well as foraging grounds for birds and fish. Dry beach slopes upwards and landwards towards the dune system, which typically begins with sea oats (*Uniola paniculat*) and ends with sea grape (*Coccoloba uvifera*) at the dune crest (Koch et al. 1992).

3.3.6 HARDBOTTOMS

A hardbottom area is located immediately south of the mouth of the Hillsboro Inlet (see **Figure 13**) and is adjacent to the proposed southern nearshore placement site. A 1.66-acre artificial reef was constructed as mitigation for impacts to 0.4 acres of hardbottom associated with the 2002 Hillsboro Inlet Improvements Project (HIIP). This hardbottom area has been monitored as part of the permit requirements for the HIIP. Monitoring included algal, sponge, and coral coverage as well as sediment accumulation (depth and location) and observed benthic species. Over the course of four years since project construction, there was no statistical difference noted between turf algal coverage, macroalgal coverage, sediment coverage, sponge coverage, and coral coverage when comparing the artificial reef to the adjacent hardbottom area, which was used as a control for the monitoring (Coastal Systems International, Inc. 2012). These hardbottoms are consistent with what is seen elsewhere in southeast Florida.



Figure 13. Location of hardbottom community. (Source: Coastal Systems International, Inc. 2012.)

3.4 THREATENED AND ENDANGERED SPECIES

The list of endangered and threatened species developed for this EA (see **Table 3**) are a compilation from the South Atlantic Regional Biological Opinion (SARBO) for the continued hopper dredging of channels and borrow areas in the southeastern U.S., the Statewide Programmatic Biological Opinion (SPBO) for Shore Protection Activities along the Coast of Florida, the Programmatic Piping Plover Biological Opinion (P3BO), as well as project specific biological assessments and biological opinions (BOs) for projects which have taken place in the vicinity of the proposed project.

Table 3. Threatened and endangered species in the proposed project vicinity.

Common Name	Scientific Name	Listing Status
Green sea turtle <i>North Atlantic Distinct Population Segment (DPS)</i>	<i>Chelonia mydas</i>	Threatened
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Loggerhead sea turtle <i>Northwest Atlantic DPS</i>	<i>Caretta caretta</i>	Threatened/Critical Habitat
Smalltooth sawfish	<i>Pristis pectinata</i>	Endangered
American crocodile	<i>Crocodylus acutus</i>	Threatened
Florida manatee	<i>Trichechus manatus latirostris</i>	Threatened
Piping plover	<i>Charadrius melodus</i>	Threatened
Rufa red knot	<i>Calidris canutus rufa</i>	Threatened
Johnson's seagrass	<i>Halophila johnsonii</i>	Threatened
Pillar coral	<i>Dendrogyra cylindrus</i>	Threatened
Rough cactus coral	<i>Mycetophyllia ferox</i>	Threatened
Lobed star coral	<i>Orbicella annularis</i>	Threatened
Mountainous star coral	<i>Orbicella faveolata</i>	Threatened
Boulder star coral	<i>Orbicella franksi</i>	Threatened
Elkhorn coral	<i>Acropora palmata</i>	Threatened/Critical Habitat
Staghorn coral	<i>Acropora cervicornis</i>	Threatened/Critical Habitat

3.4.1 SEA TURTLES

Broward County and Palm Beach County are within the nesting range of four species of sea turtles; the loggerhead (*Caretta caretta*), the North Atlantic distinct population segment (DPS) of green sea turtle (*Chelonia mydas*) (80 FR 15272), hawksbill (*Eretmochelys imbricata*) and the leatherback (*Dermochelys coriacea*). The leatherback sea turtle and hawksbill sea turtle are listed as endangered under the ESA. The loggerhead sea turtle and the North Atlantic DPS of the green sea turtle are listed as threatened. Additionally, the waters offshore of Broward County and Palm Beach County are also used for foraging and shelter for the four species listed above as well as the Kemp's ridley sea turtle (*Lepidochelys kempii*).

NMFS has designated two units of critical habitat for the loggerhead sea turtle in the waters

offshore of Broward and Palm Beach Counties (see **Figure 14**): migratory habitat (blue area) and nearshore breeding habitat (green area). The primary constituent elements (PCEs) of each designated unit can be found in the final rule issued by NMFS designating the habitat (NMFS 2014).

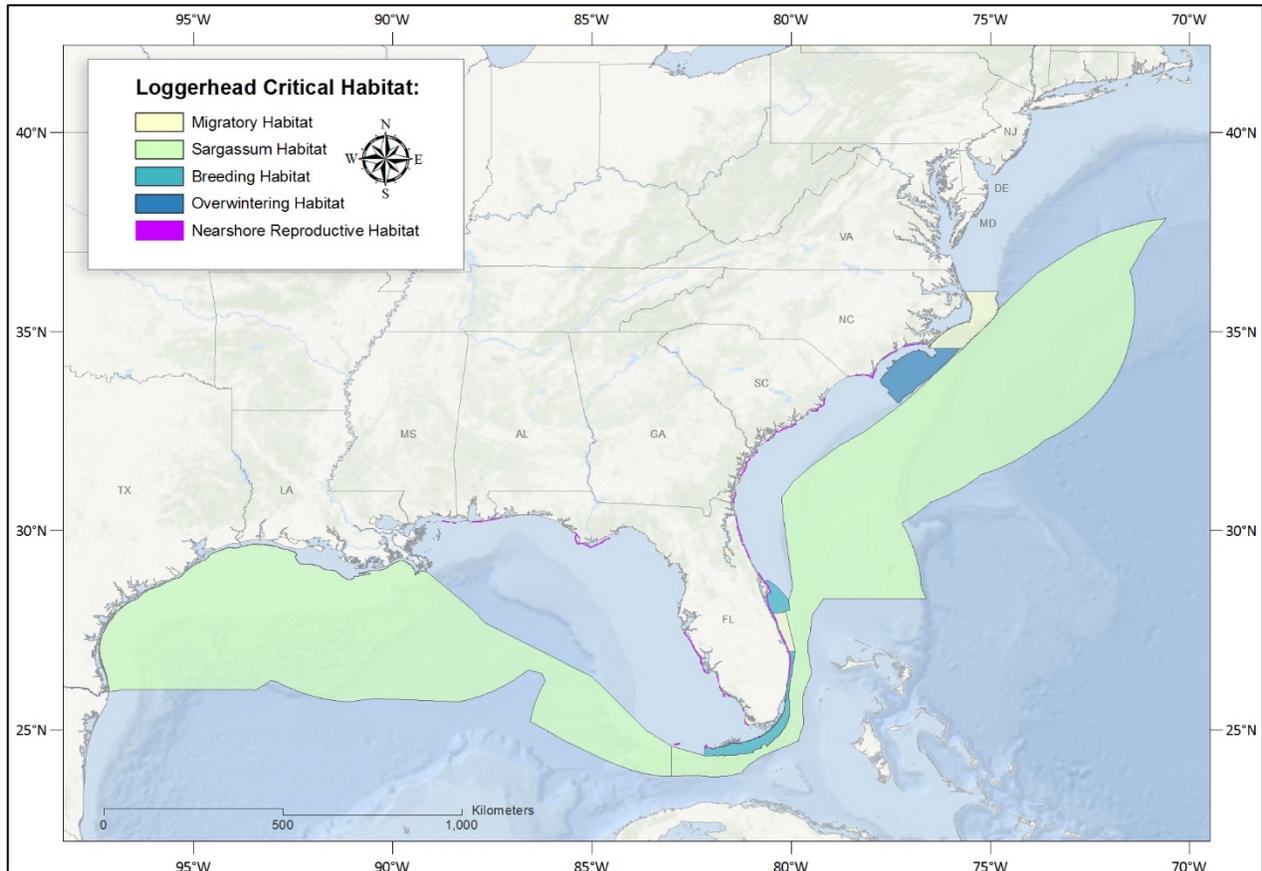


Figure 14. Summary map of NMFS DCH for loggerhead sea turtles.

(Source: http://www.nmfs.noaa.gov/pr/species/turtles/images/loggerhead_critical_habitat_map.jpg)

USFWS has designated critical habitat for nesting loggerhead sea turtles in Broward County (LOGG-T-FL-14) and Palm Beach County (LOGG-T-FL-13) (see **Figure 15**). The PCEs of each designated unit can be found in the final rule issued by USFWS designating the habitat (USFWS 2014).

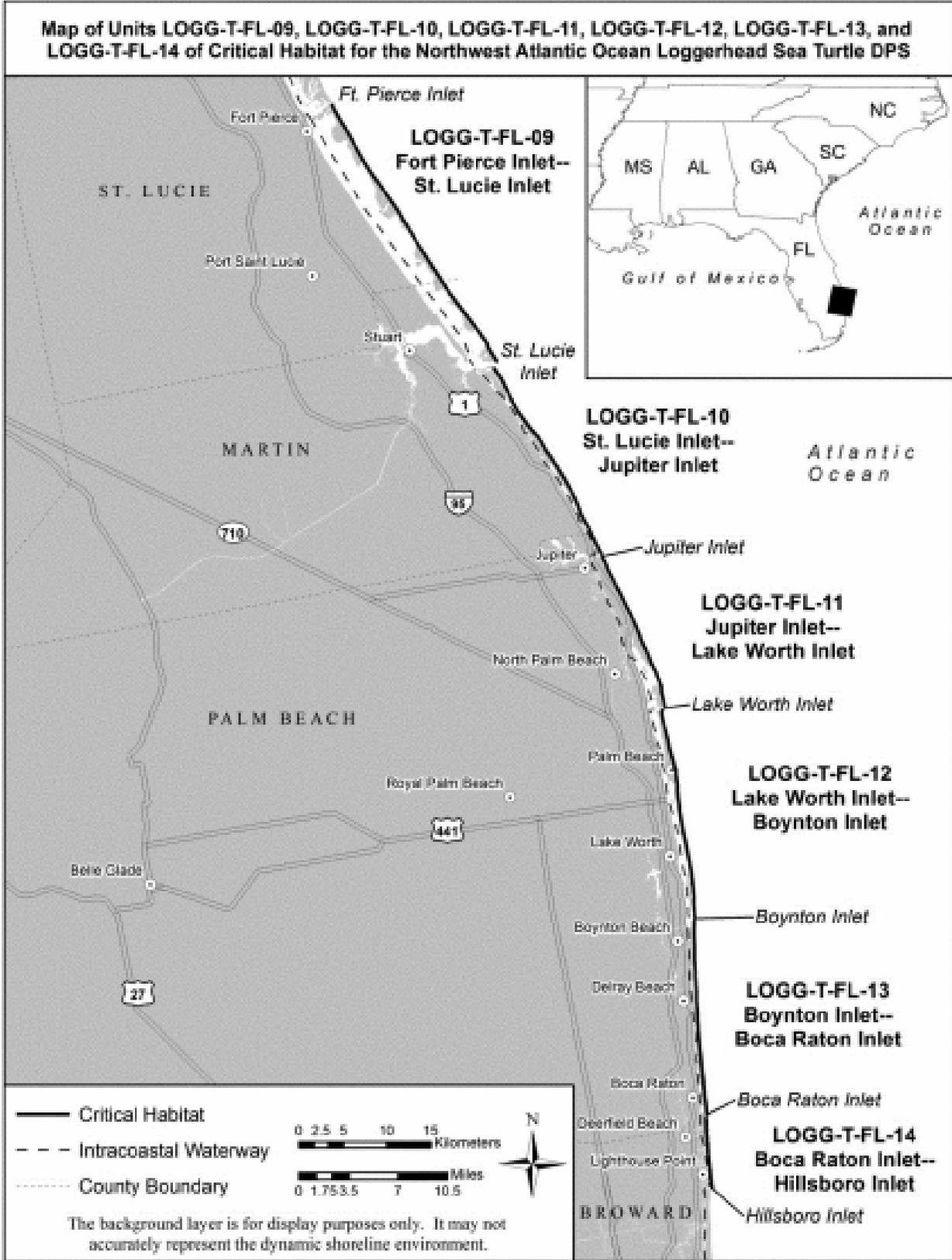


Figure 15. Map of USFWS DCH for loggerhead sea turtles. (Source: USFWS 2014)

3.4.2 SMALLTOOTH SAWFISH

The smalltooth sawfish (*Pristis pectinata*) is currently listed as endangered by NMFS. This species has become rare along the southeastern Atlantic and northern Gulf of Mexico coasts of the U.S. during the past 30 years. Its known primary range is now reduced to the coastal waters of Everglades National Park in extreme southern Florida, with rare sightings outside of that area. Fishing and habitat degradation have extirpated the smalltooth sawfish from much of this former range.

The smalltooth sawfish is distributed in tropical and subtropical waters worldwide. It normally inhabits shallow waters (33 feet/10 meters (M) or less), often near river mouths or in estuarine lagoons over sandy or muddy substrates, but may also occur in deeper waters (66 feet/20 M) of the continental shelf. Shallow water less than 3.3 feet (1 M) deep is an important nursery area for young smalltooth sawfish and maintenance and protection of these habitat is an important component of the “Recovery Plan for Smalltooth Sawfish (*Pristis pectinata*).” (NMFS 2009). Recent studies indicate that key habitat features (particularly for immature individuals) nominally consist of shallow water, proximity to mangroves, and estuarine conditions. Smalltooth sawfish grow slowly and mature at about 10 years of age. Females bear live young, and the litters reportedly range from 15 to 20 embryos requiring a year of gestation. Their diet consists of macroinvertebrates and fishes such as herrings and mullets. The saw is reportedly used to rake surficial sediments in search of crustaceans and benthic fishes or to slash through schools of herrings and mullets (NMFS 2009).

Although NMFS designated critical habitat for the species in 2009, there is no DCH in the project area (see **Figure 16**).

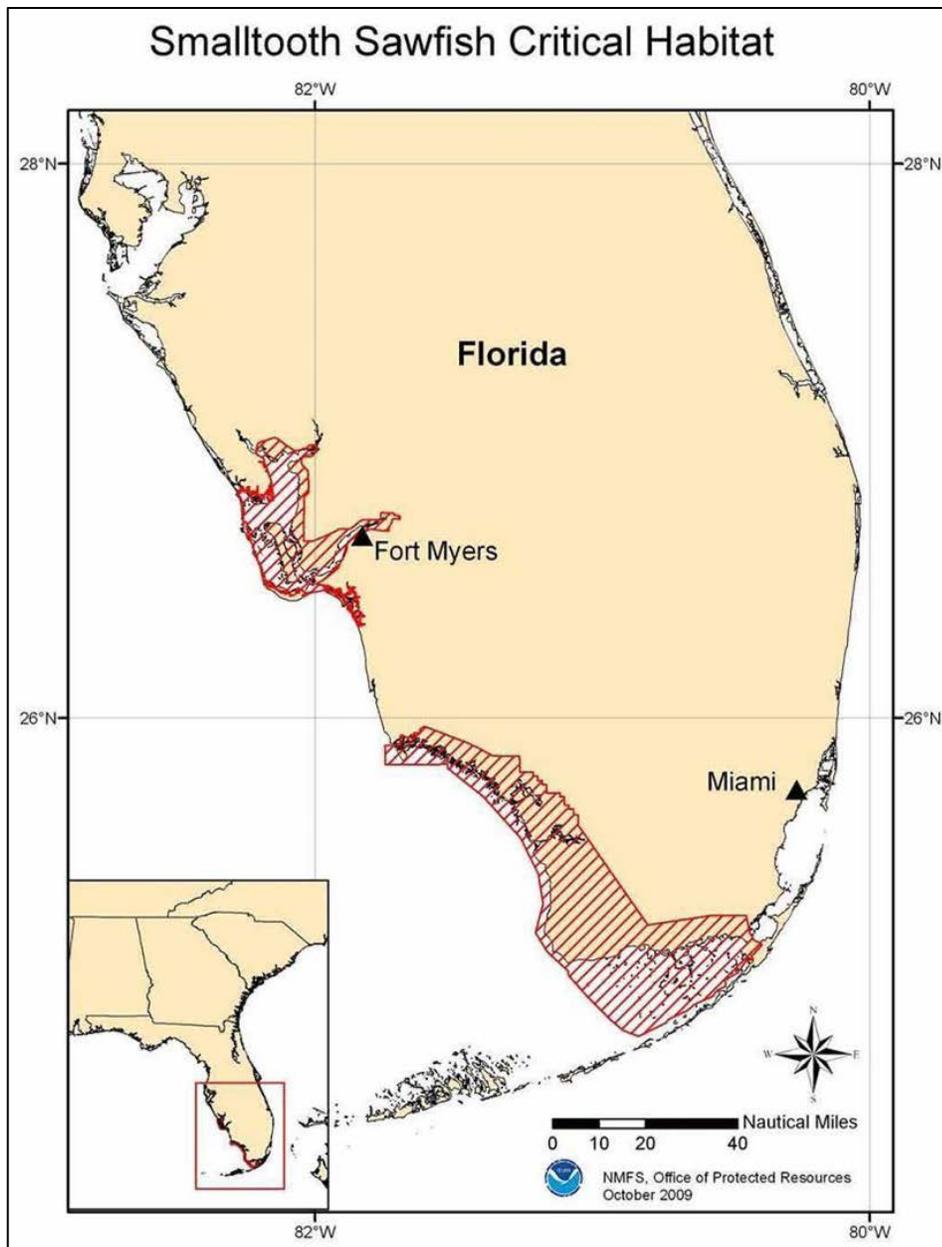


Figure 16. NMFS DCH for the smalltooth sawfish.

(Source: <http://www.nmfs.noaa.gov/pr/species/fish/smalltooth-sawfish.html>)

3.4.3 AMERICAN CROCODILE

The American crocodile (*Crocodylus acutus*) is endemic to the U.S. and inhabits mostly in low-energy bays, creeks, and inland swamps in extreme South Florida, the Caribbean, Mexico, Central America and northern South America. The species was listed as endangered by the USFWS in 1975 (40 FR 44151) due to habitat loss and fragmentation, changes in the distribution, timing, and quantity of water flows, and hunting for hide and meat. Hurricanes, cold weather, and traffic also threaten the mortality of American crocodiles. In March 2007, the USFWS reclassified the American crocodile from endangered to threatened. Feeding typically occurs shortly before sunset to just after sunrise and consists of opportunistic foraging for any animals they can catch and easily

overpower. Nesting habitat includes sandy shorelines, creek banks adjacent to deep water, or manmade structures, such as canal berms. Males establish and defend breeding territory from late February through March. Females select a nest site and typically clutch size ranges from as few as eight to as many as 56 eggs. Hatchlings are about 10 inches and yellowish-tan in color with cross markings that fade as they grow. Adults are typically greenish-gray with black mottling and can be over 14 feet long. Although DCH was identified in 1979 in the extreme southern portion of Florida (44 CFR 75076), no DCH is present in the project area (see **Figure 17**).

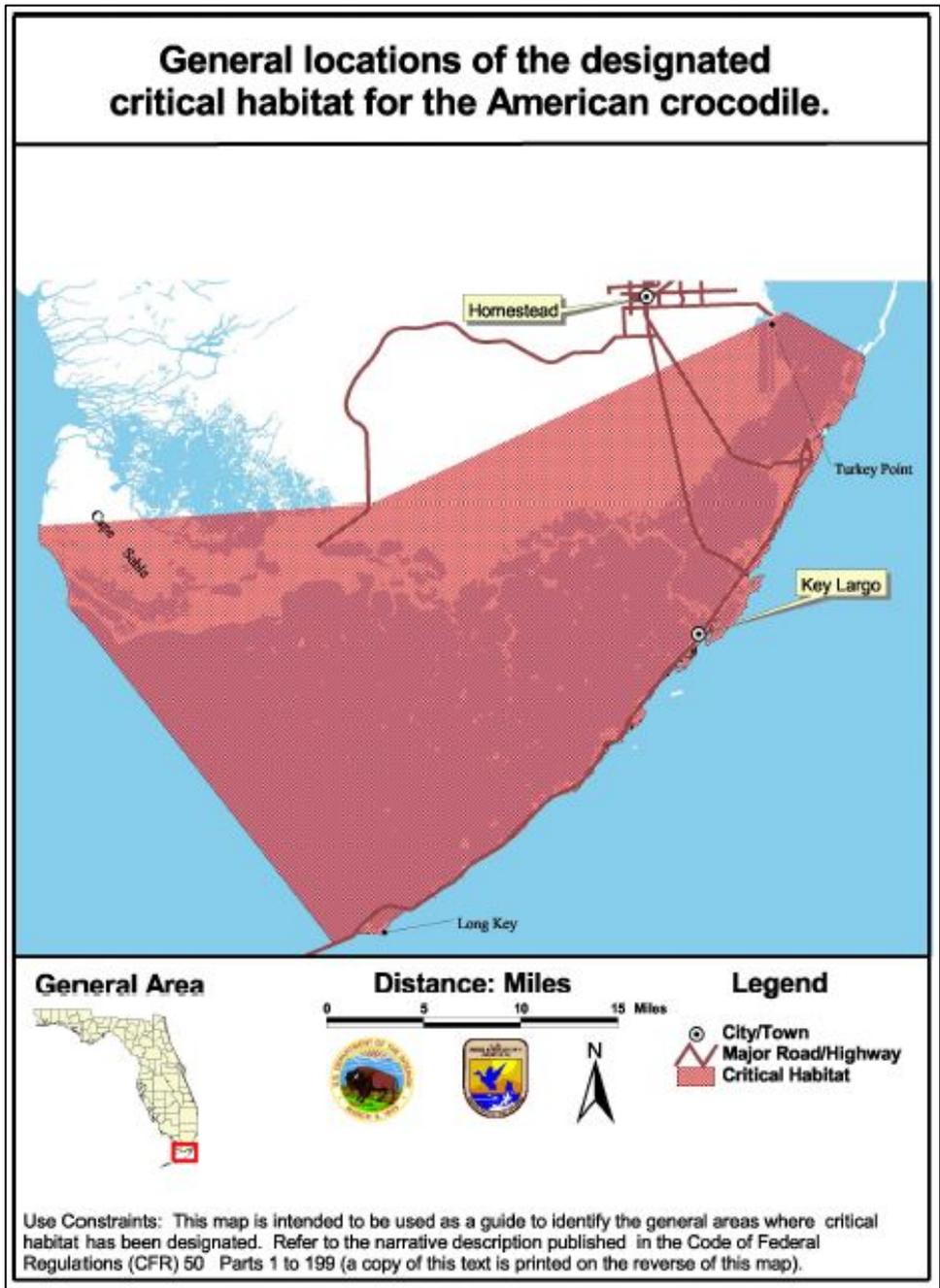


Figure 17. USFWS American crocodile DCH.

(Source: <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C02J#crithab>)

3.4.4 FLORIDA MANATEE

The Florida manatee (*Trichechus manatus latirostris*) is a subspecies of the West Indian manatee (*Trichechus manatus*) and can be found throughout the southeastern U.S., including the project area. The manatee is a large, plant-eating aquatic mammal that moves between freshwater and saltwater environments. They can be found in shallow coastal waters, rivers, and springs. Adult manatees are approximately 10 feet long, weighing between 800 – 1200 pounds, and consume approximately 4-9% of their body weight each day. Although manatees feed underwater, they frequently rest just below the water surface with only the snout above water. The manatee was listed as endangered throughout its range for both the Florida and Antillean subspecies (*Trichechus manatus latirostris* and *Trichechus manatus manatus*) in 1967 (32 FR 4001). In May 2017, the USFWS reclassified the manatee from endangered to threatened. The USFWS designated critical habitat for the manatee in 1976 (41 FR 41914) and revised it in 1977 (42 FR 47840). Critical habitat was not designated within the boundaries of Broward County or in the vicinity of Palm Beach County, Reach 4 (cuts P-59 to P-60).

Manatees can be found in the inshore waters of the IWW and in the coastal waters of the Atlantic Ocean primarily during migration. While the project area is not within DCH for this species, (see **Figure 18** for all of Florida's DCH and see **Figure 19** for the project area) it is located within a FWC Manatee Protection Zone (see **Figure 20**). Mortality data for the Florida manatee is available from 1974-2014, through the FWRI. Mortality data within one-mile of the project area reported the occurrence and cause of six manatee deaths between 1974 and 2015 (FWRI 2017). Four of the mortalities were determined to be as a result of natural causes, one was due to a watercraft collision, and in one case, the cause was unknown.



Figure 18. USFWS Florida manatee critical habitat.

(Source:
https://www.fws.gov/northflorida/manatee/2009_CH_Petition/20100112_frn_Federal%20Register_manatee_12-mo_325.pdf)

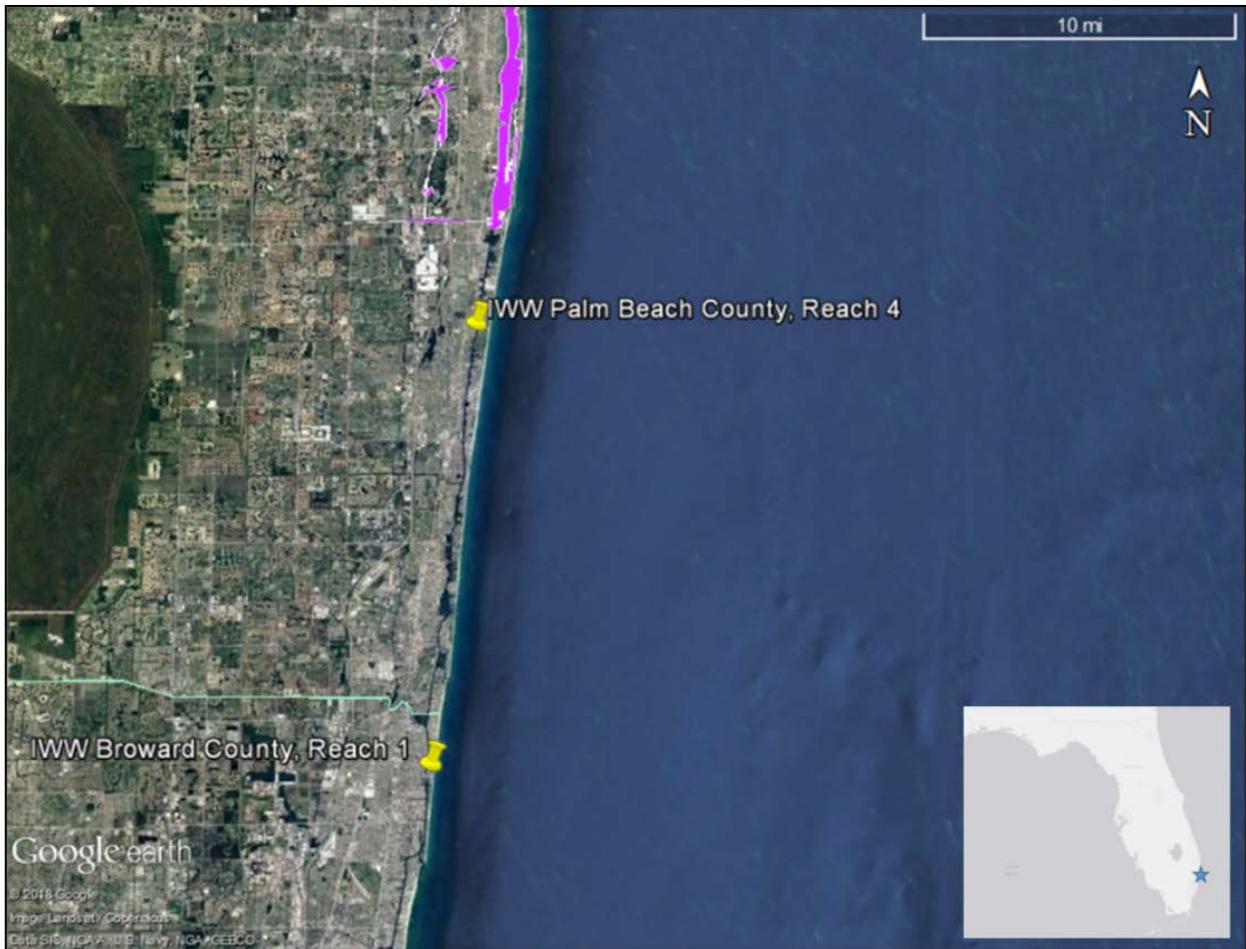
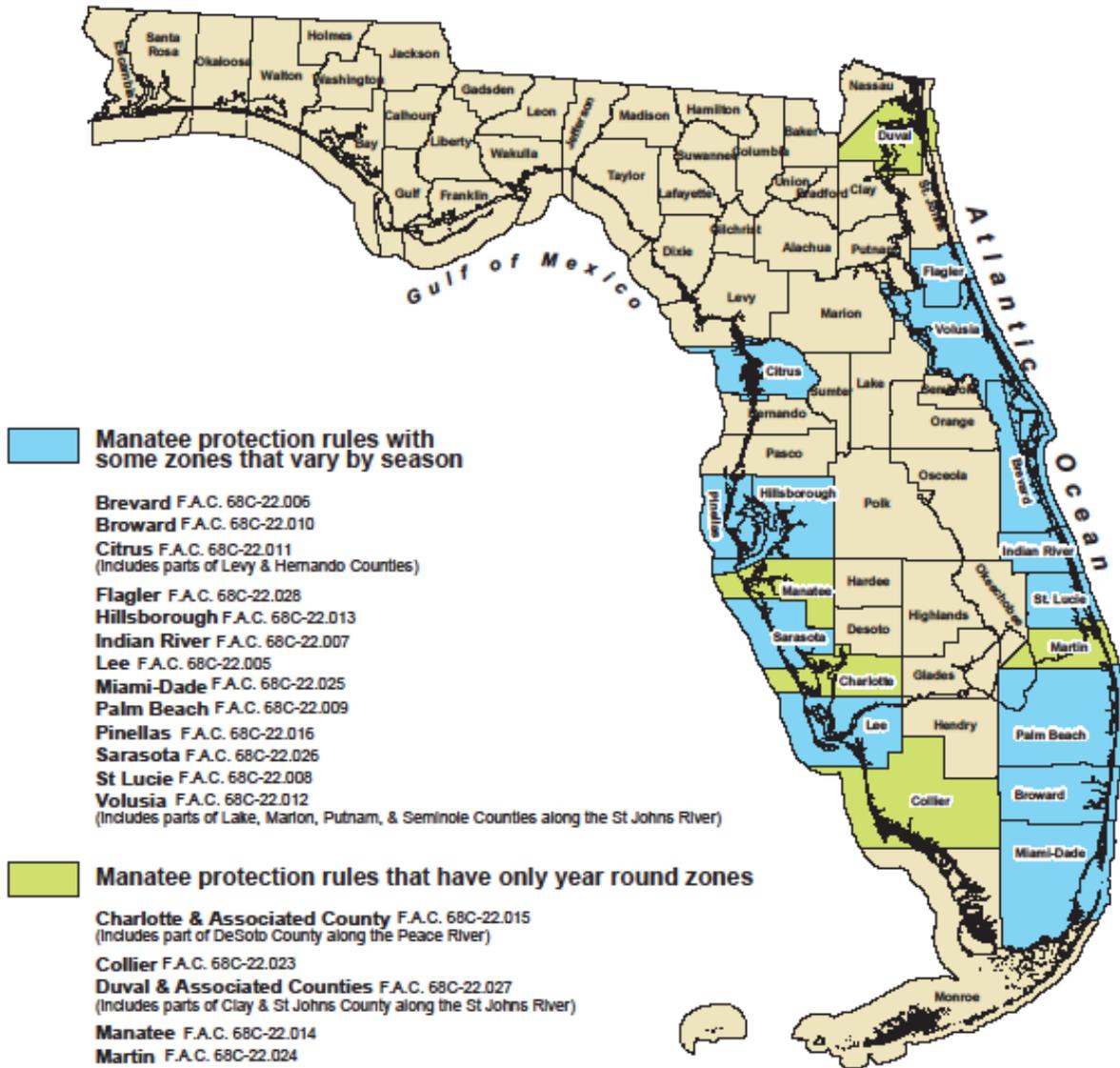


Figure 19. USFWS Florida manatee critical habitat, zoomed to southeast Florida. (Source: Resources at Risk layer, RD.)

Florida Counties with FWC Manatee Protection Zones



**Florida Fish and Wildlife
Conservation Commission**
Division of Habitat and Species Conservation
Imperiled Species Management Section
MyFWC.com
620 South Meridian Street - MS6A
Tallahassee, Florida 32399-1800
(850) 922-4330



Printed 5/2016

Figure 20. FWC Florida manatee protection zones.

(Source: <http://myfwc.com/media/2944209/MPZStatewideMap.pdf>)

3.4.5 PIPING PLOVER

The piping plover (*Charadrius melodus*) Atlantic Coast and Northern Great Plains populations were listed as threatened in 1985 (50 FR 50726). Piping plovers are generally found on sandy beaches on the Atlantic Coast and Great Lakes as well as sandbars along major rivers on the northern Great Plains. While most shorebirds have a wide distribution, the piping plover barely extends into Mexico during the winter (Audubon 2018). Piping plovers are foragers and feed on prey such as insects, marine worms, and crustaceans. The population has declined primarily due to human disturbance on nesting areas, especially in competition for beach use. Nests are shallow scrapes in open ground with no direct shelter or shade. Although critical habitat has been designated for the species in 2001 (50 FR 36038), there is not any DCH in the project area. The project area includes habitat that could be suitable for use by piping plover but it is not considered optimal habitat.

3.4.6 RUFA RED KNOT

The rufa subspecies of the red knot (*Calidris canutus rufa*), is listed as threatened, and is a small shorebird that can occur along the Atlantic and Gulf coasts during its migration. It is also known to overwinter in low numbers along both coasts. Florida is home to the largest concentration of wintering rufa in the U.S. (A.C. Schwarzer et al. 2012). In migration and winter, it prefers coastal mudflats, tidal zones, and sometimes open sandy beaches where it feeds on small invertebrates such as small mollusks, marine worms, and crustaceans (Kaufman 1996). The knot population has declined primarily due to reduced food availability from increased harvests of horseshoe crabs (USFWS 2015). Their numbers appear to have stabilized in the past few years, but they remain at low levels relative to earlier decades (USFWS 2015). Critical habitat has not been designated for this species. Although the project area includes habitat that could be suitable for use by rufa red knot, it is not considered optimal habitat.

3.4.7 JOHNSON'S SEAGRASS

Johnson's seagrass (*Halophila johnsonii*) was listed as a threatened species by NMFS on September 14, 1998 (63 FR 49035) and the final rule for critical habitat designation for *H. johnsonii* was published April 5, 2000 (65 FR 66). Although NMFS has listed *H. johnsonii* as a threatened species under Section 4 of the ESA, it has not promulgated a 4d rule under the Act, and as a result, there is no prohibition on take. *H. johnsonii* has the most limited geographic ranges of all seagrass species. It is known to occur only from 21.5 km north of Sebastian Inlet (i.e., near Palm Bay in Brevard County) south to northern Biscayne Bay (i.e., near North Miami) on the east coast of Florida (Kenworthy 1997; Virnstein and Hall 2009). Although critical habitat has been designated for the species, there is not any DCH in the project area (see **Figure 21**).

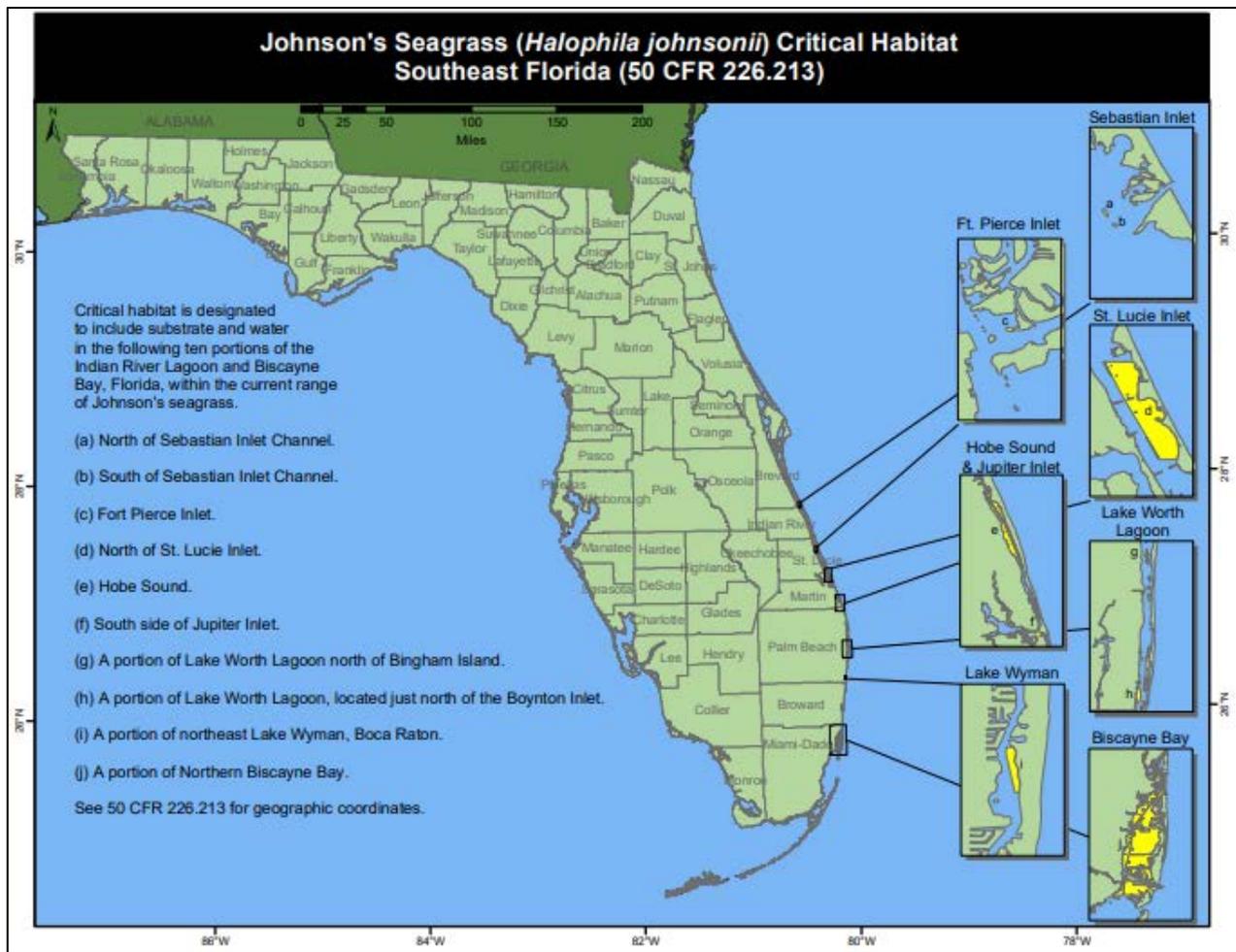


Figure 21. NMFS DCH for Johnson's seagrass.

(Source: <http://www.nmfs.noaa.gov/pr/pdfs/criticalhabitat/johnsonsseagrass.pdf>)

3.4.8 LISTED CORAL SPECIES

Listed coral species include pillar coral (*Dendrogyra cylindrus*), rough cactus coral (*Mycetophyllia ferox*), lobed star coral (*Orbicella annularis*), mountainous star coral (*Orbicella faveolata*), boulder star coral (*Orbicella franksi*), elkhorn coral (*Acropora palmata*), and staghorn coral (*Acropora cervicornis*), all of which are listed as threatened under the ESA. These species may be found adjacent to the southern beach and/or nearshore placement area where there is adjacent hardbottom present. Species descriptions are included below:

Pillar Coral (*Dendrogyra cylindrus*)

Pillar coral was listed as threatened in 2014 (79 FR 67356). It is tan colored with tentacles that are often exposed during daylight giving a fur light appearance over a skeleton that looks similar to brain coral. Sexual reproduction occurs via broadcast spawning of gametes into the water column in mid-August. Pillar coral can be found in warm marine environments throughout the Caribbean Sea and subtropical and tropical West Atlantic Ocean. Similar to other corals, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Although

this coral may be located within the region, it is not present within the project footprint. Critical habitat has not been designated for this species.

Rough Cactus Coral (*Mycetophyllia ferox*)

Rough cactus coral was listed as threatened in 2014 (79 FR 67356). This species occurs in the Caribbean, southern Gulf of Mexico, Florida, and the Bahamas. The corals are most commonly found in fore reef environments but can also occur in deeper habitats and lagoons. Similar to other corals, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Although this coral may be located within the region, it is not present within the project footprint. Critical habitat has not been designated for this species.

Lobed Star Coral (*Orbicella annularis*), Mountainous Star Coral (*Orbicella faveolata*), and Boulder Star Coral (*Orbicella franksi*)

Lobed star coral, mountainous star coral, and boulder star coral were listed as threatened in 2014 (79 FR 67356). *O. faveolata* and *O. franksi* were previously included in *O. annularis*. Most studies prior to 1994 do not distinguish between the three species clearly. The corals occur in the Caribbean, Gulf of Mexico, Florida, and the Bahamas. *O. annularis* is a common species in fore reef environments, especially in semi-protected reefs, lagoons, and upper reef slopes. *O. faveolata* is found in both back and fore reef environments and is abundant in fore reef environments between 10-20m. *O. franksi* is most abundant from 15-30m in fore reef environments. Similar to other corals, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Although these corals may be located within the region, they are not present within the project footprint. Critical habitat has not been designated for these species.

Elkhorn Coral (*Acropora palmata*)

Elkhorn coral is a large, branching coral with thick and sturdy antler-like branches. The dominant mode of reproduction is asexual, with new colonies forming when branches break off a colony and reattach to the substrate. Sexual reproduction occurs via broadcast spawning of gametes into the water column once each year in August or September. Since 1980, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Critical habitat was designated in 2008 (73 CFR 72210) and is specifically defined as:

All waters in the depths of 98 FT (30 M) and shallower to the 6 FT (1.8 M) contour from Boynton Inlet, Palm Beach County, to Government Cut, Miami-Dade County; and the mean low water line from Government Cut south to 82° W longitude in Monroe Counties." Within these specific areas, the essential feature consists of natural consolidated hard substrate or dead coral skeleton that are free from fleshy or turf macroalgae cover and sediment cover.

Although this coral and its DCH may be located adjacent to the nearshore placement areas on the adjacent hardbottom habitats, the PCEs are not present within the project dredging or in water placement areas footprints.

Staghorn Coral (*Acropora cervicornis*)

Staghorn coral is a branching coral with cylindrical branches ranging from a few centimeters to over 6.5 feet (2 M) in length. The dominant mode of reproduction for staghorn coral is asexual fragmentation, with new colonies forming when branches break off a colony and attach to the substrate. Sexual reproduction occurs via broadcast spawning of gametes into the water column once each year in August or September. Staghorn coral occur in back reef and fore reef environments from 0-98 feet (0-30 M) deep. The upper limit is defined by wave forces and the lower limit is controlled by suspended sediments and light availability. Staghorn coral is found throughout the Florida Keys, the Bahamas, and the Caribbean islands. This coral occurs in the western Gulf of Mexico, but is absent from U.S. waters in the Gulf of Mexico. It also occurs in Bermuda and the west coast of South America. The greatest source of region-wide mortality for staghorn coral has been disease outbreaks, mainly of white band disease. Other, more localized losses have been caused by hurricanes, increased predation, bleaching, algae overgrowth, human impacts, and other factors. Critical habitat was designated for this species in 2008 (73 CFR 72210) and is specifically defined as:

All waters in the depths of 98 FT (30 M) and shallower to the 6 FT (1.8 M) contour from Boynton Inlet, Palm Beach County, to Government Cut, Miami-Dade County; and the mean low water line from Government Cut south to 82° W longitude in Monroe Counties. Within these specific areas, the essential feature consists of natural consolidated hard substrate or dead coral skeleton that are free from fleshy or turf macroalgae cover and sediment cover."

Although this coral and its DCH may be located within the region, it is not present within the project footprint.

3.5 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NMFS on activities that may adversely affect essential fish habitat (EFH). South Atlantic Fish Management Council (SAFMC) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, or growth to maturity" (SAFMC 1998).

SAFMC designated seagrasses, corals, coral reefs, hardbottom, and unconsolidated sediments as EFH. Hardbottom habitats are EFH for coral, red grouper (*Epinephelus morio*), gag grouper (*Mycteroperca microlepis*), gray snapper (*Lutjanus griseus*), mutton snapper (*L. analis*), white grunt (*Haemulon plumieri*), and spiny lobster (*Panulirus argus*). Unconsolidated habitats are EFH for cobia (*Rachycentron canadum*), black seabass (*Centropristis striata*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*S. maculatus*), spiny lobster, and pink shrimp (*Farfantepenaeus duorarum*). All demersal fish species under SAFMC management that associate with coral habitats are contained within the fishery management plan for snapper-grouper species and include some of the more commercially and recreationally valuable fish of the region. All of these species show an association with coral or hardbottom habitat during their life history. In groupers, the demersal life history of almost all *Epinephelus* species, several *Mycteroperca* species, and all *Centropristis* species, takes place in association with coral habitat (SAFMC 2009). Coral, coral reef and hardbottom habitats benefit fishery resources by providing food or shelter (SAFMC 1983). SAFMC also designated corals, coral reefs, hardbottoms and seagrass as a Habitat Area of

Particular Concern (HAPC), which is a subset of EFH that is either rare, particularly susceptible to human-induced degradation, especially important ecologically, or located in an environmentally stressed area. In light of their designation as EFH-HAPC's and Executive Order (E.O.) 13089, NMFS applies greater scrutiny to projects affecting corals, coral reefs, hardbottoms, and seagrass to ensure practicable measures to avoid and minimize adverse effects to these habitats are fully explored.

3.5.1 CORALS, CORAL REEF AND HARD/LIVE BOTTOMS

HAPCs for corals, coral reefs and hard/live bottom habitats of central east Florida include 1) the worm reefs in nearshore waters; 2) nearshore hardbottom in water depths 0 to 4 M; 3) offshore hardbottom habitats in water depths 5 to 30 M and 4) *Oculina* banks from Fort Pierce to Cape Canaveral in water depths > 30 M. Only the second type of HAPCs is in the project area, as hardbottoms offshore of Hillsboro Inlet, which is discussed in section 3.3.6. Listed coral species are discussed in section 3.4.8 of this EA and are incorporated here by reference.

3.5.2 SEAGRASSES

An EFH assessment for seagrasses in the IWW was prepared for the issuance of the RGP SAJ-93 and is incorporated herein. Seagrasses within the project area are discussed in sections 3.3.4 and 3.4.7 of this EA and are incorporated here by reference.

3.6 AIR QUALITY

Ambient air quality along the southeast Florida coast is generally good due to prevalent ocean breezes from the northeast to the southeast. The area is in the Southeast Florida Intrastate Air Quality Control Region, as established by 40 CFR § 81.49. USEPA (40 CFR § 81.310) designates air quality compliance on a county level. Palm Beach County and Broward County are considered as being in attainment with National Ambient Air Quality Standards (NAAQS) for ozone, nitrogen dioxide, carbon monoxide, total suspended particulates, and sulfur dioxide. USEPA has not made a designation for lead in southeastern Florida.

3.7 WATER QUALITY

The IWW Broward County, Reach 1 is a tidally connected water body approximately 5 nautical miles (NM) long that runs parallel with the coastline of Deerfield/Hillsboro Beach; this reach is not located within Outstanding Florida Waters. Water quality within the IWW Broward County, Reach 1 project area is influenced by feeder canals from the west (Hillsboro Canal), Boca Raton inlet to the north, and Hillsboro Inlet to the south.

The IWW Palm Beach County, Reach 4 (cuts P-59 to P-60), is a tidally connected water body approximately 0.5 NM long that runs parallel with the eastern coastline of MSA 641A; this reach is not located within Outstanding Florida Waters. Water quality within the IWW Palm Beach County Reach 4 project area is influenced by multiple finger canals to the north and south, the C-15 Canal 4 NM to the south, and Boynton Inlet (see **Figure 15**) 4 NM to the north. The C-15 Canal is utilized to drain neighborhoods in Boynton Beach, Delray Beach, Boca Raton and unincorporated communities west of these cities.

The predominant issue that affects water quality in water of South Florida is turbidity, which is considered an appropriate measure of water quality. Turbidity is measured in Nephelometric Turbidity Units (NTU), which is a measure of light-scatter by particulates within the water. This measurement does not address the characteristics of suspended material that creates turbid conditions. The Florida State Water Quality Standard for turbidity is less than 29 NTU above background levels outside the turbidity-mixing zone.

Turbidity values are generally lowest in the summer months and highest in the winter months, corresponding with winter storm events and the rainy season, and are higher closer to shore (Gilliam 2008; Dompe and Haynes 1993; Coastal Planning & Engineering 1989). Moreover, higher turbidity levels can generally be expected around inlet areas, especially in estuarine areas, where nutrient and entrained sediment levels are higher. Although some colloidal material will remain suspended in the water column upon disturbance, high turbidity episodes usually return to background conditions within several days to several weeks, depending on the duration of the perturbation (storm event or other) and on the amount of suspended fines.

Waters within the proposed dredging area have been designated by the State of Florida as Class III waters, suitable for recreation as well as propagation and maintenance of a healthy and well-balanced population of fish and wildlife. IWW Broward County, Reach 1 and IWW Palm Beach County, Reach 4 are used for both commercial/recreational boating, recreational fishing, kayaking, and other recreational uses.

3.8 NOISE

Noise is defined as unwanted sound and, in the context of protecting public health and welfare, implies potential effects on the human and natural environment. Noise is a significant concern associated with construction, dredging, and transportation activities and projects. Ambient noise levels within a given region may fluctuate over time because of variations in intensity and abundance of noise sources. Ambient sources of noise within the project area are recreational activities (boating and fishing), commercial vessels transiting up and down the coast, and natural sounds from the physical and biological environment. The IWW is an area of very high recreational boat traffic, particularly on weekends. Broward County and Palm Beach County have many seasonal residents and tourists, and many more residents are present in the winter months, which results in more boating traffic during the winter tourist season, resulting in higher noise levels near the IWW.

3.9 AESTHETIC RESOURCES

The area of the IWW in the vicinity of Broward County, Reach 1 and Palm Beach County, Reach 4 is an urban environment and as previously discussed, heavily used by recreational and commercial vessels. The project area consists of light beige sandy beaches that contrast strikingly with the deep hues of the panoramic Atlantic Ocean. Dunes, dune vegetation and tropical landscaping separate the beach from condominium and hotels along the shore. Landscaping vegetation consists of trees such as coconut, sabal, and date palms, as well as a shrub canopy including seagrape and cocoa plum, which transitions into sea oats, dune sunflower, and morning glory vines. These and many other tropical beach plantings provide an aesthetic transition between the dunes and the beach.

3.10 RECREATIONAL RESOURCES

Broward County and Palm Beach County are heavily populated counties on Florida's Atlantic Coast, which receives a tremendous volume of tourists, particularly during the winter months. Those beaches that can be accessed by the general public are heavily used year round. Adjacent to these beaches are many condominiums and hotels used by long-term and short-term visitors and residents of the area. Other water-related activities within the project area include on-shore and offshore fishing, snorkeling, scuba diving, windsurfing and recreational boating. Commercial enterprises along the beach rent beach chairs, cushions, umbrellas, and jet skis. Food vendors are also found along the beach areas.

3.11 ECONOMIC RESOURCES

The median household income in Broward County was \$52,954 and Palm Beach County was \$55,277 in 2016, which was slightly lower than the national average of \$55,322 (U.S. Census 2016a, 2016b). Tourism contributes significantly to the Broward County and Palm Beach County economy, with the largest industries being healthcare and social assistance, retail trade, and accommodations and food service (Data USA 2016a, 2016b). Amenities such as restaurants, fishing, nightclubs, golf courses, casinos, malls, etc. provide a large benefit through tourism, taxes, and jobs.

3.12 NAVIGATION AND PUBLIC SAFETY

Shoaling has reduced the operating depth of the IWW. Reduced operating depths may threaten safe navigation and human health and safety. Socio and economic benefits based on navigation, such as fishing, vessel transit, etc., may also be threatened by shoaling in the IWW.

3.13 NATIVE AMERICANS

The IWW in the vicinity of Broward County, Reach 1, Palm Beach County, Reach 4 (cuts P-59 to P-60), or the beaches to the north of south of the Hillsboro Inlet are not located within or adjacent to known Native American-owned lands, reservation lands, or Traditional Cultural Properties.

