

MAY 2014

Final Environmental Assessment

MAINTENANCE DREDGING INTRACOASTAL WATERWAY REACH I AND PORTION OF REACH II ST. LUCIE COUNTY, FLORIDA

Includes placement in SL-2



U.S. Army Corps
of Engineers
JACKSONVILLE
DISTRICT



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
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REPLY TO
ATTENTION OF

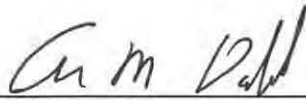
FINDING OF NO SIGNIFICANT IMPACT
MAINTENANCE DREDGING INTRACOASTAL WATERWAY REACH I
AND PORTION OF REACH II
ST. LUCIE COUNTY, FLORIDA

I have reviewed the Environmental Assessment (EA) for the proposed maintenance dredging of the federally authorized Intracoastal Waterway in St. Lucie County, FL. Dredged material would be placed either in Dredged Material Management Area (DMMA) SL-2 or on Ft. Pierce Beach. This Finding incorporates by reference all discussions and conclusions contained in the EA enclosed hereto. Based on information analyzed in the EA, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the proposed action will not significantly impact the quality of the human environment and does not require an Environmental Impact Statement. Reasons for this conclusion are in summary:

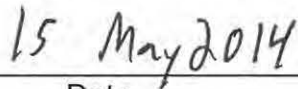
- a. The proposed action would be conducted in accordance with the Endangered Species Act, and specifically in compliance with the Regional Biological Opinion and project specific consultation Biological Opinion issued by the National Marine Fisheries Service and the Statewide Programmatic Biological Opinion issued by the US Fish and Wildlife Service. The work would not jeopardize the continued existence of any threatened or endangered species or impact any designated "critical habitat."
- b. This project has been coordinated with the State of Florida, and all applicable water quality standards will be met.
- c. The State of Florida has concurred with the Corps consistency determination that the proposed work is consistent with the enforceable policies of the Florida Coastal Management Program.
- d. The proposed work has been coordinated with the Florida State Historic Preservation Officer and appropriate federally recognized tribes. No effects to cultural resources are anticipated.
- e. Measures will be in place during construction to eliminate, reduce, or avoid adverse impacts below the threshold of significance to fish and wildlife resources.
- f. Public benefits will be provided with unobstructed channel navigation.

In consideration of the information summarized, I find that the proposed Federal Navigation Project, maintenance dredging of the Intracoastal Waterway with dredged material placement in either DMMA SL-2 or Ft. Pierce Beach placement, will not significantly affect the human environment and does not require an Environmental Impact Statement. A copy of this document will be made available to the public at the following website:

http://www.saj.usace.army.mil/About/DivisionsOffices/Planning/EnvironmentalBranch/EnvironmentalDocuments.aspx#St_Lucie



ALAN M. DODD.
Colonel, Corps of Engineers
Commanding



Date

**FINAL ENVIRONMENTAL ASSESSMENT
ON
MAINTENANCE DREDGING
INTRACOASTAL WATERWAY
REACH I AND PORTION OF REACH II
ST. LUCIE COUNTY, FLORIDA**

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REACH I AND PORTION OF REACH II
ST. LUCIE COUNTY, FLORIDA**

1 PROJECT PURPOSE AND NEED

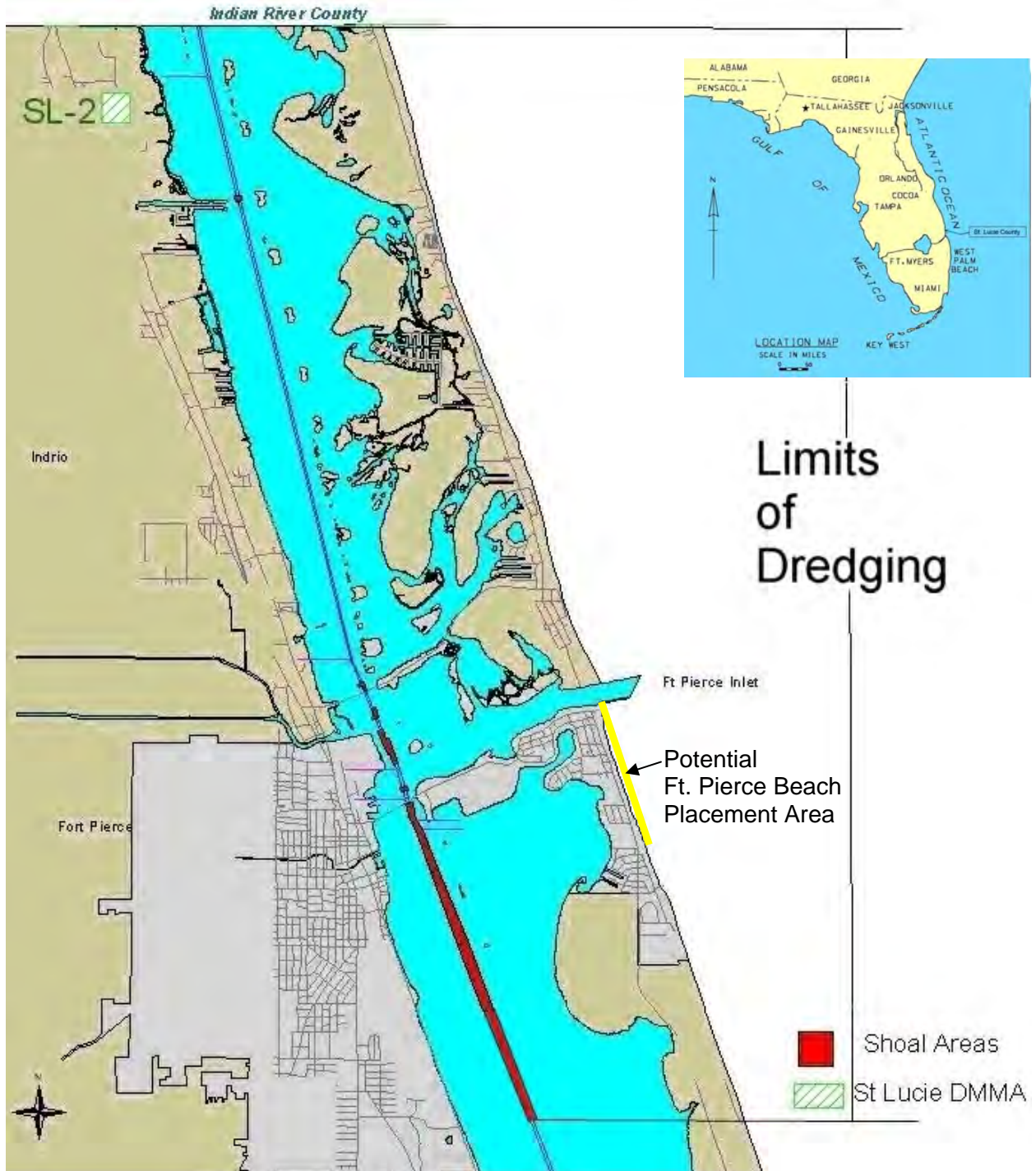
1.1 PROJECT DESCRIPTION.

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is proposing to conduct periodic maintenance dredging of the St. Lucie County, Florida portion of the Intracoastal Waterway (IWW) in the vicinity of Ft. Pierce Inlet. This would include all of Reach I (as defined in Taylor et al., 2000) which extends from the Indian River/St. Lucie County line (IWW mile 218.46) southward 8.80 miles to Bear Point (IWW mile 227.27) and the northern mile of Reach II to IWW mile 228.27 (see Figure 1, Project Map). Dredged material would be placed in the previously constructed Dredged Material Management Area (DMMA) SL-2 located about 3,300 ft south of the Indian River/St. Lucie County line (about seven miles north of Ft. Pierce). SL-2 is designed to accommodate the projected 50 year Reach I dredged material storage requirement of 78,116 cubic yards (cy). The federal channel would be maintained to its authorized dimensions of 125-feet wide by 12-feet deep plus 2-feet of allowable over-depth at mean low water (mlw) from the County line south to the Ft. Pierce Harbor Project turning basin (IWW mile 225.24), and -10 ft MLW from that point southward. The accumulation of sediment, commonly referred to as shoaling, has restricted the width of the project channel and significantly reduced its depth.