3.14 CULTURAL RESOURCES

3.14.1 CULTURAL, HISTORIC, AND ARCHEOLOGICAL RESOURCES

The earliest widely accepted date of occupation by aboriginal inhabitants of Florida dates from around 12,500 years ago, and new evidence suggests that people were present in the region even earlier. This earliest cultural period, called the Paleo-Indian period, lasted until about 7500 B.C. Few Paleo-Indian archeological sites are recorded in south Florida. During this period, the continental shelves were exposed, and the Florida peninsula encompassed an area approximately twice the current size of the state Florida. Gradual sea level rise, which occurred between about 10,000 years ago to 6,000 years ago, resulted in the submergence of many terrestrial archaeological sites along the coast.

During the Archaic period (ca. 7500 B.C.-ca. 500 B.C.), prehistoric people exploited a wider range of resources and may have led a more sedentary existence than earlier periods. Most Archaic period archeological sites recorded in the Florida Master Site File (FMSF) are clustered along the Atlantic and Gulf coasts. Sea levels continued to rise until reaching approximate modern levels during this period. The stabilization of sea levels resulted in the formation of estuaries where

Archaic period populations heavily exploited coastal resources. Large prehistoric Archaic period shell rings have been identified on coastal sites including Bonita Bay and Horr's Island in southwest Florida (Russo 2006).

Two Late Archaic cultures are generally recognized in South Florida, the Orange culture and the Glades Archaic cultures. The Orange culture is recognized for using a distinctive type of pottery manufactured using fiber temper. While most widely known from northeast Florida, Orange culture sites have been identified along the southeast coast. Site types generally consist of middens composed of oyster and coquina shell along the coasts and freshwater pond snail along the inland rivers and streams. The Archaic traditions eventually developed into the unique cultural affiliations identified temporally as Malabar I and Malabar II cultures.

At the time of initial European contact, the area of present-day Broward County was inhabited by the Tequesta Indians, which can be traced back in time at least to 500 BCE (Milanich 1995). The archaeological information from the pre-Columbian period provides no evidence that the Tequesta were organized in as complex a fashion as the Calusa, who dominated the lands on the southwestern coast of Florida. Sixteenth-century Spanish documents indicate the Tequesta chief ruled over a small population with allegiance to the Calusa chief. With European expansion to the north came the arrival of displaced native populations from the northern areas into South Florida. By the mid-eighteenth century, a Jesuit mission was established for a brief time at the mouth of the Miami River where the Tequesta's main village had once been. Documents relative to that mission no longer refer to the Tequesta, but they do mention two other groups, the Santaluces and the Boca Raton. The Spanish probably named the Boca Raton Indians after the small coastal inlet in which they lived, which is still today called Boca Raton located just north of the project area (Milanich 1995) (Wilson et al. 2018).

The first European to land on and explore Florida was Ponce de Leon. In 1763, the English gained temporary possession of the region from the Spanish. During the American Revolution, the Spanish retook Florida from the British in 1781. During the Second Spanish period, the population of Florida continued to grow. As the eighteenth century ended and the nineteenth century began, the Seminole Indians were increasingly forced into the interior of Florida. In the early nineteenth century, Spain's control over Florida was weak, and after the First Seminole War, Spain sold Florida to the U.S. (McIver 1983). In 1821, Florida became an American territory and remained a territory until 1845, when it was granted statehood. Dade County, which encompassed present-day Miami-Dade, Broward, and Palm Beach counties, was established in 1936.

The 1920s were a boom time across Florida, including Broward County. New developments sprang up across the county (Allen and Capone 2000). In the 1920s, the Port of Palm Beach opened and it was very successful. In 1926, hurricanes and a banking crisis ended the boom times for Florida. Despite the difficulties of the times, Port Everglades successfully opened in 1928 (McIver 1983). World War II brought civilian jobs and military base construction to Broward and Palm Beach counties. The Postwar period brought yet another surge in development to Broward and Palm Beach Counties, with the creation of new subdivisions and towns. Improved flood control opened up more land in the county for real estate development. This pattern of development continued

through the 1960s. Today, the east coast of Florida is one of America's premier retirement locations and the beaches are a tourism attraction.

3.14.2 INTRACOASTAL WATERWAY

In 1881, the private Florida Coast Line Canal and Transportation Company began dredging a channel along the coast between the shore and the barrier islands. By the 1890s, the canal had reached the Hillsboro Inlet. The canal was difficult to maintain due to constant shoaling and it failed to collect sufficient tolls to financially support the company. The company changed hands several times and was even owned by Henry Flagler and his East Coast Railroad. In 1923, the canal went into receivership and was purchased from bankruptcy with State funds (Bland and Johnston 1998; Butler 1995; Crawford 1997).

The Federal government assumed control of the canal in 1927 creating the Florida Inland Navigation District and the River and Harbors Act of 1927 was passed. Between 1950 and 1965, efforts continued to widen and deepen the channel, with a goal of a minimum width of 125 feet and a minimum depth of 10 feet (Butler 1995). These segments were constructed in 1965 and the authorized depth and width for these segments is 10 feet by 100 feet.

3.14.3 PREVIOUS CULTURAL RESOURCE INVESTIGATIONS

Several submerged cultural resource investigations have been completed near the proposed project. In 1997, a survey was completed offshore of Deerfield Beach, Hillsboro Beach, Pompano Beach, and Lauderdale-By-The-Sea (Baer 1997). In 2001, John Gifford conducted investigations of several wrecks identified by Baer (1997) to determine their significance. As a result, a section of the S.S. Copenhagen (8BD2567) was identified offshore and outside the Area of Potential Effects (APE). Mid-Atlantic Technology and Environmental Research, Inc. (MATER) conducted a survey of the Hillsboro Inlet in 1998 (Hall 1998). In total, 22 magnetic anomalies were detected with 13 having a high or medium potential for significance. In the summer of 1999, MATER investigated the anomalies and identified one as the wreckage of a modern vessel. All other targets were determined modern debris (Hall 1999). John Gifford returned to the Hillsboro area and performed a magnetometer survey of a proposed 1.6-acre artificial reef mitigation area immediately south of the Hillsboro Inlet in 2005 (Gifford 2005). The survey was unsuccessful at locating in situ historic artifacts and encountered modern debris. The debris was believed to have been produced by dredging operations or various engineering structures from the 1950s.

The investigations of the Copenhagen, Gil Blas (8BD67), and the Barefoot Mailman (8BD68) shipwrecks were summarized by Vone Research, Inc. (Vone) in their reports describing their survey work in their lease area of "E-149." This area is located off the coast from the Hillsboro Inlet, east and offshore of the current project area, which extends from Hillsboro Beach to Sea Ranch Lakes. The company released several annual reports detailing their survey work in the lease area from 2001 to 2011 (Vone Research, Inc. 2001, 2005, 2007, 2009, 2010, and 2011).

3.14.4 NAVIGATION CHANNEL

In 2017, a submerged cultural resource survey of the Broward Reach 1 navigation channel (Cuts BW-7 through BW-21) identified 167 magnetic anomalies, 20 sidescan sonar targets within the Broward Reach 1 survey area (Wilson et al. 2018). One anomaly is associated with a shipwreck while the others appear to be non-significant modern debris. Sonar Contact C0003, associated with

Anomaly M013, is a charted wreck located just inside the channel and it appears to be the wreck of a barge approximately 45 feet long, 20 feet wide, and at least 1 foot above the bottom. The FMSF has designated this shipwreck as site 8BD06446. Although the wreck is located within the navigation channel, this wreck is located outside the area proposed APE for dredging and will not be affected by this project.

4 ENVIRONMENTAL EFFECTS

This section is the analytic basis for the comparisons of the alternatives. (See **Table 1** in Section 2 (Alternatives) for summary of effects.) The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects. The Preferred Alternative for the upcoming cycle is placement in the upland DMMA's. However, in the future, any of the alternatives could be the Preferred Alternative depending on dredging locations, capacity, sediment color and quality, and available funding.

4.1 SEDIMENT CHARACTERISTICS

Under the No Action Alternative, no effect to native sediment characteristics would occur within the navigation channels. The channel will continue to fill with sediments brought in on the flood tide each day and in association with weather events.

In comparison, long-term impacts to bathymetry, typical of a dredging project (i.e. deeper depths due to the removal of sediments), are expected with implementation of Alternative 1 (O&M Dredging). Maintenance dredging may encounter debris, including trash, rope, chain, cable, tires, and miscellaneous scrap metal. These materials will be properly disposed of as required by contract specifications and in accordance with Section 307 of the CWA (33 U.S.C. §1317).

The FDEP "Sand Rule" (F.A.C. 41.007(2)(j)) describes sediment that is suitable for placement on Florida's beaches and requires that placed sand be of similar color to the native beach sand. F.A.C. 41.007(2)(k) specifies the standards for dredged material from O&M projects for beach and nearshore placement: up to 10% fines for beach placement and up to 20% fines for nearshore placement. The "Sand Rule" does not apply to placement in upland DMMA's.

Based on geotechnical investigations conducted in 2014 and 2018, the existing sediments in IWW Broward County, Reach 1 and cuts P-59 to P-60 of the IWW Palm Beach County, Reach 4 meet the majority of the "Sand Rule" criteria. However, these sediments are not similar in color to the material currently existing on Broward County beaches or materials currently being placed on the beaches. Sediment characteristics for Placement Options B through F would be similar in nature. FDEP would likely not approve beach placement (Placement Options E and F), however, some mixing of sediments would be expected with nearshore placement (Placement Options C and D) and in the Hillsboro Inlet Impoundment Basin (Placement Option B), which could result in the dredged material becoming light enough for placement in these proposed locations. No effect or change to sediments is expected from placement of dredged material into DMMA's (Placement Option A).

4.2 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

In response to the HTRW concerns received from Miami Waterkeeper, the Corps' geotechnical hazardous waste section conducted an investigation on potential effects of the proposed project. Based on previous geotechnical investigations, the soil boring logs and HTRW analysis indicated no reason to believe that there is HTRW present in the sediments to be dredged. The proposed project will not introduce any new sources of contaminants or hazardous waste to the area. **Appendix D**

(Geotechnical Investigations) includes more details on the geotechnical analysis.

The No Action Alternative, Alternative 1 (O&M Dredging), and placement in any of the placement options would not result in a change to the project area's existing HTRW conditions.

4.3 FISH AND WILDLIFE

Under the No Action Alternative, as the Broward County, Reach 1 and Palm Beach County, Reach 4 channels fill in with sediment, the area available to macroinfaunal benthos already in the sediment will increase. The number of benthic invertebrates may increase in proportion to the available substrate. Additionally, the shoaling of the channels may result in the colonization of the channel by seagrasses as more light reaches the bottom of the channel.

Migratory Birds, Marine Mammals, and Channel Benthos

Implementation of Alternative 1 (O&M Dredging) will result in temporary increases in turbidity and sedimentation, removal and burial of benthic species, and displacement of fish; however, those effects are minimal given the short-duration of activities and widespread availability of equivalent adjacent habitat. Marine mammals in the dredging area may also be temporarily displaced from the area by the activities, although the operation of the dredge is not expected to affect marine mammals any more than recreational and commercial vessels operating within the IWW or in the nearshore north or south of the Inlet during sand placement activities. Direct effects to birds, fish, and other wildlife from project construction are expected to be minimal as these animals are motile and can avoid construction activities, however, temporary displacement and noise related to use of heavy construction equipment could disturb nesting and foraging birds, marine mammals, and other wildlife. Some wildlife and birds may experience temporary adverse effects from a reduction in available food sources. The non-motile benthic invertebrates in the channel will be removed by the dredging or buried by the placement of dredged material in nearshore environments or beaches. The macroinfaunal community will likely begin recovery immediately through the recolonization of the newly created habitat via species present in the undisturbed areas adjacent to the channel (Burlas et al. 2001; Van Dolah et al. 1984; Jutte et al. 2002).

Placement options will all have some similar effects. During the placement of the dredged materials, birds, like gulls, may forage in the immediate area of equipment operation where heavy equipment is used to shape dewatering sediment discharges for any of the proposed placement sites. Elevated turbidity levels within the immediate vicinity of the impoundment basin (Placement Option B), nearshore (Placement Options C and D), or beach discharge sites (Placement Options E and F) may interfere with foraging by sight feeders such as the brown pelican (*Pelecanus occidentalis*). However, increased turbidity levels would be limited to a small portion of the shoreline and should not result in significant effects to foraging activities. If Placement Options E and/or F (beach placement) were selected in future cycles, there would be long-term benefits from the creation of additional nesting and foraging areas for migratory birds due to the increase in dry beach. Although nesting least tern colonies have been documented in DMMA's (Placement Option A) along the east coast of Florida, it is unlikely that least terns would nest in DMMA's MSA 641A or MSA 726 due to the small size and high potential for predation or disturbance from the surrounding areas. During beach placement, there may be some interruption of foraging and resting activities

for shorebirds and other wildlife that utilize the project area. This effect would be short-term and limited to the immediate area of placement and time of construction. There would be sufficient area north and south of the sites that can be used by displaced birds and wildlife during construction.

The Corps, in conjunction with the USFWS and FWC, has developed statewide guidelines to avoid and monitor potential effects to shorebirds. If placement of dredged material occurs during migratory bird nesting season, short-term, localized effects may occur. The timeframe for the O&M dredge events will be in accordance with P3BO and SPBO Terms and Conditions (T&C). The Corps developed a suite of contractual specifications for contractors to implement during construction where migratory birds may be present. The Contractor, will be assisted in this by a qualified bird observer as required by the SPBO, will keep all dredging and construction activities under surveillance, management, and control to prevent effects to migratory birds and their nests. The Contractor may be held responsible for harming or harassing the birds, their eggs or their nests as a result of their activities. The FDEP Joint Coastal Permit and the Corps' protection guidelines jointly require monitoring of shore birds and operation restrictions during the nesting season between April and September, when nesting and courting behavior is most prevalent.

Seagrasses

Implementation of Alternative 1 (O&M Dredging) will have minimal adverse effects on seagrasses, as the O&M dredging events are limited in scope and duration and negligible in considering the small impact to seagrass within an existing disturbed habitat i.e., the federal navigation channel. Although dredging will not take place in the channel side slopes, seagrasses that have colonized the side slopes of may also be removed through the sloughing resulting from box cuts associated with dredging. Such effects are expected in association with the dredging. Depending on the dredging method and location of dredging, anchors may also be used and the anchors will be placed in the side slopes, which may result in temporary effects associated with the placement and removal of anchors. RD conducted an analysis of effects to seagrasses associated the issuance of RPG-93 for maintaining the entire IWW for dredging conducted from 1999-2014. The analysis states:

Within the actual federal navigation channel, seagrass has been documented to recover and recolonize. Pre and post-dredging surveys from 1999 through 2014 show "gains" of 12.78 acres and "losses" of 9.05 acres of seagrass within the federal navigation channel. This is due to the ability of seagrass to recolonize after dredging events. The channel side slopes form a buffer between the actual dredging activity and natural water bodies where seagrass is most prevalent.

Additionally, in discussions with NMFS and RD on March 3, 2016, NMFS advised that programmatic consultation is not required under the ESA for RGP SAI-93 (discussed in section 1.7.1), as the scope of the action falls within the scope of the SARBO (Corps 2016). Based on these statements from the event-specific monitoring and discussions with NMFS and RD, long-term, adverse effects to seagrasses are not expected, and seagrasses removed from the implementation of Alternative 1 (O&M Dredging), if present, are expected to recolonize the channel as sand fills into the channel

between dredging events. Seagrasses are not present in any of the placement options footprints; however, seagrasses may be present in the vicinity of MSA 641A (Placement Option A). Seagrass locations would need to be confirmed prior to dredging.

Beach Placement Area Resources

The effects of placing sand on the beaches of Broward County have been assessed numerous times, and those analyses remain valid (Corps 2004, Corps 2015) for this project's Placement Options E and F (beach placement south and north of the Hillsboro Inlet). Nelson (1989) reviewed the literature on the effects of beach nourishment projects on sand beach fauna and concluded that minimal biological effects resulted from beach nourishment. In addition, some mortality of organisms may occur where grain size is a poor match to existing sediments; however, recovery of the beach system appears to be rapid. Nelson reviewed several studies on the most common beach invertebrates of the southeastern U.S., including the mole crab (*Emerita talpoida*), the surf clam, (*Donax sp.*) and the ghost crab (*Ocyropode quadrata*). None of the studies cited by Nelson (1989) showed significant or lasting impacts to any of the above species resulting from beach nourishment. Hackney et al. (1996) provide a more recent review of the effects of beach restoration projects on beach infauna in the southeastern U.S. They also reviewed studies on the above species and agree with the conclusions set forth by Nelson (1989), with the suggestion that construction should take place in winter months to minimize potential effects, and that the sand used should be a close match to native beach sand. In review of past studies, there was a considerable short-term reduction in the abundances of mole crabs, surf clams, and ghost crabs attributable to direct burial. Recruitment and immigration were generally sufficient to re-establish populations within one year of construction. No long-term adverse effects are anticipated to the intertidal macroinfaunal community due to placement activities (Deis et al. 1992, Nelson 1985, Gorzelany & Nelson 1987).

Hardbottoms

Hardbottoms are not in the direct footprint for Alternative 1 (O&M Dredging) or any of the placement options. Proposed placement sites on the beach or in the nearshore environment south of Hillsboro Inlet (Placement Options E and C, respectively) are adjacent to an artificial reef and hardbottom habitats, which is discussed in section 3.3.6. The HID has conducted monitoring of this reef community over the course of 4 years since the construction of the HIIP. There was no statistical difference noted between turf algal coverage, macroalgal coverage, sediment coverage, sponge coverage, and coral coverage when comparing the artificial reef to the adjacent hardbottom area, which was used as a control for the monitoring (Coastal Systems International, Inc. 2012). Based on these monitoring results, potential temporary effects due to short-term turbidity during beach or nearshore placement, similar to ongoing activities at the Hillsboro Inlet Sand Bypass project, is expected.

4.4 THREATENED AND ENDANGERED SPECIES

Under the No Action Alternative, O&M dredging of the IWW would not occur. The ongoing shoaling may result in shallow channel depths that enable the expansion of seagrasses into the previously dredged areas, benefitting seagrass species found adjacent to the channel. The increase in seagrass may also attract manatees and sea turtles into the channel area to forage on the grasses. As the channel shallows, there may be an increase in vessel strikes of sea turtles and manatees that are

unable to avoid vessels continuing to transit the channel, due to decrease in available area for the animals use of the channel footprint.

Potential effects of dredging (Alternative 1) and placement of material on the beach (Alternative E and F) has been reviewed in the SARBO, SPBO, and P3BO. These BOs include T&Cs to minimize adverse effects to listed species and provide incidental take authorizations where adverse effects cannot be avoided. The Corps is incorporating those T&Cs into the project plans and specifications. As a result of the BOs, the effects of the continued dredging of the IWW Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) with placement of dredged material in a FIND upland DMMA (Placement Option A), in the Hillsboro Inlet Impoundment Basin (Placement Option B), on the beaches north or south of Hillsboro Inlet (Placement Options F or E), and/or in the north or south nearshore environment (Placement Options C or D), may affect, but is not likely to adversely affect the continued existence of any listed species.

In compliance with Section 7 of the ESA, the continued O&M of the IWW project was fully coordinated under the ESA as part of the recently authorized RGP SAJ-93 (refer to Section 1.7.1). The applicable conditions of the SARBO issued by NMFS and the SPBO issued by the USFWS have been incorporated into the project plans and specifications and will be followed during construction.

Additional analysis, by species group or species is provided below:

Sea Turtles

Dredging and the use of the various placement locations could potentially directly and indirectly affect sea turtles in several ways, including:

- Placement activities in the nearshore (Placement Options C or D) and on nesting beaches (Placement Options E and F) may affect sea turtles.
- Escarpment formations and resulting impediments to nesting females as well as potential losses to the beach equilibration process;
- Sediment density (compaction), shear resistance (hardness), sediment moisture content, beach slope, sediment color, sediment grain size, sediment grain shape, and sediment grain mineral content can be altered potentially affecting the nesting and incubating environment;
- Hard sediment can prevent a female turtle from digging a nest or result in a poorly constructed nest cavity;
- Changes in sediment properties and color could alter the temperature of the beach and incubating nests, thus influencing sex ratios.

The project's dredging will incorporate T&Cs from the SARBO, which covers all dredge types. Although large hopper dredges are known to lethally take or injure sea turtles through entrainment, the smaller "Currituck class" of hopper dredges that may be used for operations in the IWW are "not expected to adversely affect listed species of sea turtles because of the slow speed of the vessels, the low suction levels inherent to these small dredges, and the small size of

the dragheads.” (NMFS 1999). Mechanical, hydraulic cutterhead, or small hopper dredges could be used in this area and may affect, but are not likely to adversely affect, sea turtles.

The 1991 SARBO; (amended in 1995 and 1997; NMFS 1991) states:

Clamshell dredges are the least likely to adversely affect sea turtles because they are stationary and impact very small areas at a given time. Any sea turtle injured or killed by a clamshell dredge would have to be directly beneath the bucket. The chances of such an occurrence are extremely low, although the take of a live turtle by a clamshell dredge has been documented at Canaveral. On the basis of the best available information, NMFS has determined that dredging with a clamshell dredge is unlikely to result in the take of sea turtles. . . . Pipeline dredges are relatively stationary and only influence small areas at a given time. For a turtle to be taken with a pipeline dredge, it would have to approach the cutterhead and be caught in the suction. This type of behavior would appear unlikely, but may be possible. Presently, NMFS has determined that pipeline dredges are unlikely to adversely affect sea turtles. . . . the special purpose split-hull hopper dredge and sidecast dredges are used in a limited basis in the southeast. These dredges are not believed harmful to sea turtles because of the small size of dragheads (roughly 2' by 2'). For the present consultation, NMFS has determined that these dredges are unlikely to adversely affect sea turtles.

For placement on the beach or in the nearshore environment (Placement Options C through F), USFWS biological opinions for similar projects acknowledge that placement of sand on a critically eroded beach can enhance sea turtle nesting habitat if the sand placed is highly compatible (*i.e.*, grain size, shape, color, etc.) with naturally occurring beach sediments at the recipient site, and compaction and escarpment remediation measures are properly adopted (USFWS 2015).

The Corps plans to minimize potential effects to nesting sea turtles in the project area by implementing steps that are now common practice including, but not limited to:

- contingency plans;
- risk assessments;
- sediment quality monitoring;
- compaction tests;
- tilling; and
- leveling escarpments in the fill;
- time of year restriction: no beach placement from 1 May through 1 November.

Smalltooth Sawfish

The logic set forth in the Gulf Regional BO of 2003 (as amended in 2005 and 2007) regarding hopper dredge effects to smalltooth sawfish in the Gulf of Mexico is also applicable to the IWW where sawfish occurrences are rare. As stated in the Gulf Regional BO, (page 21):

Smalltooth sawfish (Pristis pectinata) are tropical marine and estuarine fish that have the northwestern terminus of their Atlantic range in the waters of the eastern U.S. Currently, their

distribution has contracted to peninsular Florida and, within that area, they can only be found with any regularity off the extreme southern portion of the state. The current distribution is centered in the Everglades National Park, including Florida Bay. They have been historically caught as bycatch in commercial and recreational fisheries throughout their historic range; however, such bycatch is now rare due to population declines, population extirpations and a ban on fishing with floating nets. Between 1990 and 1999, only four documented takes of smalltooth sawfish occurred in shrimp trawls in Florida (Simpendorfer 2000). After consultation with individuals with many years in the business of providing qualified observers to the hopper dredge industry to monitor incoming dredged material for endangered species remains (C. Slay, Coastwise Consulting, pers. comm. August 18, 2003) and a review of the available scientific literature, NOAA Fisheries has determined that there has never been a reported take of a smalltooth sawfish by a hopper dredge, and such take is unlikely to occur because of smalltooth sawfishes' affinity for shallow, estuarine systems. Only hopper dredging of Key West channels would have the potential to impact smalltooth sawfish but those channels are not within the area of influence of this project. Therefore, NOAA Fisheries believes that smalltooth sawfish are rare in the action area, the likelihood of their entrainment is very low, and that the chances of the proposed action affecting them are discountable.

The Corps agrees with this determination and hereby incorporates it into this effects determination.

American Crocodile

American crocodiles are shy and retiring. They are unlikely to be found in a major coastal waterway with the high levels of disturbance (e.g. vessel traffic, human attention, etc.). Although possible, it is not probable to encounter an American crocodile in the project area, therefore, the Corps has determined that the proposed project will have no effect on this species.

Florida Manatee

In accordance with Section 7 of the ESA, consultation with the USFWS will be conducted under the SPBO. The Corps has determined that the proposed dredge work may affect, but is not likely to adversely affect, manatees. This determination was based on the implementation of species-specific protective measures and the type of dredging equipment typically used to dredge the channel. The Corps will include the 2011 USFWS Standard Manatee Conditions for In-Water Work to ensure protection of manatees during implementation of Alternative 1 (O&M Dredging) and for placement in the proposed nearshore and beach placement sites (Placement Options C through F).

Piping Plover and Rufa Red Knot

Placement on the beach (Placement Options C and/or D) or in an upland DMMA (Placement Option A) includes habitat that could be used by the piping plover and/or rufa red knot, but it is not considered optimal habitat for either species. Direct effects to the birds from project construction are expected to be minimal as birds are motile and can avoid construction activities. Placement of dredged O&M material on the beach may displace foraging and resting birds. This interruption would be limited to the immediate area of disposal and duration of construction. Habitat exists outside of the beach placement areas with similar characteristics that may be used by

displaced species while placement activities are underway. As previously discussed in Section 4.3, the prey base, which includes the benthic organisms, may be temporarily reduced in the proposed beach placement areas. This effect would be short-term as recovery of beach infauna is expected to occur quickly. Therefore, implementation of Alternative 1 (O&M Dredging) with placement on the beach (Placement Options C and/or D) and/or in an upland DMMA (Placement Option A) may affect, but is not likely to adversely affect, the piping plover or rufa red knot. If either species are found at the placement area(s), the protective conditions developed for migratory birds will be utilized as well as conditions of the P3BO. Compliance with the reasonable and prudent measures and T&Cs listed in the P3BO will provide sufficient protection for piping plover and rufa red knot.

Johnson's Seagrass

Seagrasses are not located within the proposed project footprint; however, if Johnson's seagrass has directly colonized the IWW channel, it will be removed by the dredging activity (Alternative 1) and the potential side slope sloughing. Any grasses located in the channel would be expected to recolonize these areas as they refill with sand between dredging events, as demonstrated in previous analysis for dredging in the IWW (Corps 2017). Potential effects to seagrasses from placement activities are discussed in section 4.3 and are incorporated herein by reference.

Listed Coral Species

There are no hardbottoms in the direct footprint of Alternative 1 (O&M Dredging) or any of the proposed dredged material placement options. Listed coral species are not expected to be found on the bulkheads adjacent to the IWW. The effects of the proposed O&M dredging and associated placement to hardbottoms within the project area are discussed in section 4.3 of this EA and are incorporated here by reference. Long-term, adverse effects to the listed corals that may be in this region are not expected for any of the alternatives.

4.5 ESSENTIAL FISH HABITAT

Under the No Action Alternative, as the channel fills with sand, any non-motile organisms that have colonized inside the channel will be buried in sand. The sand fill of the channel may also result in the colonization of the channel by seagrasses as the channel shallows and more light reaches the bottom of the channel. This would be a beneficial effect to seagrasses, which are designated as EFH. Potential effects to EFH due to implementation of Alternative 1 (O&M Dredging) and any of the placement options include temporary effects to the estuarine water column through turbidity. Specific potential effects to seagrasses and hardbottoms are discussed in sections 4.3 and 4.4 and are incorporated herein by reference. The EFH assessment for seagrasses in the IWW analyzed the effects of O&M dredging on seagrasses in the IWW for the issuance of the RGP SAJ-93 and is incorporated herein.

4.6 AIR QUALITY

Under the No Action Alternative, air quality conditions would remain the same. Implementation of Alternative 1 (O&M Dredging) and any of the placement options will occur in an urban, highly developed area, which already experiences various emissions and is in attainment with NAAQS. Conformity determinations do not apply to some Federal actions, including O&M dredging and

dredged material placement where no new depths are required, applicable permits are secured, and placement is at an approved site (40 CFR 93.153). Exempted projects are considered to have either no emissions increase or an increase that is clearly *de minimis*. The Preferred Alternative will have minor, temporary degradation of air quality due to emissions from dredging and placement operations for any of the proposed placement locations.

4.7 WATER QUALITY

Under the No Action Alternative, the ongoing shoaling will result in increasingly shallow channel depths. Due to the heavy recreational and commercial vessel use, it is likely that transit through the shallow depths would stir up the bottom sediments, thus resulting in increased turbidity. Water quality characteristics are not substantially different when considering implementation of Alternative A (O&M Dredging) with any of the placement sites. No long-term adverse impact on water quality is expected to occur as a result of the work. Dredging operations will potentially create minor, temporary reduction of water quality in the vicinity of the construction by increased turbidities. Turbidities directly due to dredging are expected to return to ambient levels within a short time period. Elevated turbidity levels would potentially occur within the mixing zone in the dredging areas and in the return water from the upland DMMA's (Placement Option A). If Placement Option B (Hillsboro Inlet Impoundment Basin) were selected in future cycles, short-term turbidity effects, similar to ongoing activities from the Hillsboro Inlet Sand Bypass project, would be expected.

Although placement in the nearshore or on the beach (Placement Options C through F) would temporarily reduce water quality due to increased turbidity, the FDEP "Sand Rule", which is previously mentioned in section 4.1.2, limits the maximum percentage of fine sediments that can be placed on the beach or in the nearshore. This restriction helps to limit turbidity levels and associated beach or nearshore placement effects. After placement, water quality will quickly return to pre-construction conditions.

This project will be performed in compliance with State of Florida water quality standards. The Corps will obtain water quality certification (WQC) prior to commencement of any activities associated with this Environmental Assessment.

4.8 NOISE

Under the No Action Alternative, noise levels would remain the same. Implementation of Alternative 1 (O&M Dredging) and any of the placement options will result in temporary, minor increases in noise during construction. Waterways where dredging will occur currently experience elevated background noise associated with navigation activities from recreational and commercial vessels. Dredging and placement operations near populated or other noise-sensitive locations may result in increased levels of noise. Dredging will increase noise in the underwater environment, which may temporarily cause fish and other wildlife to avoid the area. Following dredging and placement operations, noise levels would revert to background levels.

4.9 AESTHETIC RESOURCES

Under the No Action Alternative, aesthetic resources would remain the same; however, if

Alternative 1 (O&M Dredging) is implemented, effects to aesthetics depend on the locations of the dredging and placement areas. During construction, equipment used for implementation of Alternative 1 (O&M Dredging) and any of the placement options would be visible, resulting in a temporary reduction in the aesthetic value during construction. Members of the public may consider pipelines and heavy equipment used during beach and nearshore placement (Placement Options C through F) “unsightly”. The upland DMMA’s (Placement Option A) are constructed with a surrounding buffer of vegetation to alleviate potential “unsightly” aesthetic effects. Air emissions, turbid water, and increased noise can also temporarily affect aesthetics during construction. No effects to aesthetic resources from placement operations at the Hillsboro Inlet Impoundment Basin (Placement Option B) are expected as this would be no different from the typical activities already occurring in the area.

4.10 RECREATIONAL RESOURCES

Under the No Action Alternative, failure to maintain the channel would have negative effects on long-term recreational use of the area. Implementation of Alternative 1 (O&M Dredging), beach and/or nearshore placement (Placement Options C through F) may temporarily impede or restrict recreational and commercial boat traffic within the project vicinity due to the presence of the dredge, support vessels, and pipelines. Similarly, beach or nearshore placement operations may temporarily restrict beach use or impede immediate offshore use due to equipment in the area. Placement in the DMMA’s or Hillsboro Inlet Impoundment Basin (Placement Options A and B) may impede or restrict boat traffic within the DMMA or basin’s vicinity due to the presence of the dredge, support vessels, and pipelines. Any recreational use of the DMMA’s would be restricted or ceased entirely during placement operations for safety purposes.

4.11 ECONOMIC RESOURCES

Under the No Action Alternative, adverse effects to recreational and commercial vessels are expected as vessels become limited on their ability to navigate the IWW. This limitation could result in a loss of navigation that will ultimately affect recreation and tourism economic outputs. In 2008, FIND conducted a study (“Economic Analysis of the District’s Waterways in Broward County”) to determine the economic benefits of marine-related activities on FIND waterways in Broward County. In 2011, FIND updated the analysis and estimated that the economic benefits generated by the waterways would be reduced by 45% to 50% if the IWW were not properly maintained (FIND 2011). Implementation of Alternative 1 (O&M Dredging) and any of the placement options will ensure economic benefits based on navigation associated with the Federal project continue.

4.12 NAVIGATION AND PUBLIC SAFETY

Under the No Action Alternative, the ongoing shoaling would result in a continued reduction in operational depth of the channel, increasing hazards to navigation and risks to public safety. However, maintaining authorized depths in the IWW assures safe navigation for the public. Implementation of Alternative 1 (O&M Dredging) and any placement option may impede or restrict commercial or recreational access or ingress/egress to the area during construction. This temporary, localized effect is considered only a minor effect to navigation. Effects to public safety are very similar across all of the placement options. Use of the beach (Placement Options E and F),

the nearshore environment (Placement Options C and D), or recreational access points at upland DMMA's (Placement Option A) may be temporarily restricted to ensure safety of the public during placement operations. No effects to public safety from placement operations at the Hillsboro Inlet Impoundment Basin (Placement Option B) are expected as this would be no different from the typical activities already occurring in the area.

4.13 NATIVE AMERICANS

No portion of the proposed action is located within or adjacent to known Native American-owned lands, reservation lands, or Traditional Cultural Properties. However, Native American groups have lived throughout the region as evidenced by the presence of prehistoric archaeological sites near the project area, and their descendants continue to live within the State of Florida and throughout the United States. Pursuant to Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. §306101 et seq.), obligations regarding the Corps' Trust Responsibilities to federally-recognized Native American Tribes, and in consideration of the Burial Resources Agreement between the Corps and the Seminole Tribe of Florida, the Corps initiated consultation with the appropriate federally-recognized tribes on February 15, 2018. The Seminole Tribe of Florida, Seminole Nation of Oklahoma, and Thlopthlocco Tribal Town concurred with the Corps' determination of no effect by letters on April 3 and 4, 2018. In a phone conversation on March 15, 2018, the Miccosukee Tribe of Indians of Florida concurred with the Corps' determination of no effect. **Appendix A (Environmental Correspondence)** includes pertinent correspondence.

The No Action Alternative would have no effect on effect to known Native American-owned lands, reservation lands, or Traditional Cultural Properties. Similarly, implementation of Alternative 1 (O&M Dredging) and associated placement of dredged material into DMMA's, Hillsboro Inlet Impoundment Basin, and/or the northern nearshore (Placement Options A, B, and D, respectively) poses no effect to known Native American-owned lands, reservation lands, or Traditional Cultural Properties. Additional consultation with the appropriate federally recognized tribes would be required for northern beach placement, southern beach placement, and southern nearshore placement (Placement Options F, E, and C, respectively).

4.14 CULTURAL RESOURCES

There are no known cultural resources listed or eligible for listing in the NRHP within the APE; however, there is one archaeological site located within the APE that has not yet been evaluated by Florida State Historic Preservation Office (SHPO). Site 8BD6446 was identified within the APE near the edge of the Broward Reach 1 navigation channel and is located outside of the Preferred Alternative. There are no recorded cultural resources listed or eligible for listing in the NRHP within the Palm Beach County, Reach 4 (cuts P-59 to P-60) APE. Under the Preferred Alternative, the site will not be impacted by this proposed action. In the event of future actions in the vicinity of the site, the Corps will buffer 8BD6446 with a 200-foot buffer where no dredging, anchoring, or spudding will be permitted. The Corps has determined the Preferred Alternative poses no effect to historic properties contingent on maintaining a 200-foot buffer of site 8BD6446. Pursuant to Section 106 of the NHPA, consultation was initiated with the Florida SHPO and appropriate federally recognized tribes on February 15, 2018. The Florida SHPO concurred with the Corps' determination of no effect by letter dated May 1, 2018. The Seminole Tribe of Florida, Seminole

Nation of Oklahoma, and Thlopthlocco Tribal Town concurred with the Corps' determination of effects by letter on April 3 and 4, 2018. In a phone conversation on March 15, 2018, the Miccosukee Tribe of Indians of Florida concurred with the Corps' determination of no effect. **Appendix A (Environmental Correspondence)** includes pertinent correspondence.

Neither of the alternatives (No Action and Alternative 1) or any of the Placement Options A, B, D, E, and F would affect historic properties listed or eligible for listing in the NRHP. However, there are several unevaluated archaeological sites located in the nearshore placement area south of the inlet (Placement Option C) that may require evaluation or avoidance measures in the event of future dredging. Additional cultural resources surveys may also be required prior to dredging. Consultation with SHPO and appropriate federally recognized tribes will be updated prior to new undertakings outside the Preferred Alternative.

4.15 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Under the No Action Alternative, continued shoaling of the IWW Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) may result in adverse effects to the environment if vessels collide or run aground and spill fuel or other fluids.

Implementation of Alternative 1 (O&M Dredging) and placement on the beach (Placement Options E and F), in the nearshore (Placement Options C and D), or in Hillsboro Inlet Impoundment Basin (Placement Option B) may have some unavoidable effects to marine animals (including benthic organisms in the channel and fishes near and in the channel during dredging operations) that may experience increased noise and turbidity associated with the channel dredging. Infaunal resources that live inside the boundaries of the channel will be lethally impacted by dredging and placement but are expected to recolonize shortly after construction has ceased. Migratory birds may also be effected by the implementation of Alternative 1 (O&M Dredging) and any of the placement options through avoidance of nesting or foraging areas, particularly those located in upland disposal sites (Placement Option A). All of these effects are expected to be short-term and minor in nature.

Natural or Depletable Resources:

The No Action Alternative would have no effect on natural or depletable resources, however, implementation of Alternative 1 and any of the placement options include indirect effects, such as the use of fuel for construction and operations (petroleum depletion), machinery wear and tear (metal ore depletion), and similar effects. These effects are considered to be of minor consequence.

Energy Requirements and Conservation:

The No Action Alternative would require no energy or energy conservation efforts; however, implementation of Alternative 1 and any of the placement options will involve the use of fuel to power dredges, pumps, and associated machinery in conjunction with the maintenance of the channels and placement of dredged material.

4.16 CUMULATIVE EFFECTS

Cumulative effects are defined in 40 CFR §1508.7 as those effects that result from "...the

incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.”

Past, present and reasonably foreseeable actions and plans are summarized below in **Table 4**. Section 1.4 of the EA contains more details on environmental reports completed in/around the project’s vicinity. In addition to maintenance dredging of the IWW, other Federal civil works projects in the vicinity include Broward County shore protection projects. The HID maintains the Hillsboro Inlet Impoundment Basin for its sand bypass project. In addition, it is expected that the public, state of Florida, and local governments could have permitted activities in or around the project area. Federal activities are evaluated under NEPA directly for each project. Other projects that take place in-water or would affect wetlands are evaluated under a permit issued by RD.

The periodic maintenance of the IWW Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60), when considered with past projects in the area and potential future projects, has no significant cumulative impact on the environmental conditions of the project area. A summary of cumulative effects on environmental factors from past, present, and reasonably foreseeable actions and plans is provided in **Table 5**.

Table 4. Past, present, and reasonably foreseeable actions and plans affecting the project area.

Past Actions/Authorized Plans	Current Actions and Operating Plans	Reasonably Foreseeable Future Actions and Plans
<ul style="list-style-type: none"> - Hillsboro Inlet Sand Bypass project (2015) - Hillsboro Inlet Improvements Project (2002) - Beach nourishment projects - General urbanization 	- No known projects	- Broward County Shore Protection Project Segment II

Table 5. Summary of cumulative effects.

Natural Setting (Fish and Wildlife, Threatened and Endangered, and EFH)	
Past Actions	Construction of residential and commercial/public infrastructure has decreased the amount of habitat available for fish, wildlife, and threatened and endangered species use in the area.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Dredging and associated placement may result in temporary impacts to fish, wildlife, and threatened and endangered species during construction due to noise and/or construction activities; however, these impacts are expected to be minor and will cease with the completion of construction. Benthic species located in the channel, beach, or nearshore placement sites would be lethally impacted due to dredging or placement operations, as typically expected in

	dredging projects. These impacts, although lethal, are expected to be minor and temporary as recolonization from adjacent communities will occur almost immediately. Beach placement of dredged material may affect, but is not likely to adversely affect nesting sea turtles. Detailed discussion of the effects of the proposed action on the components of the natural setting are described in Section 4 (Environmental Effects), specifically sections 4.3 (Fish and Wildlife), 4.4 (Threatened and Endangered), and 4.5 (EFH).
Future Actions	Any Federal and/or state/local projects will be required to follow regulations to maintain and protect threatened and endangered species and their habitats within the area.
Cumulative Effect	No cumulative effects to the natural setting of this area are expected.
Physical Setting (Sediment Characteristics, HTRW, Air Quality, and Water Quality)	
Past Actions	Ongoing erosion of non-fortified IWW shoreline has likely contributed to shoaling and degradation of water quality.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Temporary, minor turbidity impacts caused by dredging and dewatering at the DMMA may occur. Construction equipment may release negligible amounts of pollutants, including oils and grease. Best management practices will be used to limit the possibility of adverse effects, and detailed pollution control plans will be developed during the design phase. Detailed discussion of the effects of the proposed action on the components of the physical setting are described in Section 4 (Environmental Effects), specifically sections 4.1 (Sediment Characteristics), 4.2 (HTRW), 4.6 (Air Quality), and 4.7 (Water Quality).
Future Actions	Maintenance dredging and dewatering can temporarily elevate localized levels of suspended solids and turbidity. Projects implemented would maintain and meet regulated water quality standards within the area.
Cumulative Effect	Ongoing erosion, seasonal weather, and storm event effects on water quality are unlikely to be eliminated; however, implementation of the Preferred Alternative will maintain safe operational depths and navigation in the IWW. The Corps is committed to ensuring that projects will not result in violations of water quality standards.
Socioeconomic Resources (Aesthetic Resources, Recreation Resources, Economic Resources)	
Past Actions	General urbanization of the region has increased the aesthetic, recreation, and economic resources in this area.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Maintenance dredging and associated placement of dredged material will ensure continued use of IWW, which provides benefits to the recreation and economy in this area. Detailed discussion of the effects of the proposed action on the components of socioeconomic resources are described in Section 4 (Environmental

	Effects), specifically sections 4.9 (Aesthetic Resources), 4.10 (Recreation Resources), and 4.11 (Economic Resources).
Future Actions	Continued urbanization and projects to increase benefits to the economy (e.g. tourism), recreation, and aesthetics are likely in this region.
Cumulative Effect	Continuation of benefits to socioeconomic resources may be anticipated when considering the cumulative effects of projects in this area.
Native Americans	
Past Actions	Ongoing erosion and storm event effects have added to the degradation of cultural resources located along the shoreline of the IWW.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	There are no known impacts.
Future Actions	Dredge material placement may result in the stabilization of existing shorelines and minimize future erosion in some areas.
Cumulative Effect	Ongoing erosion and storm event effects on cultural resources are unlikely to be eliminated; however, implementation of the Preferred Alternative will not impact any known sites in the project area. No cumulative impacts are expected.
Cultural Resources	
Past Actions	Ongoing erosion and storm event effects have added to the degradation of cultural resources located along the shoreline of the IWW.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Preferred Alternative will not impact any known historic properties in the project area.
Future Actions	Future actions are not anticipated to impact any known historic properties in the project area.
Cumulative Effect	Ongoing erosion and storm event effects on historic properties are unlikely to be eliminated; however, cumulative effects from the implementation of the Preferred Alternative will not impact any known historic properties in the project area.

5 PUBLIC/AGENCY COORDINATION

5.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. §4321 ET SEQ.)

Under the requirements of Section 102 of NEPA, this proposed project constitutes a major Federal action and an EA is therefore required. This EA has been prepared pursuant to NEPA and its implementing regulations. A Notice of Availability for the draft EA and proposed FONSI was coordinated with pertinent agencies and interested stakeholders for a 30-day review and comment period. The project is in compliance with the NEPA of 1969, as amended, 42 U.S.C. 4321, *et seq.* P.L. 91-190.

5.2 PUBLIC AND AGENCY COORDINATION

Consistent with NEPA regulations and guidance, a Notice of Availability of the draft EA and proposed FONSI was distributed to the following list of recipients:

Federal Agencies:

NMFS, U.S. Coast Guard, USEPA, USFWS

Tribal Nations:

Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, Poarch Band of Indians, Muscogee (Creek) Nation, Kialegee Tribal Town, Alabama-Quassarte Tribal Town, Thlopthlocco Tribal Town, and the Seminole Nation of Oklahoma

State Agencies:

FDEP, FIND, Florida State Clearinghouse, FWC, South Florida Water Management District, SHPO

Local Agencies:

Palm Beach County: District 4 Commissioner, Mayor, Vice Mayor, Parks and Recreation, Environmental Resources Management

Broward County: District 4 Commissioner, Mayor, Vice Mayor, Department of Planning and Environmental Protection, Planning Council

City of Pompano Beach: City Commission, Mayor, Vice Mayor, City Manager, Parks and Recreation

City of Deerfield Beach: District 1 City Commissioner, Mayor, City Manager, Parks and Recreation

Town of Hillsboro Beach: Town Commission, Mayor, Vice Mayor

City of Lighthouse Point: City Commission President, City Commission Vice President, Mayor, Recreation Department

Non-Governmental Agencies:

Save the Manatee Club; South Florida Audubon Society; Audubon of Florida; Florida Wildlife Federation; Sierra Club; Fish and Wildlife Foundation of Florida; Florida Biodiversity Project; the Wildlife Society; Nature Conservancy; Surfrider Foundation; Sea Turtle Oversight Protection; South Florida Wilderness Association; Florida Shore and Beach Preservation Association; Cry of the Water, Inc.; Reefkeeper International; National Wildlife Federation; and Miami Waterkeeper.

5.3 COMMENTS RECEIVED AND THE CORPS' RESPONSES ON THE DRAFT EA

Comments received during the 30-day agency review and public comment period are addressed in the final EA. **Appendix E (Public and Agency Project Comments)** includes a list of the comments received and the Corps' responses.

6 ENVIRONMENTAL COMMITMENTS

The Corps will comply with all terms and conditions of the revised SPBO, SARBO, P3BO, and the State's WQC issued for the project. The Corps and its contractors also commit to avoiding and minimizing for adverse effects during construction activities by including the following commitments in the contract specifications:

6.1 PROTECTION OF FISH AND WILDLIFE RESOURCES

Contractors will keep construction activities under surveillance, management, and control to minimize interference with and disturbance and damage to fish and wildlife. Species that require specific attention, along with measures for their protection, will be listed in the Contractor's Environmental Protection Plan (EPP) prior to the beginning of construction operation. In the event a Corps' dredge is utilized, the Corps' dredge order will include protection criteria for fish and wildlife.

6.2 ENDANGERED AND THREATENED SPECIES PROTECTION

The Corps and its contractors commit to avoiding and minimizing for adverse effects to endangered and threatened species. The Corps will include the T&Cs of the P3BO and SPBO for sand placement and the SARBO for dredging in the project specifications. If protective measures for state listed species are outlined within the WQC, these measures will also be included in the project specifications. The Contractor will also include protection criteria for Endangered and Threatened species protections in their EPP, or in the Corps' dredge order.

6.3 WATER QUALITY

The Corps and its contractors will prevent oil, fuel, or other hazardous substances from entering the air or water. This will be accomplished by design and procedural controls. The Corps will obtain a WQC from the State of Florida. The project specifications will include provisions from the WQC. All wastes and refuse generated by project construction will be removed and properly disposed. Contractors will implement a spill contingency plan for hazardous, toxic, or petroleum material for the borrow area. Contractors will monitor water quality (turbidity) at the dredging and placement sites, as required by the State WQC.

6.4 CULTURAL RESOURCES

An unexpected cultural resources finds clause will be included in the project specifications. In the event that any archaeological resource is uncovered during construction activities, all activities will be halted immediately within the area. Once reported, Corps staff will initiate coordination with the appropriate Federal, tribal, and state agencies to determine if archaeological investigation is required. Additional work in the area of the discovery will be suspended at the site until compliance with all Federal and state regulations is successfully completed and Corps staff members provide further directive.

6.5 PROTECTION OF MIGRATORY BIRDS

The Corps will incorporate the standard migratory bird protection protocols into the project plans and specifications and will require the contractor to abide by those requirements to include all

monitoring timeframes as specified by the FDEP permit or appropriate BOs.

7 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

7.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. §4321 ET SEQ.)

The project complies with NEPA as noted by the discussion in Section 5.1 above.

7.2 ENDANGERED SPECIES ACT OF 1973 (16 U.S.C. §1531 ET SEQ.)

This project has been coordinated with NMFS through the SARBO dated September 25, 1997. By letter dated October 25, 2007, NMFS instructed the Corps to continue to apply the 1997 SARBO on all O&M dredging projects while NMFS completes the new SARBO. That document is not yet complete. If a *Currituck* class dredge is used for the project, the T&Cs of the *Currituck* class dredge BO will also be incorporated. For species under the jurisdiction of the USFWS, the Corps will use the SPBO dated March 13, 2015 for O&M dredging and placement activities. The conservation recommendations included in the P3BO for shorebirds will provide protections to the piping plover and rufa red knot. In addition, the Corps will include the 2011 USFWS Standard Manatee Conditions for In-Water Work to ensure protection of the manatees during dredging operations and for placement in the proposed nearshore and beach placement sites. To reduce potential impacts to nesting and hatchling sea turtles, placement of sand on the beach is not allowed during peak sea turtle nesting and hatching period, which is between May 1 to November 1 in Broward County and Palm Beach County. If beach placement occurs during early (March 1 to April 30) or late (November 1 to January 15) sea turtle nesting season, daily sea turtle nest surveys and potential nest relocations is required. Nest laying typically ends around November 11. Broward County Environmental Protection and Growth Management Department, could conduct these surveys, as they already possess a marine turtle permit from FWC for monitoring and relocation of nests for conservation purposes. The 2015 SPBO issued by the USFWS covers nest relocations due to beach nourishment activities, however, Broward County or other turtle monitoring permit holders would need a permit modification for activities during construction prior to conducting relocations. USFWS concurred with the Corps' determinations in a sticker notice dated October 12, 2018. This project has been fully coordinated under the ESA and is in compliance with the Act.

7.3 FISH AND WILDLIFE COORDINATION ACT OF 1958 (16 U.S.C. §661 ET SEQ.)

A memorandum for the record (MFR) was submitted to USFWS to document an agreement between the Corps and USFWS to use the NEPA review and ESA consultation processes to complete coordination responsibilities under the Fish and Wildlife Coordination Act. This agreement, signed by both agencies, avoids duplicate analysis and documentation as authorized under 40 CFR section 1500.4 (k), 1502.25, 1506.4, and is consistent with the Presidential E.O. 13563 (Improving Regulation and Regulatory Review), released January 18, 2011. This project complies with this Act.

7.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

The NHPA was enacted to preserve historical and archaeological sites in the United States, and it created the NRHP, the list of National Historic Landmarks, and the SHPOs. The proposed project is in compliance with Section 106 of the NHPA, as amended. As part of the requirements and consultation process contained within the NHPA implementing regulations of 36 CFR 800, the proposed project is also in compliance through ongoing consultation with the Archaeological and Historic Preservation Act, as amended (16 U.S.C. §§469-469c) (Public Law 93-291), Archaeological

and Resources Protection Act (16 U.S.C. §§470aa-470mm) (Public Law 96-95), American Indian Religious Freedom Act (Public Law 95-341), Native American Graves Protection and Repatriation Act (25 U.S.C. §3001 et seq.) and its implementing regulations, E.O. 11593, 13007, and 13175, the Presidential Memo of 1994 on Government to Government Relations and appropriate Florida Statutes, and the Abandoned Shipwrecks Act (43 U.S.C. §§2101-2106). The Corps has determined the Preferred Alternative poses no effect to historic properties contingent on maintaining a 200-foot buffer of site 8BD6446. Pursuant to Section 106 of the NHPA, consultation was initiated with the Florida SHPO and appropriate federally recognized tribes on February 15, 2018. The Florida SHPO concurred with the Corps' determination of no effect by letter dated May 1, 2018. The Seminole Tribe of Florida, Seminole Nation of Oklahoma, and Thlopthlocco Tribal Town concurred with the Corps' determination of effects by letter on April 3 and 4, 2018. In a phone conversation on March 15, 2018, the Miccosukee Tribe of Indians of Florida concurred with the Corps' determination of no effect. **Appendix A (Environmental Correspondence)** includes pertinent correspondence. The project complies with the goals of the NHPA; undertakings on any other alternatives will require additional consultation.