1.2 PROJECT NEED OR OPPORTUNITY.

The most recent examination survey documented a total in situ shoaling volume of 69,057 cy within the authorized channel. Minimum depths recorded from the project channel are less than 7.1 ft causing navigation problems for commercial and larger recreational vessels. Some commercial vessels that utilize this segment of the IWW require at least 9-feet of draft. Vessels are currently being forced outside the authorized channel in search of deeper water, waiting for high tides, or prop dredging through the channel. Specifically, the large ocean going research vessels of the Harbor Branch Oceanographic Institute (HBOI) have incurred several thousands of dollars in damage from hitting the shoals (FIND 2008). Removal of the shoal material would maintain the navigable capacity of the project channel.

Figure 1. Project Map - St. Lucie County IWW and Shoaling Areas.



1.3 PROJECT AUTHORITY.

1.3.1 INITIAL AUTHORIZATION.

Spanning nearly the entire length of Florida from Jacksonville to Miami, an 8 ft deep x 75 ft wide channel was authorized January 21, 1927 by House document 586, 69th Congress, 2nd Session.

1.3.2 SUPPLEMENTAL AUTHORIZATIONS.

The present configuration (12 ft deep x 125 ft wide) was authorized by House Document 740, 79th Congress, 2nd Session, 2 March 1945. Maintenance of the channel is the responsibility of the Corps. The Florida Inland Navigation District (FIND) serves as the local sponsor and is responsible for providing and maintaining the DMMAs.

1.4 RELATED ENVIRONMENTAL DOCUMENTS.

Related NEPA, design, and planning documents of the IWW in St. Lucie County include the following:

- Long-Range Dredged Material Management Plan for The Intracoastal Waterway, St. Lucie County, Florida. Taylor Engineering, Inc., Jacksonville, FL, August 1997. (hereafter Long-Range Plan)
- Long-Range Dredged Material Management Plan for The Intracoastal Waterway, St. Lucie County, Florida, Technical Addendum: Revised Operational Channel Reaches. Taylor Engineering, Inc., Jacksonville, FL, November 2000.
- Draft Environmental Assessment SL-2 DMMA St. Lucie County, Florida. Corps of Engineers. June 2004.
- Public Notice SAJ-2005-9292 for a Department of the Army permit for construction of DMMA SL-2. Corps of Engineers. December 2005.
- Letter to David Roach, FIND, indicating that construction of SL-2 is covered by Nationwide Permits (NWP) 12 and 18. Corps of Engineers. September 2006.

1.5 DECISIONS TO BE MADE.

This Environmental Assessment will evaluate whether to conduct maintenance dredging of Reach I and a portion of Reach II of the IWW in St. Lucie County, FL (hereafter Project Channel) and, if so, recommend alternatives to accomplish that goal.

1.6 SCOPING AND ISSUES.

1.6.1 RELEVANT ISSUES.

The following issues were identified as relevant to the proposed action and appropriate for further evaluation: threatened and endangered species including sea turtles, West Indian manatee, smalltooth sawfish, and Johnson's seagrass; water quality; essential fish habitat (including seagrass); wildlife resources; air quality; cultural resources; aesthetics; recreation; socio economics; noise; and navigation.

1.6.2 ISSUES ELIMINATED FROM FURTHER ANALYSIS.

The proposed action is expected to have little or no impact on soils, housing, or population dynamics.

1.7 ENVIRONMENTAL COORDINATION

1.7.1 WATER QUALITY CERTIFICATION

This project would be performed in compliance with State of Florida water quality standards. A 373.406(6) Florida Statute (F.S.) dredging exemption verification will be obtained from the Florida Department of Environmental Protection. In accordance with the Coastal Zone Management Act, the proposed maintenance dredging would also be reviewed by the State in order to determine if the project is consistent with the Coastal Zone Management Plan. This review is performed concurrently with the State permitting review.

1.7.2 ENDANGERED SPECIES ACT- SECTION 7 COORDINATION

In accordance with Section 7 of the Endangered Species Act, the proposed work was coordinated with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. The proposed work would not jeopardize the continued existence of any threatened or endangered species.

2 ALTERNATIVES

The alternatives section is perhaps the most important component of this EA. It describes the no-action alternative, the proposed action, and other reasonable alternatives that were evaluated. The beneficial and adverse environmental effects of the alternatives are presented in comparative form, providing a clear basis for choice to the decisionmaker and the public. A preferred alternative was selected based on the information and analysis presented in the sections on the Affected Environment and Probable Impacts.

2.1 DESCRIPTION OF ALTERNATIVES.

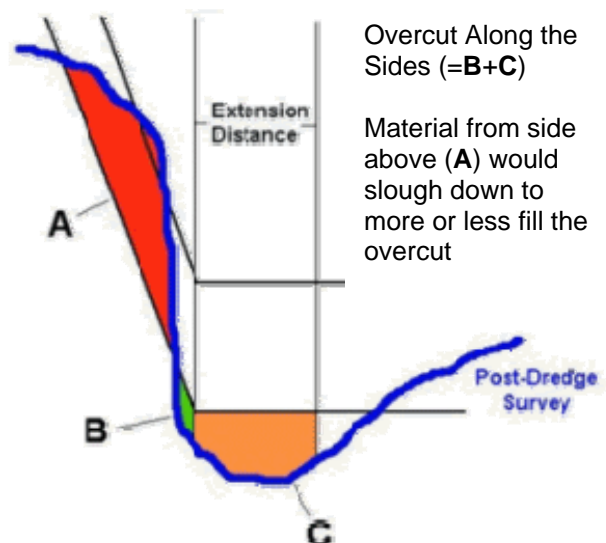
2.1.1 NO-ACTION ALTERNATIVE

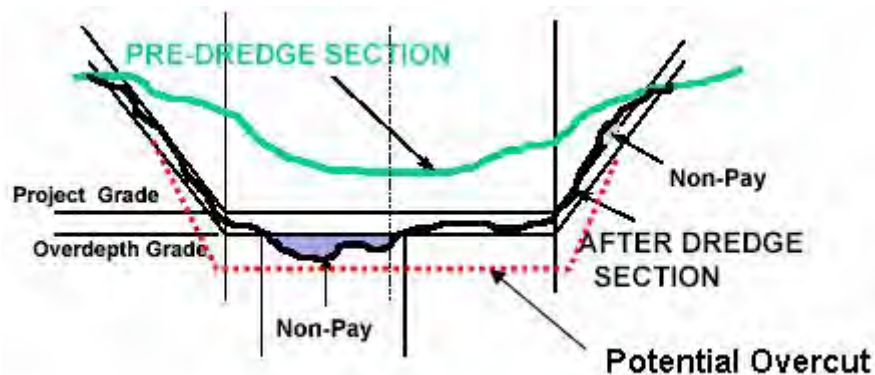
The IWW would not be maintenance dredged. This would result in increased shoaling and unsafe navigation conditions for vessels.

2.1.2 DREDGING ALTERNATIVE

The proposed periodic maintenance dredging of the IWW would occur as planned (refer to Section 1.1 for more detail). The Corps does not normally specify the type of dredging equipment to be used. This is generally left to the dredging industry to offer the most appropriate and competitive equipment available at the time. Never-the-less, certain types of dredging equipment are normally considered more appropriate depending on the type of material, the depth of the channel, the depth of access to the disposal or placement site, the amount of material, the distance to the disposal or placement site, the wave-energy environment, etc. 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>.

The plans and specifications normally require dredging beyond the project depth or width. The purpose of the “required” additional dredging is to account for shoaling between dredging cycles (reduce the frequency of dredging required to maintain the project depth for navigation). In addition, the dredging contractor is allowed to go beyond the required depth. This “allowable” accounts for the inherent variability and inaccuracy of the dredging equipment (normally ± 2 feet). In





addition, the dredge operator may practice over-cutting. An “over-cut” along the sides of the channel may be employed in anticipation of movement of material down the sides of the channel. Over-cut throughout the channel bottom may be the result of furrowing or pitting by the dredging equipment (the suction dredge’s cutterhead, the hopper dredge’s drag arms, or the clam-shell dredge’s bucket). In addition, some mixing and churning of material below the channel bottom may occur (especially with a large cutterhead). Generally, the larger the equipment, the greater the potential for over-cut and mixing of material below the “allowable” channel bottom. Some of this material may become mixed-in with the dredged material. If the characteristics of the material in the overcut and mixing profile differ from that above it, the character of the dredged material may be altered. The quantity and/or quality of material for disposal or placement may be substantially changed depending on the extent of over-depth and over-cut.