7.5 CLEAN WATER ACT OF 1972, SECTION 401 AND SECTION 404(b) (33 U.S.C. §1341 ET SEQ. AND 33 U.S.C. §1344(b) ET SEQ.)

CWA Sections 401 and 404(b) cover dredging and discharges into the waters of the U.S. **Appendix C (CWA 404(b)(1) Guidelines Evaluation)** includes this project's Section 404(b)(1) guidelines evaluation (33 U.S.C. §1344(b)). Maintenance dredging of the IWW Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) with placement in FIND DMMA is covered by Section 401 of the CWA. Maintenance dredging and placement into an upland FIND-owned site meets requirements of the exemption statute (Section 403.813, Florida Statutes) and will meet water quality standards per Chapter 62-302, State of Florida, Department of Environmental Protection. If at a future date, the Corps selects Hillsboro Inlet Impoundment Basin, the nearshore, and/or the beach for placement of dredged material, the Corps will obtain a water quality certification pursuant to Section 401 of the Clean Water Act from FDEP prior to construction. Conditions imposed by the exemption statute and/or water quality certification will be implemented in order to minimize adverse impacts to water quality. Additionally, the Corps coordinated the project with the State of Florida via the issuance and request for concurrence on the project's FCD (as required by CZMA). All state water quality requirements will be met. The project complies with this Act.

7.6 CLEAN AIR ACT OF 1972 (42 U.S.C. §7401 ET SEQ.)

The short-term effects from construction equipment associated with the project would not significantly affect air quality. No air quality permits would be required for this project. Broward County is designated as an attainment area for Federal air quality standards under the Clean Air Act. Because the project is located within an attainment area, USEPA's General Conformity Rule to implement Section 176(c) of the Clean Air Act does not apply and a conformity determination is not required.

7.7 COASTAL ZONE MANAGEMENT ACT OF 1972 (16 U.S.C. §1451 ET SEQ.)

In compliance with the CZMA, the Corps submitted a FCD to the State of Florida for concurrence

during the public noticing of the draft EA. In an email dated October 2, 2018, FDEP concurred with the FCD stating, “Based on the information contained in the submittal, the state has determined that the proposed federal actions are consistent with the Florida Coastal Management Program.” The project complies with this Act.

7.8 FARMLAND PROTECTION POLICY ACT OF 1981 (7 U.S.C. §4201 ET SEQ.)

No prime or unique farmland will be affected by implementation of this project. This Act is not applicable.

7.9 WILD AND SCENIC RIVER ACT OF 1968 (16 U.S.C. §1271 ET SEQ.)

This project will not affect any designated wild and scenic river reaches. This Act is not applicable.

7.10 MARINE MAMMAL PROTECTION ACT OF 1972 (16 U.S.C. §1361 ET SEQ.)

To ensure the protection of any manatees or dolphins present in the project area, incorporation of safeguards used to protect these species have been included in the project plans and specifications and will be implemented by the contractor during dredging and placement operations. In addition, if dredging is conducted with a clamshell dredge, a qualified manatee monitor will be assigned to watch for manatees. Therefore, this project complies with the Act.

7.11 ESTUARY PROTECTION ACT OF 1968 (16 U.S.C. §§1221-26)

No designated Estuary of National Significance will be affected by project related activities. This Act is not applicable.

7.12 FEDERAL WATER PROJECT RECREATION ACT (16 U.S.C. §460(L)(12)-460(L)(21) ET SEQ.)

The principles of the Federal Water Project Recreation Act (16 U.S.C. §460(l)(12)-460(l)(21) et seq.) require the Corps to consider any opportunity for the project to add or improve outdoor recreation and/or fish and wildlife enhancement. Recreational resources and opportunities are discussed in this report. This project complies with the Act.

7.13 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976, AS AMENDED (16 U.S.C. §1801 ET SEQ.)

This project’s dredging footprint is included in the project scope and description of the RGP SAI-93 issued by RD on April 26, 2016. EFH consultation has been concluded through the issuance of the permit and no additional EFH consultation is required. Placement of dredged material in upland sites does not require EFH consultation. Placement of dredged material in the proposed southern nearshore and beach placement areas is similar to the effects analyzed for the issuance of the Hillsboro Inlet permit and EFH consultation; therefore, no additional consultation is required. If at a future date, northern nearshore and/or beach placement areas are selected for the placement of dredged material, EFH consultation would be required.

7.14 SUBMERGED LANDS ACT OF 1953 (43 U.S.C. § 1301 ET SEQ.)

The project will occur on submerged lands of the State of Florida. The Corps has coordinated the project with the state via the issuance of an exemption verification, as well as through the review process for the EA and CZMA FCD. This project complies with the Act.

7.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990 (16 U.S.C. §3501 ET SEQ.)

There are no designated coastal barrier resource (CBR) system units that will be affected by this project. The closest CBR unit (#FL-19, Birch Park) is approximately seven miles south of the project area. These Acts are not applicable.

7.16 RIVERS AND HARBORS ACT OF 1899, SECTION 10 (33 USC §403 ET SEQ.)

The proposed work could temporarily obstruct navigable waters of the U.S. during construction. The proposed action will be subjected to the public notice and other evaluations normally conducted for activities subject to the Act. The project is in compliance with the Act.

7.17 ANADROMOUS FISH CONSERVATION ACT (16 U.S.C. §§757A-757G)

Anadromous fish species are not likely to be affected. The project was coordinated with NMFS and the USFWS, and complies with this Act.

7.18 MIGRATORY BIRD TREATY ACT (16 U.S.C. §§703-712) AND MIGRATORY BIRD CONSERVATION ACT (16 U.S.C. §§715-715D, 715E, 715F-715R)

The project plans and specifications will include migratory bird protection measures for construction activities. If nesting activities occur within the construction area, appropriate buffers will be placed around nests to ensure their protection. The project was coordinated with USFWS and complies with these acts.

7.19 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT (16 U.S.C. §1431 ET SEQ. AND 33 U.S.C. §1401 ET SEQ.)

Ocean disposal is not a component of this project; therefore, this Act is not applicable.

7.20 UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970 (42 U.S.C. §4601 ET SEQ.)

The purpose of Public Law 91-646 is to ensure that owners of real property to be acquired for federal and federally assisted projects are treated fairly and consistently and that persons displaced as a direct result of such acquisition will not suffer disproportionate injuries as a result of projects designed for the benefit of the public as a whole. This project will not be acquiring any real estate interests from private property owners in the upcoming cycle. If a placement option is selected in the future, which requires acquisition of real estate interests, the Corps will work with the sponsor to ensure the sponsor complies with this law. The project complies with the Act.

7.21 E.O. 11988, FLOOD PLAIN MANAGEMENT

To comply with E.O. 11988, the policy of the Corps is to formulate projects that, to the extent possible, avoid or minimize adverse effects associated with the use of the floodplain and avoid inducing development in the floodplain unless there is no practicable alternative. The Corps concludes that the proposed project will not result in harm to people, property, and floodplain values, will not induce development in the floodplain, and the project is in the public interest. The project complies with the Order.

7.22 E.O. 11990, PROTECTION OF WETLANDS

No wetlands will be affected by project activities. This project complies with the goals of this E.O.

7.23 E.O. 12898, ENVIRONMENTAL JUSTICE

On February 11, 1994, the President of the U.S. issued E.O. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The E.O. mandates that each Federal agency make environmental justice (EJ) part of the agency mission and to address, as appropriate, disproportionately high and adverse human health or environmental effects of the programs and policies on minority and low-income populations. Significance thresholds that may be used to evaluate the effects of a proposed action related to EJ are not specifically outlined. However, the Council of Environmental Quality (CEQ) guidance requires an evaluation of a proposed action's effect on the human environment and the Corps must comply with E.O. 12898. The Corps has determined that a proposed action or its alternatives would result in significant effects related to EJ if the proposed action or an alternative would disproportionately adversely affect an EJ community through its effects on:

- Environmental conditions such as quality of air, water, and other environmental media; degradation of aesthetics, loss of open space, and nuisance concerns such as odor, noise, and dust;
- Human health such as exposure of EJ populations to pathogens;
- Public welfare in terms of social conditions such as reduced access to certain amenities like hospitals, safe drinking water, public transportation, etc.; and
- Public welfare in terms of economic conditions such as changes in employment, income, and the cost of housing, etc.

The Corps conducted an evaluation of EJ impacts using a two-step process: as a first step, the study area was evaluated to determine whether it contains a concentration of minority and/or low-income populations. Following that evaluation, in the second step, the Corps determined whether the proposed action would result in the types of effects listed above in a disproportionately, high adverse manner on these populations.

As defined in E.O. 12898 and the CEQ guidance, a minority population occurs where one or both of the following conditions are met within a given geographic area:

- The American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic population of the affected area exceeds 50 percent; or
- The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Using the USEPA EJAssist Tool, the project area was identified (see **Figure 22**) and the average percentage for the EJ criteria are compared in **Table 6** for the project area, the state of Florida, and the U.S.

Table 6. USEPA EJAssist environmental justice criteria percentages.

	Project Area %	Florida Average %	USA Average %
Minority Population	12%	44%	38%
Low Income Population	20%	38%	34%

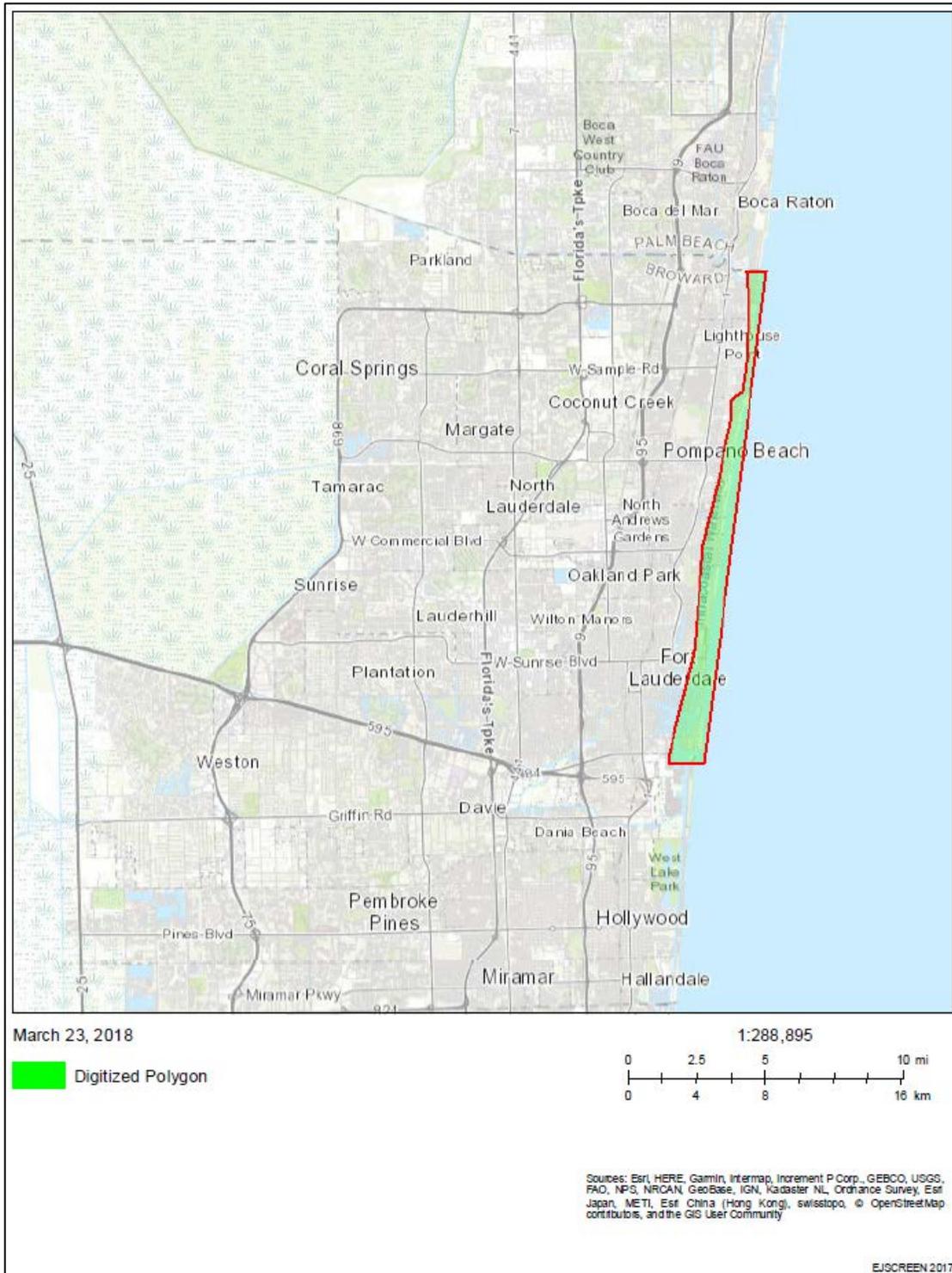


Figure 22. USEPA EJAssist Tool User-defined Project Area.

E.O. 12898 does not provide criteria to determine if an affected area consists of a low-income population. For the purpose of this assessment, the CEQ criterion for defining a minority population has been adapted to identify whether or not the population in an affected area constitutes a low-income population. An affected geographic area is considered to consist of a low-income population (i.e. below the poverty level for purposes of this analysis) where the percentage of low-income persons:

- is at least 50 percent of the total population; or
- is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis.

Based on the information provided by the USEPA EJAssist tool, the project is not located within an area of high minority and/or low-income populations. No disproportionate and adverse effects to minority and/or low income populations are expected to result from the implementation of the project. The project complies with the Order.

7.24 E.O. 13045, PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS

On April 21, 1997, the President of the U.S. issued E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks. The E.O. mandates that each Federal agency make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. As the proposed action does not affect children disproportionately from other members of the population, the proposed action would not increase any environmental health or safety risks to children. The project complies with the Order.

7.25 E.O. 13089, CORAL REEF PROTECTION

While there are no coral reefs in the direct footprint for dredging or dredged material placement, there are hardbottom habitats that support some coral species east of the proposed southern beach placement and nearshore environment areas. Potential effects are discussed in section 4.3.2 and 4.4.2 and are incorporated herein by reference. Based on the distance from the proposed placement sites and results of the 4-year HID mitigation monitoring, it is unlikely that long-term, adverse effects to hardbottom habitats will occur. The project complies with the Order.

7.26 E.O. 13112, INVASIVE SPECIES

The proposed action will require the mobilization of dredge equipment from other geographical regions. Dredge equipment has the potential to transport species from one region to another, introducing them to new habitats where they are able to out-compete native species. The benefits of the proposed project outweigh the risks associated with the very slight potential for introducing non-native species to this region. The project complies with the Order.

7.27 E.O. 13186, RESPONSIBILITIES OF FEDERAL AGENCIES TO PROTECT MIGRATORY BIRDS

This E.O. requires, among other things, a Memorandum of Understanding (MOU) between the Federal Agency and the USFWS concerning migratory birds. Neither the Department of Defense

MOU nor the Corps' Draft MOU clearly address migratory birds on lands not owned or controlled by the Corps. For many Corps' civil works projects, the real estate interests are provided by the non-Federal Sponsor. Control and ownership of the Project lands remain with a non-Federal interest. Measures to avoid the destruction of migratory birds and their eggs or hatchlings are described in section 7.18, and incorporated by reference. The Corps will include standard migratory bird protection requirements in the Project plans and specifications and will require the contractor to abide by those requirements. The Project complies with the Order.

8 LIST OF PREPARERS

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9 ACRONYM LIST

APE	Area of Potential Effects
BCE	Before Common Era
BMPs	Best Management Practices
BO	Biological Opinion
C.F.R.	Code of Federal Regulations
CBR	Coastal Barrier Resource
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CY	Cubic Yards
CZMA	Coastal Zone Management Act
DCH	Designated Critical Habitat
DMMA	Dredged Material Management Area
DPS	Distinct Population Segment
E.O.	Executive Order
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
ESA	Endangered Species Act
F.A.C.	Florida Administrative Code
FCD	Federal Consistency Determination
FDEP	Florida Department of Environmental Protection
FIND	Florida Inland Navigation District
FMSF	Florida Master Site File
FONSI	Finding of No Significant Impact
FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Fish and Wildlife Research Institute
HAPC	Habitat of Particular Concern
HID	Hillsboro Inlet District
HIIP	Hillsboro Inlet Improvements Project
HTRW	Hazardous, Toxic, and Radioactive Waste
IWW	Intracoastal Waterway
M	Meters
MATER	Mid-Atlantic Technology and Environmental Research, Inc.
MBTA	Migratory Bird Treaty Act
MFR	Memorandum for the Record
MMPA	Marine Mammal Protection Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	Nautical Miles

NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
O&M	Operations and Maintenance
ODMDS	Ocean Dredged Material Disposal Site
P3BO	Programmatic Piping Plover Biological Opinion
PCEs	Primary Constituent Elements
RCRA	Resource Conservation and Recovery Act
RD	Regulatory Division
SAFMC	South Atlantic Fish Management Council
SARBO	South Atlantic Regional Biological Opinion
SHPO	State Historic Preservation Office
T&C	Terms and Conditions
U.S.	United States
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WQC	Water Quality Certification

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APPENDIX A

Environmental Correspondence

Environmental Assessment

Operations and Maintenance Dredging and Dredged Material Placement for
Intracoastal Waterway (IWW) Broward County, Reach 1 and
Palm Beach County, Reach 4 (cuts P-59 to P-60)



US Army Corps of Engineers
JACKSONVILLE DISTRICT

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207-8915

CESAJ-PD-E (ER 200-2-2)

JUL 27 2018

MEMORANDUM FOR THE RECORD

SUBJECT: Coordination Act Report for the operations and maintenance dredging and dredged material placement for the Intracoastal Waterway (IWW) Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) in Broward County and Palm Beach County, Florida.

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Project Description. The U.S. Army Corps of Engineers, Jacksonville District (Corps) proposes to periodically maintain the Intracoastal Waterway (IWW) in Broward County, Reach 1 and cuts P-59 to P-60 of the IWW Palm Beach County, Reach 4, on an "as needed" basis with the state local sponsor, the Florida Inland Navigation District (FIND).

Proposed Work. The proposed work consists of the following:

- Routine O&M dredging on an "as needed" basis of an estimated 75,000 cubic yards (CY) of silt and silty sand from the IWW Broward County, Reach 1 Federal channel to maintain an authorized depth of twelve feet (ten feet required project depth plus up to two foot allowable over depth);
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 - Nearshore environment north and/or south of the Hillsboro Inlet;
 - Beach approximately 300 linear feet (LF) north of the Hillsboro Inlet;
 - Beach approximately 500 LF south of the Hillsboro Inlet, between R-28 to R-32;
 - Hillsboro Inlet Impoundment Basin.

CESAJ-PD-E (ER 200-2-2)

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Coordination. The Fish and Wildlife Coordination (FWCA; 16 U.S.C. 661 et seq., March 10, 1934, as amended 1946, 1958, 1978, and 1995) requires Federal agencies to consult with USFWS regarding the impacts to fish and wildlife resources and the proposed measures to mitigate these impacts. Additional coordination authorities exist through the review process of the National Environmental Policy Act (NEPA; 42 U.S.C. 4321-4347, January 1, 1970, as amended 1975 and 1982) and the consultations required under the Endangered Species Act of 1973 (ESA; 7 U.S.C. 136, 16 U.S.C. 1531 et seq. December 28, 1973). USFWS continues to coordinate and consult with the Corps through NEPA and the ESA in which impacts to fish and wildlife resources are adequately addressed via these two authorities. USFWS will include comments relevant to FWCA in the USFWS response to the Corps' ESA coordination letter.

Agreement. The undersigned, the Corps and USFWS, agree to utilize the project's NEPA review and ESA consultation processes to complete coordination responsibilities under the FWCA. This agreement will avoid duplicate analysis and documentation as authorized under 40 CFR section 1500.4 (k), 1502.25, 1506.4, and is consistent with Presidential Executive Order for Improving Regulation and Regulatory Review, released January 18, 2011.

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Field Office

Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BLVD
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Planning and Policy Division
Environmental Branch

Good 8/6/18

JUL



U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960
772-562-3909 Fax 772-562-4288

FWS Log No. 2018-F-0978

The U.S. Fish and Wildlife Service has reviewed the information provided and finds that the proposed action is not likely to adversely affect any federally listed species or designated critical habitat protected by the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 et. seq.). A record of this consultation is on file at the South Florida Ecological Service Office.

Roxanna Hinzman
Field Supervisor *2018-TA-0978*
South Florida Ecological Services Field Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960

This fulfills the requirements of section 7 of the Act and further action is not required. If modifications are made to the project, if additional information involving potential effects to listed species becomes available, or if a new species is listed, reinitiation of consultation may be necessary.

[Signature]

Roxanna Hinzman, Field Supervisor

10/12/2018
Date

Dear Ms. Hinzman:

In accordance with Section 7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), the U.S. Army Corps of Engineers, Jacksonville District (Corps), respectfully requests consultation under the 2015 Statewide Programmatic Biological Opinion (SPBO) and the 2013 Programmatic Piping Plover Biological Opinion (P3BO) for the maintenance dredging and dredged material placement of the Intracoastal Waterway (IWW) Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) Federal navigation Projects located in Broward County and Palm Beach County, Florida. Included with this letter are maps showing the project location as well as the proposed dredging and placement sites. The proposed work consists of the following:

- Routine O&M dredging on an "as needed" basis of an estimated 75,000 cubic yards (CY) of silt and silty sand from the IWW Broward County, Reach 1 Federal channel to maintain an authorized depth of twelve feet (ten feet required project depth plus up to two foot allowable over depth);
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- Determination of the exact placement location(s) to use will be reliant upon available funds, location, and CY of sediments to be dredged as well as the placement site's capacity, authorizations, and location in relation to the dredging. Dredged material is proposed for placement in the following locations:
 - Florida Inland Navigation District (FIND) owned property and/or previously authorized and approved upland dredged material management area (DMMA). Sites MSA 726 and 641A will be used in the upcoming dredge cycle;
 - Nearshore environment north and/or south of the Hillsboro Inlet;
 - Beach approximately 300 linear feet (LF) north of the Hillsboro Inlet;
 - Beach approximately 500 LF south of the Hillsboro Inlet, between R-28 to R-32;
 - Hillsboro Inlet Impoundment Basin.



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BLVD
JACKSONVILLE, FL 32207-8915

Planning and Policy Division
Environmental Branch

JUL 27 2018

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Field Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960

Dear Ms. Hinzman:

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 - Hillsboro Inlet Impoundment Basin.

Listed species and/or designated critical habitat which may occur in the vicinity of the proposed work and are under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) include:

Common Name	Scientific Name	Listing Status
Green sea turtle <i>North Atlantic Distinct Population Segment (DPS)</i>	<i>Chelonia mydas</i>	Threatened
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Loggerhead sea turtle <i>Northwest Atlantic DPS</i>	<i>Caretta caretta</i>	Threatened/Critical Habitat
Piping plover	<i>Charadrius melodus</i>	Threatened
Rufa red knot	<i>Calidris canutus rufa</i>	Threatened
American crocodile	<i>Crocodylus acutus</i>	Threatened
Florida manatee	<i>Trichechus manatus latirostris</i>	Threatened

The Corps evaluated the project with respect to the March 15, 2015 SPBO, and the May 22, 2013 P3BO as well as species specific minimization/avoidance measures:

Sea Turtles

Placement of dredged material in the upland DMMAs, which is proposed for the upcoming dredge cycle, will have no effect on nesting sea turtles. However, if at a future date, the nearshore and/or beach areas are selected for dredged material placement, the applicable minimization measures, Reasonable and Prudent Measures (RPMs), and Terms and Conditions (T&Cs) in the SPBO would be applicable to the project to ensure the protection of nesting sea turtles. Therefore, the Corps has determined the proposed project may affect, but is not likely to adversely affect, nesting sea turtles.

Piping Plover and Rufa Red Knot

The proposed upland and beach placement sites could be suitable for use by piping plovers (*Charadrius melodus*) and the rufa red knot (*Calidris canutus rufa*) but these sites are not considered to be optimal habitat for either species. If either species are found at the placement areas, the protective conditions developed for migratory birds will be utilized as well as conditions of the 2013 P3BO.

Compliance with the RPMs and T&Cs listed in the P3BO will provide sufficient protection for piping plover and rufa red knot. Therefore, the Corps has determined that the project may affect, but is not likely to adversely affect, the piping plover or rufa red knot.

American Crocodile

American crocodiles are shy and retiring. They are unlikely to be found in a major coastal waterway with the high levels of disturbance (e.g. vessel traffic, human attention, etc.). Although possible, it is not probable to encounter an American crocodile in the project area, therefore, the Corps has determined that the proposed project will have no effect on this species.

Florida Manatee

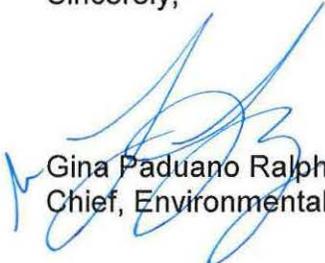
The Corps will include the 2011 USFWS Standard Manatee Conditions for In-Water Work in the project's plans and specifications. The Corps has also determined that the proposed project may affect, but is not likely to adversely affect the Florida manatee.

For additional information on the proposed work and potential effects, the Environmental Assessment (EA), Proposed Finding of No Significant Impact, and associated appendices are available for review on the Jacksonville District's Environmental planning website, under Broward County:

<http://www.saj.usace.army.mil/About/Divisions-Offices/Planning/Environmental-Branh/Environmental-Documents/>

Based on the information provided in this letter and the EA, the Corps respectfully requests that USFWS provide a letter of concurrence within 30 days of the receipt of this letter. If you have any questions, or need additional information, please contact Ms. Kristen Donofrio by telephone 904-232-2918 or via email Kristen.L.Donofrio@usace.army.mil. Thank you for your assistance.

Sincerely,


Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Enclosure

Section 7 ESA Consultation Enclosure:
Maps and Figures for
Operations and Maintenance Dredging and Dredged Material Placement for
Intracoastal Waterway (IWW) Broward County, Reach 1 and
IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) in
Broward County, Florida and Palm Beach County, Florida



US Army Corps of Engineers
JACKSONVILLE DISTRICT

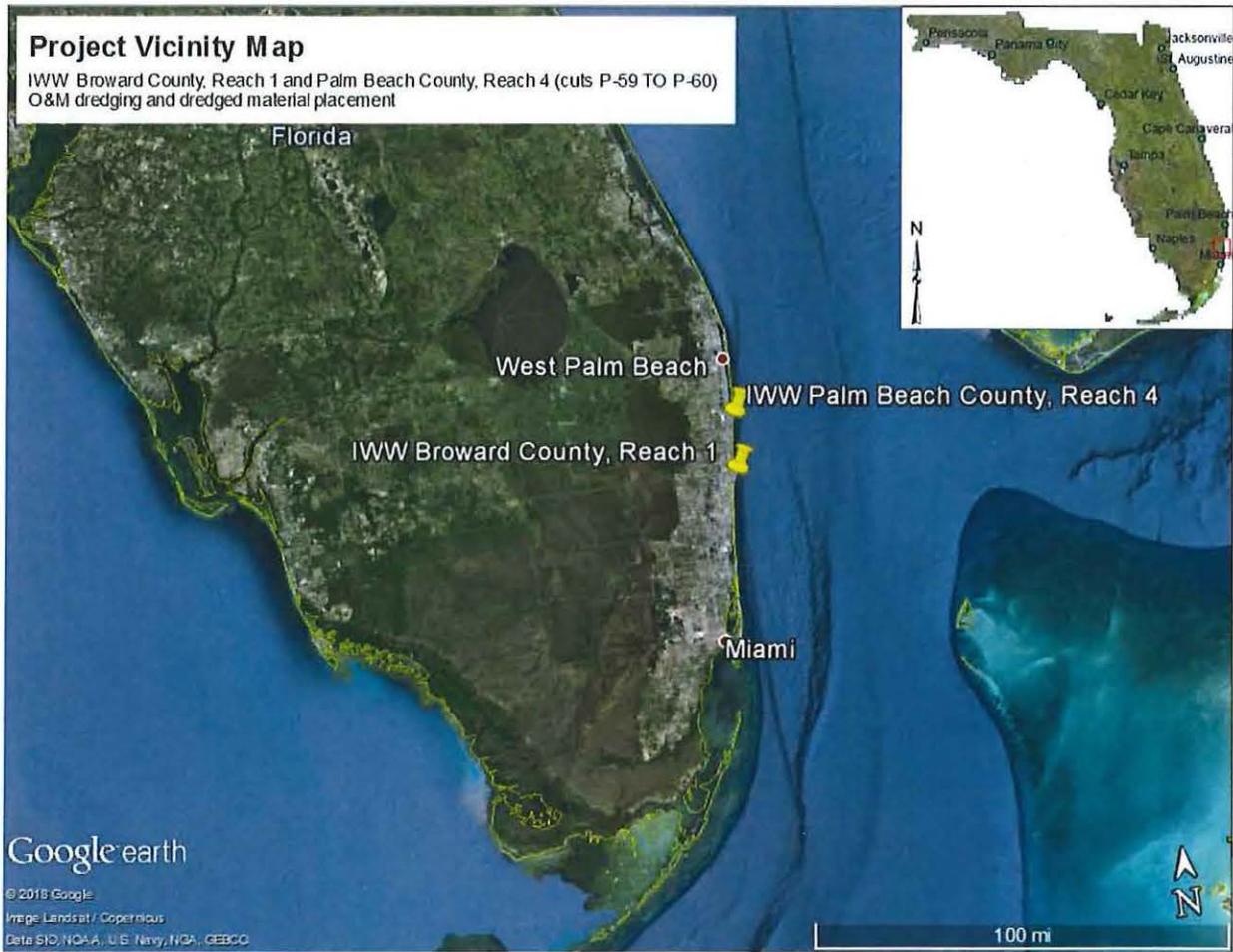


Figure 1. Project location in Florida.
(Source: Google Earth, 2018.)

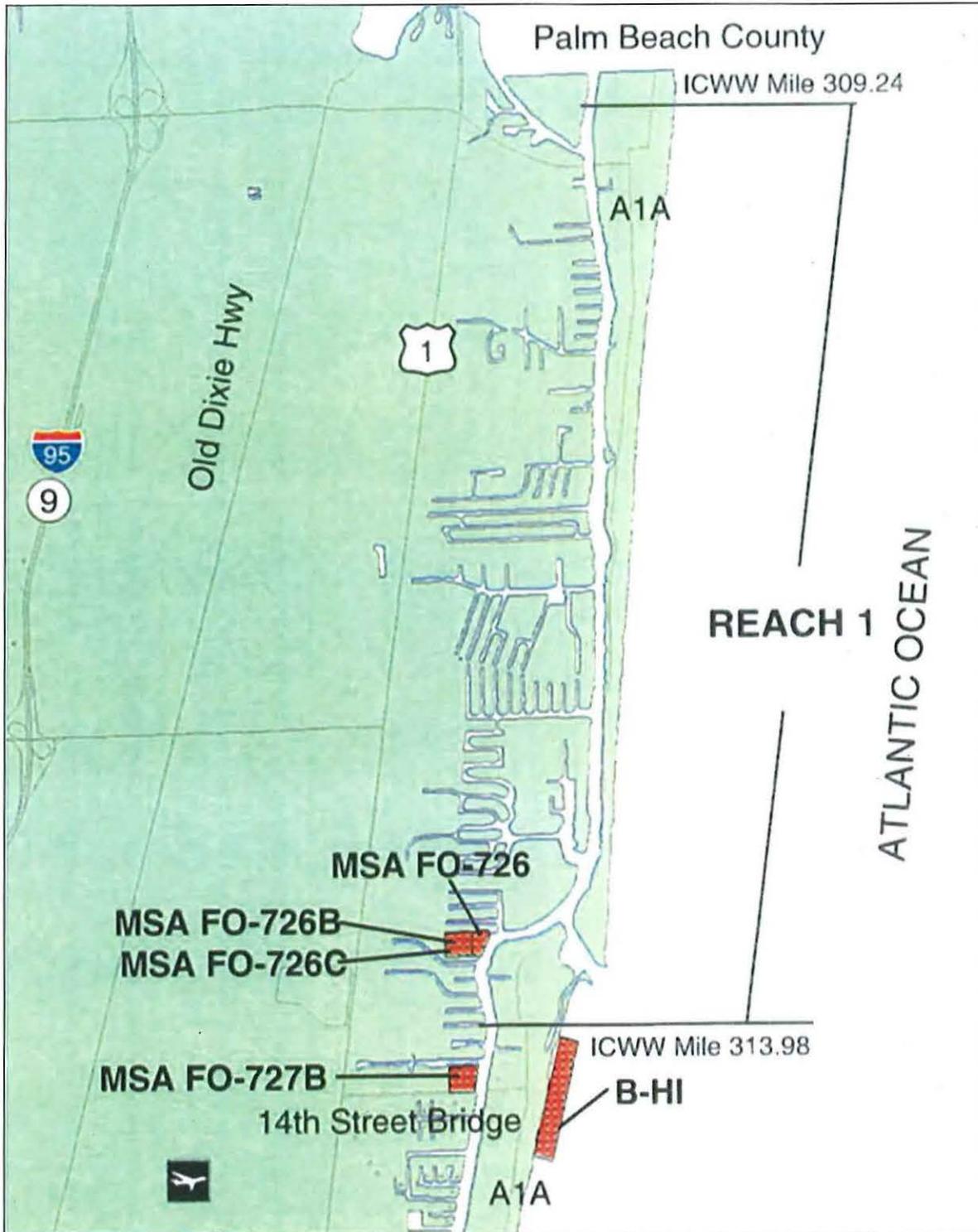


Figure 2. Location of IWW Broward County, Reach 1 and adjacent FIND DMMA's.
 (Source: Taylor Engineering, Inc. 2003 Long-Range Dredged Material Management Plan for the Intracoastal Waterway in Broward County, Florida. Final report for Florida Inland Navigation District.)

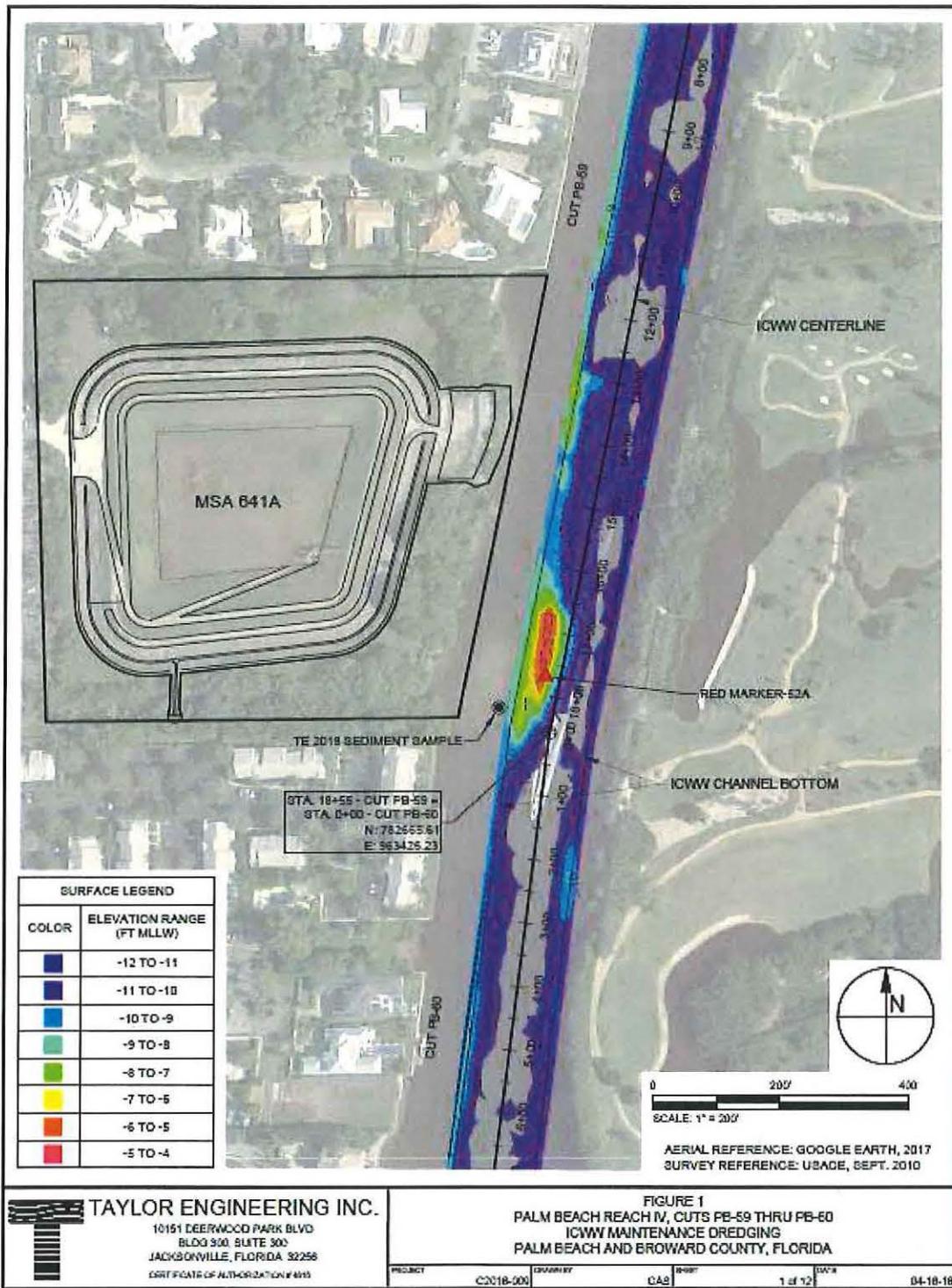


Figure 3. Location of IWW Palm Beach County, Reach 4 shoal in cuts P-59 to P-60 and adjacent FIND DMMA, MSA 641.
(Source: Taylor Engineering, Inc. May 2, 2018 Memorandum to FIND. RE: Site Placement Alternative Analysis and Recommendation.)

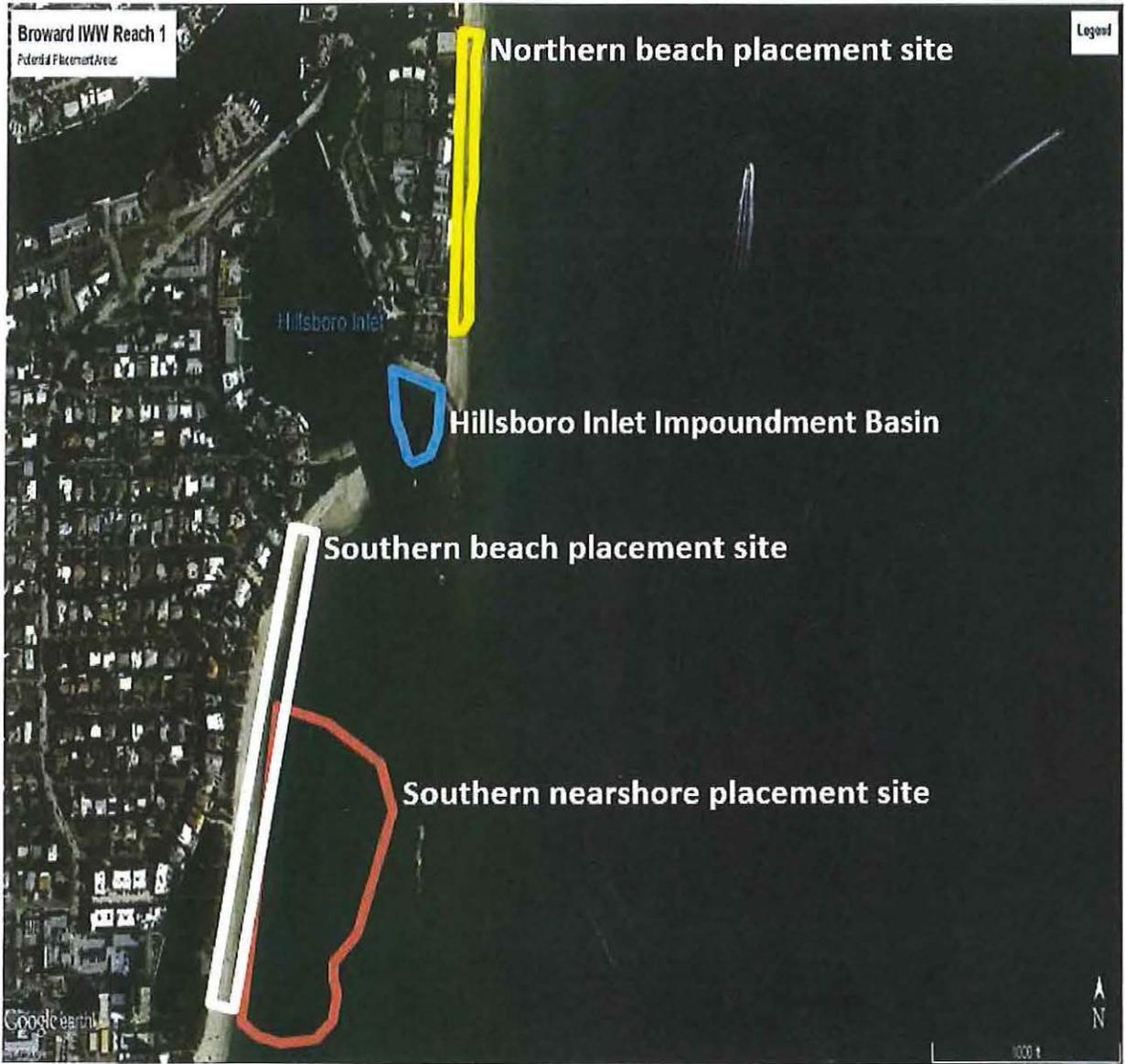


Figure 4. Location of Hillsboro Inlet Impoundment Basin, proposed northern beach placement site, southern beach placement site, and southern nearshore placement site. (Source: Corps' project scoping letter, July 2017.)

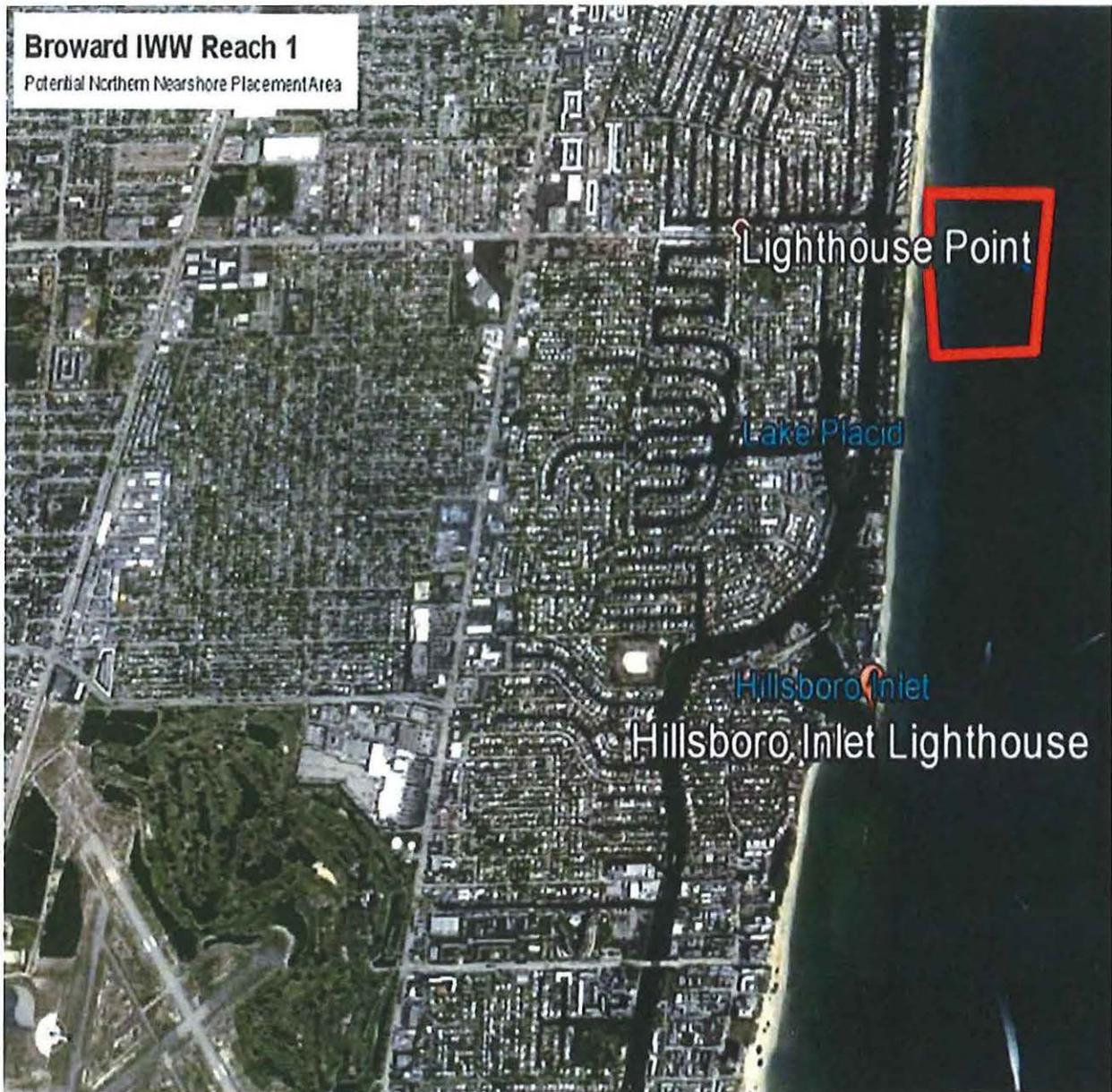


Figure 5. Proposed northern nearshore placement area.
(Source: Corps' project scoping letter, July 2017.)



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207-8915

CESAJ-PD-E (ER 200-2-2)

JUL 27 2018

MEMORANDUM FOR THE RECORD

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Roxanna Hinzman
Field Supervisor
South Florida Ecological Services Field Office



Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch



FLORIDA DEPARTMENT OF STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Dr. Gina Paduano Ralph
Jacksonville District Corps of Engineers
Chief, Environmental Branch
701 San Marco Boulevard
Jacksonville, Florida 32207-8175

May 1, 2018

RE: DHR Project File No.: 2016-5158-C, Received by DHR: April 10, 2018
*Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel,
Broward County, Florida*

Dear Dr. Paduano Ralph:

Our office received and reviewed the above referenced project for possible effects on historic properties listed, or eligible for listing, on the *National Register of Historic Places (NRHP)*. The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties*.

Between September and October 2017, Panamerican Consultants, Inc. (PCI) conducted the above referenced remote sensing cultural resource assessment survey (CRAS) on behalf of the U.S. Army Corps of Engineers, Jacksonville District (Corps) in preparation of routine operation and maintenance dredging of the Broward Reach 1 Navigation Channel, cuts BW-1 to BW-21. PCI recorded 167 magnetic anomalies, 20 side scan sonar targets, and no evidence of remnant paleochannels. Analysis of the remote sensing data resulted in the identification of one (1) cultural resource, Target 1. PCI recommended avoidance of Target 1 or diver investigation if avoidance is not possible.

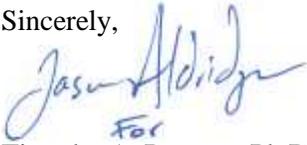
The Corps notes that dredge spoil will be placed in an existing Dredge Material Management Area (DMMA) or in geo-tubes to dewater, neither of which would include ground disturbance. The Corps reviewed this report and determined the best course of action is avoidance of Target 1 with a 200-foot (approximately 60-meter) buffer zone where no dredging, anchoring, or spudding would take place. Based on these criteria, the Corps determined the periodic maintenance dredging of the Broward Reach 1 federal navigation channel and placement of the dredging material in an existing DMMA or geo-tubes poses no effect to historic properties listed or eligible for inclusion in the NRHP.

PCI recorded Target 1/Sonar Contact C0003 with the Florida Master Site File (FMSF) as 8BD06446 and determined it has insufficient information for a definitive NRHP determination at this time. PCI reported this in a revised CRAS report which was submitted to DHR in response to a request for additional information on March 12, 2018.

Based on the information provided, our office concurs with the insufficient information NRHP determination for site 8BD06446 and concurs with the Corps' determination of no effect to historic properties provided 8BD06446 is avoided by the proposed 200-foot (approximately 60-meter) buffer zone, where no dredging, anchoring, or spudding will take place, during the periodic maintenance dredging of the Broward Reach 1 federal navigation channel. Further, we find the submitted report complete and sufficient in accordance with Chapter 1A-46, *Florida Administrative Code*.

If I can be of any further help, or if you have any questions about this letter, please feel free to contact Lindsay Rothrock at Lindsay.Rothrock@dos.myflorida.com.

Sincerely,

A handwritten signature in blue ink that reads "Jason Aldridge". Below the signature, the word "For" is written in a smaller, lighter blue ink.

Timothy A. Parsons, Ph.D.
Director, Division of Historical Resources
and State Historic Preservation Officer



THLOPTHLOCCO TRIBAL TOWN
Tribal Historic Preservation Office
Terry Clouthier, Tribal Historic Preservation Officer

P.O. Box 188
Okemah, OK 74859
(918) 560-6113
thpo@ttown.org

April 4, 2018

THPO File Number: 2018-94

Gina Paduano Ralph
Chief, Environmental Branch
Department of the Army
Jacksonville District Corps of Engineers
701 San Marco Boulevard
Jacksonville, Florida 32207

RE: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida

Dear Mrs. Paduano Ralph,

Thank you for contacting the Thlopthlocco Tribal Town Tribal Historic Preservation Office (THPO) regarding the submerged cultural resources remote sensing survey for the Broward Reach 1 Navigation Channel in Broward County, Florida. Our office has reviewed the document provided and offers the following comments.

We concur that the wreck is potentially eligible for the National Register. Based upon review of the information and consulting our records, we are unaware of any culturally significant sites within the APE. However, should any human remains or cultural resources be inadvertently discovered, please cease all work and contact our THPO at thpo@ttown.org immediately.

The THPO agrees with the findings and recommendations within the letter and concurs with the No Effect determination for this undertaking.

Please feel free to contact the THPO at thpo@ttown.org if you have any questions.

Please refer to THPO file number 2018 -94 in all correspondence for this undertaking.

Sincerely,

Terry Clouthier
Thlopthlocco Tribal Town
Tribal Historic Preservation Officer

Moser, Jason D CIV (US)

From: Bradley Mueller <bradleymueller@semtribe.com>
Sent: Tuesday, April 3, 2018 1:27 PM
To: Ralph, Gina P CIV USARMY CESAJ (US)
Cc: Moser, Jason D CIV (US)
Subject: [Non-DoD Source] Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Channel

**SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE
AH-TAH-THI-KI MUSEUM**

TRIBAL HISTORIC
PRESERVATION OFFICE
SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

30290 JOSIE BILLIE HIGHWAY
PMB 1004
CLEWISTON, FL 33440

THPO PHONE: (863) 983-6549
MUSEUM PHONE: (863) 902-1113
FAX: (863) 902-1117

THPO WEBSITE: WWW.STOFTHPO.COM
MUSEUM WEBSITE: WWW.AHTAHTHIKI.COM



TRIBAL OFFICE

MARCELLUS W. OSC
CHAIRMAN

MITCHELL CYPRI
VICE CHAIRMAN

LAVONNE RO
SECRETARY

PETER A. HAI
TREASURER

April 3, 2018

Ms. Gina Paduano Ralph, Ph.D.
Environmental Branch Chief, Planning and Policy Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Subject: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida

THPO Compliance Tracking Number: 0030522

Dear Ms. Paduano,

Thank you for contacting the Seminole Tribe of Florida – Tribal Historic Preservation Office (STOF-THPO) regarding the Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida. The proposed undertaking does fall within the STOF Area of Interest. We have reviewed the documents you provided and completed our project

assessment pursuant to Section 106 of the National Historic Preservation Act as amended 2014, and its implementing authority, 36 CFR 800 in order to determine if the undertaking would affect any areas important to the Tribe. We concur with the USACE's assessment that provided sonar contact C0003 is avoided and that dredged material is disposed of as proposed in your letter dated February 15, 2018 there will be no effects to historic properties. We have no objections to the project at this time. Please notify us if any archaeological, historical, or burial resources are inadvertently discovered during project implementation. Thank you and feel free to contact us with any questions or concerns.

Respectfully,

A handwritten signature in blue ink that reads "Bradley M. Mueller". The signature is written in a cursive style.

Bradley M. Mueller, MA, Compliance Supervisor
STOF-THPO, Compliance Review Section
30290 Josie Billie Hwy, PMB 1004
Clewiston, FL 33440

Office: 863-983-6549 ext 12245

Fax: 863-902-1117

Email: bradleymueller@semtribe.com

Web: Blockedwww.stofthpo.com

Moser, Jason D CIV (US)

From: Theodore Isham <isham.t@sno-nsn.gov>
Sent: Tuesday, April 3, 2018 11:13 AM
To: Moser, Jason D CIV (US)
Subject: [Non-DoD Source] RE: USACE Broward Reach 1 Broward County, Florida

This Opinion is being provided by Seminole Nation of Oklahoma's Cultural Advisor, pursuant to authority vested by the Seminole Nation of Oklahoma General Council. The Seminole Nation of Oklahoma is an independently Federally-Recognized Indian Nation headquartered in Wewoka, OK.

In keeping with the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act (NHPA), 36 CFR Part 800, this letter is to acknowledge that the Seminole Nation of Oklahoma has received notice of the proposed project at the above mentioned location. The Seminole Nation of Oklahoma has no knowledge of cultural resources at this project site. Therefore, we have no comment on the project as proposed and no issues with the project as proposed.

We do request that if cultural or archeological resource materials are encountered that all activity cease and the Seminole Nation of Oklahoma and other appropriate agencies be contacted immediately.

Furthermore, due to the historic presence of our people in the project area, inadvertent discoveries of human remains and related NAGPRA items may occur, even in areas of existing or prior development. Should this occur we request all work cease and the Seminole Nation of Oklahoma and other appropriate agencies be immediately notified.

Theodore Isham
Seminole Nation of Oklahoma
Historic Preservation Officer
PO Box 1498
Seminole, Ok 74868
Phone: 405-234-5218
Cell: 918-304-9443
e-mail: isham.t@sno-nsn.gov

-----Original Message-----

From: Moser, Jason D CIV (US) [mailto:Jason.D.Moser@usace.army.mil]
Sent: Tuesday, April 03, 2018 9:46 AM
Subject: Re: USACE Broward Reach 1 Broward County, Florida

Hello:

It has been over 30 days since I've sent out the submerged cultural resource survey archaeological report for an Army Corps dredging project in Broward Reach 1 Broward County, Florida. I need to finalize the survey report with the consultant and wanted to make sure that you had no comments on either the report, or on the determination of no effect for this project. If I receive no additional comments by the end of the day on April 4, 2018, I plan on moving forward with this project.

Thanks for your assistance,

Sincerely,

Jason D. Moser, PhD, RPA
Archaeologist
Planning Division, Environmental Branch
Jacksonville District, US Army Corps of Engineers
Office: 904-232-3028

CONVERSATION RECORD

TIME

DATE

TYPE

VISIT

CONFERENCE

TELEPHONE

ROUTING

NAME/SYMBOL

INT

INCOMING
 OUTGOING

Location of Visit / Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU

ORGANIZATION (Office, dept., bureau,

TELEPHONE NO.

SUBJECT

SUMMARY

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION

SIGNATURE

DATE

ACTION TAKEN

SIGNATURE

TITLE

DATE



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

Dr. Paul Backhouse, THPO
Seminole Tribe of Florida
Tribe Historic Preservation Office
30290 Josie Billie Highway
PMP 1004
Clewiston, FL 33440

FEB 15 2018

Re: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida

Dear Dr. Backhouse:

The U.S. Army Corps of Engineers, Jacksonville District (Corps), is studying the environmental effects associated with routine operation and maintenance dredging of the Broward Reach 1 Navigation Channel as part of the preparation for an environmental assessment. The Broward Reach 1 Navigation Channel consists of cuts BW-1 through BW-21, and is an approximately 5-mile long section of the Intracoastal Waterway (IWW) through Broward County (Figure 1). The proposed project would entail the first dredging of this section of the IWW since its initial construction in order to maintain safe navigation in the channel. Dredged material will be placed within an existing Dredge Material Management Area (DMMA) or it will be placed into geo-tubes that will be temporarily placed in a former park, located just west of the IWW, to dewater. No ground disturbance is anticipated during the placement of the dredge material.

The Area of Potential Effects (APE) for this project includes the federal navigation channel and the dredge disposal area. The Broward Reach 1 Navigation Channel has not previously been subject to a submerged cultural resources survey. Due to the location of the APE, the project was determined to have a potential for containing intact cultural resources. Consequently, the US Army Corps of Engineers contracted with Panamerican Consultants, Inc. (Panamerican) to identify potential historic properties that may be located within the APE. Their survey is documented in the report titled: *Submerged Cultural Resources Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida*. A draft copy of that report is enclosed with this letter for your review.

The Panamerican submerged cultural resources survey of the APE utilized a magnetometer, sidescan sonar, and a subbottom profiler. A total of 167 magnetic anomalies and 20 sidescan sonar targets were recorded during the survey. Analysis of the magnetometer and sidescan sonar data identified a single potentially significant target within the APE. One sonar contact (C0003) associated with magnetic anomaly M013, is a charted wreck located just inside the federal channel, approximately 100 meters south of the East Hillsboro Boulevard Bridge. The wreck is approximately 45-foot long, 20-foot wide, and at least one foot above the bottom of the channel. The wreck is present on navigational charts and appears to be a barge. Because it is unknown if this wreck is eligible for listing on the National Register of Historic Places (NRHP) it is considered a potential historic property under 36 CFR 800.

As a result of these investigations and to ensure protection of potentially significant cultural resources, the Corps will buffer the wreck identified by Panamerican with a 200-foot buffer where no dredging, anchoring, or spudding will be permitted. Based on this information, the Corps has determined that periodic maintenance dredging of the Broward Reach 1 federal navigation channel and placement of the dredged material in an existing DMMA or in geo-tubes poses no effect to historic properties listed or eligible for inclusion in the NRHP.

Pursuant to the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (16 USC 470), as amended and its implementing regulations (36 CFR 800), and in consideration of the Corps' Trust Responsibilities to the Seminole Tribe of Florida, the Corps kindly requests your comments on the determination of no adverse effect. If there are any questions, please contact Mr. Jason Moser at 904-232-3028 or e-mail at Jason.D.Moser@usace.army.mil.

Sincerely,


for: Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Encl



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

Mr. Fred Dayhoff, Tribal Representative
NAGPRA, Section 106
Miccosukee Tribe of Indians of Florida
HC 61 SR 68
Ochopee, Florida 34141

FEB 15 2018

Re: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1
Navigation Channel, Broward County, Florida

Dear Mr. Dayhoff:

The U.S. Army Corps of Engineers, Jacksonville District (Corps), is studying the environmental effects associated with routine operation and maintenance dredging of the Broward Reach 1 Navigation Channel as part of the preparation for an environmental assessment. The Broward Reach 1 Navigation Channel consists of cuts BW-1 through BW-21, and is an approximately 5-mile long section of the Intracoastal Waterway (IWW) through Broward County (Figure 1). The proposed project would entail the first dredging of this section of the IWW since its initial construction in order to maintain safe navigation in the channel. Dredged material will be placed within an existing Dredge Material Management Area (DMMA) or it will be placed into geo-tubes that will be temporarily placed in a former park, located just west of the IWW, to dewater. No ground disturbance is anticipated during the placement of the dredge material.

The Area of Potential Effects (APE) for this project includes the federal navigation channel and the dredge disposal area. The Broward Reach 1 Navigation Channel has not previously been subject to a submerged cultural resources survey. Due to the location of the APE, the project was determined to have a potential for containing intact cultural resources. Consequently, the US Army Corps of Engineers contracted with Panamerican Consultants, Inc. (Panamerican) to identify potential historic properties that may be located within the APE. Their survey is documented in the report titled: *Submerged Cultural Resources Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida*. A draft copy of that report is enclosed with this letter for your review.

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As a result of these investigations and to ensure protection of potentially significant cultural resources, the Corps will buffer the wreck identified by Panamerican with a 200-foot buffer where no dredging, anchoring, or spudding will be permitted. Based on this information, the Corps has determined that periodic maintenance dredging of the Broward Reach 1 federal navigation channel and placement of the dredged material in an existing DMMA or in geo-tubes poses no effect to historic properties listed or eligible for inclusion in the NRHP.

Pursuant to the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (16 USC 470), as amended and its implementing regulations (36 CFR 800), and in consideration of the Corps' Trust Responsibilities to the Miccosukee Tribe of Indians of Florida, the Corps kindly requests your comments on the determination of no adverse effect. If there are any questions, please contact Mr. Jason Moser at 904-232-3028 or e-mail at Jason.D.Moser@usace.army.mil.

Sincerely,


for: Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Encl



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

Mr. Terry Clouthier
Tribal Historic Preservation Officer
Thlopthlocco Tribal Town
PO Box 188
Okemah, Ok 74859

FEB 15 2018

Re: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida

Dear Mr. Clouthier:

The U.S. Army Corps of Engineers, Jacksonville District (Corps), is studying the environmental effects associated with routine operation and maintenance dredging of the Broward Reach 1 Navigation Channel as part of the preparation for an environmental assessment. The Broward Reach 1 Navigation Channel consists of cuts BW-1 through BW-21, and is an approximately 5-mile long section of the Intracoastal Waterway (IWW) through Broward County (Figure 1). The proposed project would entail the first dredging of this section of the IWW since its initial construction in order to maintain safe navigation in the channel. Dredged material will be placed within an existing Dredge Material Management Area (DMMA) or it will be placed into geo-tubes that will be temporarily placed in a former park, located just west of the IWW, to dewater. No ground disturbance is anticipated during the placement of the dredge material.

The Area of Potential Effects (APE) for this project includes the federal navigation channel and the dredge disposal area. The Broward Reach 1 Navigation Channel has not previously been subject to a submerged cultural resources survey. Due to the location of the APE, the project was determined to have a potential for containing intact cultural resources. Consequently, the US Army Corps of Engineers contracted with Panamerican Consultants, Inc. (Panamerican) to identify potential historic properties that may be located within the APE. Their survey is documented in the report titled: *Submerged Cultural Resources Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida*. A draft copy of that report is enclosed with this letter for your review.

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Pursuant to the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (16 USC 470), as amended and its implementing regulations (36 CFR 800), and in consideration of the Corps' Trust Responsibilities to Thlopthlocco Tribal Town, the Corps kindly requests your comments on the determination of no adverse effect. If there are any questions, please contact Mr. Jason Moser at 904-232-3028 or e-mail at Jason.D.Moser@usace.army.mil.

Sincerely,



for Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Encl



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

Tim Parsons, Ph.D., SHPO
Division of Historical Resources
State Historic Preservation Officer
500 South Bronough Street
Tallahassee, Florida 32399-0250

FEB 15 2018

Re: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida

Dear Dr. Parsons:

The U.S. Army Corps of Engineers, Jacksonville District (Corps), is studying the environmental effects associated with routine operation and maintenance dredging of the Broward Reach 1 Navigation Channel as part of the preparation for an environmental assessment. The Broward Reach 1 Navigation Channel consists of cuts BW-1 through BW-21, and is an approximately 5-mile long section of the Intracoastal Waterway (IWW) through Broward County (Figure 1). The proposed project would entail the first dredging of this section of the IWW since its initial construction in order to maintain safe navigation in the channel. Dredged material will be placed within an existing Dredge Material Management Area (DMMA) or it will be placed into geo-tubes that will be temporarily placed in a former park, located just west of the IWW, to dewater. No ground disturbance is anticipated during the placement of the dredge material.

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Pursuant to the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (16 USC 470), as amended and its implementing regulations (36 CFR 800), the Corps kindly requests your comments on the determination of no effect and Panamerican's draft report entitled: *Submerged Cultural Resources Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida*. If there are any questions or comments, please contact Mr. Jason Moser at 904-232-3028 or by email at Jason.D.Moser@usace.army.mil.

Sincerely,


for: Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Encl



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

Mr. Theodore Isham
Historic Preservation Officer
Seminole Nation of Oklahoma
PO Box 1498
Wewoka, Ok 74884

FEB 15 2018

Re: Submerged Cultural Resources Remote Sensing Survey for the Broward Reach 1 Navigation Channel, Broward County, Florida

Dear Mr. Isham:

The U.S. Army Corps of Engineers, Jacksonville District (Corps), is studying the environmental effects associated with routine operation and maintenance dredging of the Broward Reach 1 Navigation Channel as part of the preparation for an environmental assessment. The Broward Reach 1 Navigation Channel consists of cuts BW-1 through BW-21, and is an approximately 5-mile long section of the Intracoastal Waterway (IWW) through Broward County (Figure 1). The proposed project would entail the first dredging of this section of the IWW since its initial construction in order to maintain safe navigation in the channel. Dredged material will be placed within an existing Dredge Material Management Area (DMMA) or it will be placed into geo-tubes that will be temporarily placed in a former park, located just west of the IWW, to dewater. No ground disturbance is anticipated during the placement of the dredge material.

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Pursuant to the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (16 USC 470), as amended and its implementing regulations (36 CFR 800), and in consideration of the Corps' Trust Responsibilities to the Seminole Tribe of Oklahoma, the Corps kindly requests your comments on the determination of no adverse effect. If there are any questions, please contact Mr. Jason Moser at 904-232-3028 or e-mail at Jason.D.Moser@usace.army.mil.

Sincerely,



for: Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Encl

APPENDIX B

Coastal Zone Management Act Federal Consistency Determination and Evaluation

Environmental Assessment Operations and Maintenance Dredging and Dredged Material Placement for Intracoastal Waterway (IWW) Broward County, Reach 1 and Palm Beach County, Reach 4 (cuts P-59 to P-60)



US Army Corps of Engineers
JACKSONVILLE DISTRICT

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From: [Stahl, Chris](#)
To: [Donofrio, Kristen L CIV USARMY CESAJ \(US\)](#)
Cc: [State Clearinghouse](#)
Subject: [Non-DoD Source] State_Clearance_Letter_For_FL201807318375C_Draft Environmental Assessment Operations and Maintenance Dredging and Dredged Material Placement for Intracoastal Waterway (IWW) Broward County, Reach 1 and Palm Beach County, Reach 4 (Cuts P...
Date: Tuesday, October 2, 2018 11:09:37 AM
Attachments: [20180904_BrowardCountyReach1Clearinghouse.pdf](#)
[IWW_Broward_PB_9_18gg_003\).pdf](#)

October 2, 2018

Kristen Donofrio

U.S. Army Corps of Engineers

P.O. Box 4970

Jacksonville, Florida 32232

RE: Department of Defense, Office of the Chief of Engineers, Department of the Army, Navigation Projects, Draft Environmental Assessment Operations and Maintenance Dredging and Dredged Material Placement for Intracoastal Waterway (IWW) Broward County, Reach 1 and Palm Beach County, Reach 4 (Cuts P-59 to P-60) in Broward and Palm Beach County, Florida

SAI # FL201807318375C

Dear Kristen:

The Florida State Clearinghouse has coordinated a review of the proposed amendments under the following authorities: Presidential Executive Order 12372; § 403.061(42), Florida Statutes; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The Florida Department of Environmental Protection and the Florida Fish and Wildlife Conservation Commission has reviewed the proposed action and submitted comments. As a courtesy, these have been attached to this letter and are incorporated hereto.

Based on the information contained in the submittal, the state has determined that the proposed federal actions are consistent with the Florida Coastal Management Program.

Thank you for the opportunity to review these proposals. Should you have any questions regarding this letter, please contact me at (850) 717-9076.

Sincerely

Chris Stahl

Chris Stahl, Coordinator

Florida State Clearinghouse

Florida Department of Environmental Protection

3900 Commonwealth Blvd., M.S. 47

Tallahassee, FL 32399-2400

ph. (850) 717-9076

State.Clearinghouse@dep.state.fl.us <<mailto:State.Clearinghouse@dep.state.fl.us>>

<Blockedhttp://survey.dep.state.fl.us/?refemail=Chris.Stahl@dep.state.fl.us>



DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BLVD
JACKSONVILLE, FL 32207-8915

Planning and Policy Division
Environmental Branch

JUL 27 2018

Chris Stahl
Coordinator
Florida State Clearinghouse
Florida Department of Environmental Protection
2600 Blair Stone Road, M.S. 47
Tallahassee, FL 32399

Dear Mr. Stahl:

Pursuant to the National Environmental Policy Act and the U.S. Army Corps of Engineers (Corps) Regulation (33 CFR 230.11), this letter constitutes the Notice of Availability of the Environmental Assessment (EA), Proposed Finding of No Significant Impact (FONSI), and Federal Consistency Determination (FCD) for the operations and maintenance (O&M) dredging and dredged material placement for the Intracoastal Waterway (IWW) Broward County, Reach 1 and IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) Federal navigation Projects located in Broward County and Palm Beach County, Florida. The proposed work consists of the following:

- Routine O&M dredging on an "as needed" basis of an estimated 75,000 cubic yards (CY) of silt and silty sand from the IWW Broward County, Reach 1 Federal channel to maintain an authorized depth of twelve feet (ten feet required project depth plus up to two foot allowable over depth);
- Routine O&M dredging on an "as needed" basis of an estimated 7,000 CY of poorly graded sand from the shoal in the IWW Palm Beach County, Reach 4, cuts P-59 to P-60 to maintain an authorized depth of ten feet (nine feet required project depth plus one foot allowable over depth).
- Determination of the exact placement location(s) to use will be reliant upon available funds, location, and CY of sediments to be dredged as well as the placement site's capacity, authorizations, and location in relation to the dredging.

Dredged material is proposed for placement in the following locations:

- Florida Inland Navigation District (FIND) owned property and/or previously authorized and approved upland dredged material management area (DMMA). Sites MSA 726 and 641A will be used in the upcoming dredge cycle;
- Nearshore environment north and/or south of the Hillsboro Inlet;
- Beach approximately 300 linear feet (LF) north of the Hillsboro Inlet;
- Beach approximately 500 LF south of the Hillsboro Inlet, between R-28 to R-32;
- Hillsboro Inlet Impoundment Basin.

The EA, Proposed FONSI, and associated appendices are available for your review on the Jacksonville District's Environmental planning website, under Broward County:

<http://www.saj.usace.army.mil/About/Divisions-Offices/Planning/Environmental-Branch/Environmental-Documents/>

The Corps has determined that the proposed federal action is consistent to the maximum extent practicable with the enforceable policies of Florida's Coastal Zone Management Program. The Corps respectfully requests a letter of concurrence with the FCD determination within 60 days of the date of this letter for the project.

Questions or comments can be submitted to Kristen Donofrio at the letterhead address, or via email to Kristen.L.Donofrio@usace.army.mil within 60 days from the date of this Notice of Availability. Ms. Donofrio may also be reached by telephone at 904-232-2918.

Sincerely,



Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch

Florida Coastal Zone Management Program Evaluation Procedures
Federal Consistency Determination (FCD)

**OPERATIONS AND MAINTENANCE DREDGING AND DREDGED MATERIAL PLACEMENT FOR
INTRACOASTAL WATERWAY (IWW) BROWARD COUNTY, REACH 1 AND
PALM BEACH COUNTY, REACH 4 (CUTS P-59 TO P-60) IN
BROWARD COUNTY AND PALM BEACH COUNTY, FLORIDA
JUNE 2018**

1. Chapter 161, Beach and Shore Preservation. *The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.*

RESPONSE: The proposed plans and information will be submitted to the State in compliance with this chapter.

2. Chapters 186 and 187, State and Regional Planning. *These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.*

RESPONSE: The proposed project will be coordinated with Federal, State, federally-recognized Native American tribes, local agencies, and other interested parties during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the environment. The proposed project complies with the goals of this chapter.

3. Chapter 252, Disaster Preparation, Response and Mitigation. *This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.*

RESPONSE: By continuing periodic operations and maintenance (O&M) dredging on an as-needed basis, the channel will continue to provide safe navigation for commercial and recreational vessels, which protects and ensures public peace, health, and safety for people and vessels transiting the area. The proposed project is consistent with the efforts of Division of Emergency Management and complies with the goals of this chapter.

4. Chapter 253, State Lands. *This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other*

benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

RESPONSE: The proposed project will be coordinated with Federal, State, federally-recognized Native American tribes, local agencies, and other interested parties during the planning process. All proposed work will avoid or minimize impacts to resources within submerged state lands. Applicable and appropriate protective measures will be implemented where necessary. The proposed project complies with the goals of this chapter.

5. *Chapters 253, 259, 260, and 375, Land Acquisition.* *This chapter authorizes the state to acquire land to protect environmentally sensitive areas.*

RESPONSE: No land acquisition is proposed in this project.

6. *Chapter 258, State Parks and Aquatic Preserves.* *This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.*

RESPONSE: There are no state parks or preserves that occur within or along the proposed project area.

7. *Chapter 267, Historic Preservation.* *This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.*

RESPONSE: In accordance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations (36 CFR Part 800), USACE consulted with the State Historic Preservation Office (SHPO) and federally-recognized tribes regarding the proposed work. Consultation is ongoing with the Florida SHPO and appropriate Federally-recognized tribes, and will be concluded prior to project implementation. The proposed project complies with the goals of this chapter.

8. *Chapter 288, Economic Development and Tourism.* *This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.*

RESPONSE: The proposed project will maintain or improve eco-tourism by ensuring safe navigation for recreational and commercial vessel transit. The proposed project complies with the goals of this chapter.

9. *Chapters 334 and 339, Public Transportation.* *This chapter authorizes the planning and development of a safe balanced and efficient transportation system.*

RESPONSE: No public transportation systems will be affected by the proposed project.

10. Chapter 370, Saltwater Living Resources. *This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.*

RESPONSE: O&M dredging is expected to have temporary effects to saltwater living resources during construction. The proposed project will be coordinated with Federal, State, federally-recognized Native American tribes, local agencies, and other interested parties during the planning process. Appropriate protection measures will be implemented where necessary. The proposed project complies with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. *This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.*

RESPONSE: The proposed project does not involve freshwater resources as described by this chapter, and therefore, is not expected to have effects on freshwater aquatic life or wild animal life. The proposed project will be coordinated with Federal, State, federally-recognized Native American tribes, local agencies, and other interested parties during the planning process. The proposed project complies with the goals of this chapter.

12. Chapter 373, Water Resources. *This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.*

RESPONSE: The proposed project does not involve water resources as described by this chapter.

13. Chapter 376, Pollutant Spill Prevention and Control. *This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.*

RESPONSE: The contract specifications will prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan will be required. The proposed project complies with the goals of this chapter.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

RESPONSE: The proposed project does not involve the exploration, drilling, or production of gas, oil, or petroleum product as described by this chapter; therefore, this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development.

RESPONSE: The proposed project does not involve land development as described by this chapter; therefore, this chapter does not apply.

16. Chapter 388, Arthropod Control. This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

RESPONSE: The proposed project will not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

RESPONSE: Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. Coordination with the Florida Department of Environmental Protection will occur prior to construction. The proposed project complies with the goals of this chapter.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

RESPONSE: The proposed project will include appropriate erosion control plans and measures where applicable. The proposed project complies with the goals of this chapter.

APPENDIX C

Clean Water Act 404(b)(1) Guidelines Evaluation

Environmental Assessment

Operations and Maintenance Dredging and Dredged Material Placement for
Intracoastal Waterway (IWW) Broward County, Reach 1 and
Palm Beach County, Reach 4 (cuts P-59 to P-60)



US Army Corps of Engineers
JACKSONVILLE DISTRICT

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**Final Evaluation of 404(b)(1) Guidelines
Contained in Vol. 45 No. 249 of the
Federal Register dated 24 December 1980**

Operations and Maintenance (O&M) Dredging and Dredged Material Placement for the
Intracoastal Waterway (IWW) Broward County, Reach 1 Federal Navigation Project
located in Broward County and Palm Beach County, Florida
June 2018

1. Technical Evaluation Factors

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (230.20-230.25)(Subpart C)

	N/A	Not Significant	Significant
(1) Substrate impacts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(2) Suspended particulates/turbidity impacts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(3) Water Quality Control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(4) Alteration of current patterns and water circulation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(5) Alteration of normal water fluctuations/hydroperiod	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(6) Alteration of salinity gradients	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Proposed Action consists of the following:

- Routine O&M dredging on an “as needed” basis of an estimated 75,000 cubic yards (CY) of silt and silty sand from the IWW Broward County, Reach 1 Federal channel to maintain the authorized depth of twelve feet (ten feet required project depth plus up to two foot allowable over depth);
- Routine O&M dredging on an “as needed” basis of an estimated 7,000 CY of poorly graded sand from the shoal in the IWW Palm Beach County, Reach 4, cuts P-59 to P-60 to maintain the authorized depth of ten feet (nine feet required project depth plus one foot allowable over depth). Determination of the exact location to use will be reliant on available funds, location, and CY of sediments to be dredged as well as the placement site’s capacity, authorizations, and location in relation to the dredging.
- Dredged material is proposed for placement in the following locations:
 - o Florida Inland Navigation District (FIND) owned property and/or previously authorized and approved upland dredged material management area (DMMA). Sites MSA 726 and 641 will be used in the upcoming dredge cycle;
 - o Nearshore environment north and/or south of the Hillsboro Inlet;
 - o Beach approximately 300 linear feet (LF) north of the Hillsboro Inlet;
 - o Beach approximately 500 LF south of the Hillsboro Inlet, between R-28 to R-32;
 - o Hillsboro Inlet Impoundment Basin.

For the upcoming dredge cycle, dredged material will be placed upland in MSA 641 (unconsolidated) and MSA 726 (pumped into geotubes that will be dewatered and stored). Placement of dredged material in an upland site is not subject to 404(b)(1) evaluation.

The other listed placement sites could be used in future cycles and require 404(b)(1) evaluation. Dredged material placement in the nearshore environment, on the beach, or in the Hillsboro Inlet Impoundment Basin will increase turbidity at the site, but this will be a minor, temporary impact that will dissipate once dredging has ceased. Best Management Practices (BMPs) and methods will ensure minimized and controlled turbidity. Final details for BMPs and methods will be determined during the permitting and contracting process. The contractor will be given criteria to determine and achieve acceptable means and methods.

b. Biological Characteristics of the Aquatic Ecosystem(230.30-230.32) (Subpart D)

	N/A	Not Significant	Significant
(1) Effect on threatened/endangered species and their habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(2) Effect on the aquatic food web	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(3) Effect on other wildlife (mammals, birds, reptiles, and amphibians)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

USACE has concluded that the following federally listed species may be in or near the proposed project area (in either the dredging or in the placement areas):

- Green sea turtle (North Atlantic Distinct Population Segment (DPS)) (*Chelonia mydas*);
- Hawksbill sea turtle (*Eretmochelys imbricata*);
- Leatherback sea turtle (*Dermochelys coriacea*);
- Loggerhead sea turtle (Northwest Atlantic DPS) (*Caretta caretta*);
- Smalltooth sawfish (*Pristis pectinata*);
- American crocodile (*Crocodylus acutus*);
- Florida manatee (*Trichechus manatus*);
- Piping plover (*Charadrius melodus*);
- Rufa red knot (*Calidris canutus rufa*);
- Johnson’s seagrass (*Halophila johnsonii*);
- Pillar coral (*Dendrogyra cylindrus*);
- Rough cactus coral (*Mycetophyllia ferox*);
- Lobed star coral (*Orbicella annularis*);
- Mountainous star coral (*Orbicella faveolata*);
- Boulder star coral (*Orbicella franksi*);
- Elkhorn coral (*Acropora palmate*);
- Staghorn coral (*Acropora cervicornis*).

This project has been coordinated with NMFS through the South Atlantic Regional Biological Opinion (SARBO) dated September 25, 1997. By letter dated October 25, 2007, NMFS instructed USACE to continue to apply the 1997 SARBO on all O&M dredging projects while NMFS completes the new SARBO. (That document is not yet complete.) Additionally, in discussions with NMFS and USACE-RD on March 3, 2016, NMFS advised that programmatic consultation is not required under the ESA for RGP SAJ-93 (discussed in section 1.7.1), as the scope of the action falls within the scope of the SARBO (USACE 2016). If a *Currituck* class dredge is used for the project, the T&Cs of the “USACE Side-cast and split hull hopper dredge “ BO will also be incorporated. For species under the jurisdiction of the US Fish and Wildlife Service (USFWS), the USACE will use the Statewide Programmatic Biological Opinion (SPBO) dated March 13, 2015 for O&M dredging and placement activities. The conservation recommendations included in the Piping Plover Programmatic Biological Opinion (P3BO) for shorebirds will provide protections to the piping plover and rufa red knot. In addition, USACE will include the 2011 USFWS “Standard Manatee Conditions for In-Water Work” to ensure protection of the manatees during dredging operations and for placement in the proposed nearshore and beach placement sites. The proposed project will be coordinated with other pertinent Federal, state, federally-recognized Native American tribes, local agencies, and other interested parties during the planning process.

c. Special Aquatic Site (230.40-230.45) (Subpart E)

	N/A	Not Significant	Significant
(1) Sanctuaries and refuges	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(2) Wetlands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(3) Mud flats	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(4) Vegetated shallows	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(5) Coral reefs	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(6) Riffle and pool complexes	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A nearshore hardbottom area is located close to shore and adjacent to the Hillsboro Inlet Bypass project, which has extensively monitored the reef for project effects. The habitat is not located in the direct footprint of the proposed project. USACE has concluded that the proposed project will have no effect to the hardbottom habitat in this area.

d. Human Use Characteristics (230.50-230.54) (Subpart F)

	N/A	Not Significant	Significant
(1) Effects on municipal and private water supplies	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(2) Recreational and Commercial fisheries impacts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(3) Effects on water-related recreation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(4) Aesthetic impacts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

By continuing O&M dredging on an as-needed basis, the IWW will continue to provide safe navigation for commercial and recreational vessels, which protects and ensures public health and safety for people and vessels transiting the area.

2. Evaluation of Dredged or Fill Material (230.60) (Subpart G)

- a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. **(Check only those appropriate)**
- (1) Physical characteristics
 - (2) Hydrography in relation to known or anticipated sources of contaminants
 - (3) Results from previous testing of the material in the vicinity of the project
 - (4) Known, significant, sources of persistent pesticides from land runoff or percolation
 - (5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances
 - (6) Other public records of significant introduction of contaminants from industries, municipalities or other sources
 - (7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge
 - (8) Other sources (specify)

In response to the hazardous, toxic, and radioactive waste (HTRW) concerns received from Miami Waterkeeper, USACE conducted an investigation on existing HTRW conditions in the project area. The records of Florida Department of Environmental Protection (FDEP) contaminated sites and active Resource Conservation and Recovery Act (RCRA) facilities near the IWW Broward County, Reach 1 and cuts P-59 to P-60 of Palm Beach County, Reach 4 were examined to evaluate potential impact to the dredging project from groundwater plume discharge and/or the accumulation of contaminated sediment. The most extensive groundwater plume was associated with the Flash Cleaners Superfund site that is undergoing active remediation at the source property. The center of the plume has been remediated and remaining groundwater and sediment pore water concentrations discharging to the Grand Canal pose no harm to aquatic species. This plume discharge area will not impact dredging as it is located more than 0.5 mile from the IWW dredging project. The remaining contaminated sites have documented small areas of impact or score too low to receive funding for current investigation. The majority of sites are located too far away from the IWW to impact the project. For the four contaminated sites located close to the IWW project area, three sites score too low to have investigation data and one has a small area of impacted groundwater restricted to the source property (an active petroleum site). These four sites are unlikely to be of a concern. None of these contaminated sites are projected to impact either surface water, sediment, or elutriate water quality within the dredging footprint. None of the active RCRA sites posed a potential impact to the IWW dredging project.

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

YES NO

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

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

- (1) Depth of water at disposal site
- (2) Current velocity, direction, and variability at disposal site
- (3) Degree of turbulence
- (4) Water volume stratification
- (5) Discharge vessel speed and direction
- (6) Rate of discharge
- (7) Dredged material characteristics (constituents, amount, and type of material, settling velocities)
- (8) Number of discharges per unit of time
- (9) Other factors affecting rates and patterns of mixing (specify)

Dredged material will be placed in a FIND owned upland property and/or previously approved and authorized upland DMMA. BMPs and methods to manage the placement and dewatering of dredged material will ensure minimized and controlled turbidity. Final details for BMPs and methods will be determined during the permitting and contracting process. The contractor will be given criteria to determine and achieve acceptable means and methods.

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

YES NO

4. Actions to Minimize Adverse Effects (Section 230.70-230.77)(Subpart H)

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

YES NO

5. Factual Determination (Section 230.11)

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

- a. Physical substrate at the disposal site (review sections 2a, 3, 4, & 5)
- b. Water circulation, fluctuation & salinity (review sections 2a, 3, 4, & 5)
- c. Suspended particulates/turbidity (review sections 2a, 3, 4, & 5)
- d. Contaminant availability (review sections 2a, 3, & 4)
- e. Aquatic ecosystem structure and function (review sections 2b, c; 3, & 5)
- f. Disposal site (review sections 2, 4, & 5)
- g. Cumulative impact on the aquatic ecosystem
- h. Secondary impacts on the aquatic ecosystem

6. Review of Compliance (230.10(a)-(d) (Subpart B)

A review of the permit application indicates that:

- a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative);

YES NO

- b. The activity does not appear to 1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the CWA; 2) jeopardize the existence of Federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies);

YES NO

- c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2);

YES NO

- d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5);

YES NO

7. Findings

a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404 (b)(1) guidelines

b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions:

c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reason(s):

(1) There is a less damaging practicable alternative

(2) The proposed discharge will result in significant degradation of the aquatic ecosystem

(3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem

APPENDIX D

Geotechnical Investigations

Environmental Assessment

Operations and Maintenance Dredging and Dredged Material Placement for
Intracoastal Waterway (IWW) Broward County, Reach 1 and
Palm Beach County, Reach 4 (cuts P-59 to P-60)



US Army Corps of Engineers
JACKSONVILLE DISTRICT

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Appendix D: Geotechnical Investigations

IWW Palm Beach County, Reach 4 (cuts P-59 to P-60) Geotechnical Investigation

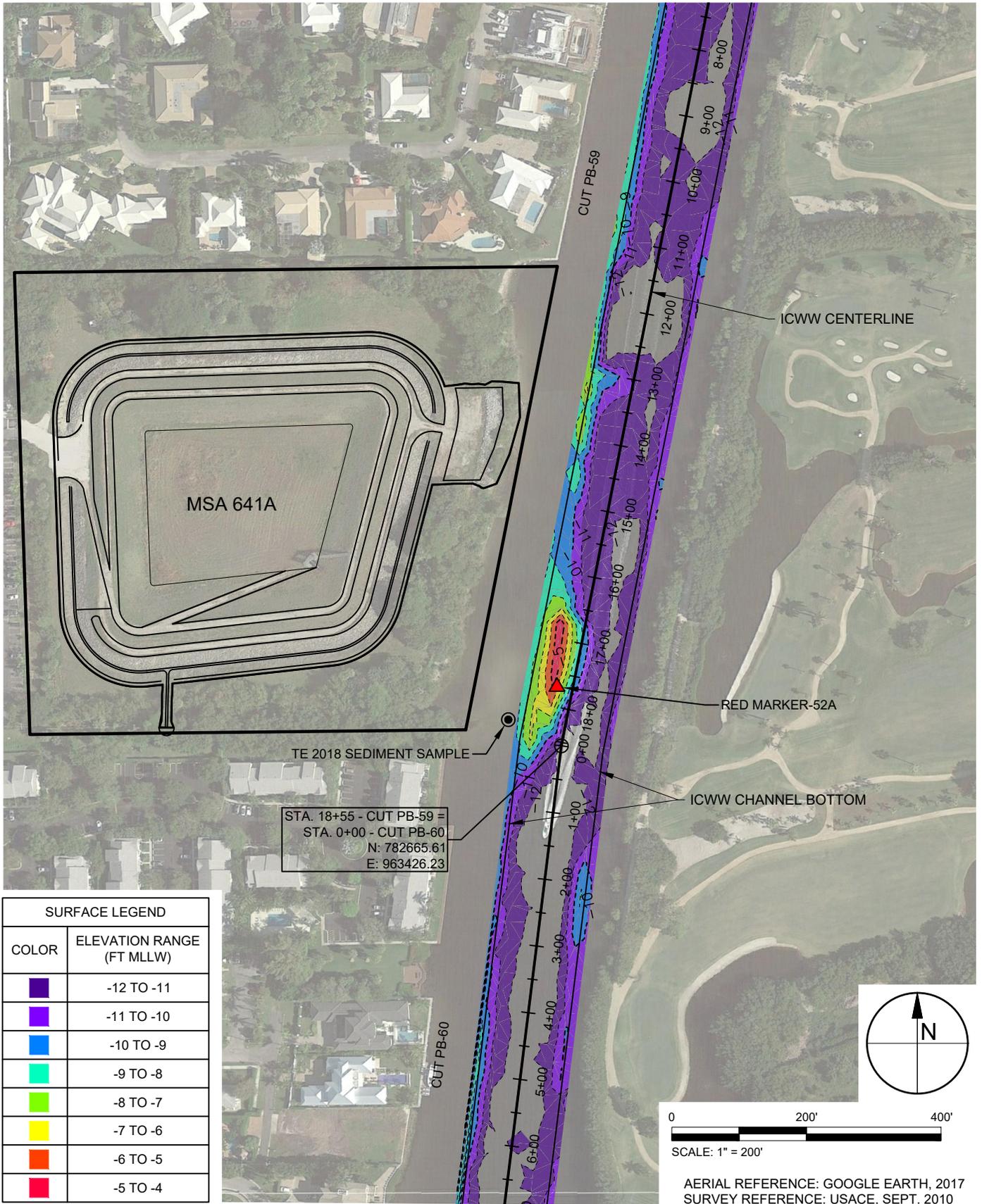
Taylor Engineering, Inc.

Pages from May 2, 2018 Memorandum to FIND

RE: Site Placement Alternative Analysis and Recommendation

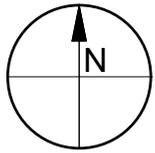
Palm Beach Reach IV and Broward Reach I Maintenance Dredging

CATHY SHELL X:\SIS\PROJECTS\C2018-008\FIND BROWARD REACH\FIGURES\PALM BEACH REACH IV CUTS PB-59 - PB-60.DWG 4/17/2018 2:21:10 PM

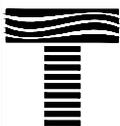


STA. 18+55 - CUT PB-59 =
 STA. 0+00 - CUT PB-60
 N: 782665.61
 E: 963426.23

SURFACE LEGEND	
COLOR	ELEVATION RANGE (FT MLLW)
	-12 TO -11
	-11 TO -10
	-10 TO -9
	-9 TO -8
	-8 TO -7
	-7 TO -6
	-6 TO -5
	-5 TO -4



AERIAL REFERENCE: GOOGLE EARTH, 2017
 SURVEY REFERENCE: USACE, SEPT. 2010



TAYLOR ENGINEERING INC.

10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 1
 PALM BEACH REACH IV, CUTS PB-59 THRU PB-60
 ICWW MAINTENANCE DREDGING
 PALM BEACH AND BROWARD COUNTY, FLORIDA

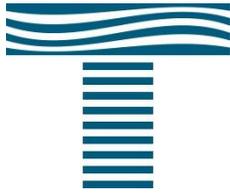
PROJECT	C2018-009	DRAWN BY	CAS	SHEET	1 of 12	DATE	04-16-18
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Boring Designation MSA641-1

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Jacksonville District		SHEET 1 OF 1 SHEETS
1. PROJECT MSA 641A Shoal			9. SIZE AND TYPE OF BIT 2.25" Macro-Core		
2. BORING DESIGNATION MSA641-1		LOCATION COORDINATES		10. COORDINATE SYSTEM/DATUM	HORIZONTAL
3. DRILLING AGENCY Taylor Engineering, Inc.		CONTRACTOR FILE NO.		11. MANUFACTURER'S DESIGNATION OF DRILL Geoprobe Macro-core tooling	<input type="checkbox"/> AUTO HAMMER <input checked="" type="checkbox"/> MANUAL HAMMER
4. NAME OF DRILLER Bill Aley			12. TOTAL SAMPLES		DISTURBED 0
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED			DEG. FROM VERTICAL		BEARING
6. THICKNESS OF OVERBURDEN N/A			13. TOTAL NUMBER CORE BOXES 0		UNDISTURBED (UD) 0
7. DEPTH DRILLED INTO ROCK N/A			14. ELEVATION GROUND WATER		
8. TOTAL DEPTH OF BORING 4.0 Ft.			15. DATE BORING		STARTED 03-19-18
			16. ELEVATION TOP OF BORING -3.0 Ft.		COMPLETED 03-19-18
			17. TOTAL RECOVERY FOR BORING N/A		
			18. SIGNATURE AND TITLE OF INSPECTOR Bill Aley, Geologist		

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
-3.0	0.0	[Dotted pattern]	SAND, poorly-graded, mostly medium-grained sand-sized sand, trace silt, trace shell, 2.5Y 6/1 gray (SP)		S1		-3.0		
-5.6	2.6		SAND, poorly-graded, mostly medium-grained sand-sized sand, trace silt, trace shell, 2.5Y 4/1 dark gray (SP)		S2		Slightly darker color observed due to higher silt content.		
-7.0	4.0		100				-7.0		
			NOTES: 1. End of boring at -4.0 feet below ground surface. Possible refusal by rock, noticed several small rock fragments in the bottom of the core.						

10

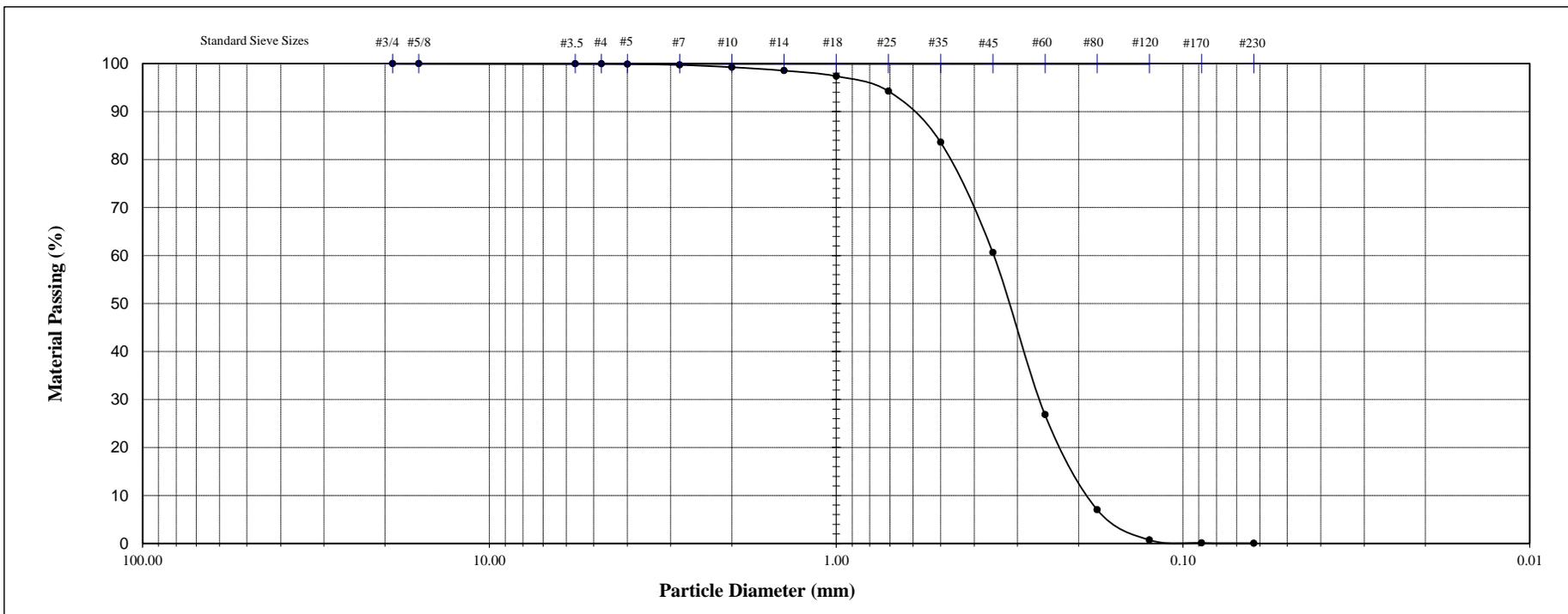


Taylor Engineering, Inc.

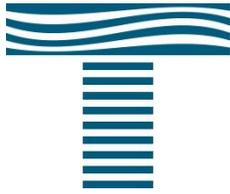
10151 Deerwood Park Blvd;
Bldg 300, Suite 300
Jacksonville, FL 32256
Phone: 904-731-7040

Granulometric Report

Project:	MSA 641A Shoal		Date Sampled:	3/19/2018				
Project #:	C2018-009		Sampled By:	B. Aley, Y. Siddiqui				
Client:	FIND		Date Tested:	4/13/2018				
Sample:	1		Tested By:	B. Aley				
Location:	963347.266, 782704.663		Date Checked:	4/13/2018				
Depth:	1.0'		Checked By:	B. Aley				
Description:	Depth = Depth below top of core.							
Sieve No.	Sieve Size (ϕ)	Sieve Size (mm)	Weight (g)	% Weight	Cum. Weight %	% Passing		
3/4	-4.25	19.03	0.00	0.00	0.00	100.00		
5/8	-4	16.00	0.00	0.00	0.00	100.00		
3.5	-2.5	5.66	0.07	0.06	0.06	99.94		
4	-2.25	4.76	0.00	0.00	0.06	99.94		
5	-2	4.00	0.06	0.05	0.11	99.89		
7	-1.5	2.83	0.19	0.17	0.28	99.72		
10	-1	2.00	0.55	0.48	0.76	99.24		
14	-0.5	1.41	0.82	0.72	1.48	98.52		
18	0	1.00	1.32	1.15	2.63	97.37		
25	0.5	0.71	3.57	3.12	5.75	94.25		
35	1	0.50	12.20	10.66	16.40	83.60		
45	1.5	0.35	26.31	22.98	39.39	60.61		
60	2	0.25	38.67	33.78	73.17	26.83		
80	2.5	0.18	22.66	19.79	92.96	7.04		
120	3	0.13	7.23	6.32	99.27	0.73		
170	3.5	0.09	0.72	0.63	99.90	0.10		
230	4	0.06	0.08	0.07	99.97	0.03		
Pan	>4	<0.06	0.03	0.03	100.00	0.00		
Pre-Sieve Weight (g):	114.88		Gravel (%):	0.76		Wet color: 2.5Y 6/1		
Post-Sieve Weight (g):	114.48		Sand (%):	99.14		Dry color: 2.5Y 7/1		
Sieve Loss (%):	0.35		Fines (%):	0.10		USCS: SP		
% Carbonate:	N/T		Notes: N/T = Not Tested					
% Organics:	N/T							
Moment Method Statistics	Mean (ϕ)		Mean (mm)		Sorting (ϕ)		Skewness (ϕ)	
	1.59		0.33		0.72		-1.02	
Coefficients (mm)			$C_u =$		1.87		$C_c =$	
					1.02			
D_5	D_{16}	D_{25}	D_{50}	D_{75}	D_{84}	D_{95}		
0.16	0.21	0.21	0.32	0.45	0.51	0.78		



Sample	Depth	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurtosis	Sort	Sample Information	
1	1.0'	SP	0.10	N/T	N/T	0.32	0.33	-1.02	6.30	0.72	Project:	MSA 641A Shoal
Notes: N/T = Not Tested											Analysis Date:	4/13/2018
 <p>Taylor Engineering, Inc. 10151 Deerwood Park Blvd; Bldg 300, Suite 300 Jacksonville, FL 32256 Phone: 904-731-7040</p>											Analyzed By:	B. Aley
											Location:	963347.266, 782704.663
											Horizontal System:	NA
											Vertical System:	NA

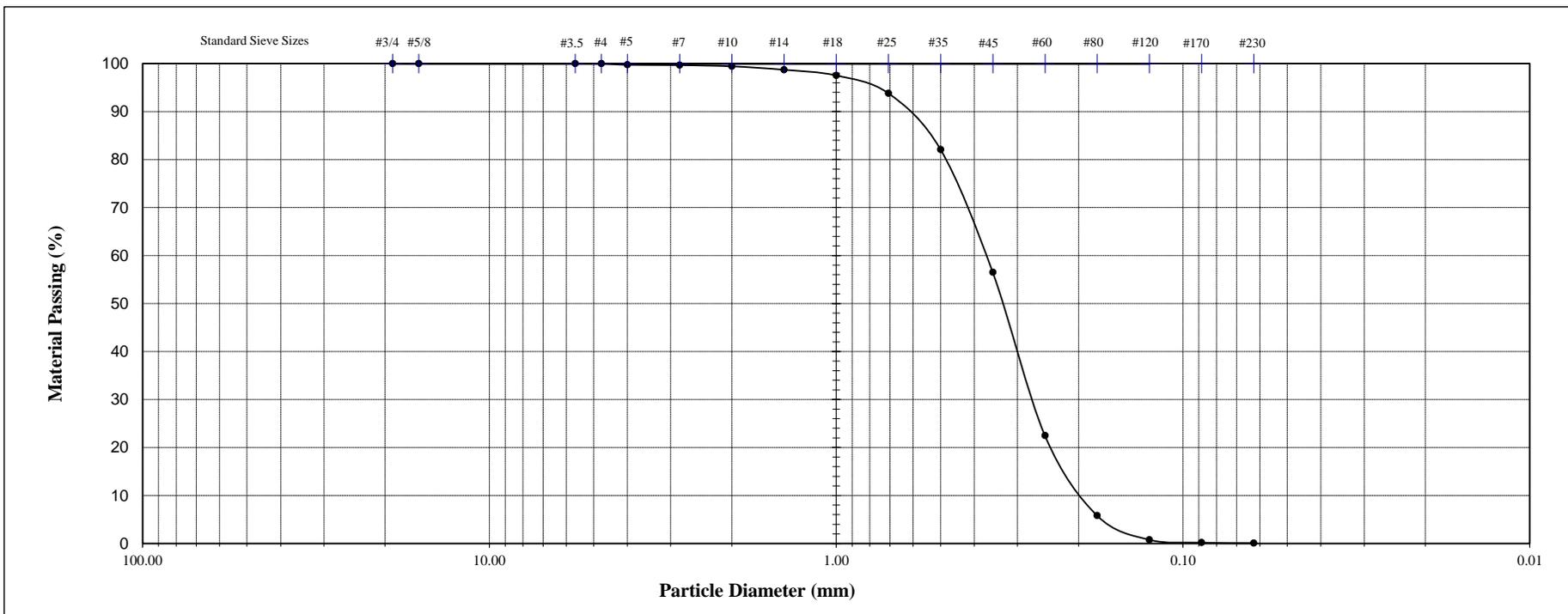


Taylor Engineering, Inc.