Only one maintenance dredging operation in this segment of the IWW has taken place since it was dredged to the present project depth of -12 ft MLW south to the Ft. Pierce Harbor Project turning basin (IWW mile 225.24) in 1959, and -10 ft MLW from that point southward in 1961. This 1972 maintenance operation removed approximately 2,400 cubic yards (cy) of material from the channel immediately north of the Seaway (S.R. AIA) Bridge near the -10 ft MLW project's northern limit (IWW mile 225.43 to mile 225.47). Dredging of the IWW has been typically performed with a hydraulic pipeline cutterhead suction dredge although a clamshell or small hopper dredge could also perform the work, albeit less efficiently.

Since dredging equipment does not typically result in a perfectly smooth and even channel bottom (see discussion above); a drag bar, chain, or other item may be drug along the channel bottom to smooth down high spots and fill in low spots. This finishing technique also reduces the need for additional dredging to remove any high spots that may have been missed by the dredging equipment. It may be more cost effective to use a drag bar or other leveling device.

2.1.3 DREDGED MATERIAL PLACEMENT OPTIONS

2.1.2.2 BEACH PLACEMENT

Beach placement — placing on the beach dredged material compatible with the native beach sands — is an approach to dredged material management that the State of Florida encourages. The Corps also includes this approach as an essential part of dredged material management for channel reaches which, based on historic data, are likely to contain beach quality sediments. These conditions are most typically encountered immediately adjacent to tidal inlets where Waterway shoals are formed primarily by sand driven through the inlet by waves and tides. However, at Ft. Pierce Inlet the greater depths within the Ft. Pierce Harbor turning basin likely act as a sediment trap and limit the deposition of sand introduced through the inlet in the adjacent IWW channel. The two causeways immediately north and south of the inlet further limit the spread of littoral material. No sediment samples have been taken from the Waterway channel immediately adjacent to the turning basin. Samples taken north of the North Beach Causeway and immediately south of the Seaway Bridge suggest that at least some of the sediment within the IWW channel may potentially be suitable for beach placement. However, because of the inlet's restricted impact as a source of IWW shoal material, most shoal material that enters the IWW channel is likely derived from upland sources or the redistribution of sediment already within the Indian River Lagoon. As a result, the future compatibility of material dredged from the Waterway within St. Lucie County with native beach sands is uncertain. Therefore, beach placement is not the primary strategy of dredged material management for the project channel. However, should event-specific analysis document that IWW shoal material be suitable for beach placement; the Corps would consider placing that material on the beach, in cooperation with FIND and local interests. Geotechnical investigations of the channel shoal material are ongoing and will determine if this alternative is viable.

2.1.3.2 UPLAND PLACEMENT

Upland storage offers a number of significant advantages over the other available methods: (1) upland storage provides an efficient means of dredged material management without the excessive costs of transportation and material re-handling involved with the use of ocean disposal; (2) provided suitable upland sites can be identified, upland storage avoids most wetland impact issues inherent in the use of open water disposal; and (3) unlike beach disposal, the use of upland sites does not depend upon the physical characteristics of the dredged material. The use of a limited number of centralized upland sites has additional economic, operational, and environmental advantages over the use of a greater number of smaller sites: (1) fewer, larger sites reduce the total acreage required and thereby reduce the total cost of site acquisition; (2) developing and constructing fewer, larger sites is more cost effective than developing and constructing a number of smaller sites; (3) the use of centralized sites allows for improved site security and requires the allocation of fewer operating personnel; and (4) the use of fewer, larger sites reduces the total impact to upland habitat and allows for improved effluent and storm water control, as well as the institution of more efficient and comprehensive monitoring procedures.

The use of fewer centralized sites as discussed above also facilitates the active management of these sites as permanent operating facilities. This represents a significant departure from the historic practice of more or less abandoning sites after limited use. Operating sites as permanent facilities allows for the implementation of a suite of management procedures and techniques with long-term operational and environmental benefits. Example management measures include improved detention area design; material handling and processing to increase dewatering efficiency (e.g., mechanical grading, trenching, storm water control); and the use of natural buffer areas and dike vegetation to improve their appearance. Most importantly, the permanency of the sites encourages exploring ways to remove and reuse the dewatered material. Alternatively, if no market for the material is found, it could be removed and stored in less ecologically sensitive upland areas further inland. Road access, existing or potential, is therefore essential. Sites managed as intermediate processing areas rather than one-time holding facilities will serve the needs of the IWW in perpetuity. This approach, in combination with effective site management measures, will establish the long-term material management capability required.