10151 Deerwood Park Blvd;
Bldg 300, Suite 300
Jacksonville, FL 32256
Phone: 904-731-7040

Granulometric Report

Project:	MSA 641A Shoal			Date Sampled:	3/19/2018		
Project #:	C2018-009			Sampled By:	B. Aley, Y. Siddiqui		
Client:	FIND			Date Tested:	4/13/2018		
Sample:	1			Tested By:	B. Aley		
Location:	963347.266, 782704.663			Date Checked:	4/13/2018		
Depth:	3.5'			Checked By:	B. Aley		
Description:	Depth = Depth below top of core.						
Sieve No.	Sieve Size (ϕ)	Sieve Size (mm)	Weight (g)	% Weight	Cum. Weight %	% Passing	
3/4	-4.25	19.03	0.0	0.00	0.00	100.00	
5/8	-4	16.00	0.0	0.00	0.00	100.00	
3.5	-2.5	5.66	0.0	0.00	0.00	100.00	
4	-2.25	4.76	0.0	0.00	0.00	100.00	
5	-2	4.00	0.3	0.26	0.26	99.74	
7	-1.5	2.83	0.1	0.06	0.32	99.68	
10	-1	2.00	0.3	0.25	0.58	99.42	
14	-0.5	1.41	0.7	0.71	1.29	98.71	
18	0	1.00	1.2	1.18	2.48	97.52	
25	0.5	0.71	3.8	3.72	6.19	93.81	
35	1	0.50	12.0	11.73	17.92	82.08	
45	1.5	0.35	26.2	25.59	43.51	56.49	
60	2	0.25	34.8	34.01	77.53	22.47	
80	2.5	0.18	17.0	16.67	94.20	5.80	
120	3	0.13	5.2	5.04	99.24	0.76	
170	3.5	0.09	0.6	0.59	99.82	0.18	
230	4	0.06	0.1	0.11	99.93	0.07	
Pan	>4	<0.06	0.1	0.07	100.00	0.00	
Pre-Sieve Weight (g):	102.29		Gravel (%):	0.58		Wet color:	2.5Y 4/1
Post-Sieve Weight (g):	102.22		Sand (%):	99.25		Dry color:	2.5Y 6/1
Sieve Loss (%):	0.07		Fines (%):	0.18		USCS:	SP
% Carbonate:	N/T		Notes: N/T = Not Tested				
% Organics:	N/T						
Moment Method Statistics	Mean (ϕ)		Mean (mm)		Sorting (ϕ)		Skewness (ϕ)
	1.53		0.35		0.70		-0.84
Coefficients (mm)			$C_u =$		1.91		$C_c =$
							1.02
D_5	D_{16}	D_{25}	D_{50}	D_{75}	D_{84}	D_{95}	
0.17	0.22	0.22	0.33	0.46	0.53	0.80	



Sample	Depth	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurtosis	Sort	Sample Information	
1	3.5'	SP	0.18	N/T	N/T	0.33	0.35	-0.84	5.83	0.70	Project:	MSA 641A Shoal
Notes: N/T = Not Tested											Analysis Date:	4/13/2018
 <p>Taylor Engineering, Inc. 10151 Deerwood Park Blvd; Bldg 300, Suite 300 Jacksonville, FL 32256 Phone: 904-731-7040</p>											Analyzed By:	B. Aley
											Location:	963347.266, 782704.663
											Horizontal System:	NA
											Vertical System:	NA



Appendix D: Geotechnical Investigations

IWW Broward County, Reach 1 Geotechnical Investigation
USACE, Jacksonville District

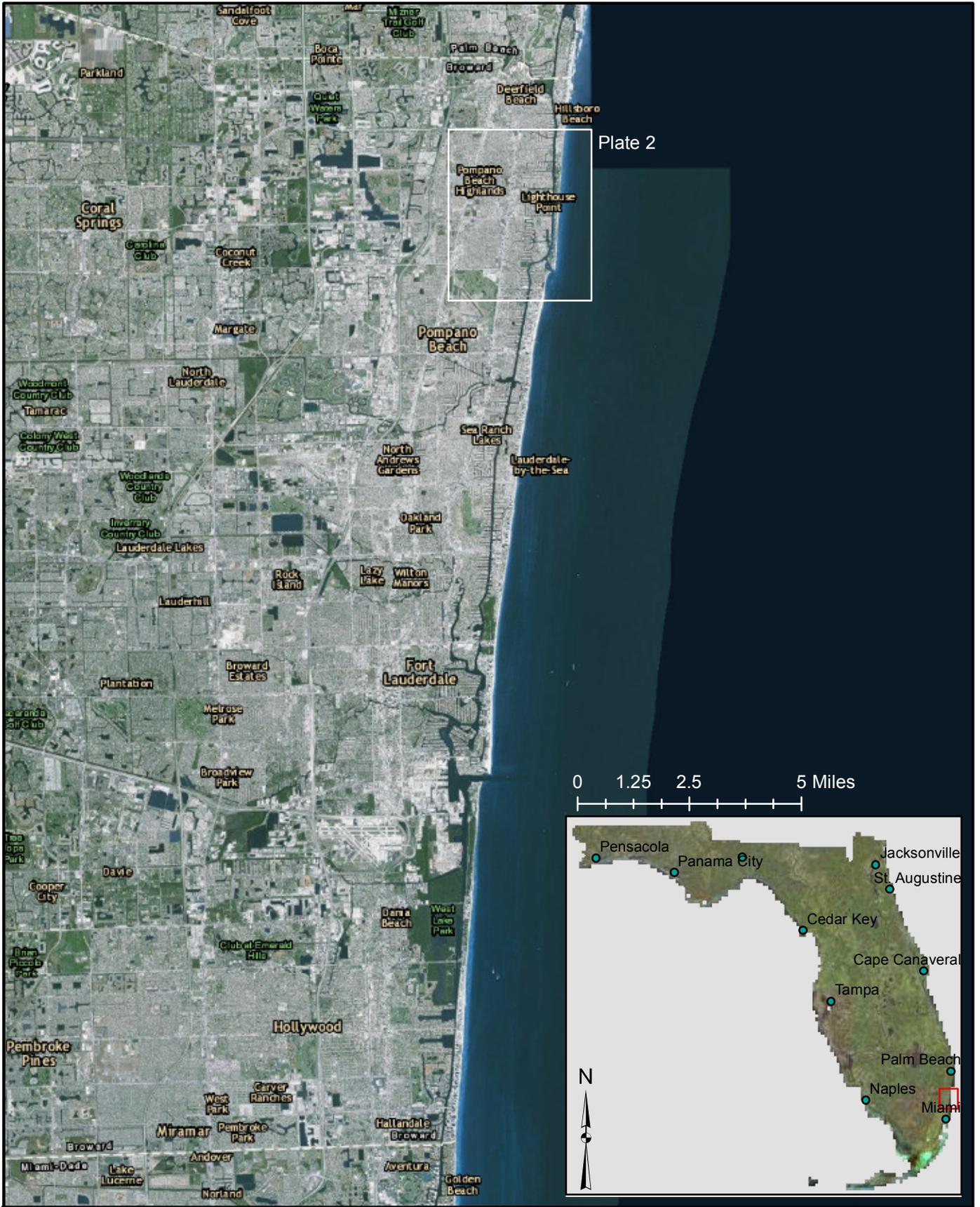
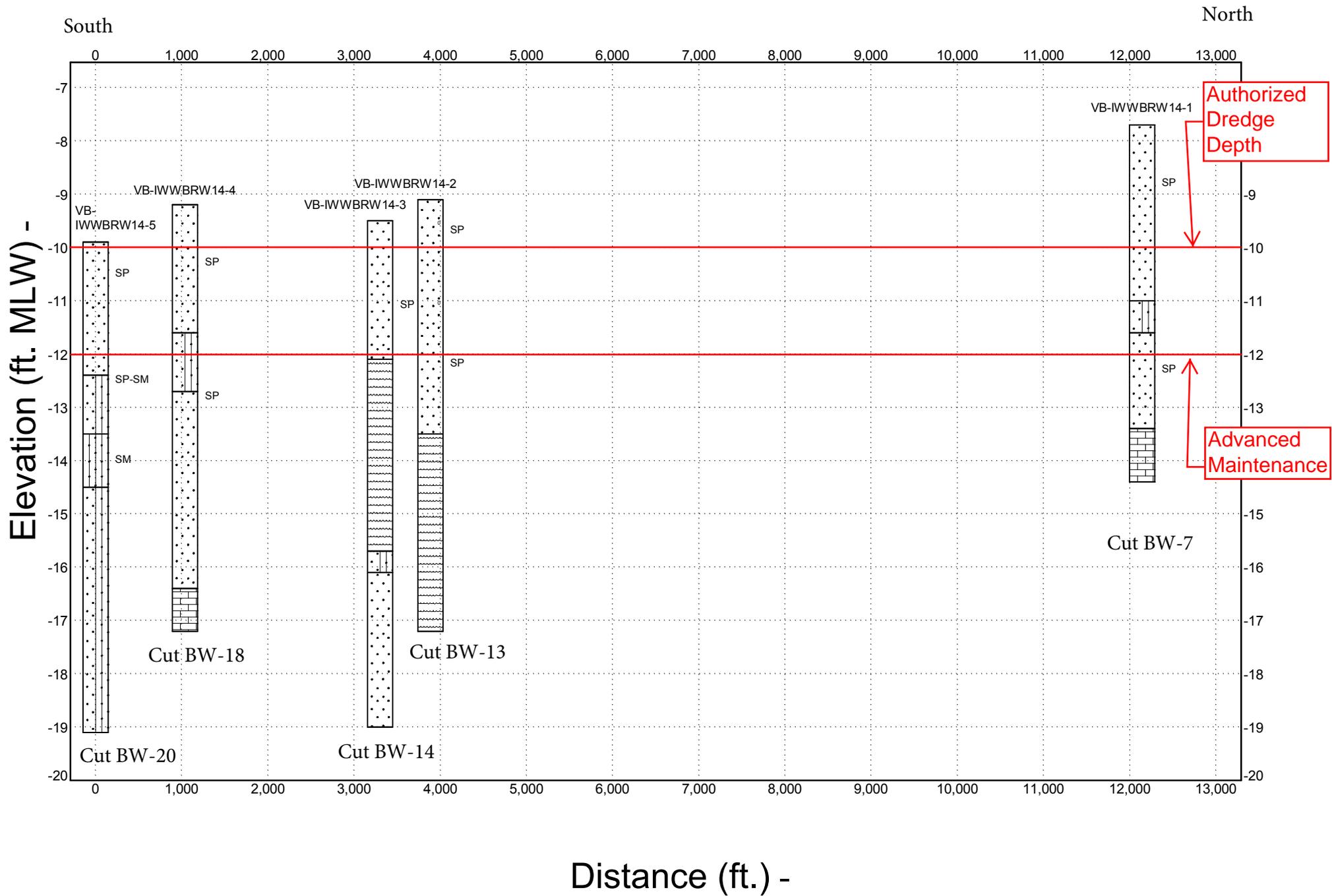


Plate 2

 <p>US Army Corps of Engineers Jacksonville District</p>	Geotechnical Drawings	Dsn by: JLC	<p>DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA</p>	PLATE NO.
	IWW - BROWARD O&M Vicinity Map	Dwn by: JLC		<p>B-1</p>
		Ckd by: JLC		
		Dated: 16AUG17		



 US Army Corps of Engineers Jacksonville District	Geotechnical Drawings	Dsn by: JLC	DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	PLATE NO.
	IWW - BROWARD O&M Boring Locations	Dwn by: JLC		B-2
		Ckd by: JLC		
		Dated: 16AUG17		



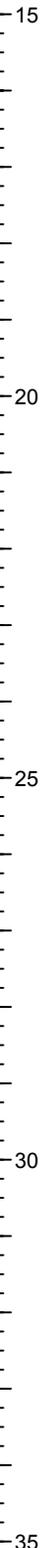
Boring Designation VB-IWWBRW14-1

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS
1. PROJECT IWW Broward Vibracoring 2014 Vibracore Logging and Lab Testing			9. SIZE AND TYPE OF BIT See Remarks	
2. BORING DESIGNATION VB-IWWBRW14-1		10. COORDINATE SYSTEM/DATUM		HORIZONTAL NAD83
3. DRILLING AGENCY Corps of Engineers - CESAS		11. MANUFACTURER'S DESIGNATION OF DRILL		<input type="checkbox"/> AUTO HAMMER <input type="checkbox"/> MANUAL HAMMER
4. NAME OF DRILLER		12. TOTAL SAMPLES		DISTURBED 2
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED		13. TOTAL NUMBER CORE BOXES		0
6. THICKNESS OF OVERBURDEN N/A		14. ELEVATION GROUND WATER		
7. DEPTH DRILLED INTO ROCK N/A		15. DATE BORING		STARTED 04-25-14
8. TOTAL DEPTH OF BORING 10.0 Ft.		16. ELEVATION TOP OF BORING		-7.7 Ft.
		17. TOTAL RECOVERY FOR BORING		67 %
		18. SIGNATURE AND TITLE OF INSPECTOR		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
-7.7	0.0		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some medium to coarse-grained sand-sized shell, trace silt, strong reaction with HCl, moist, 5Y 3/1 very dark gray (SP) At El. -9.0 Ft., few organic matter, 10Y 3/1 very dark greenish gray	670			-7.7 Vibracore		0
-11.0	3.3		At El. -10.2 Ft., 3" long piece of timber		1		-8.7		
-11.6	3.9		SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, little fine to coarse-grained sand-sized shell, little organic matter, few silt, strong reaction with HCl, moist, 3" wood pieces, 10Y 3/1 very dark greenish gray (SP-SM)				-12.2		5 -
-13.4	5.7		SAND, poorly-graded, mostly fine to coarse-grained sand-sized shell, some fine-grained sand-sized quartz, trace silt, strong reaction with HCl, moist, 10Y 4/1 dark greenish gray (SP)		2				
-14.4	6.7		At El. -12.7 Ft., little medium to coarse-grained sand-sized shell						
-17.7	10.0	Highly Weathered NO RECORDED	LIMESTONE, hard, highly weathered, medium grained, little fine-grained sand-sized quartz, 5Y 5/2 olive gray				-17.7		10 -
NOTES:			1. USACE Jacksonville is the custodian for these original files.		Abbreviations: NR = Not Recorded.				
			2. Soils are field visually classified in accordance with the Unified Soils Classification System.						
			3. Laboratory Testing Results						
			SAMPLE ID SAMPLE DEPTH LABORATORY CLASSIFICATION						
			1 1.0/1.3 SP*						

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2	
			OF 2 SHEETS	
PROJECT IWW Broward Vibracoring 2014	COORDINATE SYSTEM/DATUM	HORIZONTAL NAD83	VERTICAL MLW	
LOCATION COORDINATES X = 957,494 Y = 712,845	ELEVATION TOP OF BORING -7.7 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
			2 4.5/4.8 SP*						
			*Lab visual classification based on gradation curve. No Atterberg limits.						



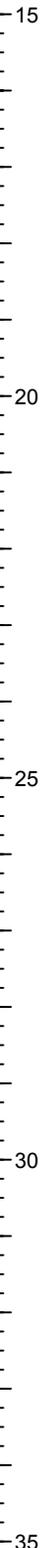
Boring Designation VB-IWWBRW14-2

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS
1. PROJECT IWW Broward Vibracoring 2014 Vibracore Logging and Lab Testing		9. SIZE AND TYPE OF BIT See Remarks		
2. BORING DESIGNATION VB-IWWBRW14-2		10. COORDINATE SYSTEM/DATUM HORIZONTAL: NAD83 VERTICAL: MLW		
3. DRILLING AGENCY Corps of Engineers - CESAS		11. MANUFACTURER'S DESIGNATION OF DRILL <input type="checkbox"/> AUTO HAMMER <input type="checkbox"/> MANUAL HAMMER		
4. NAME OF DRILLER		12. TOTAL SAMPLES DISTURBED: 2 UNDISTURBED (UD): 0		
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED		13. TOTAL NUMBER CORE BOXES 0		
6. THICKNESS OF OVERBURDEN N/A		14. ELEVATION GROUND WATER		
7. DEPTH DRILLED INTO ROCK N/A		15. DATE BORING STARTED: 04-25-14 COMPLETED: 04-25-14		
8. TOTAL DEPTH OF BORING 10.0 Ft.		16. ELEVATION TOP OF BORING -9.1 Ft.		
		17. TOTAL RECOVERY FOR BORING 81 %		
		18. SIGNATURE AND TITLE OF INSPECTOR		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
-9.1	0.0						-9.1		
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some medium-grained sand-sized shell, trace silt, trace limestone, strong reaction with HCl, moist, 5Y 5/2 olive gray (SP) At El. -10.3 Ft., little medium-grained sand-sized shell, N 4/ dark gray	1620	1		-9.6 Vibracore		0
			At El. -12.1 Ft., few medium-grained sand-sized limestone At El. -12.7 Ft., trace organic matter		2		-12.1		
-13.5	4.4		PEAT, some wood debris, some silt, few fine-grained sand-sized quartz, weak reaction with HCl, moist, organic odor, 5Y 2.5/1 black (PT)						5-
-17.2	8.1								
-19.1	10.0	NR					-19.1		10-
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Laboratory Testing Results SAMPLE ID: 1 SAMPLE DEPTH: 0.5/0.8 LABORATORY CLASSIFICATION: SP*				Abbreviations: NR = Not Recorded.		15-

DRILLING LOG (Cont. Sheet)	INSTALLATION Jacksonville District		SHEET 2	
			OF 2 SHEETS	
PROJECT IWW Broward Vibracoring 2014	COORDINATE SYSTEM/DATUM	HORIZONTAL NAD83	VERTICAL MLW	
LOCATION COORDINATES X = 957,324 Y = 704,537	ELEVATION TOP OF BORING -9.1 Ft.			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
			2 3.0/3.3 SP*						
			*Lab visual classification based on gradation curve. No Atterberg limits.						

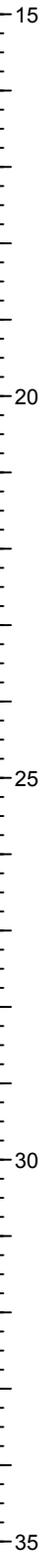


Boring Designation VB-IWWBRW14-3

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS
1. PROJECT IWW Broward Vibracoring 2014 Vibracore Logging and Lab Testing			9. SIZE AND TYPE OF BIT See Remarks	
2. BORING DESIGNATION VB-IWWBRW14-3		10. COORDINATE SYSTEM/DATUM		HORIZONTAL NAD83
3. DRILLING AGENCY Corps of Engineers - CESAS		11. MANUFACTURER'S DESIGNATION OF DRILL		<input type="checkbox"/> AUTO HAMMER <input type="checkbox"/> MANUAL HAMMER
4. NAME OF DRILLER		12. TOTAL SAMPLES		DISTURBED 1
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED		13. TOTAL NUMBER CORE BOXES		0
6. THICKNESS OF OVERBURDEN N/A		14. ELEVATION GROUND WATER		
7. DEPTH DRILLED INTO ROCK N/A		15. DATE BORING		STARTED 04-25-14
8. TOTAL DEPTH OF BORING 10.0 Ft.		16. ELEVATION TOP OF BORING		-9.5 Ft.
		17. TOTAL RECOVERY FOR BORING		95 %
		18. SIGNATURE AND TITLE OF INSPECTOR		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
-9.5	0.0		SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, little medium to coarse-grained sand-sized shell, strong reaction with HCl, moist, 5Y 5/2 olive gray (SP) At El. -10.8 Ft., trace organic matter, N 4/ dark gray	633	1		Vibracore		0
-12.1	2.6		PEAT, some wood debris, some silt, few fine-grained sand-sized quartz, strong reaction with HCl, moist, organic odor, 5Y 2.5/1 black (PT) At El. -13.4 Ft., some organic matter						5 -
-15.7	6.2		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace organic matter, strong reaction with HCl, moist, (occasional interbedded silty fine sand seams), 10Y 5/1 greenish gray (SP-SM)						
-16.1	6.6		SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt, strong reaction with HCl, moist, 5Y 4/2 olive gray (SP) At El. -17.0 Ft., 10Y 5/1 greenish gray						
-19.0	9.5								
-19.5	10.0	NR							10 -
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Laboratory Testing Results SAMPLE ID SAMPLE DEPTH LABORATORY CLASSIFICATION ----- 1 1.5/1.8 SP*				Abbreviations: NR = Not Recorded.		15 -

DRILLING LOG (Cont. Sheet)			INSTALLATION Jacksonville District				SHEET 2 OF 2 SHEETS		
			PROJECT IWW Broward Vibracoring 2014		COORDINATE SYSTEM/DATUM NAD83		HORIZONTAL MLW		
LOCATION COORDINATES X = 957,246 Y = 703,961			ELEVATION TOP OF BORING -9.5 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			*Lab visual classification based on gradation curve. No Atterberg limits.						

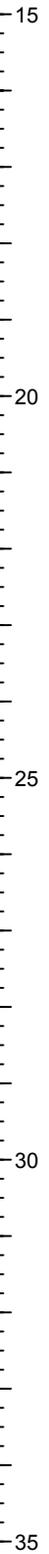


Boring Designation VB-IWWBRW14-4

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS
1. PROJECT IWW Broward Vibracoring 2014 Vibracore Logging and Lab Testing			9. SIZE AND TYPE OF BIT See Remarks	
2. BORING DESIGNATION VB-IWWBRW14-4		LOCATION COORDINATES X = 956,109 Y = 701,826		10. COORDINATE SYSTEM/DATUM HORIZONTAL: NAD83 VERTICAL: MLW
3. DRILLING AGENCY Corps of Engineers - CESAS		CONTRACTOR FILE NO. 6738-14-5363		11. MANUFACTURER'S DESIGNATION OF DRILL <input type="checkbox"/> AUTO HAMMER <input type="checkbox"/> MANUAL HAMMER
4. NAME OF DRILLER			12. TOTAL SAMPLES DISTURBED: 2 UNDISTURBED (UD): 0	
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED			13. TOTAL NUMBER CORE BOXES 0	
6. THICKNESS OF OVERBURDEN N/A		DEG. FROM VERTICAL		14. ELEVATION GROUND WATER
7. DEPTH DRILLED INTO ROCK N/A		BEARING		15. DATE BORING STARTED: 04-25-14 COMPLETED: 04-25-14
8. TOTAL DEPTH OF BORING 10.0 Ft.			16. ELEVATION TOP OF BORING -9.2 Ft.	
			17. TOTAL RECOVERY FOR BORING 80 %	
18. SIGNATURE AND TITLE OF INSPECTOR				

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
-9.2	0.0						-9.2		
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, trace silt, trace shell, strong reaction with HCl, moist, 10Y 5/1 greenish gray (SP) At El. -10.2 Ft., mostly fine to medium-grained sand-sized quartz, few medium-grained sand-sized shell, trace limestone	800	1		Vibracore		
-11.6	2.4						-10.2		
-12.7	3.5		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, trace organic matter, strong reaction with HCl, moist, 5Y 3/2 dark olive gray (SP-SM)				-12.7		
			SAND, poorly-graded, mostly fine-grained sand-sized quartz, few medium-grained sand-sized shell, trace limestone, trace silt, strong reaction with HCl, moist, 5Y 3/2 dark olive gray (SP) At El. -13.1 Ft., discontinue shell, discontinue limestone, no reaction with HCl, 5Y 6/2 light olive gray At El. -15.8 Ft., 5Y 4/3 olive		2				
-16.4	7.2								
-17.2	8.0	Moderately Weathered	LIMESTONE, hard, moderately weathered, fine grained, some fine-grained sand-sized quartz, 5Y 5/3 olive						
-19.2	10.0	NR					-19.2		
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Laboratory Testing Results SAMPLE ID: 1 SAMPLE DEPTH: 1.0/1.3 LABORATORY CLASSIFICATION: SP*				Abbreviations: NR = Not Recorded.		

DRILLING LOG (Cont. Sheet)			INSTALLATION			SHEET 2 OF 2 SHEETS			
PROJECT IWW Broward Vibracoring 2014			COORDINATE SYSTEM/DATUM		HORIZONTAL	VERTICAL			
LOCATION COORDINATES X = 956,109 Y = 701,826			ELEVATION TOP OF BORING -9.2 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			2 3.5/3.8 SP*						
			*Lab visual classification based on gradation curve. No Atterberg limits.						

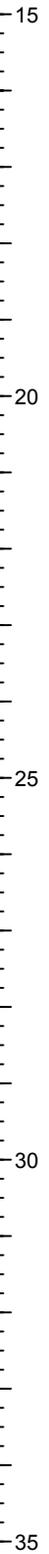


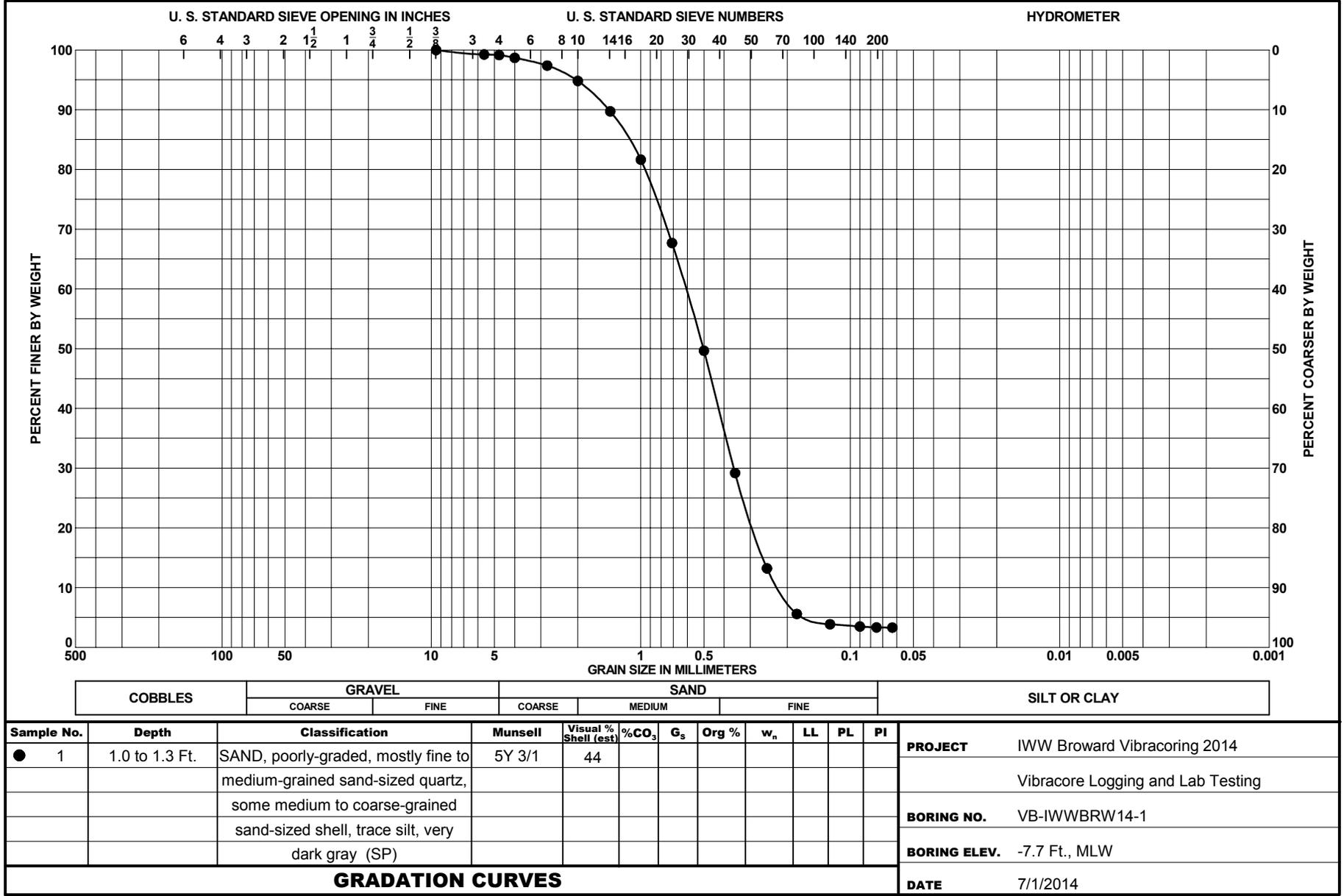
Boring Designation VB-IWWBRW14-5

DRILLING LOG		DIVISION South Atlantic	INSTALLATION Jacksonville District	SHEET 1 OF 2 SHEETS
1. PROJECT IWW Broward Vibracoring 2014 Vibracore Logging and Lab Testing			9. SIZE AND TYPE OF BIT See Remarks	
2. BORING DESIGNATION VB-IWWBRW14-5		10. COORDINATE SYSTEM/DATUM		HORIZONTAL NAD83
3. DRILLING AGENCY Corps of Engineers - CESAS		11. MANUFACTURER'S DESIGNATION OF DRILL		<input type="checkbox"/> AUTO HAMMER <input type="checkbox"/> MANUAL HAMMER
4. NAME OF DRILLER		12. TOTAL SAMPLES		DISTURBED 3
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED		13. TOTAL NUMBER CORE BOXES		0
6. THICKNESS OF OVERBURDEN N/A		14. ELEVATION GROUND WATER		
7. DEPTH DRILLED INTO ROCK N/A		15. DATE BORING		STARTED 04-25-14
8. TOTAL DEPTH OF BORING 10.0 Ft.		16. ELEVATION TOP OF BORING		-9.9 Ft.
		17. TOTAL RECOVERY FOR BORING		92 %
		18. SIGNATURE AND TITLE OF INSPECTOR		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/1 FT.	N-VALUE
-9.9	0.0						-9.9		
			SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, few fine gravel-sized limestone, trace shell, trace silt, weak reaction with HCl, moist, 5Y 5/3 olive (SP) At El. -11.5 Ft., 1/2" limestone At El. -11.6 Ft., 5Y 4/3 olive	1840	1		Vibracore		0
-12.4	2.5				2		-12.4		
-13.5	3.6		SAND, poorly-graded with silt, mostly fine to medium-grained sand-sized quartz, few silt, weak reaction with HCl, moist, 5Y 4/3 olive (SP-SM) At El. -12.5 Ft., few wood debris		3		-13.9		
-14.5	4.6		SAND, silty, mostly fine-grained sand-sized quartz, little silt, little fine to medium-grained sand-sized limestone, trace organic matter, weak reaction with HCl, moist, 5Y 6/2 light olive gray (SM)						5 -
-19.1	9.2		SAND, poorly-graded with silt, mostly fine-grained sand-sized quartz, few silt, few organic matter, weak reaction with HCl, moist, 5Y 4/3 olive (SP-SM) At El. -15.4 Ft., mottled with dark brown silty fine sand seams						
-19.9	10.0	NR					-19.9		10 -
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Laboratory Testing Results				Abbreviations: NR = Not Recorded.		
			SAMPLE ID SAMPLE DEPTH LABORATORY CLASSIFICATION ----- 1 0.5/0.8 SP*						

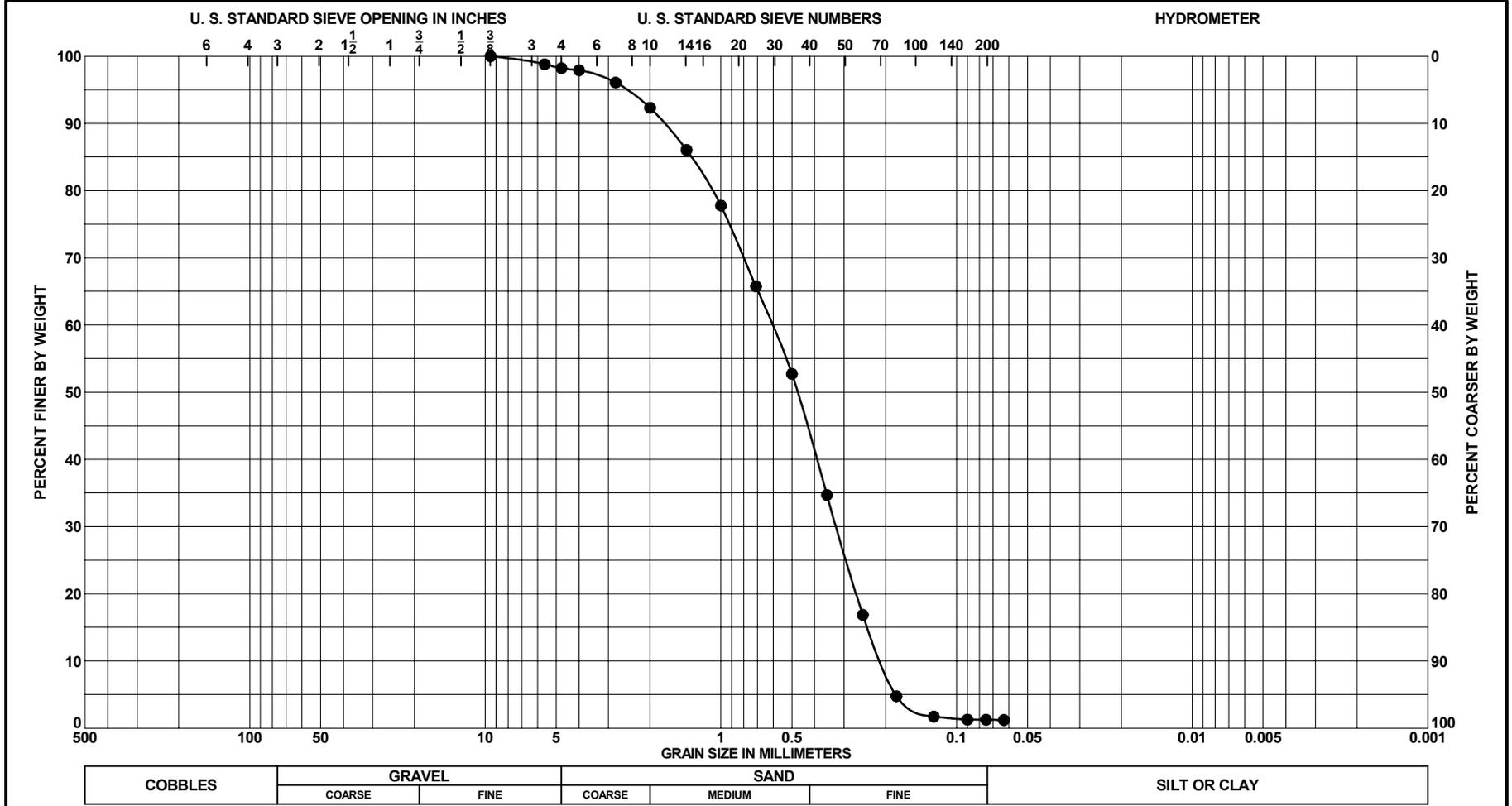
DRILLING LOG (Cont. Sheet)			INSTALLATION			SHEET 2 OF 2 SHEETS				
PROJECT IWW Broward Vibracoring 2014			COORDINATE SYSTEM/DATUM		HORIZONTAL	VERTICAL				
LOCATION COORDINATES X = 954,498 Y = 700,991			ELEVATION TOP OF BORING -9.9 Ft.							
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS		% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 1 FT.	N-VALUE
			2	2.5/2.8	SP-SM*					
			3	4.0/4.3	SM*					
			*Lab visual classification based on gradation curve. No Atterberg limits.							





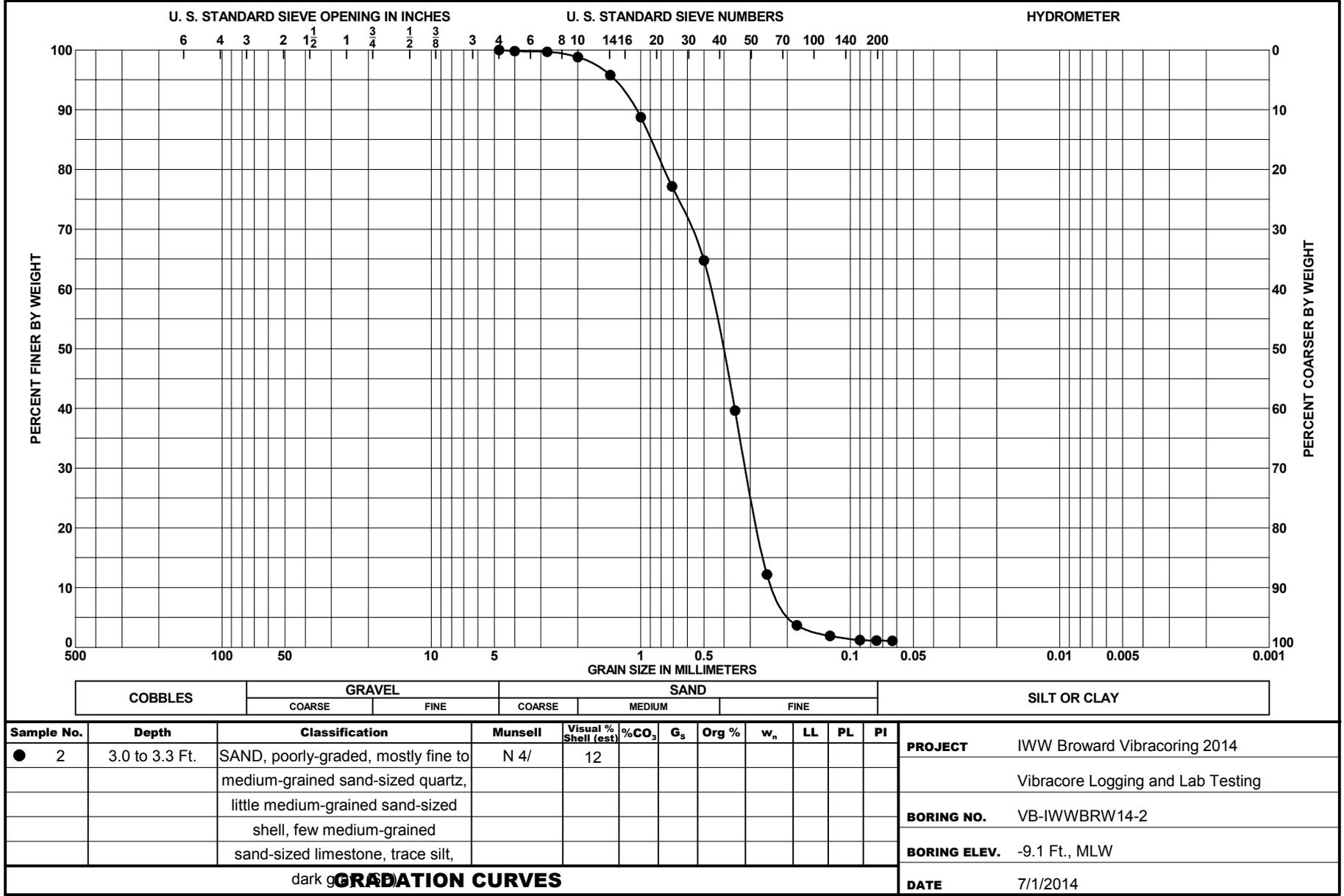
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

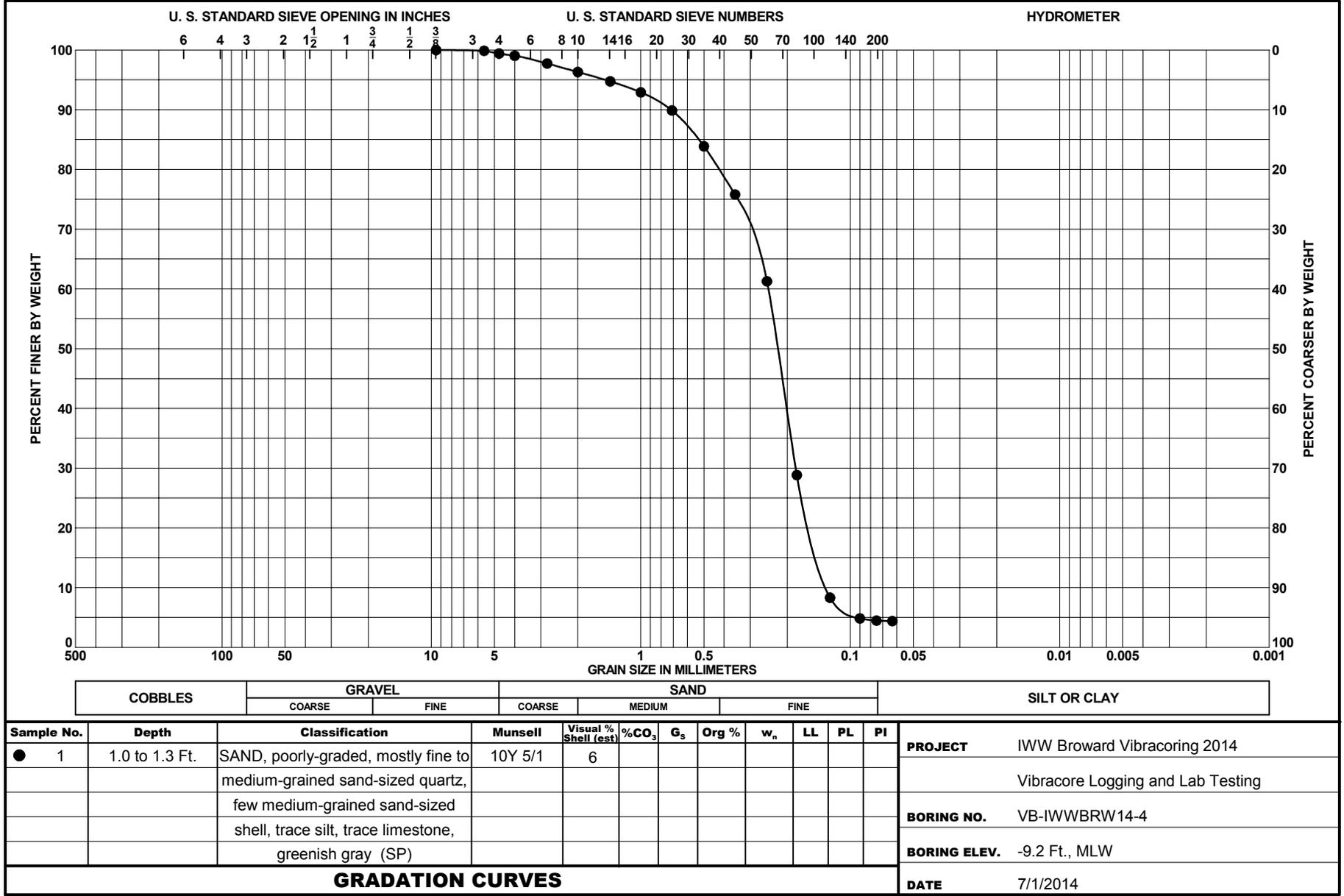
Sample No.	Depth	Classification	Munsell	Visual % Shell (est)	%CO ₃	G _s	Org %	w _n	LL	PL	PI	PROJECT
● 1	1.0 to 1.3 Ft.	SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, some medium to coarse-grained sand-sized shell, trace silt, very dark gray (SP)	5Y 3/1	44								IWW Broward Vibracoring 2014
												Vibracore Logging and Lab Testing
												BORING NO. VB-IWWBRW14-1
												BORING ELEV. -7.7 Ft., MLW
GRADATION CURVES												DATE 7/1/2014

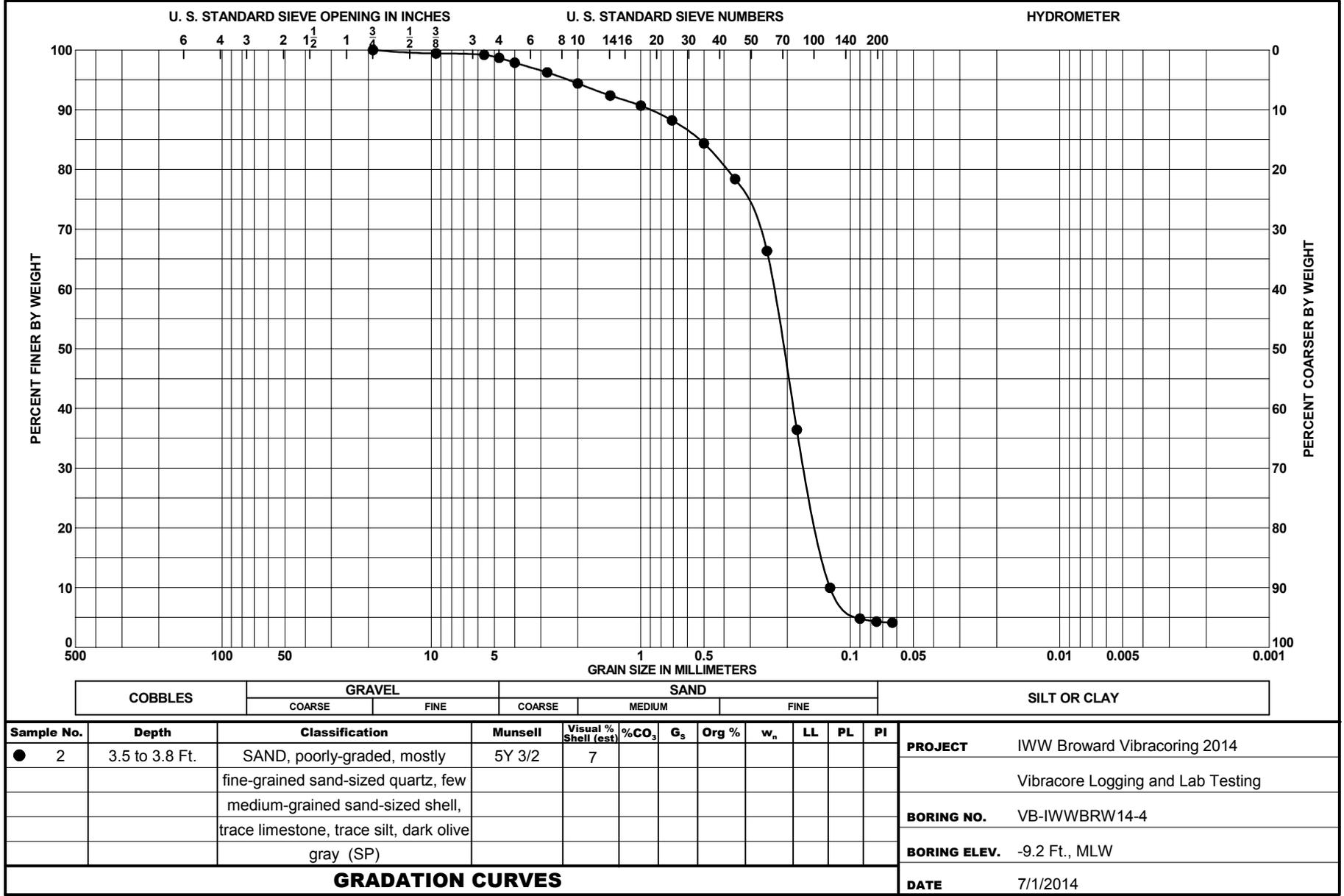


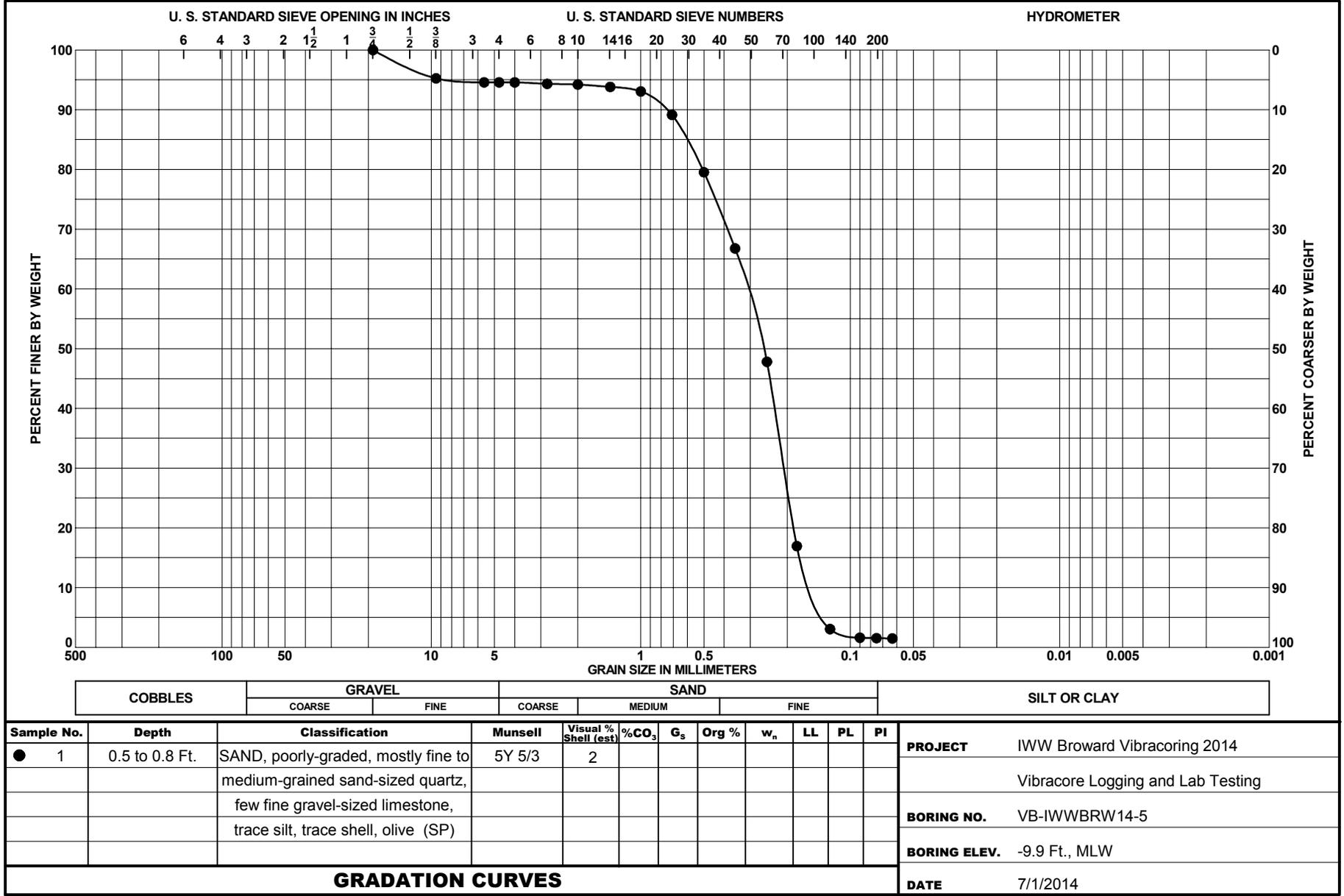
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	Munsell	Visual % Shell (est)	%CO ₃	G _s	Org %	w _n	LL	PL	PI	PROJECT
● 2	4.5 to 4.8 Ft.	SAND, poorly-graded, mostly fine to coarse-grained sand-sized shell, some fine-grained sand-sized quartz, trace silt, dark greenish gray (SP)	10Y 4/1	53								IWW Broward Vibracoring 2014
												Vibracore Logging and Lab Testing
												BORING NO. VB-IWWBRW14-1
												BORING ELEV. -7.7 Ft., MLW
GRADATION CURVES												DATE 7/1/2014



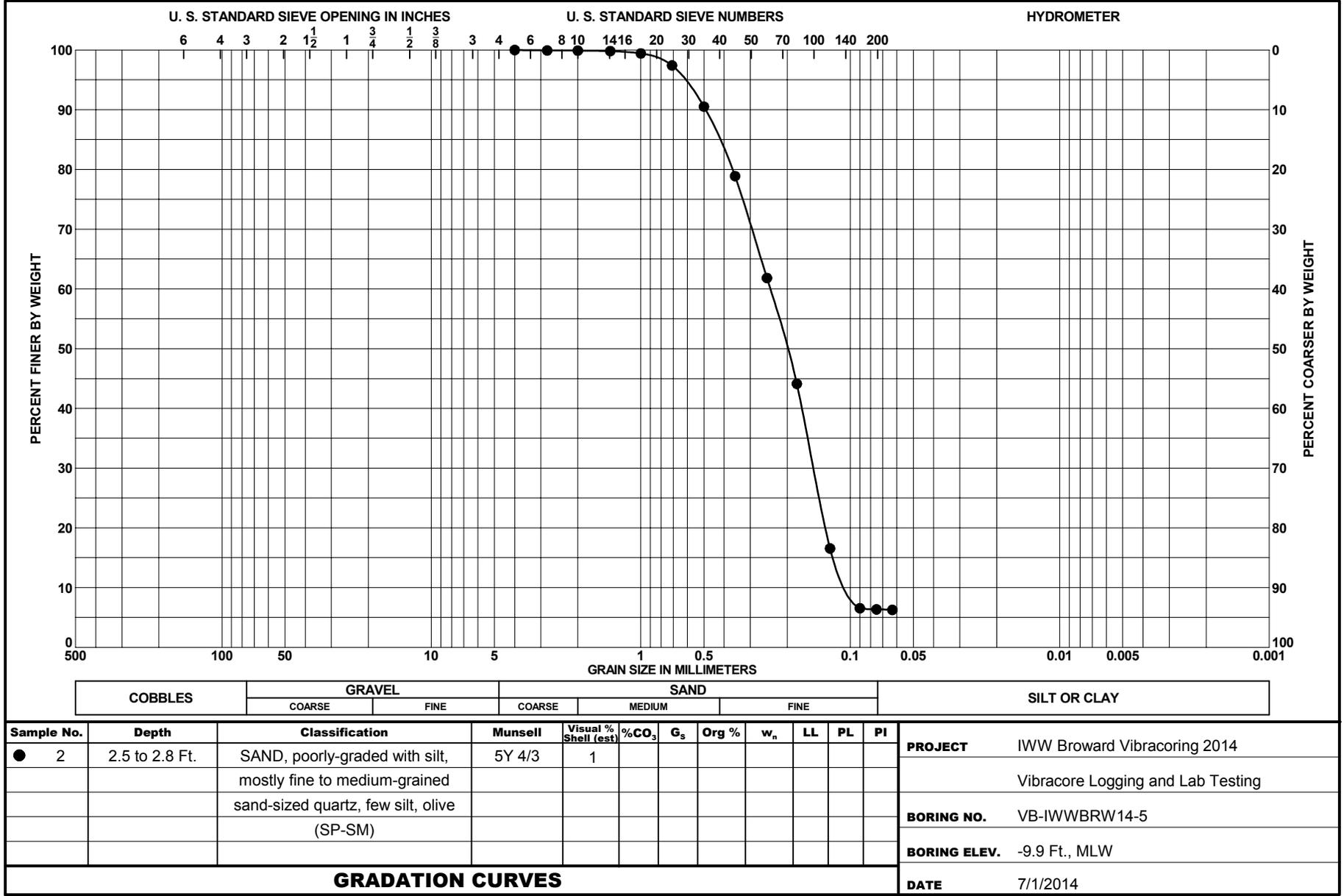


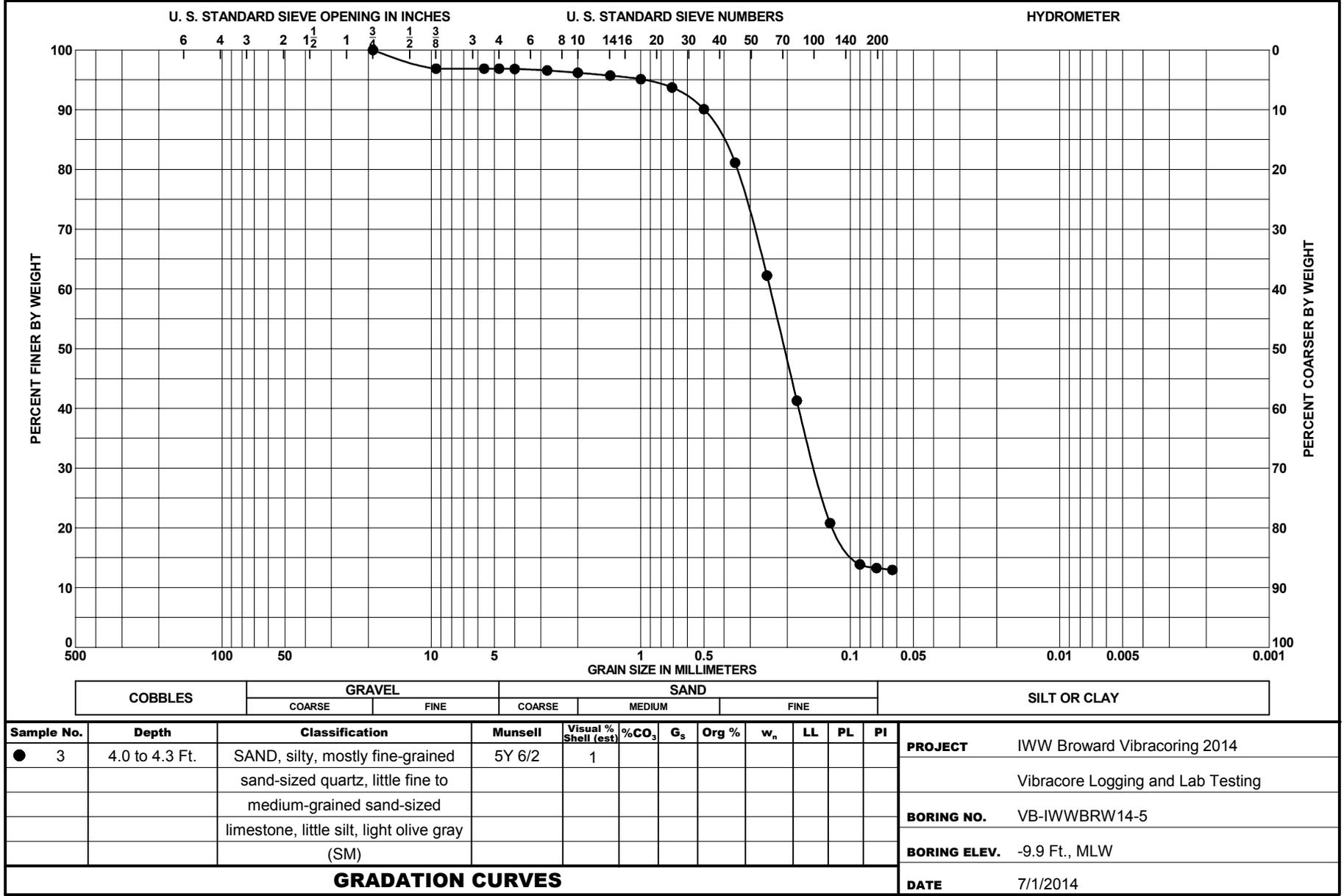




COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	Munsell	Visual % Shell (est)	%CO ₃	G _s	Org %	w _n	LL	PL	PI	PROJECT
● 1	0.5 to 0.8 Ft.	SAND, poorly-graded, mostly fine to medium-grained sand-sized quartz, few fine gravel-sized limestone, trace silt, trace shell, olive (SP)	5Y 5/3	2								IWW Broward Vibracoring 2014
												Vibracore Logging and Lab Testing
												BORING NO. VB-IWWBRW14-5
												BORING ELEV. -9.9 Ft., MLW
GRADATION CURVES												DATE 7/1/2014





COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth	Classification	Munsell	Visual % Shell (est)	%CO ₃	G _s	Org %	w _n	LL	PL	PI	PROJECT
● 3	4.0 to 4.3 Ft.	SAND, silty, mostly fine-grained sand-sized quartz, little fine to medium-grained sand-sized limestone, little silt, light olive gray (SM)	5Y 6/2	1								IWW Broward Vibracoring 2014
												Vibracore Logging and Lab Testing
												BORING NO. VB-IWWBRW14-5
												BORING ELEV. -9.9 Ft., MLW
GRADATION CURVES												DATE 7/1/2014

Appendix D: Geotechnical Investigations

IWW Broward County, Reach 1 Hazardous, Toxic, and Radioactive Waste (HTRW)
Investigation
USACE, Jacksonville District

This document summarizes the United States Army Corps of Engineers (USACE) findings from a search of Florida Department of Environmental Protection (FDEP) contaminated sites and active RCRA facilities near the Broward County Intercoastal Waterway, Reach 1 (IWW). FDEP's Contamination Locator Map (CLM) was utilized to identify those contaminated sites located east of U.S. 1 North Federal Highway, adding in the Flash Cleaners Superfund site located on the west side of the highway. U.S. 1 North Federal Highway was selected as the western boundary of the search area to focus on those sites located closest to the Reach 1 Project. The search area covered four municipalities: Deerfield Beach, Hillsboro Beach, Lighthouse Point, and Pompano Beach. The attached maps show the search area, municipality boundaries, and contaminated site locations. The potential Cleanup site types are Brownfields, Petroleum, Superfund (CERCLA), and Other Waste Cleanup. No Brownfields sites are located within the search area and Hillsboro Beach has no Cleanup sites. The category "Other Waste Cleanup" includes dry cleaning, responsible party, State-funded cleanup, State-owned lands, and hazardous waste sites. Within this type, only dry cleaning sites are present. The hazardous waste sites with contamination issues coincide with either the petroleum or dry cleaning sites. The hazardous waste status, i.e. active or closed is discussed below with the dry cleaning and petroleum sites. On the attached maps, yellow triangles depict the location of dry cleaners, green triangles depict petroleum sites, and the red triangle is the location of the one CERCLA site; Flash Cleaners. Site descriptions that follow below are organized first by municipality, then by source (CERCLA, dry cleaning, and petroleum in that order), and finally in a north to south order across the municipality.

The FDEP OCULUS (an electronic data base) files of the listed sites were examined in regard to potential chemical contribution that might pose an impact on the proposed dredging action either from the discharge of contaminated groundwater or from the accumulation of contaminated sediments. Existing information for the majority of petroleum and dry cleaning sites is sparse to evaluate potential impact (i.e., the sites score lower than the current level for study, and therefore do not rank high enough in priority to have investigation data. Consequently only 1990's era data exists from the initial application to the dry cleaning cleanup program. Low scoring Petroleum sites may have no data). The current funding scores are 92 for dry cleaning sites and 27 for Petroleum sites (under the Low Score Site Initiative (LSSI) program, work is occurring on some low scoring petroleum sites).

RCRA facilities or businesses subject to Hazardous Waste regulations (for chemical use, handling, and disposal) located within the subject area were also researched. The status of these facilities is included with contaminated site information when appropriate. Category abbreviations are as follows: Conditionally Exempt (CESQG: <100 kg/month), Small Quantity Generators (SQG: 100-1000 kg/month), or Large Quantity Generators (LQG: >1000 kg/month). No businesses with Corrective Action Plans are located in the search area. Other RCRA facilities that are not mentioned here are not a cleanup site.

The descriptions below summarize existing information.

Within Deerfield Beach, dry cleaning and petroleum sites are present.

- (a) The following dry cleaning facilities have very limited existing information and the scope of environmental impact is unknown. None of the dry cleaning sites are projected to have an impact on the “to be dredged” sediment or water quality.

Former Cove Cleaners, 1660 SE 3rd Ct, Facility ID: ERIC_4225: “Pending Other Cleanup”, Eligible with score of 30. The most recent document dated October 7, 2014, found no potable wells within ½ mile. In December 1994 Contamination Assessment Report (CAR): MW-1 at 13 foot well depth contained tetrachloroethene (PCE) at 236 ug/l and trichloroethene (TCE) at 40.7 ug/l (both chemicals have a Groundwater Cleanup Target Level “GCTL” of 3 ug/l); property is 300 feet from a marina connected to the Intercoastal Waterway. Closed as of 11/18/2011, FLD047831995

Spotmaster Dry Cleaners, 1480 E. Hillsboro Blvd, Facility ID: ERIC_4242: “Pending Other Cleanup”, Ineligible, but in 1998: SS-3 at 1 inch soil depth PCE was 1907 ug/kg (versus Leachate-based Soil Cleanup Target Level “SCTL” of 30 ug/kg). Property is 500 feet from a finger canal of the Hillsboro Canal. No groundwater data. FLD000124438 (CESQG HW records – most recent manifest 8/12/2015)

60 Minute Cleaners, 1090 E. Hillsboro Blvd, Facility ID: ERIC_4134 (dry cleaning records), FLD053763975 (CESQG HW records), SQG 6301 (no records): “Pending Other Cleanup”, Eligible with score of 75, 1996 soil PCE 22,600 ug/kg, ceased dry cleaning operations in 2012. Oct 2012 Limited Site Assessment Report (LSAR) found no soil or groundwater impacts (temporary well inside building TCE 1.2 ug/l. Property is 500 feet from Hillsboro finger canal, found no potable wells within ½ mile.

Sutton Place Cleaners, 814 S. Federal Hwy, Facility ID: ERIC_4060: “Pending Other Cleanup”, Eligible with score of 29, January 1998 TMW-1 5 foot well depth PCE 579 ug/l, found no potable wells within ½ mile, unnamed canal approximately 750 feet south. CESQG FLD981004104

- (b) the listed FDEP cleanup sites that are petroleum sites:

7-Eleven Store #34943, 10 N. Federal Hwy: Fac ID 8501892: “Active Petroleum” - contaminated soils removed Sept 2008 during replacement of tanks. Under LSSI, June 21, 2017 groundwater flow to E, maximum naphthalene “N” (36.6 ug/l vs 14 ug/l GCTL and 26 ug/l Surface Water Cleanup Target Level “SWCTL”) and isopropylbenzene “IPB” (17.1 ug/l vs 0.8 ug/l GCTL and 260 ug/l SWCTL). Small plume located approximately 500 feet from Little Harbor and unlikely to be of a concern.

Speedway #6490, 714 S. Federal Hwy: Fac ID 8502873: “Active Petroleum” – May 2017 Site Assessment Report (SAR), very small plume 20 feet by 50 feet located more than 1000 feet from the closest finger canal; it is unlikely to impact IWW.

Chevron Federal Hwy Food Mart #202647, 998 S. Federal Hwy: Fac ID 8501924: “Active Petroleum” – air sparging with vacuum extraction, will return to active remediation in consideration of July 2017 maximum benzene “B” (980 ug/l vs 1 ug/l GCTL), ethylbenzene “EB” 480 vs 30 ug/l GCTL), xylene “X” (1800 ug/l vs 20 ug/l GCTL), N 210 ug/l vs 14 ug/l GCTL), 1-methylnaphthalene “1MN” 140 ug/l vs 28 ug/l GCTL), and 2-methylnaphthalene “2MN” (149 ug/l vs 28 ug/l GCTL). Groundwater flow is to the east and

not towards Kingfisher Waterway approximately 500 feet away. Priority Score of 11. Site is unlikely to impact IWW dredging project. Closed as of 10/12/2011 FLD984196071.

Within Lighthouse Point, there are dry cleaning and petroleum sites.

(a) The following are dry cleaning facilities:

Roberts Cleaners & Tailors (now Lighthouse Pointe Cleaners), 5030 N. Federal Highway: CESQG as of 5/5/2017, Handler# FLD114144082, ME# 45052, Facility ID: ERIC_4175: "Active Other Cleanup", activities have included soil removal, soil vapor extraction (SVE), biostimulation events, Post-Active Remediation Monitoring "PARM", and now annual groundwater monitoring. March 10, 2017 catch basin sediment 0.495 mg/kg PCE and MW002 contained 17.3 ug/l PCE. No potable wells within ½ mile. Plume is less than 150 feet long with groundwater flow to the east-southeast and at least 1000 feet from surface water; this site is not expected to impact canal water or sediment quality.

Betty Brite Cleaners, 2041 NE 36th St: Facility ID: ERIC_4085: "Pending Other Cleanup", Eligible with a score of 29. Soil PCE concentration of 79 ug/kg. No potable wells within ½ mile.

Beacon Light Shopping Center, 1875 NE 24th St: Facility ID: ERIC_4214: "Pending Other Cleanup", Eligible with a score of 35. In November 1993, MW-17 well depth 29 feet PCE at 2100 ug/l. No other groundwater data, no potable wells within ½ mile, and site is approximately 500 feet from the Sailfish Waterway.

(b) the listed FDEP cleanup sites that are petroleum sites:

U-Gas #3203 Lighthouse Point, 5200 N. Federal Hwy, 33064: Fac ID 8501761: "Active Petroleum", Score 30, contaminated soil removed 1989 and 1992, 2017 groundwater flow to south, 2017 soil vapor extraction pilot, plume restricted to immediate source area and unlikely to impact dredging proposal. Closed as of 4/17/2013, Handler# FLD984212365, ME# 41147.

Sonny's Brushless Car Wash #0009, 5190 N. Federal Hwy: Fac ID 8502653: "Pending Petroleum Cleanup", tanks removed 1999, 2016 groundwater contained EB 488 ug/l, X 2320 ug/l and N 214 ug/l, Total Recoverable Petroleum Hydrocarbons (TRPH) 10,600 ug/l vs 5000 ug/l, groundwater flow to E and as a small plume restricted to property, is not expected to impact the dredging proposal. Score 26, no potable wells within 1/2 mile.

Sunshine #30049, 4900 N. Federal Hwy: Fac ID 8502181: "Active Petroleum", Score 46, Broward County requested submission of remediation costs by March 18, 2009, but there is no indication this occurred. Station is an active Exxon. Groundwater flow to southeast with 2008 plume not expected to reach the west end of the Flamingo Waterway. No impact to the IWW dredging project.

Sunoco Lighthouse, 3900 N. Federal Hwy: Fac ID 8502854: "Active Petroleum", Score 10, LSSI Site Assessment Report groundwater flow to north, soil and groundwater need more assessment but impacted area is relatively small.

Lighthouse Point City, 3760 NE 22nd Ave: Fac ID 8622455: "Active Petroleum", site approaching closure; July 2017 met GCTLs and next event scheduled for October 2017. No impact to dredging proposal.

Shell-First Coast Energy #3810, 3600 N. Federal Hwy: Fac ID 8502264: "Active Petroleum", contaminated soil removed 2008 and 2010, annual groundwater monitoring – next event December 2017.

Courtesy Car Rental & Sales, 3400 N. Federal Hwy: Fac ID 8841434: "Pending Petroleum", Score 11, contaminated soil removed 1993, 30-day pump and treat (P & T), groundwater flow to NE, no potable wells with ½ mile. 2017 Low Score Assessment is complete.

Sheehan GMC Auto Body Shop, 1850 NE 27th CT: Fac ID 9815436: "Active Petroleum", July 2017 needs additional soil/groundwater delineation, groundwater flow to ESE, known plume is more than 900 feet from the Tern Waterway finger canal and is not expected to impact the dredging project.

Lighthouse Point Marina, 2831 Marina Circle: Fac ID 8502261: "Pending Petroleum", 1992 free product observed in tank excavation pit during tank replacement. No additional information. This property is located on a major canal close to the IWW project, but in consideration of the age (2017-1992 or 25 years) and tank replacement in 1992, it is unlikely there would be an impact to the IWW project.

Within Pompano Beach, there are Dry cleaning, Petroleum, and Superfund sites.

- a) Flash Cleaners Superfund site, 4131 N. Federal Highway (located on the west side of the highway), Pompano Beach: Facility ID: ERIC_3933: "Active Superfund Cleanup", septic tank discharge is source area, partial soil removal, SVE, emulsified oil substrate and dehalococoides bacteria injections in 2011 to treat hot spots, semi-annual groundwater monitoring, groundwater flow to NE, with the original plume 1500 feet long and up to 720 feet wide. Current groundwater plume is restricted to source property and the bifurcated plume front reaches Grand Canal (October 2015 max groundwater vinyl chloride FCMW19 43-45' was 2.8/2.8 ug/l). Note: the center of the plume has been remediated to GCTLs. Thirteen surface water/ sediment pore water sample locations were performed in the west end of Grand Canal: no contaminants were detected in surface water samples, and low concentrations detected in Grand Canal sediment pore water did not exceed Surface Water Cleanup Target Levels (SWCTLs) (example: vinyl chloride at 1.5/1.6 vs 2.4 ug/l SWCTL). No impact is projected as the plume discharge area is 0.5 mile away from the dredging project. Closed as of 10/11/2012, Handler# FLD083111005, ME# 60325.
- b) The following dry cleaning site has very limited existing information and the scope of environmental impact is unknown.

A1A Cleaners, 2608 Ocean Blvd, Pompano Beach: Facility ID: ERIC_4082: "Pending Other Cleanup", Eligible with score of 30, in 1995 MW-8 PCE concentration of 6.69 ug/l (vs GCTL 3 ug/l and SWCTL 8.85

ug/l). No additional data. No potable wells within 1 mile. Site is located less than 500 feet from the Intercoastal Waterway and Hillsboro Bay. Closed as of 4/10/2013, FLD982145625

(c) the listed FDEP cleanup sites that are petroleum sites:

Hillsboro Shopping Center, 2608 Ocean Blvd, Pompano Beach: FDEP Facility ID 069101766: "Active Petroleum", Score 10, groundwater flow to WNW, Sept 2017 ground monitoring data - maximum B (6.6 ug/l vs 1 ug/l GCTL), EB 510 vs 30 ug/l), N 640 ug/l vs 14 ug/l), 1MN (160 ug/l vs 28 ug/l GCTL) and 2MN (280 ug/l vs 28 GCTL). Site is located less than 500 feet from the Intercoastal Waterway but the plume is small, onsite, and unlikely to be of a concern.

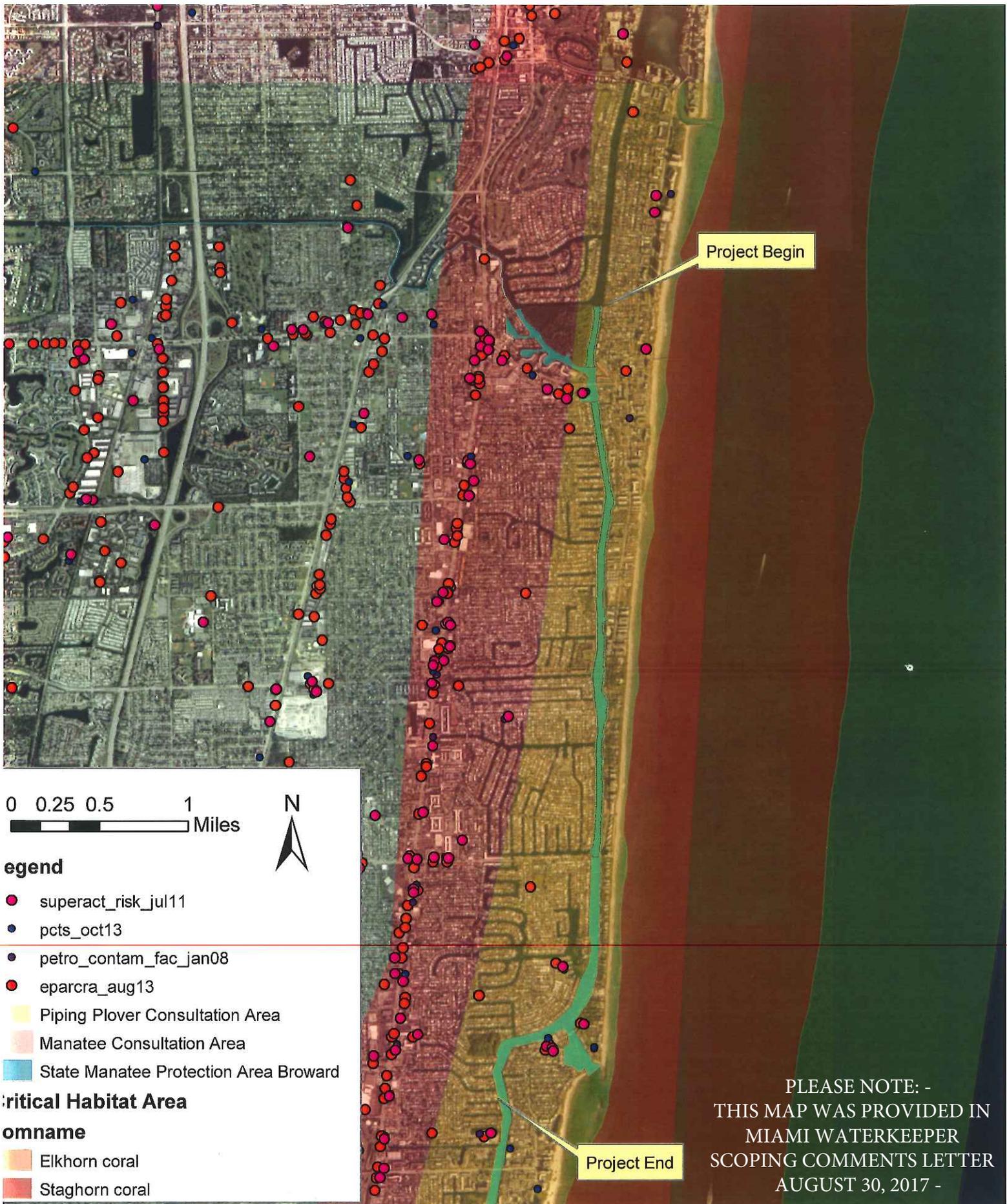
Merritt Seafood Boat & Engine Works, 2931 NE 16th St, Pompano Beach: Fac ID 8839623: "Pending Petroleum Cleanup", Score is 9. Soil removed during 1990 tank excavation, no groundwater contamination detected. SQG, FLD004794939

Mobil #02-A31, 1600 N. Federal Hwy, Pompano Beach: Fac ID 8502781: "Pending Petroleum" – groundwater flow to SE, tanks and soil removed 1990, June 2003 max B (5.7 ug/l vs 1 ug/l), Score is 30. Site is approximately 300 feet from the west end of the Caliban Canal and 0.5 mile from the IWW project; too distant to be of a concern.

Shell-First Coast Energy #1838, 1400 N. Federal Hwy, Pompano Beach: Fac ID 8501686: "Active Petroleum" – 2017 LSSI chemical injections proposed for maximum Feb 2017 groundwater EB (188 ug/l vs 30 ug/l), X (114 ug/l vs 20 ug/l), N (123 ug/l vs 14 ug/l), 1MN (80.2 ug/l vs 28 ug/l), 2MN (141 ug/l vs 28/l), and IPB (62.7 ug/l vs 0.5 ug/l), groundwater flow to NE, small plume not expected to impact dredging project. Score is 30.

Shell #1161 Pompano Car Wash, 1360 N. Federal Hwy, Pompano Beach: Fac ID 8502625: "Active Petroleum", most recent data from Feb 2001 shows small plume on site with GW flow to NE. Score is 30 and site is not anticipated to impact dredging project. Closed as of 10/5/2010, FLD000603936.

Attachments



0 0.25 0.5 1 Miles



Legend

- superact_risk_jul11
- pcts_oct13
- petro_contam_fac_jan08
- eparcra_aug13
- Piping Plover Consultation Area
- Manatee Consultation Area
- State Manatee Protection Area Broward

Critical Habitat Area

Common Name

- Elkhorn coral
- Staghorn coral

Project Begin

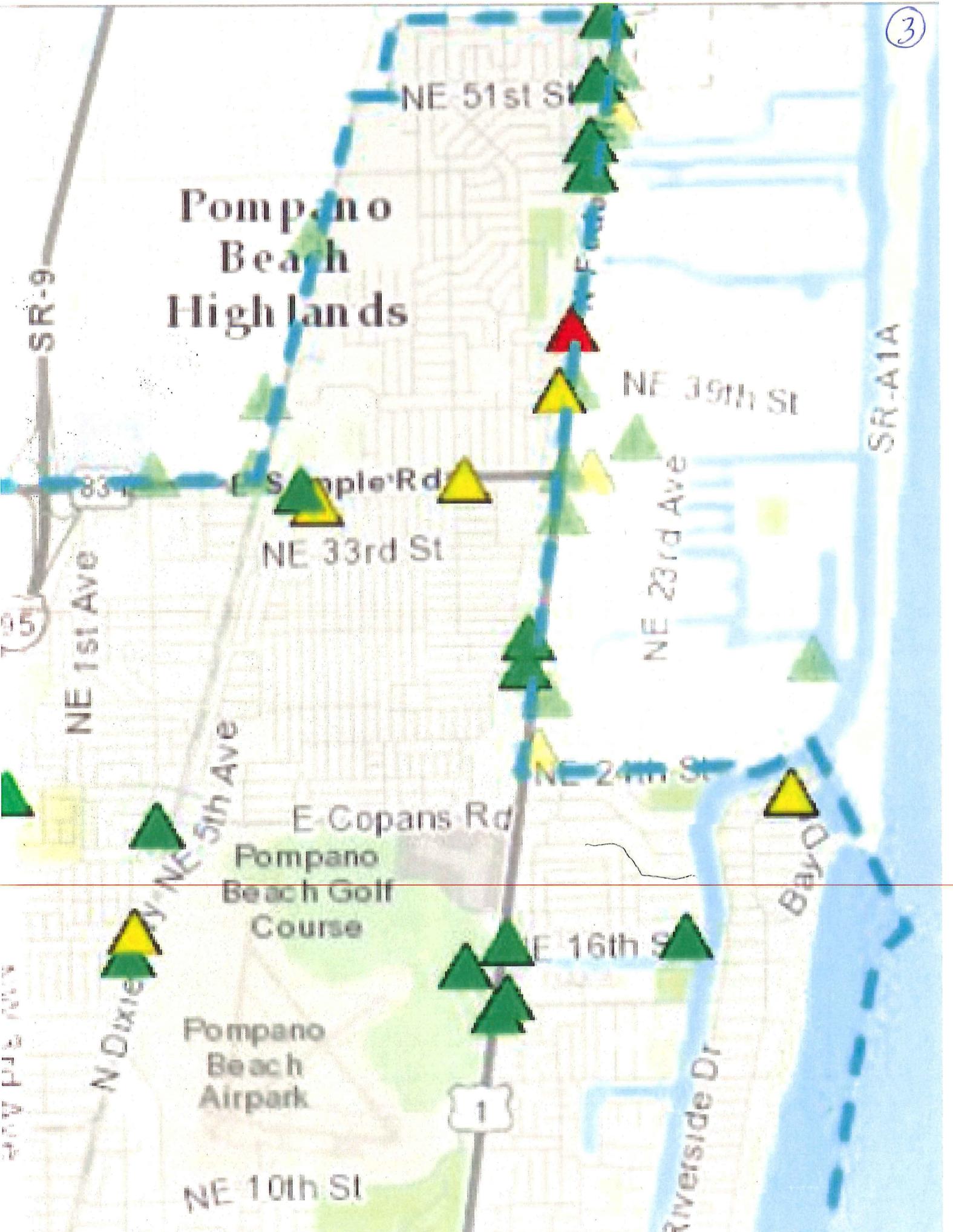
Project End

PLEASE NOTE: -
THIS MAP WAS PROVIDED IN
MIAMI WATERKEEPER
SCOPING COMMENTS LETTER
AUGUST 30, 2017 -

Prepared by: DP
AUGUST 2017

IWW Reach 1
Broward County
Potential Impacts Map

Pompano Beach Highlands



APPENDIX E

Public and Agency Project Comments

Environmental Assessment

Operations and Maintenance Dredging and Dredged Material Placement for
Intracoastal Waterway (IWW) Broward County, Reach 1 and
Palm Beach County, Reach 4 (cuts P-59 to P-60)



US Army Corps of Engineers
JACKSONVILLE DISTRICT

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Appendix E: Public and Agency Project Comments

National Environmental Policy Act (NEPA) Public and Agency Comments and USACE
Responses

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Table 1. Summary of U.S. Army Corps of Engineers (USACE) responses to comments received during the agency and public review and comment period of the proposed Finding of No Significant Impact (FONSI) and draft Environmental Assessment (EA) for the Operations and Maintenance Dredging and Dredged Material Placement for Intracoastal Waterway (IWW) Broward County, Reach 1 and Palm Beach County, Reach 4 (cuts P-59 to P-60) in Broward County and Palm Beach County, Florida.

#	Commenter	Comment	Response
1	Town of Hillsboro Beach	<p>The EA addresses dredged material placement options in the following additional locations: Nearshore environment north/south of Hillsboro Inlet Beach approximately 300 linear feet (lf) north of inlet Beach approximately 500 lf of inlet Inlet impoundment basin</p> <p>... The Town has no concerns with the planned maintenance dredging, however the Town is concerned with the inclusion of the above-referenced alternatives in the EA.</p> <p>... The Town respectfully requests the above-referenced alternatives not be considered as viable alternatives in the final version of the EA.</p>	<p>The purpose of the EA is to provide a comprehensive analysis of dredging and dredged material placement, which includes the identification of all reasonable, potential dredged material placement sites as well as an evaluation of dredged material placement effects. In doing so, it is prudent to include all reasonably foreseeable current and future placement options. If desired Munsell color can be achieved with coordination with FDEP to enable beach placement at a later date or if the Hillsboro Inlet District is interested in receiving dredged material within the Impoundment Basin at a later date, the Corps must ensure that appropriate assessment has been completed. It is prudent that these options remain the EA as “other tools in the toolbox” should the need and capability arise at a later date. Placement in the nearshore, beach, and/or Hillsboro Inlet Impoundment Basin would require additional coordination, which would need to be completed/obtained prior to placement in those locations.</p>

#	Commenter	Comment	Response
2	Florida Fish and Wildlife Conservation Commission (FWC)	Section 6 of the report notes that the terms and conditions of the National Marine Fisheries Service (NMFS) South Atlantic Division Regional Biological Opinion (SARBO), the 2015 U.S. Fish and Wildlife Services Statewide Programmatic Biological Opinion (BO), and the Programmatic Piping Plover BO that are intended to minimize incidental take of listed species will be followed. We concur with your intentions to follow these BOs.	Noted. Thank you for your comments.
3	FWC	During the state permitting process we will provide recommended conditions for listed species and habitat protection to the State permitting agency.	Noted. Thank you for your comments.
4	Shelby Wedelich (Florida Department of Environmental Protection (FDEP) – Florida Coastal Office, Coral Reef Conservation Program)	Will turbidity monitoring occur during dewatering as well as where the dewatering would occur in MSA-726?	If placement occurs in MSA-726, dredged material would be pumped into geotubes that are stored in MSA-726. The tubes would be filled and stored on a visqueen sheet which would direct the return water back into the IWW. (Turbidity monitoring would occur at/near the return point but would not require a permit.)
5	Shelby Wedelich (FDEP – Florida Coastal Office, Coral Reef Conservation Program)	Will USACE release a statement if the decision was made to place dredged material in Placement Options C (nearshore environment south of Hillsboro Inlet) and/or E (beach placement south of Hillsboro Inlet)?	Additional environmental coordination, analysis, surveys, easements, etc. would need to be completed/obtained prior to placement in those locations.
6	Shelby Wedelich (FDEP – Florida Coastal Office, Coral Reef Conservation Program)	What was the coordination for potential effects to seagrasses?	This project is within the same action and scope covered by the USACE, Jacksonville District Regulatory Division’s regional general permit (RGP-93) and NMFS SARBO. More detailed information can be found in section 4.3 of the EA.

#	Commenter	Comment	Response
7	Shelby Wedelich (FDEP – Florida Coastal Office, Coral Reef Conservation Program)	Correct typo in section 3.3.4.	Corrected. Thank you for your comments.
8	FDEP - Department of Beaches, Inlets, and Ports	Seagrasses within a potential 150-meter mixing zone along the channel will need to be surveyed, and the mixing zone will be reduced if any are identified within that boundary. Turbidity monitoring will be required at the edge of the mixing zone. Mitigation for any unexpected loss of seagrass may be required.	Turbidity monitoring will occur at the edge of the mixing zone. No seagrasses have been identified in the dredging template in Broward County, and the potential seagrasses identified in Palm Beach County Reach 4, Cuts P-59 to P-60 appear to be located within the shoal that is required to be removed to maintain safe navigation in this stretch of the IWW. Consistent with USACE Regional General Permit #93 and the exemption issued by FDEP (File No. 50-0364278-001-EE) because this potential seagrass is within the footprint of the IWW, no mitigation is proposed.
9	FDEP - Department of Beaches, Inlets, and Ports	The Program has no objections to maintenance dredging of these cuts and placement of dredged material in geotubes at MSA-726.	Noted.
10	FDEP - Department of Beaches, Inlets, and Ports	Subsequent placement of the material in the Hillsboro Inlet Impoundment Basin or on the beach segments would require additional permitting, where compatibility would be evaluated.	Noted. The EA describes maintenance dredging and placement of dredged material into Florida Inland Navigation District (FIND) Dredged Material Management Area (DMMA) as the Preferred Alternative. All other placement options proposed in the EA would require the completion of additional environmental coordination, analysis, surveys, easements, etc. prior to placement in those locations.

#	Commenter	Comment	Response
11	FDEP - Department of Beaches, Inlets, and Ports	The program cautions that permitting nearshore placement of dredged material would be very difficult.	Noted. The EA describes maintenance dredging and placement of dredged material into FIND DMMA as the Preferred Alternative. All other placement options proposed in the EA would require the completion of additional environmental coordination, analysis, surveys, easements, etc. prior to placement in those locations.

From: [Blankenship, Tim](#)
To: [Donofrio, Kristen L CIV USARMY CESAJ \(US\)](#)
Subject: [Non-DoD Source] RE: Broward County Intracoastal Waterway - Corps of Engineers Environmental Assessment
Date: Tuesday, August 28, 2018 4:33:56 PM
Attachments: [image001.png](#)

Kristen,

The Town of Hillsboro Beach (Town) has concerns with some of the information included in the Public Notice for the Draft Environmental Assessment (EA) for the planned dredging in Reach 1 of the federal navigation project in Broward County. The notice is dated June 27, 2018. Specifically, the EA addresses dredged material placement options in the following additional locations:

Nearshore environment north/south of Hillsboro Inlet
Beach approximately 300 lf north of inlet
Beach approximately 500 lf of inlet
Inlet impoundment basin

Based on recent discussions and meetings with FIND, the Town understands FIND intends to place the material in the dredged material management areas (DMMA) MSA 726 and 641A, or another DMMA up in Delray Beach. The Town has no concerns with the planned maintenance dredging, however the Town is concerned with the inclusion of the above-referenced alternatives in the EA.

The EA states that placement of dredged material into FIND owned property and/or previously authorized and approved upland DMMA's is currently the least cost, environmentally acceptable placement option; therefore, Alternative 1A is the preferred alternative and placement option for this upcoming dredge cycle. However, there is language in the analysis sections for the above-referenced alternatives that allows the consideration of these other options for future maintenance cycles under certain conditions. The alternatives analysis references the impoundment basin option as not currently meeting the inlet management plan for the Hillsboro Inlet District. In addition, the alternatives analysis references placement of sand north of the inlet where there is not currently an established Erosion Control Line (ECL). Any direct placement on the beaches would need to meet Florida DEP requirements for sand compatibility.

The Town respectfully requests the above-referenced alternatives not be considered as viable alternatives in the final version of the EA.

Please contact our office or the Town of Hillsboro Beach (954.427.4011) or mserda@townofhillsborobeach.com if you have questions or require additional information regarding these comments.

Best Regards,

Tim Blankenship, P.E.



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From: [Donofrio, Kristen L CIV USARMY CESAJ \(US\)](mailto:Donofrio.Kristen.L.CIV.USARMY.CESAJ@US)
To: shelby.wedelich@floridadep.gov
Cc: [Donofrio, Kristen L CIV USARMY CESAJ \(US\)](mailto:Donofrio.Kristen.L.CIV.USARMY.CESAJ@US)
Subject: Comments on the draft EA for the Broward County Reach 1 and Palm Beach County Reach 4 (cuts P-59 to P-60) O&M dredging and placement of dredged material
Date: Wednesday, September 5, 2018 12:42:44 PM

Hi Shelby!

It was great talking with you last week (29-Aug) about the draft EA for the Broward County Reach 1 and Palm Beach County Reach 4 (cuts P-59 to P-60) O&M dredging and placement of dredged material. I wanted to follow up to make sure I clearly understood and adequately addressed your questions/concerns:

1. You were concerned about the potential dewatering at MSA 726 being near the hardbottom resources in Hillsboro Inlet area. You wanted to know if turbidity monitoring would occur during dewatering as well as where the dewatering would actually occur in MSA-726 (e.g. - on shore or in-water)? If placement occurs in MSA-726, dredged material would be pumped into geotubes that are stored in MSA-726. The tubes would be filled and stored on a visqueen sheet which would direct the return water back into the IWW. (Turbidity monitoring would occur at/near the return point but would not require a permit.)
2. While you understood that dredged material placement in Placement Options C (Nearshore environment south of Hillsboro Inlet) and/or E (Beach placement south of Hillsboro Inlet) were not the preferred placement sites, you wanted to know if the Corps release some sort of statement if the decision was made to place dredged material in Placement Options C and/or E? As discussed, additional environmental coordination, analysis, surveys, easements, etc. would need to be completed/obtained prior to placement in those locations.
3. You also asked about coordination for potential effects to seagrasses. We discussed that this project is within the same action and scope covered by the US Army Corps of Engineers, Jacksonville District Regulatory Division's regional general permit (RGP-93) and National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (SARBO). (More detailed information can be found in section 4.3 (page 57) of the EA.)
4. Lastly, you caught a typo in section 3.3.4, which has been corrected.

Please do not hesitate to reach out again for more clarification, correct me if I've misunderstood anything, or inadvertently left something out from our discussion.

Thank you again for calling; it was nice talking with you!

Kristen Donofrio
Biologist, Planning Division
U.S. Army Corps of Engineers
Jacksonville District (PD-EC)
P.O. Box 4970
Jacksonville, FL 32232-0019
(904) 232-2918 (O)
(904) 232-3442 (F)
Kristen.L.Donofrio@usace.army.mil

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September 4, 2018

Chris Stahl, Coordinator
Florida State Clearinghouse
Florida Department of Environmental Protection
2600 Blair Stone Road, M.S. 47
Tallahassee, FL 32399-2400
Chris.Stahl@dep.state.fl.us
State.Clearinghouse@dep.state.fl.us

Subject: File No. SAI #FL201807318375C, U.S. Army Corps of Engineers (USACE), Draft Environmental Assessment for Operations and Maintenance (O&M) Dredging and Dredge Material Placement for Intracoastal Waterway (ICW) Reach 1 and Reach 4 (Cuts P-59 to P-60), Broward and Palm Beach County, Florida

Dear Mr. Stahl:

Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed the documents provided for above-referenced project and provides the following comments for your consideration in accordance with Chapter 379, Florida Statutes, and the Coastal Zone Management Act, Florida's Coastal Management Program.

The applicant proposes to conduct O&M Dredging of the ICW removing approximately 75,000 cubic yards in Broward County (Reach 1) and 7,000 cubic yards in Palm Beach County (Reach 4). The dredged material will be placed either on Federal Inlet Navigational District spoil sites, within a Dredge Management Disposal Area, or in the nearshore North and South of Hillsboro Inlet as well as on the beach 300 linear feet North of Hillsboro Inlet and 500 linear feet south of Hillsboro Inlet from R-28 to R-32.

Section 6 of the report notes that the terms and conditions of the NMFS South Atlantic Division Regional Biological Opinion (BO), the 2015 USFWS Statewide Programmatic BO, and the Programmatic Piping Plover BO that are intended to minimize incidental take of listed species will be followed. We concur with your intentions to follow these BOs. During the State permitting process we will provide recommended conditions for listed species and habitat protection to the State permitting agency.

If you have specific technical questions regarding the content of this letter, please contact Kristen Nelson Sella at (850) 922-4330 or by email at kristen.sella@myfwc.com.

Sincerely,

Carol Knox, Section Leader
Imperiled Species Management Section
Division of Habitat and Species Conservation

cc: Kristin Donofrio, USACE



FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

Memorandum

TO: Chris Stahl, Office of Intergovernmental Programs

FROM: Roxane Dow, Beaches, Inlets and Ports

SUBJECT: Review_Request_For_FL201807318375C __, DRAFT EA for OPERATIONS AND MAINTENANCE DREDGING AND DREDGED MATERIAL PLACEMENT IWW BROWARD AND PALM BEACH COUNTY, REACHES 1 & 4

DATE: September 28, 2018

The United States Army Corps of Engineers is proposing dredging of Reach 1 of the IWW in Broward County, and a shoal in cuts P-59 to P-60 in Reach 4 of the IWW in Palm Beach County. Approximately 7,000 CY of shoaled material, stretching perpendicular to the Federal Channel requires dredging to maintain the channel to the depth of 10 feet.

Seagrass within a potential 150-meter mixing zone along the channel will need to be surveyed, and the mixing zone will be reduced if any are identified within that boundary. Turbidity monitoring will be required at the edge of the mixing zone. Mitigation for any unexpected loss of seagrass may be required.

The Program has no objections to maintenance dredging of these cuts and placement of dredged material in geotubes at MSA 726. Subsequent placement of the material in the Hillsboro Inlet Impoundment Basin or on the beach segments would require additional permitting, where compatibility would be evaluated.

The Program cautions that permitting nearshore placement of dredged material would be very difficult. Hardbottom resources are already subject to cumulative sedimentation and turbidity in this area due to marine construction, storm water runoff, recreation and storm impacts. Mitigation would likely be required.

Thank you for the opportunity to comment. Please call me if you have any questions.

Cc Gregory Garis

Appendix E: Public and Agency Project Comments

Project Scoping Comments



October 30, 2017

**Florida Fish
and Wildlife
Conservation
Commission**

Terri Jordan-Sellers
U.S. Army Corps of Engineers
Planning Division
Environmental Branch
701 San Marco Boulevard
Jacksonville, FL 32207-8175
Terri.Jordan-Sellers@usace.army.mil

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Re: Intracoastal Waterway Broward Reach 1 Scoping Notice, U.S. Army Corps of Engineers (USACE), Broward County

Dear Ms. Jordan-Sellers:

Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed the above-referenced scoping document. We provide the following comments and recommendations for your consideration in accordance with Chapter 379, Florida Statutes, and the Fish and Wildlife Coordination Act.

Project Description

The USACE has been working with the Florida Inland Navigation District (FIND) to maintain the Intracoastal Waterway (IWW) in Broward County (Reach 1). The USACE is gathering information to define issues and concerns that will be addressed in an analysis to be prepared in compliance with the National Environmental Policy Act (NEPA). Reach 1 is approximately five miles long beginning at a point 650 feet south of the Palm Beach/Broward County line and ending to the south at a point 1,600 feet north of the Northeast 14th Street bridge. The IWW was originally dredged in 1965 and there has been no maintenance dredging since the initial excavation. Beach quality sediments have been documented within Reach 1, which makes beach or nearshore placement potentially viable options. Areas proposed for dredging include the IWW coastal waters inside Hillsboro Inlet, and areas proposed for dredged material placement include nearby upland disposal sites, as well as sandy beaches and nearshore waters north and south of Hillsboro Inlet.

Potentially Affected Resources

Application materials for this scoping request did not include an environmental assessment; however, the Scoping Notice did identify seagrass habitat, hardbottom habitat, threatened and endangered species, and commercial and recreational resources as potential issues. FWC staff conducted a geographic information system (GIS) analysis of the project area. Based on the GIS analysis, in addition to federally listed endangered and threatened species, the project area is located near, within, or adjacent to:

- Potential habitat for state- and federally listed species
 - Gopher tortoise (*Gopherus polyphemus*, State Threatened [ST])
 - Least tern (*Sterna antillarum*, ST)
 - American oystercatcher (*Haematopus palliatus*, ST)
 - Black skimmer (*Rynchops niger*, ST)

- Piping plover (*Charadrius melodus*, Federally Threatened [FT])
- Florida manatee (*Trichechus manatus latirostris*, Federally Endangered [FE])
- Loggerhead sea turtle (*Caretta caretta*, FT)
- Green sea turtle (*Chelonia mydas*, FE)
- Leatherback sea turtle (*Dermochelys coriacea*, FE)
- Existing Conservation Lands
 - Deerfield Island Park Critical Wildlife Area (CWA)

Comments and Recommendations

Imperiled Beach-Nesting Birds (Shorebirds)

Construction activities and the placement of dredged material on open, barren areas of upland disposal sites and beaches during shorebird nesting season have the potential to disturb breeding activities. To discuss potential conservation measures regarding project activities in these areas, please contact the FWC staff identified at the close of this letter. Potential conservation measures or conditions can provide guidance for pre-construction meetings, bird monitors, and buffer zones.

In addition to existing open, barren areas suitable for shorebird nesting, vegetated areas of proposed upland disposal sites may support shorebird nesting activity after those areas have been cleared associated with construction. Cleared sites such as areas that have undergone surface scraping may attract ground nesting species such as least terns or other imperiled shorebirds during nesting season. Shorebird nests have been documented on a variety of disturbed sites, including construction sites (FWC 2013). Shorebirds deposit their eggs in shallow depressions or scrapes in the substrate, possibly lined with pebbles, grasses, or coquina shells (FWC 2013). Egg-laying for colonial and solitary beach nesting birds usually begins in mid-February. Colonies can range in size from a few breeding pairs to many hundreds (FWC 2013). FWC staff recommends the following measures to reduce nesting potential during construction:

- Conduct construction activities outside of the breeding season (generally April through August),
- Clear the site only when ready to start work, and
- Avoid leaving cleared areas with little to no activity for an extended amount of time.

If nesting is observed, we recommend contacting FWC staff to discuss necessary nest buffers and potential permitting alternatives. For additional information, please refer to FWC's Breeding Bird Protocol for Florida's Seabirds and Shorebirds located at the following web address: <https://public.myfwc.com/crossdoi/shorebirds/PDF-files/BreedingBirdProtocolForFloridasSeabirdsAndShorebirds.pdf>.

Hardbottom

The Scoping Notice identifies that hardbottom habitat is an anticipated fish and wildlife resource that is associated with this project due to potential placement of dredged material on beaches or within nearshore waters. If coral and octocoral resources are identified within the direct or indirect impact areas of the project and require mitigation (i.e., avoidance, minimization, compensatory mitigation), FWC staff recommends relocating these resources

for impact minimization purposes and is available to provide guidance on coral and octocoral mitigation relocation methods and monitoring. FWC staff has enclosed the "FWC Coral and Octocoral Mitigation Relocation Recommendations" and can provide monitoring data sheets, if requested, for reference. If you have any questions regarding management of hardbottom species, please contact Lisa Gregg by phone at (850) 617-9621 or at Lisa.Gregg@MyFWC.com.

Gopher Tortoise

Proposed dredged material upland disposal areas may contain suitable habitat for gopher tortoises. In addition, the northernmost extent of the dredging area is adjacent to Deerfield Island Park Critical Wildlife Area, which contains a high density of gopher tortoises. The applicant should refer to the FWC's Gopher Tortoise Permitting Guidelines (Revised January 2017) (<http://www.myfwc.com/license/wildlife/gopher-tortoise-permits/>) for survey methodology and permitting guidance prior to any construction in the upland areas with suitable gopher tortoise habitat. Specifically, the permitting guidelines include methods for avoiding impacts as well as options and state requirements for minimizing, mitigating, and permitting potential impacts of the proposed activities. If you have any questions regarding gopher tortoise permitting, please contact the FWC staff at the close of this letter.

Manatees and Sea Turtles

Manatees are likely to be present in the nearshore waters of the project area. The Standard Manatee Conditions for In Water Work (2011) must be followed for all in-water activities. In addition, sea turtle nesting season on Broward County beaches runs March 1 through October 31 each year and the potential beach dredged material disposal sites provides nesting habitat for loggerhead, green, and leatherback sea turtles. Surveys should be conducted prior to disposal in these areas and any potential nests marked to avoid disturbance. For early technical assistance regarding potential conditions and standard conservation measures for these species, please contact Mary Duncan by phone at (850) 922-4330 or by email at Mary.Duncan@MyFWC.com.

We appreciate the opportunity to review the scoping documents and look forward to working more closely with the applicant during the permitting process. If you need any further assistance, please do not hesitate to contact our office by email at FWCConservationPlanningServices@MyFWC.com. If you have specific technical questions, please contact Jim Keltner at (239) 332-6972 x9209 or by email at James.Keltner@MyFWC.com.

Sincerely,



Jennifer D. Goff, Director
Office of Conservation Planning Services

jdj/jdk
ENV 1-5-2
Intracoastal Waterway Broward Reach 1 Scoping_33653_103017
Enclosure

cc: Brooke Hall, USACE, Brooke.A.Hall@usace.army.mil

Florida Fish and Wildlife Conservation Commission (FWC)

Coral and Octocoral Mitigation Relocation Recommendations

This document is specific to coral and octocoral relocation activities that are being conducted statewide for mitigation¹ purposes. This document is a living document and is updated as new information becomes available, or issues that need to be addressed are identified. For this reason, document dates are provided in the lower right hand corner for reference purposes.

Summary

In summary, the FWC recommends the following (summarized by document section):

- **FWC Authorization Required**

An FWC Stock Collection and Release, Special Activity License (SAL) is required for all marine species relocation activities statewide, including but not limited to mitigation relocation activities.

- **Coral and Octocoral Resource Mitigation**

Relocation of corals and octocorals to suitable sites in regionally appropriate densities (current or historical) should occur on all coastal projects where complete avoidance is not possible. Coral and octocoral relocation activities should be considered as minimization of project impacts, and not as compensatory mitigation. Coral and octocoral relocation activities should not occur during times of severe stress (e.g., disease outbreak, coral bleaching, cold stress, significant algal blooms), or from locations being impacted by significant stress events (e.g., areas being impacted by dredging activities or storm water run-off events), unless there are extreme circumstances that warrant an exception. Compensatory mitigation should be required for all corals and octocorals that may be impacted by project activities and will not be relocated.

- ***Coral-Specific Compensatory Mitigation Considerations***

On a case-by-case basis, the FWC will consider and evaluate any request for relocation of corals from unstable habitats (e.g., rubble) to be used as a compensatory mitigation measure to offset direct effects² from the proposed project. Also on a case-by-case basis, FWC will consider and evaluate any request for relocation of corals that are considered by the FWC to be sub-adult sized (< 5 cm), to be used as a compensatory mitigation measure to offset the loss of indirect effects³ that are temporary (e.g., temporary reduction in larval output, temporary reduction in settlement). Evaluation of such requests will be based on available and appropriate documentation of sub-adult relocation activities (e.g., literature, monitoring reports), and amount of credit that is proposed to be provided for such activities.