2.2 PREFERRED ALTERNATIVE

The preferred alternative is to perform the proposed dredging of the IWW in order to maintain the authorized depths. The upland placement alternative is considered the most environmentally acceptable.

2.3 ALTERNATIVES ELIMINATED FROM FURTHER EVALUATION

2.3.2.2 OCEAN DISPOSAL

Ocean disposal of material dredged from the IWW is not a realistic option for the St. Lucie County project area. Ocean disposal requires the transport of dredged material from the dredging site to an authorized offshore disposal area. In the case of St. Lucie County, this operational requirement poses a very costly and difficult task for the following reasons. First, the material must be loaded into hopper barges capable of transiting the relatively shallow depths of the IWW. This consideration places severe limits on hopper capacity, particularly in the segment of the Waterway south of the inlet with an authorized depth of -10 ft MLW. Regulatory restrictions on hopper overflow during filling further limit hopper capacity. These barges must then proceed to Ft. Pierce Inlet for passage to sea. Once reaching the inlet the material must then be transferred to deep draft seagoing barges for transport to the authorized disposal area. A review of offshore disposal areas currently authorized by the U.S. Environmental Protection Agency to receive dredged material identified an approved offshore placement site 4.4 miles east of Ft. Pierce Inlet. Nevertheless, the costs associated with this type of operation, and the likely increase in future regulatory restrictions on the use of ocean dumping, together make reliance on this method of material disposition inappropriate for the long-term maintenance of the Waterway.

2.3.2.2 OPEN WATER DISPOSAL

This particular method of material disposition was perhaps the most widely used approach prior to the evolution of today's environmental regulatory programs addressing wetlands protection. Discussions with representatives of the relevant regulatory agencies have confirmed that this approach carries unacceptable environmental impacts in terms of the degradation or destruction of wetlands. In addition, the intent of the FIND's dredged material management program is to provide a permanent infrastructure of material management facilities. The creation or expansion of open water islands represents a one-time opportunity for material placement and does not lend itself to active material management practices which require upland access for equipment and personnel. As a result, the use of open water disposal was not considered an acceptable dredged material management strategy for the IWW in St. Lucie County.

2.3.2.2 NEARSHORE PLACEMENT

Extensive areas of exposed hardbottom habitat occur in the nearshore of the beach placement area. Nearshore hardbottom reefs serve as settlement habitats for immigrating sub-adults of fish and invertebrates, or as intermediate nursery habitats for juveniles emigrating out of nearby inlets (Vare 1991). At least 86 taxa of fish have been identified around nearshore hardbottom habitats along southeast mainland Florida, including at least 34 species of juvenile reef fish which may utilize these habitats as nursery areas (Lindeman and Snyder 1999). Therefore due to the presence of and the need to avoid impacts to this important resource, nearshore placement was eliminated from further consideration.

2.4 COMPARISON OF ALTERNATIVES

Table 1 lists alternatives considered and summarizes the major features and consequences of the proposed action and alternatives. See section 4.0 Environmental Effects for a more detailed discussion of impacts of alternatives.

2.5 MITIGATION

The Corps proposes to conduct pre- and post-dredging surveys for seagrass adjacent to the IWW channel. Appropriate measures to avoid impacting seagrass shall be implemented. In the event that unavoidable impacts occur outside the channel, then mitigation to offset the impacts would be proposed.

Table 1: Summary of Direct and Indirect Impacts

ALTERNATIVE ENVIRONMENTAL FACTOR	No Action Status Quo	Dredging with Beach Placement	Dredging with Upland Placement in DMMA SL-2
SEA TURTLES	No effect.	May affect. Placement would occur outside the nesting season.	May affect, but not likely to adversely affect.
WEST INDIAN MANATEE	No effect.	May affect, but not likely to adversely affect, with implementation of standard protection measures.	May affect, but not likely to adversely affect, with implementation of standard protection measures.
SMALLTOOTH SAWFISH	No effect.	May affect, but not likely to adversely affect, with implementation of draft protection measures.	May affect, but not likely to adversely affect, with implementation of protection measures.
JOHNSON'S SEAGRASS	No effect.	May affect, but not likely to adversely affect, with implementation of avoidance measures.	May affect, but not likely to jeopardize the continued existence of the species.
WATER QUALITY	No effect.	Short-term localized increase in turbidity at the dredge site and nearshore area.	Short-term localized increase in turbidity at dredge site.
ESSENTIAL FISH HABITAT	No effect.	Estuarine and Marine water column with unconsolidated sediment and ocean high salinity surf zone habitats would be impacted during dredging and placement activities.	Estuarine water column with unconsolidated sediment habitat would be impacted during dredging.
FISH AND WILDLIFE RESOURCES	No effect.	Minor impact during beach placement.	Wildlife protection measures would be implemented including monitoring for migratory birds and establishing buffer zones around active nests.
AIR QUALITY	No effect.	Minor and short-term impacts caused by dredging equipment.	Minor and short-term impacts caused by dredging and construction equipment.