- ***Technical Assistance***

The FWC is available to provide technical expertise to assist with mitigation assessment (e.g., UMAM, HEA, REA), or the development or review of mitigation plans.

- **Coral and Octocoral Relocation Plans**

Relocation methodologies alone do not constitute a relocation plan. Relocation plans should at a minimum include the following information (information requested is expanded upon within the document):

- Summary of survey results.
 - Criteria for selection of corals and octocorals that will be relocated.
 - List of corals and octocorals selected for relocation.
 - Information regarding the removal, relocation and temporary holding sites.
 - Relocation methodologies.

¹ For purposes of this document, the term “mitigation” is all-encompassing and includes avoidance, minimization, and compensatory mitigation actions. The term “compensatory mitigation” is specific to actions that are intended to mitigate for impacts that are not avoided or minimized.

² Direct effects (impacts) as defined by 40 CFR §1508.8.

³ Indirect effects (impacts) as defined by 40 CFR §1508.8.

Florida Fish and Wildlife Conservation Commission (FWC) Coral and Octocoral Mitigation Relocation Recommendations

There are a number of current relocation methodologies to successfully remove, relocate and reattach corals and octocorals, and there may be additional successful methodologies developed in the future. As such, the FWC does not prefer to specify methodologies for these activities and would instead prefer to assist with development of methodologies or comment on proposed methodologies.

- **Coral Relocation Size**

- ***ESA-Listed Coral Species***

- The FWC recommends relocation of all ESA-listed coral species regardless of size, unless a coral displays signs of disease pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols.”

- ***Non-ESA listed Coral Species***

- The FWC recommends relocation of all adult corals (corals ≥ 5 cm measured as live tissue diameter - continuous live tissue patch with a diameter of 5 cm or greater), unless a coral displays signs of disease pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols.”

- **Non-ESA Listed Coral Species Prioritization**

In the event that all corals ≥ 5 cm live tissue diameter will not be relocated, the FWC has provided a prioritized list of non-ESA listed coral species for relocation.

- **Coral Fragmentation Upon Removal**

The potential exists for corals to fragment upon removal. For all ESA-listed species (regardless of relocation activity size) and for smaller-scale relocation activities, it is feasible for all fragments of the same broken coral to be kept together and reconstructed by reattaching fragments as close together as possible (like puzzle pieces – reattached within 0 - 5 cm apart from one another), to promote successful fusing. The re-constructed corals should be considered as one single coral for monitoring purposes. For larger-scale relocation activities, only 50% of fragments of broken corals that are ≥ 5 cm live tissue diameter should be relocated and reattached, and considered as separate corals for monitoring purposes.

- **Octocoral Relocation Activities**

The FWC recommends relocation of all *Gorgonia* species and other octocoral species ≥ 10 cm in height, unless an octocoral displays signs of disease pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols.” In the event that all octocoral species ≥ 10 cm in height will not be relocated, the FWC has provided a prioritized list of octocoral species for relocation.

- **Coral and Octocoral Visual Health Assessment**

A visual health assessment should be required for each coral or octocoral identified for relocation immediately prior to removal from the removal site (and again from a temporary holding site if one is used), pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols”. Corals and octocorals of any species exhibiting visual signs of disease should not be removed, held temporarily, or relocated unless identified exceptions are applicable, or additional project-specific exceptions are provided for by the FWC.

- **Temporary Holding of Corals and Octocorals Prior to Reattachment**

If corals and octocorals will be placed in a temporary holding site after removal and prior to reattachment at the relocation site (for caching, staging, acclimation, etc.), criteria is provided for the appropriate selection of a temporary holding site, maintenance of coral and octocoral species while in a temporary holding site, and authorization of the installation of structures to facilitate temporary holding activities.

- **Coral and Octocoral Relocation Site Selection**

Recommended criteria is provided for the appropriate selection of coral and octocoral relocation sites.

**Florida Fish and Wildlife Conservation Commission (FWC)
Coral and Octocoral Mitigation Relocation Recommendations**

- **Coral and Octocoral Relocation Monitoring**

The FWC recommends corals and octocorals that are relocated specifically for mitigation purposes are monitored for overall survival and attachment success during one week (may be conducted at any time during the seven days beginning the day immediately after the day relocation is conducted), at one month, at three months, at six months, at one year and at two years post-relocation. The FWC emphasizes the need for all of these recommended monitoring events to be performed, and the recommended activities/data collection to be conducted for these events is provided.

The following information is also provided with regards to monitoring coral and octocoral mitigation relocation activities:

- *Monitoring Data to be Collected*
- *Numbers of Corals/Octocorals to be Monitored*
- *Reporting Schedule*
- *Technical Assistance*

- **Performance Standards**

- *Corals – Non-ESA Listed Species*

The performance standard to determine mitigation success for coral relocation activities for non-ESA listed species should be between 65-85% overall survival, with secure substrate attachment, two years after relocation. Overall survival of corals shall be defined as no net loss in pooled (by species) Live Tissue Area Index or an increase in pooled (by species) Live Tissue Area Index.

- *Corals – ESA-Listed Species*

The performance standard to determine mitigation success for coral relocation activities for ESA-listed species will be determined by the federal Biological Opinion for the project.

- *Octocorals*

The performance standard to determine mitigation success for octocoral relocation activities should be proposed by the applicant, and supported by available and appropriate documentation of octocoral relocation activities (e.g., literature, monitoring reports.) FWC requests to review these proposals as they are submitted to determine if the documentation submitted supports the performance standard as proposed.

- *Technical Assistance*

The FWC is available to provide technical expertise to assist with the development or review of performance standards.

Florida Fish and Wildlife Conservation Commission (FWC) Coral and Octocoral Mitigation Relocation Recommendations

Definitions

For purposes of these Recommendations:

- “Coral” is a fragment or colony of any species of the Order **Scleractinia**, Order **Antipatharia**, and Genus **Millepora**.
- “ESA-listed” are species that are state-listed pursuant to 68A-27, F.A.C., federally-listed pursuant to the Endangered Species Act, or proposed to be federally-listed pursuant to the Endangered Species Act.
- “Interior waterways” are aquatic areas that have experienced physical restructuring of the shoreline (e.g., inner port harbors, marinas), or naturally occurring areas of low flushing (e.g., shallow bays, seawalls.)
- “Non-ESA listed” are species that are not ESA-listed.
- “Octocoral” is a colony of any species of the Subclass **Octocorallia**, excluding encrusting octocorals (e.g., *Erythropodium caribaeorum*, *Briareum asbestinum*).
- “Relocation” includes all activities that remove, relocate and reattach coral or octocoral fragments or colonies from one location to another location (e.g., transplanting, outplanting), including but not limited to moving them into and out of temporary holding locations (e.g., cache, staging, acclimation locations) or nurseries.

FWC Authorization Required

An FWC Stock Collection and Release, Special Activity License (SAL) is required for all marine species relocation activities statewide, including but not limited to mitigation relocation activities. Information on the FWC SAL Program and applications are available here: <http://myfwc.com/license/saltwater/special-activities/>

Coral and Octocoral Resource Mitigation

Relocation of corals and octocorals to suitable sites in regionally appropriate densities (current or historical) should occur on all coastal projects where complete avoidance is not possible. These coral and octocoral relocation activities should be considered as minimization of project impacts and not as compensatory mitigation. Coral and octocoral relocation activities conducted to minimize project impacts can be accommodated in Florida Uniform Mitigation Assessment Method (UMAM), Habitat Equivalency Analysis (HEA), and Resource Equivalency Analysis (REA) mitigation assessment methodologies, and would result in lower amounts of compensatory mitigation required for the project relative to the amount of mitigation that would be required if coral and octocoral relocation was not performed. Compensatory mitigation should be required for all corals and octocorals that may be impacted by project activities and will not be relocated.

Coral and octocoral relocation activities should not occur during times of severe stress (e.g., disease outbreak, coral bleaching, cold stress, significant algal blooms), or from locations being impacted by significant stress events (e.g., areas being impacted by dredging activities or storm water run-off events), unless there are extreme circumstances that warrant an exception. FWC will support coral and octocoral relocation activities during times of severe stress or from locations being impacted by significant stress events on a case-by-case basis when resource or project impacts are imminent and cumulatively harmful, and when benefits outweigh potential risks. Please see the “Coral and Octocoral Visual Health Assessment” section of these Recommendations for exceptions that are applicable to coral and octocoral relocation during times of severe stress or from locations being impacted by significant stress events.

Coral-Specific Compensatory Mitigation Considerations

On a case-by-case basis, the FWC will consider and evaluate any request for the relocation of corals from unstable habitats (e.g., rubble) to be used as a compensatory mitigation measure to offset direct effects⁴ from the proposed project. Also on a case-by-case basis, FWC will consider and evaluate any request for the relocation of corals that are considered by the FWC to be sub-adult sized (< 5 cm measured as live tissue diameter - continuous live tissue patch with a diameter of 5 cm or greater), to be used as a compensatory mitigation measure to offset the loss of indirect effects⁵ that are temporary (e.g., temporary reduction in larval output, temporary reduction in settlement). Evaluation of such requests will be based on available and appropriate documentation of sub-adult relocation activities (e.g., literature, monitoring reports), and amount of credit that is proposed to be provided for such activities.

⁴ Direct effects (impacts) as defined by 40 CFR §1508.8.

⁵ Indirect effects (impacts) as defined by 40 CFR §1508.8.

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Technical Assistance

The FWC is available to provide technical expertise to assist with mitigation assessment (e.g., UMAM, HEA, REA), or the development or review of mitigation plans. The FWC would appreciate the ability to provide additional comments on mitigation assessment, mitigation plans or mitigation plan revisions if such information is not available at this time and becomes available in the future.

Coral and Octocoral Relocation Plans

At a minimum, Relocation Plans should include the following information:

- Summary of survey results – a summary of all coral and octocoral species and sizes that were found (by location) during bottom surveys. Specific coordinates for each individual coral are not necessary unless the species is ESA-listed, then specific coordinates must be provided for each individual ESA-listed coral.
- Criteria for selection of corals and octocorals that will be relocated - provide the criteria (e.g., size, species) that was used to select the corals/octocorals that will be relocated.
- List of corals/octocorals selected for relocation – identify corals and octocorals by species, sizes and removal site that will be relocated. Again, specific coordinates for each individual coral are not necessary unless the species is ESA-listed, then specific coordinates must be provided for each individual ESA-listed coral.
- Removal site(s) – provide the following information for the removal site(s):
 - Site coordinates.
 - Substrate size and substrate type corals/octocorals were found on (e.g., natural, artificial, boulders, structures).
 - Water depth.
 - Water quality.
 - Water circulation.
 - Light availability.
 - Orientation of attachment.
- Temporary holding site(s) – if a temporary holding site will be used to cache, stage, acclimate corals/octocorals prior to reattachment, provide the following information for the temporary holding site(s):
 - Site coordinates.
 - Proximity to both the removal and reattachment sites.
 - Estimated length of time corals/octocorals will be maintained in the temporary holding site.
 - Water depth.
 - Identify if it is a low or high energy environment.
 - Level of sedimentation.
 - Presence/absence of freshwater input.
 - Verify that the temporary holding site is conservatively further from expected project-associated direct and indirect impact areas.
 - Identify how corals/octocorals will be maintained in the temporary holding site.
 - Identify if any structures or systems will be installed to facilitate temporary holding of corals/octocorals, and if this activity has been or will be included in the appropriate permit applications for this project.
- Relocation site(s) – provide the following information for the relocation site(s):
 - Site coordinates.
 - Proximity to the removal site.
 - Identify if there has been historic presence of the species to be relocated at the relocation site within recent decades.
 - Substrate size and substrate type corals/octocorals will be reattached to (e.g., natural, artificial, boulders, structures).
 - Water depth.
 - Water quality in relation to the removal site.
 - Water circulation in relation to the removal site.
 - Light availability in relation to the removal site.
 - Orientation of reattachment.
 - Presence/absence of loose rubble.

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- Identify if it is a low or high energy environment.
- Verify that the relocation site is not located within a direct or indirect impact area for any permitted, authorized or reasonably foreseeable marine coastal construction activity (e.g., dredging, beach nourishment, pipeline or communication cable installations), or within exclusion or buffer areas/zones (e.g., military, aquaculture, resource protection).
- Provide information on spatial requirements for the species to be relocated which addresses how the relocation site will provide adequate and appropriate space to allow for: a) colony growth, tissue re-colonization and plating based on colony size, species growth rates, and maximum size capacity; and b) attachment density commensurate with regionally appropriate densities.
- Relocation methodologies – identify the methodologies that will be used to remove, transport, temporarily hold (if applicable), and reattach corals/octocorals.

There are a number of current relocation methodologies to successfully remove, relocate and reattach corals and octocorals, and there may be additional successful methodologies developed in the future. As such, the FWC does not prefer to specify methodologies for these activities and would instead prefer to assist with development of methodologies or comment on proposed methodologies.

It should be noted that many relocation contractors propose to utilize relocation methodology documents developed by the Florida Keys National Marine Sanctuary (FKNMS)⁶ as their relocation plan. These documents were developed by FKNMS staff for specific activities and projects within the FKNMS, and were not intended for use for any other purpose. Additionally, these FKNMS documents that specify methodologies do not constitute a full relocation plan, and are not appropriate to be represented as a full relocation plan for coral and octocoral mitigation relocation activities.

Technical Assistance

The FWC is available to provide technical expertise to assist with the development or review of relocation plans, including relocation methodologies. The FWC would appreciate the ability to provide additional comments on relocation plans or relocation plan revisions if such information is not available at this time and becomes available in the future.

Staff of the Florida Department of Environmental Protection – Coral Reef Conservation Program, NOAA Florida Keys National Marine Sanctuary (Monroe County), and NOAA National Marine Fisheries Service are also available to provide technical expertise to assist with the development or review of relocation plans, including relocation methodologies based on lessons learned on the Florida Reef Tract. Contacts for each of these agencies respective programs can be provided on request.

Coral Relocation Size

ESA-Listed Coral Species

The FWC recommends relocation of all ESA-listed coral species regardless of size, unless a coral displays signs of disease pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols.” The coral species that are currently listed or proposed are as follows:

- *Acropora cervicornis* (ESA and state listed as Threatened)
- *Acropora palmata* (ESA and state listed as Threatened)
- *Dendrogyra cylindrus* (ESA and state listed as Threatened)
- *Mycetophyllia ferox* (ESA and state listed as Threatened)
- *Orbicella annularis* (ESA and state listed as Threatened, formerly *Montastraea*)
- *Orbicella faveolata* (ESA and state listed as Threatened, formerly *Montastraea*)
- *Orbicella franksi* (ESA and state listed as Threatened, formerly *Montastraea*)

⁶“Final Programmatic Environmental Impact Statement for Coral Restoration in the Florida Keys and Flower Garden Banks National Marine Sanctuaries” - dated July 2010; “FKNMS Coral Rescue and Transplant Protocols” - dated November 2011 or May 2013; “FKNMS Coral Rescue & Relocation Protocols” - dated January 2014.

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Non-ESA listed Coral Species

For purposes of these Recommendations, the FWC has determined corals that are ≥ 5 cm (measured as live tissue diameter - continuous live tissue patch with a diameter of 5 cm or greater) to be adult, although corals < 5 cm have been observed to be reproductive (Soong 1993, Lazar et al. 2011, Coastal Eco-Group Inc., 2015.) The FWC determination of adult coral size was not solely based on reproductive capabilities and additionally considered:

At the 5 cm size, corals have a sufficient number of polyps and colony structure to obtain a positive identification using standard surveying methodologies. Corals below this size would require different surveying methodologies.

Corals ≥ 5 cm are generally considered to be adults (Bak and Engel 1979, Miller et al. 2000), based on average growth rates (Vaughn 1915) and estimated age of sexual maturity (Connell 1973.)

For non-ESA listed coral species, the FWC recommends relocation of all adult corals (corals ≥ 5 cm live tissue diameter), unless a coral displays signs of disease pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols.” Corals ≥ 5 cm live tissue diameter can be successfully relocated. Brownlee (2010) successfully transplanted small corals (*Siderastrea siderea*, *Dichocoenia stokesii*, and *Porites porites*) with greater than 80 percent survivorship after 13 months. Monty et al. (2006) successfully transplanted 250 corals (14 species) ranging from 5 to 40 cm in diameter with a high rate of survivorship. These corals were monitored for 13 months. Eight species had 100 percent survivorship, including 78 *Siderastrea siderea*. Thornton et al. (2000) transplanted 271 corals from an outfall pipe in Broward County to an articulated concrete mat. *Siderastrea siderea* comprised 90 percent of the corals < 1 to 100 square centimeters in size. After 27 months, 266 of the corals had survived (87 percent), as compared to 83 percent survival for corals on the nearby natural substrate. In addition, Stephens (2007) analyzed monitoring data from a transplantation effort that salvaged multiple species of coral from a coastal construction impact site in Broward County; survival of the species ranged between 92 and 100 percent during monitoring periods varying between 18 and 24 months.

Non-ESA Listed Coral Species Prioritization

In the event that all corals ≥ 5 cm live tissue diameter will not be relocated, the FWC has prioritized non-ESA listed coral species for relocation. These coral species have been prioritized and binned based on a high conservation value (i.e., rare, slow-growing, low genetic diversity, slow to recover, sensitive to stress, poor-recruiter, high post-settlement mortality). The prioritized list is as follows:

HIGH PRIORITY SPECIES

- Order Antipatharia
- *Agaricia fragilis*
- *Agaricia lamarcki*
- *Colpophyllia natans*
- *Dichocoenia stokesii*
- *Diploria labyrinthiformis*
- *Favia fragum*
- *Isophyllia* spp.
- *Leptoseris cucullata*
- *Madracis* spp.
- *Manicina areolata*
- *Meandrina meandrites*
- *Montastraea cavernosa*
- *Mussa angulosa*
- *Mycetophyllia* spp.
- *Oculina diffusa*
- *Oculina robusta*
- *Solenastrea hyades*

MEDIUM PRIORITY SPECIES

- *Eusmilia fastigiata*
- *Porites divaricata*, *P. furcata*, *P. porites*
- *Pseudodiploria* spp. (formerly *Diploria*)
- *Siderastrea siderea* ≥ 10 cm
- *Solenastrea bournoni*
- *Stephanocoenia intersepta* ≥ 10 cm
- *Undaria* spp. (formerly *Agaricia*)

LOW PRIORITY

A lower amount of effort should be attributed to removing and relocating the following species, and compensatory mitigation should be designed to offset the loss of any corals not relocated. Alternatively, if the impact area is dominated by these species, effort would be still be justified to remove and relocate the following species:

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- *Porites astreoides*
- *Siderastrea radicans*
- *Siderastrea siderea* <10 cm
- *Stephanocoenia intersepta* <10 cm
- *Cladocora arbuscula*
- *Phyllangia* spp.
- *Scolymia* spp.

FWC supports efforts to relocate corals that are less than 5 cm live tissue diameter (sub-adult sized), however we are aware that this may increase project costs due to additional survey design measures needed to accurately identify corals of this small size. For corals that will not be relocated (of any size), FWC recommends coordination with the FWC Special Activity License Program, or direct coordination with permitted/approved research/restoration facilities within the project region, to determine if such facilities have interest and financial resources to remove corals or accept donated corals.

Coral Fragmentation Upon Removal

The potential exists for corals to fragment upon removal. For all listed or proposed species (regardless of relocation activity size) and for smaller-scale relocation activities, it is feasible for all fragments of the same broken coral to be kept together and reconstructed by reattaching fragments as close together as possible (like puzzle pieces – reattached within 0 - 5 cm apart from one another), to promote successful fusing. The re-constructed corals should be considered as one single coral for monitoring purposes. Research has shown that fragments of the same genet are known to readily and successfully fuse (Raymundo and Maypa 2004). For larger-scale relocation activities, only 50% of fragments of broken corals that are ≥ 5 cm live tissue diameter should be relocated and reattached, and considered as separate corals for monitoring purposes.

Octocoral Relocation Activities

The FWC recommends relocation of all *Gorgonia* species and other octocoral species ≥ 10 cm in height, unless an octocoral displays signs of disease pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols.” In the event that all octocoral species ≥ 10 cm in height will not be relocated, the FWC has prioritized octocoral species for relocation. Similar to corals, octocoral species have also been prioritized based on a high conservation value (i.e., state prohibited species, conservation need, local abundance/density, growth rates, relocation success, and ability to recover naturally). In general, more robust rod species are slow growing and have low recruitment, but transplant well and seem to recover quickly from being transplanted (e.g., growing a new holdfast over attachment material) (Brinkhuis 2009). Plumes are low on the list because they recruit very quickly after a disturbance and have high growth rates so their potential for natural recovery is greater. Additionally, more delicate plume species have less tissue (e.g., thinner tissue = less potential/resources for healing after clipping) and are inferior transplantation candidates. However, plumes can be transplanted successfully (Brinkhuis 2009). The prioritized list is as follows:

- *Antillogorgia* (formerly *Pseudopterogorgia*)
- *Eunicea*
- *Gorgonia* (state prohibited species)
- *Leptogorgia*
- *Muricea*
- *Muriceopsis*
- *Plexaura*
- *Plexaurella*
- *Pseudoplexaura*
- *Pterogorgia*

In addition to the species previously listed, the following are priority genera if deeper relocation sites are targeted (>60 ft. or >18 m):

- *Diodogorgia*
- *Ellisella*
- *Iciligorgia*
- *Swiftia*
- *Telesto*

Coral and Octocoral Visual Health Assessment

To minimize the risk that diseases are not being spread from the removal site to a temporary holding or relocation site, the FWC recommends a visual health assessment of each coral or octocoral slated for temporary holding or direct relocation be conducted immediately prior to removal pursuant to the attached “FWC Coral and Octocoral Visual Health Assessment Protocols” (Health Protocols). Corals and octocorals exhibiting visual signs of disease or potential disease vectors should not be removed, held temporarily, or relocated. **Exceptions:**

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- As identified in the “Coral and Octocoral Resource Mitigation” section of these Recommendations, there may be extreme circumstances in which the FWC will support coral and octocoral relocation during times of severe stress or significant stress events. For corals and octocorals that will be relocated during times of severe stress or from locations being impacted by significant stress events, FWC can provide an exception on a case-by-case basis from the “bleaching and partial bleaching” and “stress indicators” criterion identified in the Health Protocols (“Coral Visual Health Assessment” section, numbers 1)a. and 1)e. respectively, and “Octocoral Visual Health Assessment” section, numbers 2)a. and 2)e. respectively.) If an exception is provided by the FWC, these corals and octocorals may be relocated provided that all other criterion in the Health Protocols are met.
- Corals and octocorals surviving in interior waterways have demonstrated resilience in spite of the poor environmental conditions they are growing in and as such, have strong survival capabilities (potentially genetic) that are highly valued. Corals and octocorals that will be relocated from interior waterways are provided with an automatic exception from the “bleaching and partial bleaching” and “stress indicators” criterion in the Health Protocols (“Coral Visual Health Assessment” section, numbers 1)a. and 1)e. respectively, and “Octocoral Visual Health Assessment” section, numbers 2)a. and 2)e. respectively), and may be relocated provided that all other criterion identified in the Health Protocols are met.

Corals and octocorals held in a temporary holding site should again be visually assessed for health pursuant to the Health Protocols immediately prior to removal from the temporary holding site and reattachment at the relocation site.

Exception - The visual health assessment does not need to be conducted for corals and octocorals that have been maintained in a temporary holding site for 48 hours or less. Any corals or octocorals displaying signs of disease in the temporary holding site should either be: a) removed and disposed of, or b) removed and donated for ex-situ research.

Any corals or octocorals that were selected for relocation but were not relocated because they failed the visual health assessment should be documented in the “Diseased Coral Colony Info” or the “Diseased Octocoral Colony Info” data sheet provided for reporting requirements.

Temporary Holding of Corals and Octocorals Prior to Reattachment

If corals and octocorals will be placed in a temporary holding site after removal and prior to reattachment at the relocation site (for caching, staging, acclimation, etc.), the FWC recommends the following criteria be adhered to:

- The temporary holding site for corals and octocorals must be located in a stable area (e.g., low energy, low sedimentation, minimal freshwater input), and err conservatively on the side of being slightly farther from expected project-associated direct and indirect impact areas.
- Corals must be maintained in a temporary holding site either by affixing them to an elevated structure, or placing them in a suspended container in a manner wherein they are above the sea floor and do not touch each other. If corals are to remain in the temporary holding site for longer than two weeks, they must be cemented or epoxied to an elevated structure or to substrate elevated above the sea floor.
- Octocorals must be maintained in a temporary holding site either by affixing them to an elevated structure, or placing them in a suspended bag in a manner wherein they are above the sea floor and have adequate water flow (i.e., bags should not be crowded). If octocorals are to remain in the temporary holding site for longer than two weeks, they must be attached with zip ties by their holdfast or base to an elevated array or line system previously installed on the sea floor. Orientation is less important, but octocorals must not touch each other.
- The installation of any structure or system to facilitate the temporary holding of corals and octocorals prior to reattachment must also be authorized by project permits.

Coral and Octocoral Relocation Site Selection

The FWC recommends that the selection of an appropriate relocation site(s) for both corals and octocorals meet the following general criteria:

- The relocation site must be as close in proximity to the removal site as possible to preserve the functional ecosystem value of the surrounding areas provided by the resources to be relocated, but err conservatively on the side of being slightly farther from expected project-associated direct and indirect impact areas.
- Relocation site must be suitable reef habitat, be within the known range of the species or genera, and have historic presence of the species to be relocated (in recent decades).

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- Optimally, the relocation site should be located in similar water depths and have similar physical conditions (e.g., light availability, water quality, water circulation) to those at the removal site. It is recognized that this will not always be possible such as when relocating corals from interior waterways, and in these cases moving the corals offshore is acceptable.
- Optimally, the relocation site should have similar substrate orientation to removal site; i.e., if corals or octocorals are being removed from a vertical or sloped elevated surface, then the relocation site should have similar vertical or sloped areas for relocation. It is recognized that this will not always be possible such as when relocating corals and octocorals from vertical surfaces, and in these cases adopting a relocation orientation that mimics the orientation at the relocation site is acceptable.
- Relocation site must not contain large amounts of loose rubble and should not be a high energy environment (Edwards and Clark 1998).
- Relocation site must not be located within a direct or indirect impact area for any permitted, authorized or reasonably foreseeable marine coastal construction activity (e.g., dredging, beach nourishment, pipeline or communication cable installations), or within exclusion or buffer areas/zones (e.g., military, aquaculture, resource protection).
- Relocation site must have adequate and appropriate space to allow for: a) colony growth, tissue re-colonization and plating based on colony size, species growth rates, and maximum size capacity; and b) attachment density commensurate with regionally appropriate densities.

Coral and Octocoral Relocation Monitoring

The FWC recommends corals and octocorals that are relocated specifically for mitigation purposes are monitored for overall survival and attachment success during one week (may be conducted at any time during the seven days beginning the day immediately after the day relocation is conducted), at one month, at three months, at six months, at one year and at two years post-relocation. The FWC emphasizes the need for all of these recommended monitoring events to be performed, and the recommended activities/data collection to be conducted for these events is provided in the attached “Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities.” Seven (7) data sheets are also provided to facilitate capturing the data requested for monitoring and reporting purposes.

Monitoring Data to be Collected

The data requested to be collected for coral and octocoral mitigation relocation monitoring activities are specific to determining overall survival and attachment success, thus determining achievement of performance standards for mitigation actions (i.e., mitigation success). The data requested to be collected for monitoring activities will also assist with determining potential factors that may have contributed to the inability for mitigation actions to achieve performance standards (i.e., mitigation failure), such as localized disease or bleaching events, severe storm events, relocation contractor performance, etc.

Numbers of Corals/Octocorals to be Monitored

If the total quantity of corals or octocorals (considered separately for monitoring purposes) to be relocated comprises less than 4,000 colonies – select a representative subset of relocated corals/octocorals to be used for monitoring events, comprising 25% (or 1,000 corals/octocorals maximum) of the total number of corals/octocorals relocated. This subset must be representative of the species composition and size classes of the total relocated corals/octocorals, with no less than 10 corals/octocorals of each species monitored. If less than 10 corals/octocorals are relocated from a species, all relocated corals/octocorals of that species must be included in the subset. It is possible that for smaller-scale relocation projects, one or both of these requirements will result in all of the relocated corals/octocorals (i.e., set) needing to be monitored.

If the total quantity of coral/octocorals to be relocated exceeds 4,000 colonies, the FWC will reach a consensus with the applicant and the permitting agency on the number of representative subset corals/octocorals that will be monitored (the minimum will be 1,000 corals/octocorals).

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Reporting Schedule

The data collected during each monitoring event should be submitted according to the following schedule:
Relocation + one week event – information should be submitted within 21 days post-one week event.
One month through 2 year monitoring events - information should be submitted within 30 days post-event.

Technical Assistance

The FWC is available to provide technical expertise to assist with the development or review of monitoring plans. The FWC would appreciate the ability to provide additional comments on monitoring plans or monitoring plan revisions if such information is not available at this time and becomes available in the future.

Performance Standards

Corals – Non-ESA Listed Species

The performance standard to determine mitigation success for coral relocation activities for non-ESA listed species should be between 65-85% overall survival, with secure substrate attachment, two years after relocation. Overall survival of corals shall be defined as no net loss in pooled (by species) Live Tissue Area Index or an increase in pooled (by species) Live Tissue Area Index.

Live Tissue Area Index is calculated by averaging the coral maximum diameter and coral maximum height, then squaring the average dimension to determine Skeletal Area, then multiplying by the percent live tissue; formula as follows: $((D+H)/2)^2 * \%L$ (Williams and Miller 2012). All of the metrics needed to determine Live Tissue Area Index are either requested for collection during monitoring activities (e.g., max diameter, max height, percent live tissue), or are auto-populated in the “Non-Listed RelocatedCoralColony” data sheet provided (e.g., skeletal area). The Live Tissue Area Index column in the data sheet will also auto-populate once the needed metrics are recorded.

To calculate pooled Live Tissue Area Index by species for purposes of identifying the overall survival percentage, sum the Live Tissue Area Indices by species (not individual coral) that was auto-populated for each coral colony that was monitored. This percentage should be recorded in the “Non-Listed Coral&Octo Summary” data sheet.

Corals – ESA-Listed Species

The performance standard to determine mitigation success for coral relocation activities for ESA-listed species will be determined by the federal Biological Opinion for the project.

Octocorals

In order to establish mitigation performance standards for octocorals, FWC recommends evaluating overall survival of relocated octocorals via maximum height, and this metric is requested for collection in the “Coral and Octocoral Relocation Monitoring” section above and reflected in the “Relocated Octo Colony Info” data sheet provided. Overall survival shall be defined as no change in maximum height or an increase in maximum height.

The performance standard to determine mitigation success for octocoral relocation activities should be proposed by the applicant, and supported by available and appropriate documentation of octocoral relocation activities (e.g., literature, monitoring reports.) FWC request to review these proposals as they are submitted to determine if the documentation submitted supports the performance standard as proposed. Note - the “Non-Listed Coral&Octo Summary” data sheet does not provide columns for summarizing monitoring information for octocorals, as the performance standard has not yet been determined. This data sheet will need to be revised to accommodate for summarizing octocoral monitoring information to assist with determining mitigation success.

Technical Assistance

The FWC is available to provide technical expertise to assist with the development or review of performance standards. The FWC would appreciate the ability to provide additional comments on performance standards or performance standard revisions if such information is not available at this time and becomes available in the future.

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Coral and Octocoral Mitigation Relocation Recommendations**

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Florida Fish and Wildlife Conservation Commission (FWC)
Coral and Octocoral Visual Health Assessment Protocols for Mitigation Relocation Activities

CORALS

Definitions

For purposes of these Protocols:

- 1) “Bleaching” for purposes of coral relocation is defined as discolored coral tissue due to the loss or reduction in number of endosymbiotic algae (zooxanthellae (Genus *Symbiodinium*)). During bleaching, tissue is present but is pale to clear in color, and the white skeleton is visible underneath. A colony may be “bleached” (where 100% of colony tissue is affected by loss of zooxanthellae) or “partially bleached” (where < 100% of colony tissue is affected by loss of zooxanthellae, and a portion of colony tissue remains a healthy color).
- 2) “Coral” is a fragment or colony of any species of the Order **Scleractinia**, Order **Antipitharia**, and Genus *Millepora*.
- 3) “Interior waterways” are aquatic areas that have experienced physical restructuring of the shoreline (e.g., inner port harbors, marinas), or naturally occurring areas of low flushing (e.g., shallow bays.)
- 4) “Partial bleaching” is where only a portion of the coral has lost its zooxanthellae, and the remaining areas of tissue appear normal in color.
- 5) “Old mortality” is the non-living portion of exposed coral skeleton that has been overgrown by algae and other biofouling organisms and where the corallite structure has eroded over time and is no longer identifiable. *Not to be confused with “recent mortality.”
- 6) “Recent mortality” is the non-living portion of recently exposed coral skeleton (i.e., skeleton is white and corallite structures are intact and identifiable), including the development of fine “fuzz” or turf algae on exposed skeleton (i.e., skeleton is yellowish in appearance and corallite structure may be slightly eroded but still identifiable), indicating that the mortality occurred within a couple of weeks prior to observation. *Not to be confused with “old mortality.”
- 7) “Relocation” includes all activities that move coral fragments or colonies from one place to another (e.g., transplanting, outplanting), including but not limited to moving them into and out of temporary holding locations (e.g., cache, staging, acclimation locations) or nurseries.

Coral Visual Health Assessment

Each coral fragment or colony selected for relocation must be visually assessed pursuant to these Protocols to ensure that they appear to be in good health and are free from suspected disease. This visual health assessment must be conducted immediately prior to removal from each and any location, and may need to be conducted more than once before the relocation activity is completed (e.g., immediately prior to removal from an original collection location, a culture location (nursery), or a temporary holding location established for purposes of caching, staging, acclimation, etc.). **Exception - The visual health assessment does not need to be conducted for coral fragments or colonies that have been maintained in a temporary holding location for 48 hours or less.**

Coral fragments or colonies that are located in an original collection or culture location when the visual health assessment is conducted and are exhibiting visual signs of disease may not be removed and relocated to other in-water locations. Coral fragments or colonies that are located in a temporary holding location when the visual health assessment is conducted and are exhibiting visual signs of disease must be removed and disposed of, and this disposition must be noted in any post-relocation reporting documents. **Field personnel conducting coral visual health assessments should be proficient with species identification, and trained in coral disease, predation identification and removal, and survey techniques to assure accuracy of the assessment.** Each coral fragment or colony must meet the following criteria prior to relocation:

Each coral fragment or colony may not show any visible signs of disease or potential disease vectors based on the presence of:

- 1) Stress indicators (e.g., bleaching or partial bleaching; tissue sloughing, swelling, or thinning; excessive sedimentation; excessive mucous production). **Exceptions:**
 - a. Partial bleaching (< 100% of colony tissue) is acceptable for relocation of specific coral species for which it is recognized as a part of these coral species’ normal, healthy state. These coral species are as follows: *Oculina* spp., *Agaricia fragilis*, *Helioseris cucullata*, *Orbicella franksi*, *Siderastrea radians*, and *Undaria humilis*. Partial bleaching <2 cm on healthy, growing branch tips is also considered acceptable and normal for branching coral species including *Acropora cervicornis*, *Acropora palmata*, *Acropora prolifera*, *Millepora alcicornis* and *Millepora complanata*.

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- b. Exception to the “stress indicators” criterion is automatically provided for corals that are being removed and relocated from interior waterways as identified in the Mitigation Relocation Recommendations, “Coral and Octocoral Visual Health Assessment” section.
- 2) Recent mortality greater than 1% tissue loss exposing underlying skeleton. **Exception** - Old mortality is acceptable for corals that are to be relocated.
 - 3) Active disease (e.g., white/black/yellow/red band diseases, white pox or plague diseases, white *Beggiatoa* mats, dark (purple) spot/blotch diseases, growth anomalies).
 - 4) Suspect disease indicators (e.g., bands, spots, microbial mats, cyanobacteria colonization).
 - 5) Predation such as fireworms (*Hermodice carunculata*) or snails (e.g., *Coralliophila abbreviata*, *Thais deltoidea*). **Exception** - Corals may be relocated once all predators have been removed.
 - 6) Evidence of competition and overgrowth from organisms that cannot be removed (e.g., peeled off) prior to relocation such as: invasive, encrusting and/or overgrowing tunicates (e.g., Genus *Symplegma*, Genus *Botryllus*), sponges, octocorals (e.g., *Erythropodium caribaeorum*, *Briareum asbestinum*), or zoanthids (e.g., Genus *Palythoa*). **Exception** - Corals containing boring sponges of the Genus *Cliona* are acceptable for relocation. Numbers of corals that are relocated containing boring sponges of the Genus *Cliona* must be noted in any post-relocation reporting documents.

OCTOCORALS

Definitions

For purposes of these Protocols:

- 1) An “octocoral” is a colony of any species of the Subclass **Octocorallia**, excluding encrusting octocorals (e.g., *Erythropodium caribaeorum*, *Briareum asbestinum*).
- 2) A “rod” is characterized as having thick branches, and usually secondary branches with thick tissues.
- 3) A “seafan” is characteristically fan shaped with interconnected net-like branching with thin tissues.
- 4) A “plume” is characterized as having thin pinnate (feather-like) branches and branchlets with thin tissues.
- 5) A “holdfast” is the base of an octocoral that attaches the colony to the substrate.
- 6) The “axis” of an octocoral is the central supporting skeletal structure made out of proteinaceous gorgonin that is dark brown to black in color.
- 7) “Bleaching” for the purposes of octocoral relocation is defined as 100% of octocoral tissue is discolored due to the loss or reduction in number of endosymbiotic algae (zooxanthellae). During bleaching, tissue is present but is pale to white in color.
- 8) “Partial bleaching” is where only a portion of the octocoral tissue has lost its zooxanthellae, and the remaining areas of tissue appear normal in color. *Note that octocorals rarely bleach and generally tend to exhibit partial bleaching at their branch tips closest to the water’s surface.
- 9) “Recent mortality” is the non-living portion of recently exposed octocoral axis skeleton (i.e., axis is dark brown to black), including the development of fine “fuzz” or turf algae on exposed axis, indicating that the mortality occurred within a few days prior to observation. **“Old mortality” is not determinable in octocorals.
- 10) “Relocation” includes all activities that move octocoral colonies from one place to another (e.g., transplanting, outplanting), including but not limited to moving them into and out of temporary holding locations (e.g., cache, staging, acclimation locations) or nurseries.

Octocoral Visual Health Assessment

Each octocoral colony selected for relocation must be visually assessed pursuant to these Protocols to ensure that they appear to be in good health and are free from suspected disease. This visual health assessment must be conducted immediately prior to removal from each and any location, and may need to be conducted more than once before the relocation activity is completed (e.g., immediately prior to removal from an original collection location, a culture location (nursery), or a temporary holding location established for purposes of caching, staging, acclimation, etc.). **Exception - The visual health assessment does not need to be conducted for octocoral colonies that have been maintained in a temporary holding location for 48 hours or less.**

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Octocoral colonies that are located in an original collection or culture location when the visual health assessment is conducted and are exhibiting visual signs of disease may not be removed and relocated to other in-water locations. Octocoral colonies that are located in a temporary holding location when the visual health assessment is conducted and are exhibiting visual signs of disease must be removed and disposed of, and this disposition must be noted in any reporting or monitoring documents. **Field personnel conducting octocoral visual health assessments should be proficient with species identification, and trained in octocoral disease, predation identification and removal, and survey techniques to assure accuracy of the assessment.** Each octocoral colony must meet the following criteria prior to relocation:

- 1) Rod, plume, and seafan colonies must have at least 10 cm (approx. 4") of linear growth (height).
- 2) Show no visible signs of disease or potential disease vectors based on the presence of:
 - a. Stress indicators (e.g., bleaching or partial bleaching, tissue sloughing or swelling; excessive mucous production). **Exception** – Exception to this criterion is automatically provided for octocorals that are being removed and relocated from interior waterways as identified in the Mitigation Relocation Recommendations, “Coral and Octocoral Visual Health Assessment” section.
 - b. Recent mortality greater than 5% of tissue loss exposing axis.
 - c. Active disease (e.g., purple spot, aspergillois, red band disease, black wasting disease, growth anomalies (severely altered morphology of tissues and skeleton)).
 - d. Suspect disease indicators (e.g., bands, spots or rings (identified by severe dark purpling (25% or greater) or blackening of tissues); microbial mats; cyanobacteria colonization).
- 3) Octocorals that are experiencing active predation (e.g., presence of predators, including *Cyphoma gibbosum* and/or *Hermodice carunculata*, in feeding position along tissue loss margin), may be relocated once all predators are removed. **Exception** – Colonies of *Gorgonia ventalina* with active predation of the nudibranch *Tritonia hamnerorum*, cannot be relocated.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

The following are monitoring activities and directions for filling out seven (7) associated monitoring data sheets, for all coral and octocoral mitigation relocation activities which include relocation and subsequent monitoring of relocated colonies. Additional monitoring events and additional data collection may be conducted as needed by the license holder to address individual project documentation needs.

List of Data Sheets

- 1) **Non-Listed Coral&Octo Summary** – this data sheet is for providing information on the removal, temporary holding, and relocation sites, and summarizing the monitoring information for all non-ESA listed coral species. Please note that columns BO through BT are for summarizing monitoring information for coral (not octocoral) species only. This data sheet does not provide columns for summarizing monitoring information for octocorals, as the performance standard has not yet been determined at this time. This data sheet will need to be revised to accommodate for summarizing octocoral monitoring information to assist with determining mitigation success.
- 2) **Non-Listed RelocatedCoralColony** – this data sheet is where the information from all of the monitoring events is recorded for relocated non-ESA listed coral species.
- 3) **ESA-Listed Site Descriptions** – this data sheet is for providing the information on the removal, temporary holding, and relocation sites for ESA-listed species only. Since ESA-listed species are evaluated individually, summarized monitoring information is not necessary for these species.
- 4) **ESA-Listed RelocatedCoralColony** - this data sheet is where the information from all of the monitoring events is recorded for relocated ESA-listed coral species.
- 5) **Diseased Coral Colony Info** – this data sheet is for providing information on both non-ESA listed and ESA-listed corals that did not pass the visual health assessment and were not relocated. This information is requested in the “Coral and Octocoral Visual Health Assessment” section of the Recommendations.
- 6) **Relocated Octocoral Colony Info** - this data sheet is where the information from all of the monitoring events is recorded for relocated octocoral species.
- 7) **Diseased Octocoral Colony Info** - this data sheet is for providing information on octocorals that did not pass the visual health assessment and were not relocated. This information is requested in the “Coral and Octocoral Visual Health Assessment” section of the Recommendations.

Prior to Relocation:

- Review all permits issued by all agencies (and the Biological Opinion if applicable), and determine what format(s) the removal, temporary holding, and relocation site coordinates need to be provided in for reporting requirements. For ESA-listed species, the Biological Opinion will typically require single-point coordinates.
- Review the “Non-Listed Coral&Octo Summary” data sheet and “Guideline A” on page 4 to be familiar with the format options for how to record site coordinates in the “Non-Listed Coral&Octo Summary” data sheet. Please note that the coordinates may need to be recorded in more than one format to meet multiple agency permit-required reporting requirements.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

At Time of Relocation:

- Take site coordinates as determined to meet permit-required reporting requirements.
- Individually tag or location mark/tag and map the set or subset of relocated corals and octocorals to be monitored (including assignment of an identification number or alphanumeric character for each coral/octocoral), so that they can be tracked individually over time for monitoring events. Location marking and tagging for mapping purposes must include a sufficient number of markers/tags to be able to identify the locations of each relocated coral or octocoral (e.g., corner point markers, central marker, tagging each row).
- Any corals and octocorals that were identified as viable candidates for relocation but were not relocated because they failed the visual health assessment, should be documented in either the “Diseased Coral Colony Info” or “Diseased Octocoral Colony Info” data sheets.

During All Monitoring Events

- This same set or subset of corals/octocorals must be used for all of the monitoring events.
- All loose or detached colonies must be reattached to their structure or substrate.

Recording Data

Each cell in all data sheets must have information recorded in it, or a value of zero. Do not include any symbols (e.g., %), or measurements (e.g., cm, ft, kts), unless specified in directions (e.g., 0-20, <1, 5+).

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

Non-Listed Coral and Octocoral Summary Data Sheet Directions

In the “Non-Listed Coral&Octo Summary” data sheet, record the following information for non-listed coral and octocoral species PER SITE, PER SPECIES (not individual colonies):

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
- A. Coral/Octocoral Species – record each relocated species by relocation site on a separate row.
- B. Total Number of Colonies Relocated – record the total number of colonies for each species that was relocated by relocation site on a separate row.
- C. Total Number of Colonies to be Monitored – record either the total number of individual colonies for each species that will be monitored by relocation site, or the total number of individual colonies for each species that will comprise the “Subset” of colonies to be monitored, by relocation site.
- D. Date Relocation Started – this is the date that relocation activities began.
- E. Time Remained in Temporary Holding Site – provide the length of time (in # of days) that the corals/octocorals were held in a temporary holding site before relocation was completed. Record a value of zero if not applicable.
- F. Date Relocation Completed – this is the date that relocation activities were completed.
- G. Removal Site Location Description – provide a brief description of where the removal site is located.
- H. Removal Site Identifier – assign and provide a unique operational name/number/alphanumeric character for the removal site.
- I. Removal Site Depth – provide the depth (in feet) of the removal site.

- Columns J. through Z. – Refer to “Guideline A” for directions on how to provide coordinates for the removal site. Provide all formats required by all permits for reporting requirements.

- ★ The following columns X. through AQ. only apply to temporary holding sites (e.g., cache, staging, acclimation). Only provide data for these columns if corals/octocorals will not be directly relocated, and a temporary holding site will be used. Provide a value of zero if not applicable.

- AA. Temporary Holding Site Location Description – provide a brief description of where the temporary holding site is located.
- AB. Temporary Holding Site Identifier – assign and provide a unique operational name/number/alphanumeric character for the temporary holding site.
- AC. Temporary Holding Site Depth – provide the depth (in feet) of the temporary holding site.

- Columns AD. through AT. – Refer to “Guideline A” for directions on how to provide coordinates for the temporary holding site. Provide all formats required by all permits for reporting requirements.

- AU. Relocation Site Location Description – provide a brief description of where the relocation site is located.
- AV. Relocation Site Identifier – assign and provide a unique operational name/number/alphanumeric character for the relocation site.
- AW. Relocation Site Depth – provide the depth (in feet) of the relocation site.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

- Columns AX. through BN. – Refer to “Guideline A” for directions on how to provide coordinates for the relocation site. Provide all formats required by all permits for reporting requirements.
- BO. At Relocation Monitoring (Pooled Coral Live Tissue Area Index) – sum the Live Tissue Area Indices auto-calculated for each coral colony by species (column “R” in the “Non-Listed RelocatedCoralColony” data sheet) – record the summed amount for each species by relocation site on a separate row.
- BP. 6 Month Monitoring (Pooled Coral Live Tissue Area Index) – sum the Live Tissue Area Indices auto-calculated for each coral colony by species (column “BD” in the “Non-Listed RelocatedCoralColony” data sheet) – record the summed amount for each species by relocation site on a separate row.
- BQ. 1 Year Monitoring (Pooled Coral Live Tissue Area Index) – sum the Live Tissue Area Indices auto-calculated for each coral colony by species (column “BS” in the “Non-Listed RelocatedCoralColony” data sheet) – record the summed amount for each species by relocation site on a separate row.
- BR. 2 Year Monitoring (Pooled Coral Live Tissue Area Index) – sum the Live Tissue Area Indices auto-calculated for each coral colony by species (column “CH” in the “Non-Listed RelocatedCoralColony” data sheet) – record the summed amount for each species by relocation site on a separate row.
- BS. Change in pooled Live Tissue Area Index – this will auto-populate to provide any changes in the pooled live tissue area index by species and site.
- BT. Overall Survival – this will auto-populate to provide overall survival by species and site.
- BU. Notes – document any additional information deemed relevant by the license holder.

Guideline A

Coordinates – There are four options for providing coordinates for the removal site, temporary holding site, and relocation site. These options are designed to meet regulatory requirements (as specifically required by any agency permit or Biological Opinion (BO)), accommodate for site design and activity size (if a specific format is not required by agency permits), and provide accuracy for permit enforcement purposes (all formats accommodate this). Provide all of the formats that are necessary to meet all regulatory requirements for all project-issued permits (first), and if a format is not specified in any permit, then provide the format that best fits the site design and activity (second). It is not necessary to provide all four formats unless required by permits. The four options are as follows:

- Single Point – Single point coordinates are usually required in most BOs for listed species, but may also be appropriate for use in smaller scale relocation activities. It is likely that if relocation activities include both listed and non-listed species, you will need to provide both single point coordinates for the listed species, and some other format for non-listed species. Provide the latitude and longitude (separate columns) of the single point coordinate in decimal degree format.
- Linear – Linear coordinates may be appropriate for use when the site is in somewhat of a straight line (e.g., seawall, rip rap). Provide the latitude and longitude (separate columns) of the beginning point and the end point of the site in decimal degree format.
- Corners – Some permits require a single point coordinate of each corner of a site to be provided, regardless of the design of the site. Provide the latitude and longitude (separate columns) of the single point coordinates of the NE, NW, SE, SW corners of the site, in decimal degree format.
- Undefined – Undefined coordinates may be appropriate for use when the site design is undefined (i.e., random, opportunistic). Provide the latitude and longitude (separate columns) of the single center point coordinate in decimal degree format, and a radius (in meters) from the single center point that will encompass the site.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

Non-Listed Relocated Coral Colony Information Data Sheet Directions

In the “Non-Listed Relocated Coral Colony” datasheet, record the following information PER INDIVIDUAL COLONY for all relocated colonies that are being monitored:

At Relocation:

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
- A. Event Date – provide the date that the colony was removed.
- B. Removal Site Identifier – provide the unique operational name/number/alphanumeric character assigned to the removal site, as identified in the “Summary” data sheet.
- C. Temporary Holding Site Identifier - provide the unique operational name/number assigned to the temporary holding site, as identified in the “Summary” data sheet.
- D. Relocation Site Identifier – provide the unique operational name/number assigned to the relocation site, as identified in the “Summary” data sheet.
- E. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- F. % Cloud Cover – record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- G. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- H. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- I. Coral species – record each relocated coral by the species full taxonomic name (no abbreviations) on a separate row.
- J. Colony Identifier – record the unique tag or map number/alphanumeric character assigned to each coral being monitored.
- K. Coral Relocation Condition – record if the colony was removed and relocated as an (I) = Intact Colony; as a (SC) = Single Colony (i.e., portion of a colony that fragmented upon removal but is 5 cm or greater); or as a (RC) = Reconstructed Colony (i.e., colony that fragmented upon removal and was reconstructed.)
- L. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- M. Coral Max Width – the maximum coral width is measured as the outward-facing surface of the colony (perpendicular to the axis of growth). This measurement includes both living tissue and dead areas of the colony.
- N. Coral Max Height – the maximum coral height is measured parallel to the axis of growth, perpendicular to growth bands, as viewed from the side of the colony.
- O. Coral Skeletal Area – this will auto-populate, and is equal to the average of the two largest dimensions (maximum width and maximum height), squared. To apply this formula to all of the data in this column, you have two options: 1) drag the formula down the column by clicking in the cell in row 5 with the value of “0”, and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded; or 2) copy and paste the formula for each colony’s data recorded.
- P. Coral Tissue Condition – Live – Includes all live tissue, including any bleached tissue (pale or clear living tissue that has lost zooxanthellae), estimated as a percentage of the entire coral skeleton. Assign a tissue condition percentage for live tissue, and record as a decimal, with two decimal places – e.g., 10% = .10
- Q. Coral Tissue Condition – Dead – Includes both recent and old dead tissue; defined as either 1) bright white dead areas where corallite structure is still identifiable, estimated as a percentage of the entire coral skeleton. May be covered by sediment or thin layer of algae; or 2) dead areas that are not bright white and may be overgrown with algae or other encrusting organisms, estimated as

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a percentage of the entire coral skeleton. Assign a tissue condition percentage for dead tissue, and record as a decimal, with two decimal places – e.g., 10% = .10

- R. Coral Live Tissue Area Index (or estimate) – this will auto-populate, and is equal to the Skeletal Area times the % live tissue value. Please copy and paste the formula for each colony's data recorded, or drag the formula down the column by clicking in the cell in row 5 with the value of "0", and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded.
- S. Presence of Other Conditions (bleaching, predation, disease, *Cliona*).
- T. Comments/Observations – Document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

One Week After Relocation:

- U. Event Date – provide the date that the colony was monitored.
- V. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.