ALTERNATIVE ENVIRONMENTAL FACTOR	No Action Status Quo	Dredging with Beach Placement	Dredging with Upland Placement in DMMA SL-2
CULTURAL RESOURCES	No known historic properties present	No known historic Properties present.	No known historic Properties present.
RECREATION	Shoaling would result in moderate adverse impact to recreational boaters.	Moderate long-term benefit to recreational boaters. Short-term disruption of recreation within IWW and Beach.	Moderate long-term benefit to recreational boaters. Short-term disruption of recreation within IWW.
AESTHETICS	No effect.	Minor short-term adverse impact due to construction activities.	Minor short-term adverse impact due to construction activities.
NOISE	No effect.	Minor and temporary adverse effect.	Minor and temporary adverse effect.
SOCIO ECONOMICS	Major long-term adverse impact to local, regional and statewide economies.	Major long-term benefit to local, regional and statewide economies. Increased dredging costs from beach building equipment.	Major long-term benefit to local, regional and statewide economies.
NAVIGATION	Major long-term adverse impact to vessels, both private and commercial.	Major long-term benefit to vessels, both private and commercial.	Major long-term benefit to vessels, both private and commercial.

3 AFFECTED ENVIRONMENT

The Affected Environment section succinctly 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 would affect or that would be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "no-action" alternative forms the base line conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

3.1.1 AREA TO BE DREDGED

The project channel is located on the southeast coast of Florida (refer to Figure 1). This portion of the IWW serves commercial and recreational vessels including the large ocean going HBOI research vessels with 12 foot drafts. Access from the Atlantic Ocean to the IWW, which is located within the Indian River Lagoon (IRL), is provided via the Ft. Pierce Inlet. The IRL is a shallow, tidal lagoon and is considered to be extremely biologically diverse (Swain 1995; Swain 1996). An estimated 4,300 species of plants and animals have been documented from the IRL according to the St. Johns River Water Management District (2000) making it the most diverse estuary in North America. Although much of the shoreline has been developed, portions remain in a natural state and are relatively undisturbed.

3.1.2 BEACH PLACEMENT AREA

The Beach Placement Area would most likely be located immediately south of the Ft. Pierce Inlet south jetty (refer to Figure 1). The exact placement area could differ depending on conditions at the time of dredging and permitting. This urban beach is highly erosive due to construction of the Ft. Pierce Inlet navigation project and requires sand placement through the Federally authorized Fort Pierce Shore Protection Project (SPP) every 2 years. Most of the shoreline is developed for residential and commercial purposes within the limits of the 1.3 mile SPP from the South Jetty State Park at FDEP Monument R-34 to the southern terminus of the authorized project at Surfside Park, Monument R-41.

3.1.3 UPLAND PLACEMENT AREA

The SL-2 DMMA is located about 3,300 ft south of the Indian River/St. Lucie County line (about seven miles north of Ft. Pierce) on the west side of the IRL (refer to Figure 1). SL-2 was constructed on a 57-acre parcel that was formerly a citrus grove. The SL-2 diked containment basin, perimeter ditch and access roads now cover 17.1 ac of this land. The remaining 29.5-acres of the site consists of citrus grove and fallow cropland

with a 150 ft buffer along the east side, and 350 ft buffers along the north, west, and south sides.

3.2 GEOLOGY

3.2.1 AREA TO BE DREDGED

Bottom substrates within the IWW channel are comprised of shoal deposits that have formed since the area was last dredged in 1972. Data characterizing channel sediments in the project area are documented in the Long-Range Plan (Taylor et al., 1997). Based on mean grain diameter, sediments from the five sampling locations within project area were classified as either fine or medium sand under the Unified Soil Classification (USC) system. The percentage of silt and clay-sized particles ranged from 1.3-18.9%.