- W. % Cloud Cover – record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- X. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- Y. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- Z. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.

At One Month After Relocation:

- AA. Event date – provide the date that the colony was monitored.
- AB. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- AC. % Cloud Cover - record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- AD. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- AE. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- AF. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- AG. Sediment Indicators – Record any indicators of sedimentation as follows:
 - (SD) = Sediment Dusting - A fine powdering of sediment observable on the surface of the colony or individual. May occur in patches or over the entire organism. Powdering does not obscure features of the colony or individual (i.e., polyps are still observable).
 - (SA) = Sediment Accumulation - Patches (areas) of sediment thicker than dusting are observable on the top or sides of the organism. Features of the colony or individual (i.e., polyps) are likely obscured by sediment patches.
 - (PB) = Partial Burial - Portions of the organism are covered by sediment, including at least some portion of the base (point of attachment). Features of colonies and individuals are obscured.
 - (BB) = Burial of the Base - Sediment covers the entire point of attachment / base of the organism.
 - (B) = Burial - Entire organism is covered by sediment.
 - (H) = Sediment Halo - A pattern of partial colony mortality in which a concentric ring of dead coral skeleton occurs at the base of the coral colony, as results from prior burial of the

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- colony edges. Sedimentation does not have to be present or observed for this indicator to be discernible.
- AH. Presence of Other Conditions – record observed conditions (bleaching, predation, disease, Cliona).
 - AI. Comments/Observations – Document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

At Three Months After Relocation

Repeat columns AA. through AI. for columns AJ. through AR.

At Six Months After Relocation:

- AS. Event date – provide the date that the colony was monitored.
- AT. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- AU. % Cloud Cover - record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.

- AV. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- AW. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- AX. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- AY. Coral Max Width – the maximum coral width is measured as the outward-facing surface of the colony (perpendicular to the axis of growth). This measurement includes both living tissue and dead areas of the colony.
- AZ. Coral Max Height – the maximum coral height is measured parallel to the axis of growth, perpendicular to growth bands, as viewed from the side of the colony.
- BA. Coral Skeletal area – this will auto-populate, and is equal to the average of the two largest dimensions (maximum width and maximum height), squared. Please copy and paste the formula for each colony's data recorded, or drag the formula down the column by clicking in the cell in row 5 with the value of "0", and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded.
- BB. Coral Tissue Condition – Live – Includes all live tissue, including bleached tissue, estimated as a percentage of the entire coral skeleton. Assign a tissue condition percentage for live tissue, and record as a decimal, with two decimal places – e.g., 10% = .10
- BC. Coral Tissue Condition – Dead – Includes both recent and old dead tissue; defined as either 1) bright white dead areas where corallite structure is still identifiable, estimated as a percentage of the entire coral skeleton. May be covered by sediment or thin layer of algae, or 2) dead areas that are not bright white and may be overgrown with algae or other encrusting organisms, estimated as a percentage of the entire coral skeleton. Assign a tissue condition percentage for dead tissue, and record as a decimal, with two decimal places – e.g., 10% = .10
- BD. Coral Live Tissue Area Index (or estimate) – this will auto-populate, and is equal to the Skeletal Area times the % live tissue value. Please copy and paste the formula for each colony's data recorded, or drag the formula down the column by clicking in the cell in row 5 with the value of "0", and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded.
- BE. Sediment Indicators – Record any indicators of sedimentation as follows:

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

- (SD) = Sediment Dusting - A fine powdering of sediment observable on the surface of the colony or individual. May occur in patches or over the entire organism. Powdering does not obscure features of the colony or individual (i.e., polyps are still observable).
- (SA) = Sediment Accumulation - Patches (areas) of sediment thicker than dusting are observable on the top or sides of the organism. Features of the colony or individual (i.e., polyps) are likely obscured by sediment patches.
- (PB) = Partial Burial - Portions of the organism are covered by sediment, including at least some portion of the base (point of attachment). Features of colonies and individuals are obscured.
- (BB) = Burial of the Base - Sediment covers the entire point of attachment / base of the organism.
- (B) = Burial - Entire organism is covered by sediment.
- (H) = Sediment Halo - A pattern of partial colony mortality in which a concentric ring of dead coral skeleton occurs at the base of the coral colony, as results from prior burial of the colony edges. Sedimentation does not have to be present or observed for this indicator to be discernible.

BF. Presence of Other Conditions – record observed conditions (bleaching, predation, disease, Cliona).

BG. Comments/Observations – document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

At One Year After Relocation

Repeat columns AS. through BG. for columns BH. through BV.

At Two Years After Relocation

Repeat columns AS. through BG. for columns BW. through CK.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

ESA-Listed Species Site Descriptions Data Sheet Direction

In the “ESA-Listed Site Descriptions” data sheet, record the following information:

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
- A. ESA-Listed Coral Species – record each relocated species by relocation site on a separate row.
- B. Removal Site Location Description – provide a brief description of where the removal site is located.
- C. Removal Site Identifier – assign and provide a unique operational name/number/alphanumeric character for the removal site.
- D. Removal Site Depth – provide the depth (in feet) of the removal site.

- Columns E. through U. – Refer to “Guideline A” on page 4 for directions on how to provide coordinates for the removal site. Provide all formats required by all permits for reporting requirements.

- ★ The following columns V. through AO. only apply to temporary holding sites (e.g., cache, staging, acclimation). Only provide data for these columns if ESA-listed corals will not be directly relocated, and a temporary holding site will be used. Provide a value of zero if not applicable.

- V. Temporary Holding Site Location Description – provide a brief description of where the temporary holding site is located.
- W. Temporary Holding Site Identifier – assign and provide a unique operational name/number/alphanumeric character for the temporary holding site.
- X. Temporary Holding Site Depth – provide the depth (in feet) of the temporary holding site.

- Columns Y. through AO. – Refer to “Guideline A” on page 4 for directions on how to provide coordinates for the temporary holding site. Provide all formats required by all permits for reporting requirements.

- AP. Relocation Site Location Description – provide a brief description of where the relocation site is located.
- AQ. Relocation Site Identifier – assign and provide a unique operational name/number/alphanumeric character for the relocation site.
- AR. Relocation Site Depth – provide the depth (in feet) of the relocation site.

- Columns AS. through BI. – Refer to “Guideline A” on page 4 for directions on how to provide coordinates for the relocation site. Provide all formats required by all permits for reporting requirements.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

ESA-Listed Relocated Coral Colony Information Data Sheet Directions

In the “ESA-Listed Relocated Coral Colony” datasheet, record the following information PER INDIVIDUAL COLONY for all relocated colonies:

At Relocation:

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
- A. Event Date – provide the date that the colony was removed.
- B. Removal Site Identifier – provide the unique operational name/number/alphanumeric character assigned to the removal site, as identified in the “Summary” data sheet.
- C. Date Relocation Started – this is the date that relocation activities began.
- D. Temporary Holding Site Identifier – provide the unique operational name/number assigned to the temporary holding site, as identified in the “Summary” data sheet.
- E. Time Remained in Temporary Holding Site – provide the length of time (in # of days) that the corals/octocorals were held in a temporary holding site before relocation was completed. Record a value of zero if not applicable.
- F. Relocation Site Identifier – provide the unique operational name/number assigned to the relocation site, as identified in the “Summary” data sheet.
- G. Date Relocation Completed – this is the date that relocation activities were completed.
- H. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- I. % Cloud Cover – record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- J. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- K. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- L. ESA-Listed Coral species – record each individual relocated ESA-listed coral by the species full taxonomic name (no abbreviations) on a separate row.
- M. Colony Identifier – record the unique tag or map number/alphanumeric character assigned to each coral being monitored.
- N. Coral Relocation Condition – record if the colony was removed and relocated as an (I) = Intact Colony; as a (SC) = Single Colony (i.e., portion of a colony that fragmented upon removal but is 5 cm or greater); or as a (RC) = Reconstructed Colony (i.e., colony that fragmented upon removal and was reconstructed.)
- O. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- P. Coral Max Width – the maximum coral width is measured as the outward-facing surface of the colony (perpendicular to the axis of growth). This measurement includes both living tissue and dead areas of the colony.
- Q. Coral Max Height – the maximum coral height is measured parallel to the axis of growth, perpendicular to growth bands, as viewed from the side of the colony.
- R. Coral Skeletal Area – this will auto-populate, and is equal to the average of the two largest dimensions (maximum width and maximum height), squared. To apply this formula to all of the data in this column, you have two options: 1) drag the formula down the column by clicking in the cell in row 5 with the value of “0”, and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded; or 2) copy and paste the formula for each colony’s data recorded.
- S. Coral Tissue Condition – Live – Includes all live tissue, including any bleached tissue (pale or clear living tissue that has lost zooxanthellae), estimated as a percentage of the entire coral

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

skeleton. Assign a tissue condition percentage for live tissue, and record as a decimal, with two decimal places – e.g., 10% = .10

- T. Coral Tissue Condition – Dead – Includes both recent and old dead tissue; defined as either 1) bright white dead areas where corallite structure is still identifiable, estimated as a percentage of the entire coral skeleton. May be covered by sediment or thin layer of algae; or 2) dead areas that are not bright white and may be overgrown with algae or other encrusting organisms, estimated as a percentage of the entire coral skeleton. Assign a tissue condition percentage for dead tissue, and record as a decimal, with two decimal places – e.g., 10% = .10
- U. Coral Live Tissue Area Index (or estimate) – this will auto-populate, and is equal to the Skeletal Area times the % live tissue value. Please copy and paste the formula for each colony's data recorded, or drag the formula down the column by clicking in the cell in row 5 with the value of "0", and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded.
- V. Presence of Other Conditions (bleaching, predation, disease, Cliona).
- W. Comments/Observations – Document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

During One Week After Relocation:

- X. Event Date – provide the date that the colony was monitored.
- Y. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- Z. % Cloud Cover – record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- AA. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- AB. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- AC. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.

At One Month After Relocation:

- AD. Event date – provide the date that the colony was monitored.
- AE. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- AF. % Cloud Cover - record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- AG. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- AH. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- AI. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- AJ. Sediment Indicators – Record any indicators of sedimentation as follows:
 - (SD) = Sediment Dusting - A fine powdering of sediment observable on the surface of the colony or individual. May occur in patches or over the entire organism. Powdering does not obscure features of the colony or individual (i.e., polyps are still observable).
 - (SA) = Sediment Accumulation - Patches (areas) of sediment thicker than dusting are observable on the top or sides of the organism. Features of the colony or individual (i.e., polyps) are likely obscured by sediment patches.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

- (PB) = Partial Burial - Portions of the organism are covered by sediment, including at least some portion of the base (point of attachment). Features of colonies and individuals are obscured.
 - (BB) = Burial of the Base - Sediment covers the entire point of attachment / base of the organism.
 - (B) = Burial - Entire organism is covered by sediment.
 - (H) = Sediment Halo - A pattern of partial colony mortality in which a concentric ring of dead coral skeleton occurs at the base of the coral colony, as results from prior burial of the colony edges. Sedimentation does not have to be present or observed for this indicator to be discernible.
- AK. Presence of Other Conditions – record observed conditions (bleaching, predation, disease, Cliona).
- AL. Comments/Observations – Document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

At Three Months After Relocation

Repeat columns AD. through AL. for columns AM. through AU.

At Six Months After Relocation:

- AV. Event date – provide the date that the colony was monitored.
- AW. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- AX. % Cloud Cover - record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- AY. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- AZ. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- BA. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- BB. Coral Max Width – the maximum coral width is measured as the outward-facing surface of the colony (perpendicular to the axis of growth). This measurement includes both living tissue and dead areas of the colony.
- BC. Coral Max Height – the maximum coral height is measured parallel to the axis of growth, perpendicular to growth bands, as viewed from the side of the colony.
- BD. Coral Skeletal area – this will auto-populate, and is equal to the average of the two largest dimensions (maximum width and maximum height), squared. Please copy and paste the formula for each colony's data recorded, or drag the formula down the column by clicking in the cell in row 5 with the value of "0", and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded.
- BE. Coral Tissue Condition – Live – Includes all live tissue, including bleached tissue, estimated as a percentage of the entire coral skeleton. Assign a tissue condition percentage for live tissue, and record as a decimal, with two decimal places – e.g., 10% = .10
- BF. Coral Tissue Condition – Dead – Includes both recent and old dead tissue; defined as either 1) bright white dead areas where corallite structure is still identifiable, estimated as a percentage of the entire coral skeleton. May be covered by sediment or thin layer of algae, or 2) dead areas that are not bright white and may be overgrown with algae or other encrusting organisms, estimated as a percentage of the entire coral skeleton. Assign a tissue condition percentage for dead tissue, and record as a decimal, with two decimal places – e.g., 10% = .10

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

- BG. Coral Live Tissue Area Index (or estimate) – this will auto-populate, and is equal to the Skeletal Area times the % live tissue value. Please copy and paste the formula for each colony's data recorded, or drag the formula down the column by clicking in the cell in row 5 with the value of "0", and dragging the green box in the lower right hand corner of the cell down to the last colony that has data recorded.
- BH. Sediment Indicators – Record any indicators of sedimentation as follows:
- (SD) = Sediment Dusting - A fine powdering of sediment observable on the surface of the colony or individual. May occur in patches or over the entire organism. Powdering does not obscure features of the colony or individual (i.e., polyps are still observable).
 - (SA) = Sediment Accumulation - Patches (areas) of sediment thicker than dusting are observable on the top or sides of the organism. Features of the colony or individual (i.e., polyps) are likely obscured by sediment patches.
 - (PB) = Partial Burial - Portions of the organism are covered by sediment, including at least some portion of the base (point of attachment). Features of colonies and individuals are obscured.
 - (BB) = Burial of the Base - Sediment covers the entire point of attachment / base of the organism.
 - (B) = Burial - Entire organism is covered by sediment.
 - (H) = Sediment Halo - A pattern of partial colony mortality in which a concentric ring of dead coral skeleton occurs at the base of the coral colony, as results from prior burial of the colony edges. Sedimentation does not have to be present or observed for this indicator to be discernible.
- BI. Presence of Other Conditions – record observed conditions (bleaching, predation, disease, Cliona).
- BJ. Comments/Observations – document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

At One Year After Relocation

Repeat columns AV. through BJ. for columns BK. through BY.

At Two Years After Relocation

Repeat columns AV. through BJ. for columns BZ. through CN.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

Diseased Coral Colony Information Data Sheet Directions

In the “Diseased Coral Colony Info” data sheet, record the following information PER INDIVIDUAL COLONY of either non-listed or ESA-listed coral species that were not relocated due to suspect disease or other disqualifying conditions:

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
- A. Event Date – provide the date that the colony was monitored.
- B. Removal Site Identifier – provide the unique operational name/number/alphanumeric character assigned to the removal site, as identified in the “Summary” data sheet.
- C. Temporary Holding Site Identifier (if applicable) – provide the unique operational name/number/alphanumeric character assigned to the temporary holding site, as identified in the “Summary” data sheet.
- D. Coral Species – record each diseased coral by the species full taxonomic name (no abbreviations) on a separate row.
- E. Coral Max Width – the maximum coral width is measured as the outward-facing surface of the colony (perpendicular to the axis of growth). This measurement includes both living tissue and dead areas of the colony.
- F. Coral Max Height – the maximum coral height is measured parallel to the axis of growth, perpendicular to growth bands, as viewed from the side of the colony.
- G. Coral Disqualifier – identify what condition disqualified the coral colony from relocation, using the key code provided.
- H. Type of Coral Disqualifying Active Disease or Suspect Disease Indicator – if the coral was disqualified due to an active disease or suspect disease indicator, use the key code provided to identify the disease or disease indicator that disqualified the coral from relocation.
- I. Type of Coral Disqualifying Stress Indicator – if the coral was disqualified due to a stress indicator indicator, use the key code provided to identify the stress indicator that disqualified the coral from relocation.
- J. Type of Coral Disqualifying Predation/Competition/Overgrowth Condition – if the coral was disqualified from relocation due to predation, competition or overgrowth, use the key code provided to identify the predator, competitor or overgrowth condition that disqualified the coral from relocation.
- K. Disposition – identify how the coral was disposed of using the key code provided.
- L. Comments/Observations - provide any observation details for unknown disease or conditions, name of entity that diseased corals were donated to (if donated), and any other information deemed relevant by the data collector.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

Relocated Octocoral Colony Information Data Sheet Directions

In the “Relocated Octocoral Colony Info” datasheet, record the following information PER INDIVIDUAL COLONY for all relocated colonies that are being monitored:

At Relocation:

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
- A. Event Date – provide the date that the colony was removed.
- B. Removal Site Identifier – provide the unique operational name/number/alphanumeric character assigned to the removal site, as identified in the “Summary” data sheet.
- C. Relocation Site Identifier – provide the unique operational name/number assigned to the relocation site, as identified in the “Summary” data sheet.
- D. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- E. % Cloud Cover – record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- F. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- G. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- H. Octocoral species – record each relocated octocoral by the species full taxonomic name (no abbreviations) on a separate row.
- I. Colony Identifier – record the tag or map number/alphanumeric character assigned to each octocoral being monitored.
- J. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- K. Octocoral Max Height – the maximum height is measured from the base of the holdfast attachment to the top of the colony (following the axis of growth) as seen from the side.
- L. Presence of Other Conditions (bleaching, predation, disease).
- M. Comments/Observations – Document any localized event (not specific to relocated octocorals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

One Week After Relocation:

- N. Event Date – provide the date that the colony was monitored.
- O. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- P. % Cloud Cover – record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- Q. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- R. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- S. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.

At One Month After Relocation:

- T. Event date – provide the date that the colony was monitored.
- U. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- V. % Cloud Cover - record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- W. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- X. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

- Y. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- Z. Sediment Indicators – Record any indicators of sedimentation as follows:
- (SD) = Sediment Dusting - A fine powdering of sediment observable on the surface of the colony or individual. May occur in patches or over the entire organism. Powdering does not obscure features of the colony or individual (i.e., polyps are still observable).
 - (SA) = Sediment Accumulation - Patches (areas) of sediment thicker than dusting are observable on the top or sides of the organism. Features of the colony or individual (i.e., polyps) are likely obscured by sediment patches.
 - (PB) = Partial Burial - Portions of the organism are covered by sediment, including at least some portion of the base (point of attachment). Features of colonies and individuals are obscured.
 - (BB) = Burial of the Base - Sediment covers the entire point of attachment / base of the organism.
 - (B) = Burial - Entire organism is covered by sediment.
 - (EA) = Eroded Axis Material - A pattern of partial colony mortality in which a concentric ring of dead coral skeleton occurs at the base of the coral colony as results from prior burial of the colony edges. Sedimentation does not have to be present or observed for this indicator to be discernible.
- AA. Presence of Other Conditions – record observed conditions (bleaching, predation, disease, Cliona).
- AB. Comments/Observations – Document any localized event (not specific to relocated corals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

At Three Months After Relocation

Repeat columns T. through AB. for columns AC. through AK.

At Six Months After Relocation:

- AL. Event date – provide the date that the colony was monitored.
- AM. Visibility – this is measured either from the surface, or between two divers, using a secchi disk.
- AN. % Cloud Cover - record the percentage of cloud cover as 0-20; 20-40; 40-60; 60-80; 80-100.
- AO. Wave Height – record the wave height in feet as <1; 1-2; 2-3; 3-4; 4-5; 5+
- AP. Wind Speed – record the wind speed in knots as 0-5; 5-10; 10-15; 15-20; 20-25
- AQ. Attachment – conduct a visual survey for attachment condition of relocated colonies, and record condition status as: (F) = Firm; (L) = Loose; (D) = Detached but still present nearby; (M) = Missing. All loose or detached colonies must be reattached to their structure or substrate.
- AR. Octocoral Max Height – the maximum height is measured from the base of the holdfast attachment to the top of the colony (following the axis of growth) as seen from the side.
- AS. Sediment Indicators – Record any indicators of sedimentation as follows:
- (SD) = Sediment Dusting - A fine powdering of sediment observable on the surface of the colony or individual. May occur in patches or over the entire organism. Powdering does not obscure features of the colony or individual (i.e., polyps are still observable).
 - (SA) = Sediment Accumulation - Patches (areas) of sediment thicker than dusting are observable on the top or sides of the organism. Features of the colony or individual (i.e., polyps) are likely obscured by sediment patches.
 - (PB) = Partial Burial - Portions of the organism are covered by sediment, including at least some portion of the base (point of attachment). Features of colonies and individuals are obscured.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

- (BB) = Burial of the Base - Sediment covers the entire point of attachment / base of the organism.
- (B) = Burial - Entire organism is covered by sediment.
- (EA) = Eroded Axis Material - A pattern of partial colony mortality in which a concentric ring of dead coral skeleton occurs at the base of the coral colony as results from prior burial of the colony edges. Sedimentation does not have to be present or observed for this indicator to be discernible.

AT. Presence of Other Conditions – record observed conditions (bleaching, predation, disease).

AU. Comments/Observations – document any localized event (not specific to relocated octocorals) that may have negative impacts on the relocation site (e.g., weather event, grounding, sedimentation, turbidity, disease, bleaching, predation, competition), and document any other information deemed relevant by the data collector.

At One Year After Relocation

Repeat columns AL. through AU. for columns AV. through BE.

At Two Years After Relocation

Repeat columns AL. through AU. for columns BF. through BO.

Monitoring Activities and Data Sheet Directions for Coral and Octocoral Mitigation Relocation Activities

Diseased Octocoral Colony Information Data Sheet Directions

In the “Diseased Octocoral Colony Info” datasheet, record the following information PER INDIVIDUAL COLONY that were not relocated due to suspect disease or other disqualifying conditions:

- Row 2: Provide the project name, FWC license number, person the license is issued to, and affiliation.
 - A. Event Date – provide the date that the colony was monitored.
 - B. Removal Site Identifier – provide the unique operational name/number/alphanumeric character assigned to the removal site, as identified in the “Summary” data sheet.
 - C. Temporary Holding Site Identifier (if applicable) - provide the unique operational name/number assigned to the temporary holding site, as identified in the “Summary” data sheet.
 - D. Octocoral Species – record each diseased octocoral by the species full taxonomic name (no abbreviations) on a separate row.
 - E. Octocoral Max Height – the maximum height is measured from the base of the holdfast attachment to the top of the colony (following the axis of growth) as seen from the side.
 - F. Octocoral Disqualifier – identify what condition disqualified the octocoral colony from relocation, using the key code provided.
 - G. Type of Octocoral Stress Indicator/Active Disease/Suspect Disease/ Predation Disqualifying Condition - if the octocoral coral was disqualified due to a stress indicator, active disease or suspect disease indicator, or predation, use the key code provided to identify the specific condition that disqualified the octocoral from relocation.
 - H. Disposition – identify how the octocoral was disposed of.
 - I. Comments/Observations - provide any observation details for unknown disease or conditions, name of entity that diseased octocorals were donated to (if donated), and any other information deemed relevant by the data collector.



August 30, 2017

Department of the Army
Jacksonville District Corps of Engineers
701 San Marco Boulevard
Jacksonville, Florida 32207-8175

Via email: terri.jordan-sellers@usace.army.mil

RE: IWW Reach 1 NEPA Request for Comments

Dear Ms. Jordan-Sellers,

Thank you for the opportunity to submit comments on the upcoming analysis under the National Environmental Policy Act (“NEPA”) that the U.S. Army Corps of Engineers (“Corps”) will perform for the proposed operations and maintenance dredging of the Atlantic Intracoastal Waterway, Reach 1, in Broward County, Florida.

There is a substantial possibility that the proposed project may have significant negative impacts on coral reef communities, hardbottom habitat, listed species, and the marine ecosystem that depends on healthy benthic communities.

The entirety of the area proposed for dredging is a State Manatee Protection area for the West Indian manatee (*Trichechus manatus*). The state of Florida has specific guidelines and specifications for how work is to proceed and cease. For example when a manatee is within 300 feet of active work, no equipment will be operated until the manatee freely leaves the area without harassment. Along with assessing the indirect, direct, and cumulative impacts to manatees, the Corps should address and outline what specific manatee protections will be implemented during all work within the State Manatee Protection Area. As a part of the dredging and dredge material placement activities, should seagrass be proposed to be impacted, the Corps should specially address how seagrass impacts will affect the manatee. Seagrass impacts have the potential to affect manatee occurrences, migration patterns, and calving. As a part of the NEPA analysis, the Corps must address all potential impacts to manatees in relation to seagrass impacts.

The entirety of the area proposed for dredging, as well as six of the seven material placement alternative locations, fall within the United States Fish and Wildlife Service (USFWS) Manatee Consultation Area. As a part of the NEPA process, the Corps should outline the specific timeline of official USFWS consultation from initiation through determination.

The entirety of the area proposed for dredging as well as six of the seven material placement alternative locations fall within the United States Fish and Wildlife Service (USFWS) Piping Plover Consultation Area. As a part of the NEPA process, the Corps should outline the specific timeline of official USFWS consultation from initiation through determination. Two of the alternatives for dredge material placement are located within beach areas. Wintering plovers feed on exposed wet sand in wash zones, intertidal ocean beach, and use beaches adjacent to foraging areas for roosting and preening. Due to the possible occurrence of plovers being higher in the fall and winter, the

Corps should address how dredge material placement timelines will avoid potential disturbance and impact to areas that may be utilized by plovers during the plover migration and wintering periods.

A majority of the proposed dredging area and all seven of the proposed material placement alternative locations are located within the wood stork Core Foraging Area (CFA) of three wood stork colonies, the Loxahatchee 1, 619315, and 2B Melaleuca colonies. The Corps should address all wetland impacts occurring within any CFA. If impacts to wetlands within the CFA are proposed, the Corps should specifically outline how mitigation will be accomplished.

The area proposed for dredging has not been heavily disturbed for over 50 years, in that time, hardbottom, seagrass, and coral communities may have developed and may be negatively impacted by the proposed dredging activities. As a part of the NEPA evaluation, the Corps should perform a full benthic survey, list all encountered resources, and analyze potential impacts.

Both nearshore alternative locations for dredge material placement fall within areas designated a critical habitat for Elkhorn and Staghorn coral. The proposed activities have the possibility of significant direct and indirect impacts to coral both inside and outside the area of work. The greatest impacts would be associated with turbidity and sedimentation caused by both the dredging activities and the deposition of dredge material nearshore or in the intertidal zone. Dredging activities produce large amounts of suspended fine-grained sediment, which lingers in the water column and produces turbidity that blocks sunlight from reaching the reef. The suspended sediment eventually settles on the ocean floor where it can smother existing coral colonies and impact habitat by making exposed hardbottom too silty for coral larvae or fragments to attach and propagate. Because dredging sediments are often fine-grained, they have a particularly harmful impact on the reef, creating anoxic conditions quickly as interstitial spaces hold little oxygen. Furthermore, these sediments have a “sticky” or “clay-like” consistency, which can be difficult to remove naturally. Distinct from natural sediment suspension events that cause turbidity, such as storms, dredging sediments deposit additional sediment to the reefscape, and therefore may fill-in interstitial spaces that provide habitat for reef organisms. Dredging-related sediment can also release contaminants and nutrients occurring from other natural and man-made sources. The fine-grained sediments can be resuspended later by wind, currents, and tides even after they have settled on the ocean bottom, continuing to cause impacts. Deposited sediment has the potential for ongoing, long-term resuspension, which can affect sediment levels, turbidity, and expose area corals to chronic sediment stress for many years.

Occurrences of shoal grass (*Halodule wrightii*) and manatee grass (*Syringodium filiforme*) have been historically prevalent throughout the proposed dredging area with the possibility of other seagrass species being present. The Corps should state when the last seagrass survey was performed for the area of proposed dredging as well as identify all alternative dredge material placement locations. If no recent seagrass survey has been performed, the Corps should conduct a full seagrass survey in order to fully assess potential impacts to seagrass. The Corps should address indirect impacts to seagrass in all areas the potential turbidity and sedimentation may affect. Turbidity in the water column reduces the amount of light reaching the bottom, resulting in “shading” and lessens the rate that seagrasses can perform photosynthesis. Should seagrass be proposed to be impacted, the Corps should specially address how mitigation will be accomplished including identifying mitigation location(s), establishing a monitoring schedule and requirements, and developing success criteria. A complete mitigation plan for seagrass, including occupied and unoccupied seagrass beds where there are enough available mitigation credits and considering the

latest surveys, in an area that supports similar physiological, ecological, and biological needs, must be established in the NEPA analysis.

There are at least four potentially contaminated sites containing petroleum, nine SUPER Act risk sites, and nine EPA RCRA sites, near or adjacent to the proposed dredging area. The Corps should determine if any contamination plumes have expanded into or underneath any area proposed to be disturbed in relation to the proposed activities. Contamination plumes migrate over time both in area and in depth. Even if a contaminated site is undergoing cleanup and/or monitoring, there is the potential to disturb a contamination plume during dredging activities. If adequate records are not found for any nearby contaminated site, the Corps should perform testing to verify that no contaminants will be disturbed during the dredging activities.

Thank you for your consideration of these initial comments. Because of the high level of public interest in this process, and NEPA's emphasis on thorough, up-front review of the environmental effects of proposed actions, we look forward to a NEPA analysis that provides a high level of detail and rigorous analysis of the full impacts of the proposed operations and maintenance dredging of the Atlantic Intracoastal Waterway, Reach 1, project.

Sincerely,



Rachel Silverstein, Ph.D.
Executive Director & Waterkeeper
Miami Waterkeeper

On behalf of:



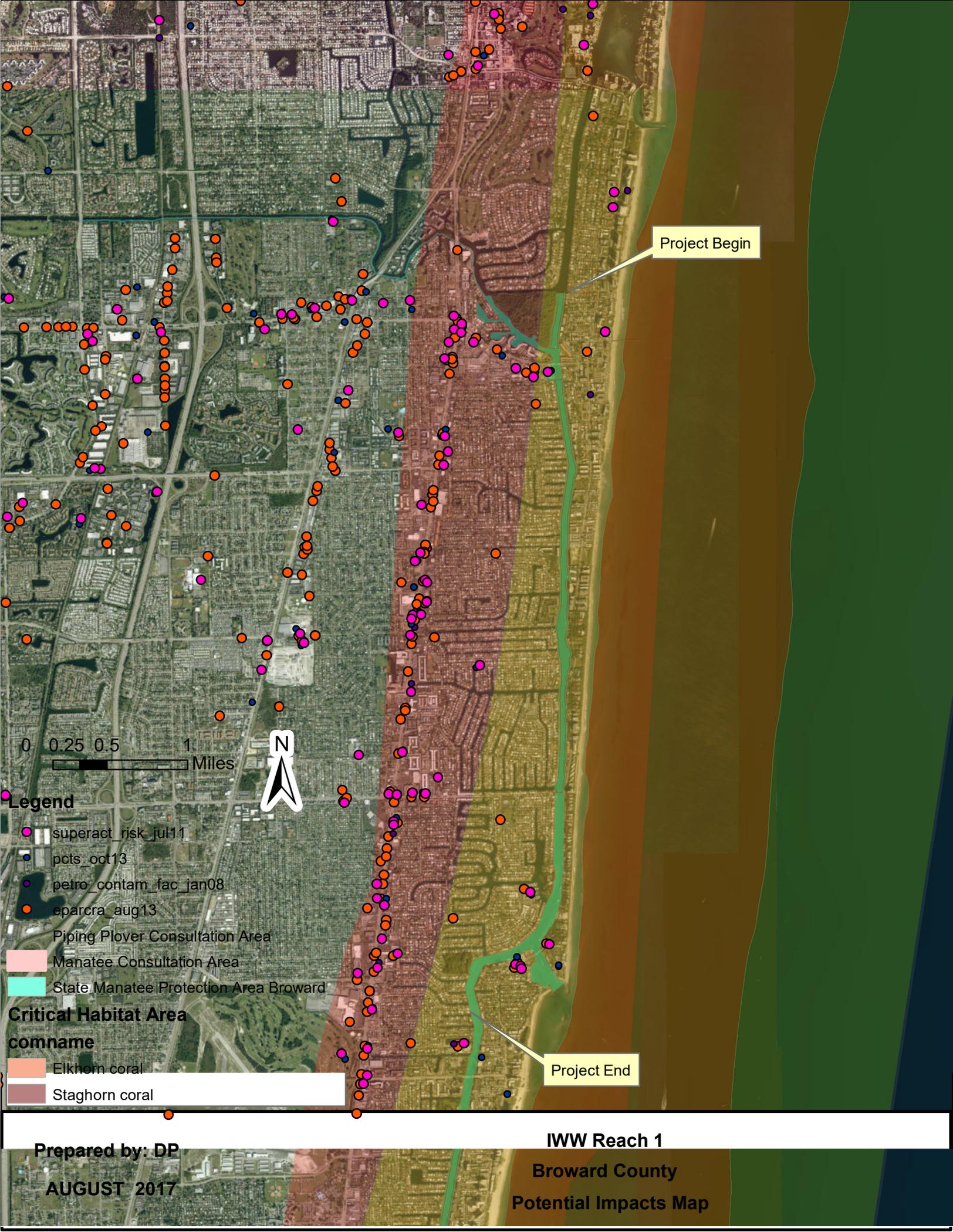
Center for Biological
Diversity



The Diving Equipment
& Marketing Association

Enclosure: GIS figure of potential impacts





Project Begin

0 0.25 0.5 1 Miles



Legend

- superact_risk_jul11
- pcts_oct13
- petro_contam_fac_jan08
- eparcra_aug13
- Piping Plover Consultation Area
- Manatee Consultation Area
- State Manatee Protection Area Broward

Critical Habitat Area

comname

- Elkhorn coral
- Staghorn coral

Project End

Prepared by: DP
AUGUST 2017

IWW Reach 1
Broward County
Potential Impacts Map

Broward County Intercoastal Waterway (IWW) NEPA
Jacksonville District, US Army Corps of Engineers (USACE)
US Environmental Protection Agency (EPA)
Scoping Comments
August 29, 2017

Hardbottom Habitat: The EPA is concerned about the project's potential impacts to hardbottom habitats and recommends the USACE conduct a hardbottom habitat survey to determine the location and approximate quantity of hardbottom habitats potentially impacted by the proposed project. Should the survey find hardbottom habitats, the EPA recommends the USACE develop an avoidance, minimization and mitigation plan and monitoring/adaptive management plan to lessen impacts to the hardbottom habitat. The survey and avoidance, minimization and mitigation plan and the monitoring/adaptive management plan also should be discussed within the EA.

Coral Reefs and Near Shore Placement Areas: The EPA is concerned about the 'near shore' placement areas. There are many coral reef resources located against the shoreline throughout the county and the EPA recommends an assessment be conducted regarding impacts from the disposal on those resources proximate to the receiving areas. Additionally, the EPA recommends evaluating the impacts of constructing pipes through any sensitive resources. These studies and findings should be discussed within the EA.

Water Quality: The EPA recommends the USACE consult with the Florida Department of Environmental Protection to determine the project's potential impacts to waterbodies listed on the 303(d) list of impaired waterbodies for each action alternative.

Wetlands: The EPA recommends the USACE identify all jurisdictional wetlands for each action alternative. Additionally, the EPA encourages the USACE to avoid and minimize wetland impacts when appropriate and mitigate wetland impacts as necessary.



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

Planning Division
Environmental Branch

JUL 31 2017

TO WHOM IT MAY CONCERN:

The U.S. Army Corp of Engineers (Corps), Jacksonville District has been working with the Florida Inland Navigation District (FIND) to maintain the Intracoastal Waterway (IWW) in Broward County (Reach 1). The Corps is gathering information to define issues and concerns that will be addressed in an analysis to be prepared in compliance with the National Environmental Policy Act (NEPA). Currently there are seven potential alternatives being evaluated for placement of the dredged material.

The Broward Reach of the IWW consists of approximately 25 miles of waterway, running the full length of the County. The Broward IWW Reach 1 is approximately 5 miles long (Figure 1). The IWW within this reach is authorized at 10 feet deep by 125 feet wide. It is anticipated that within this reach there is approximately 73,000 cubic yards of material located within the channel that needs to be dredged to maintain authorized depth. As defined in the Long-Range Dredged Material Management Plan for the Intracoastal Waterway in Broward County, Florida (Taylor et al., 2003): Reach I, the northernmost reach in Broward County, extends from a point 650 ft south of the Palm Beach/Broward County line (ICWW mile 309.24; cut BW-1, station 0+00) southward 4.74 miles to a point just south of Hillsboro Inlet (ICWW mile 313.98; Cut BW-22, station 0+00) approximately 1,600 ft north of the Northeast 14th Street Bridge.

This particular reach of the IWW has not been maintenance dredged since it was originally constructed (approximately 1965) due to its natural ability to maintain the authorized depths. This reach of the waterway is located within close proximity of the Hillsboro Inlet which may contribute to the low shoaling rate. There are documented beach-quality sediments within this segment of the waterway, which makes beach placement or nearshore placement the best viable options for disposal. Dredging could be performed by a hydraulic pipeline dredge, mechanical dredge, or by a Corps of Engineers small hopper dredge.

The dredging and material placement alternatives being considered include: 1) no action; 2) Hillsboro Inlet impoundment basin; 3) Nearshore south of the inlet; 4) Beach placement north of the inlet 5) Beach placement south of the inlet; 6) North nearshore; and 7) upland dredged material management area MSA-726. Figures 2 and 3 demonstrate potential placement sites. Issues that are anticipated include concern for seagrass habitat within the IWW and potentially hardbottom habitat, water quality,

threatened and endangered species, and cultural, commercial, and recreational resources.

Please submit any comments you may have in writing to the letterhead address within 30 days of the date of this letter. If you have questions, please contact Ms. Brooke Hall at phone number (904) 232-1061 or Ms. Terri Jordan-Sellers at phone number (904) 232-1817, or email at Brooke.A.Hall@usace.army.mil or Terri.Jordan-Sellers@usace.army.mil. Thank you in advance for your participation.

Sincerely,

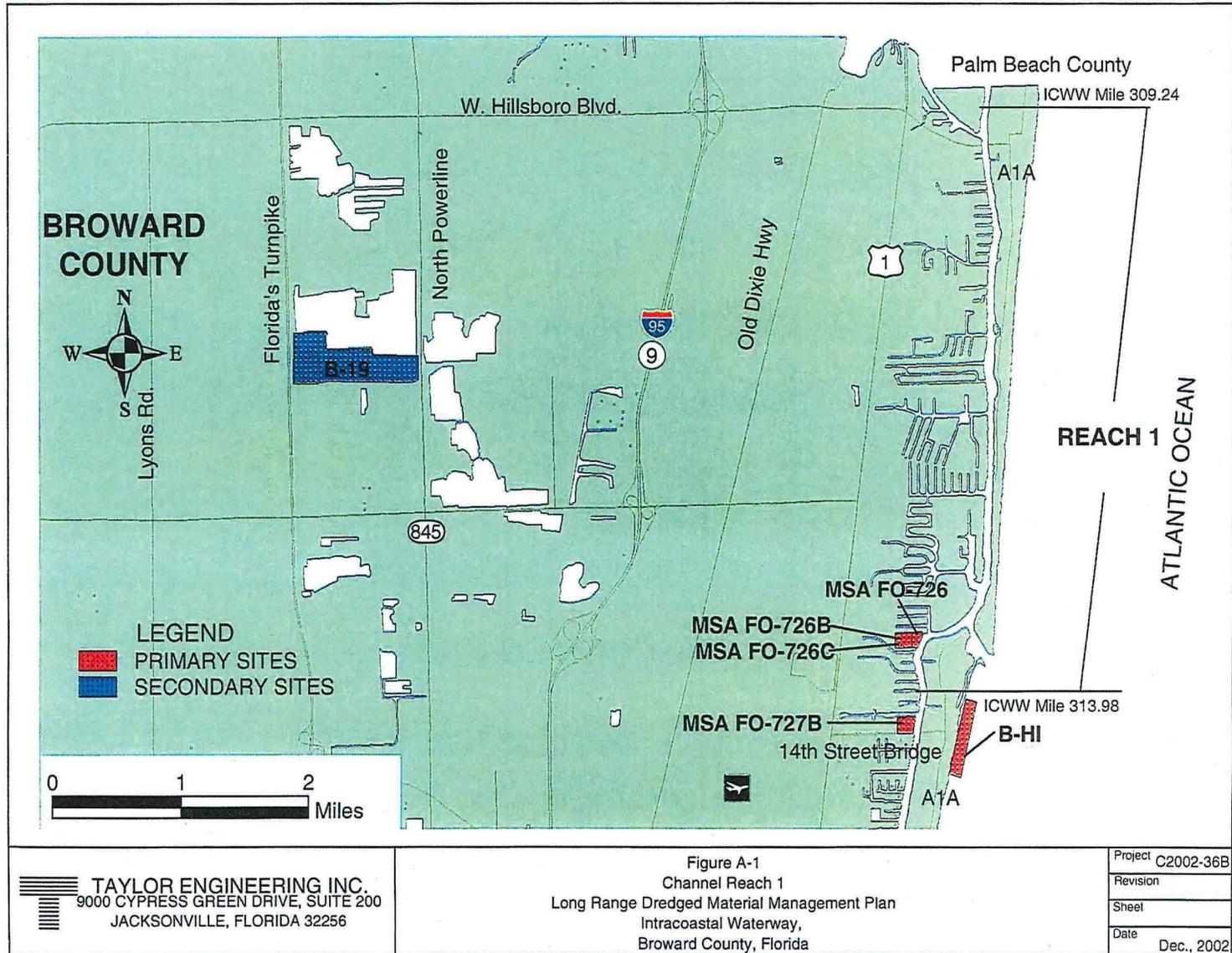


Gina P. Ralph
Chief, Environmental Branch

Encl:

Figure 1. Broward IWW Reach 1

A-1



-3-

TAYLOR ENGINEERING INC.
 9000 CYPRESS GREEN DRIVE, SUITE 200
 JACKSONVILLE, FLORIDA 32256

Figure A-1
 Channel Reach 1
 Long Range Dredged Material Management Plan
 Intracoastal Waterway,
 Broward County, Florida

Project	C2002-36B
Revision	
Sheet	
Date	Dec., 2002

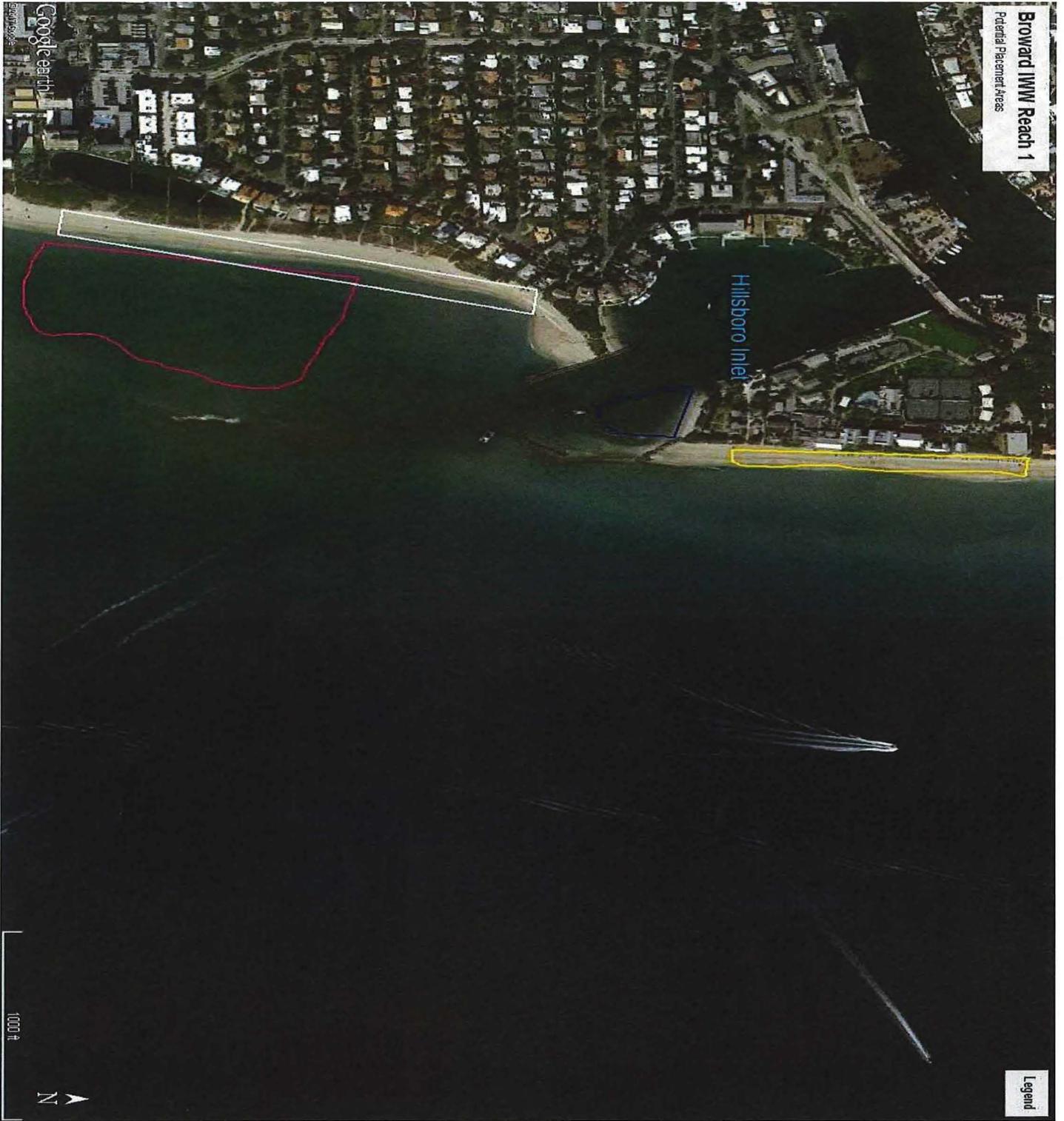


Figure 2. Broward IWW Reach 1 Potential Placement Sites

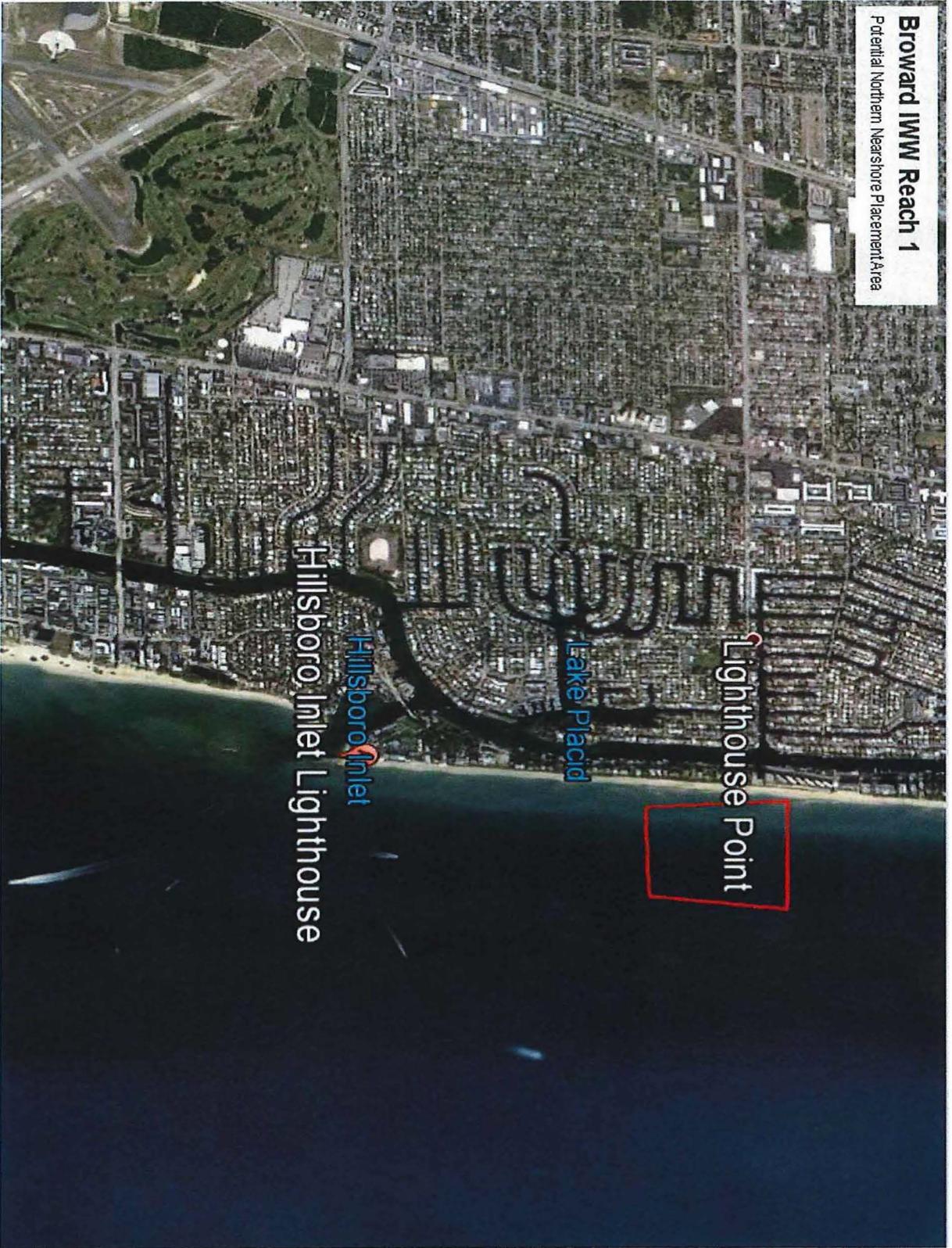


Figure 3. Broward IWW Reach 1 Potential Northern Nearshore Placement Site

APPENDIX F

Other Reports and Documents

Environmental Assessment

Operations and Maintenance Dredging and Dredged Material Placement for
Intracoastal Waterway (IWW) Broward County, Reach 1 and
Palm Beach County, Reach 4 (cuts P-59 to P-60)



US Army Corps of Engineers
JACKSONVILLE DISTRICT

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Due to the quantity and/or length of the following reports and documents, these items are available via the provided link or by request:

- NMFS. September 25, 1997. Biological Opinion – The continued hopper dredging of channels and borrow areas in the southeastern U.S.
http://sero.nmfs.noaa.gov/protected_resources/section_7/freq_biop/documents/dredge_bo/1997_south_atlantic_division_regional_biological_opinion.pdf
- NMFS. August 25, 1995. Biological Opinion – Hopper dredging of channels and beach nourishment activities in the Southeastern U.S. from North Carolina through Florida East Coast.
http://sero.nmfs.noaa.gov/protected_resources/section_7/freq_biop/documents/dredge_bo/sarbo_1995.pdf
- NMFS. November 25, 1991. Biological Opinion – Dredging of channels in the southeastern US from North Carolina through Cape Canaveral, Florida.
http://sero.nmfs.noaa.gov/protected_resources/section_7/freq_biop/documents/dredge_bo/11251991_rbo_for_se_hopper_dredging.pdf
- USACE. April 26, 2016. Department of Army Permit. Regional General Permit SAJ-93.
http://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/permitting/general_permits/RGP/gen_SAJ-93-04-26-2016.PDF
- USACE. April 26, 2016. Regional General Permit SAJ-93 (SAJ-2005-00972). Memorandum for Record. SUBJECT: Department of the Army Environmental Assessment and Statement of Finding for Re-Authorization of Regional General Permit SAJ-93.
- USACE. August 17, 2015. Programmatic Essential Fish Habitat Assessment for Regional General Permit SAJ-93 for Florida Inland Navigation District Maintenance Dredging of the Federal Navigation Channel.
- USFWS. March 13, 2015. Statewide Programmatic Biological Opinion (SPBO).
<https://www.fws.gov/panamacity/resources/2015SPBO.pdf>
- USFWS. May 22, 2013. Programmatic Piping Plover Biological Opinion (P3BO).
https://www.fws.gov/northflorida/Guidance-Docs/20130522_ltr_Service_Corps_Piping%20Plover%20Programmatic_BO_FINAL.pdf