3.2.2 BEACH PLACEMENT AREA

The dune system immediately landward of the Ft. Pierce beach placement area is largely artificial, and was built as part of previous restoration projects. A mixture of unconsolidated sandy marine sediment and rocky limestone outcrops are found along the entire length of the nearshore area seaward of the sand beach placement area.

3.2.3 UPLAND PLACEMENT SITE

DMMA SL-2 was built on Nettles and Wabasso sand. These soils consist of very deep, poorly and very poorly drained, slow or very slow permeable soils on broad areas of flatwoods, flood plains, flats and depressions of Peninsular Florida. They formed in sandy and loamy marine sediments (<http://www2.ftw.nrcs.usda.gov/osd/dat/W/WABASSO.html>).

3.3 THREATENED AND ENDANGERED SPECIES

Threatened and Endangered species that may occur in the project area, and that may be affected by the proposed work, can be found in Table 2.

Table 2. Status of Listed Species that May Occur Within the Project Area.

<i>Species</i>	<i>State Listing*</i>	<i>Federal Listing*</i>
Green Sea Turtle	LE	LE
Loggerhead Sea Turtle	LT	LT
Leatherback Sea Turtle	LE	LE
Hawksbill Sea Turtle	LE	LE
Kemp's Ridley Sea Turtle	LE	LE
West Indian Manatee	LE	LE
Smalltooth Sawfish	LE	LE
Johnson's Seagrass	LT	LT

* LE=Endangered and LT=Threatened

3.3.1 SEA TURTLES

The IRL provides developmental habitat for immature loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*) (Ehrhart *et al.* 1996). In addition, area beaches are known to support high density nesting populations of green, loggerhead, and leatherback (*Dermochelys coriacea*) sea turtles. Finally, although hawksbill (*Eretmochelys imbricata*) and Kemp's ridley (*Lepidochelys kempii*) sea turtles are known to occur in the vicinity of the project area, nesting has not been documented. Critical Habitat for the loggerhead sea turtle has been proposed by 1) USFWS for shoreline nesting habitat (Federal Register, 25 March 2013) and 2) NMFS for "Nearshore reproductive habitat" and "breeding habitat" in the coastal waters (Federal Register, 18 July 2013). Therefore beach placement on Ft. Pierce Beach would overlap proposed critical habitat for this species.

3.3.2 WEST INDIAN MANATEE

Manatees can be found in the inshore waters of the IRL where extensive seagrass beds provide essential foraging habitat and in the coastal waters of the Atlantic Ocean primarily during migration. During the Winter months manatees congregate in Moore's Creek where the warm water effluents from the Ft. Pierce Utility Authority's (FPUA's) H.D. King Power Plant are discharged. In fact, during extremely cold periods the plant operates without regard to the demand for electricity in order to provide warm water for manatees that have become accustomed to, and perhaps dependent upon, Moore's Creek as a warm-water winter refuge (EAI, 2002). Moore's Creek lies approximately 1/4 mile west of the IWW channel. The project lies within designated critical habitat for this species. Between 1977 and 2008 there have been 85 documented manatee mortalities in St. Lucie County. The probable cause of death for 21 (25%) of these mortalities was watercraft (http://www.floridamarine.org/manatees/search_individual_results.asp).

3.3.3 SMALLTOOTH SAWFISH

The endangered smalltooth sawfish (*Pristis pectinata*) may occur in the vicinity of the project. Densities of this species in these waters may be as low as 0.001-0.099 fish/square km (Simpfendorfer and Wiley 2006). Of the five St. Lucie County sightings of this large shark-like ray reported to the Smalltooth Sawfish sightings database (<http://www.mote.org/index.php?src=forms&id=Sawfish%20Encounter%20Report%20Form&PHPSESSID=688d54a53a6ceb91dada63ac798a0550>) over the last ten years, three were within the IRL and two were in the Atlantic Ocean. Of the IRL sightings, two were within the general project vicinity but were well east of the IWW channel in shallow water (see figure 2). Of the Atlantic Ocean sightings, one was in the general vicinity of the Ft. Pierce Beach placement area but was north of the inlet in 3 meters of water. The proposed work does not overlap any designated critical habitat for this species.

3.3.4 JOHNSON'S SEAGRASS

The threatened Johnson's seagrass (*Halophila johnsonii*) occurs within the project area. While the authorized Federal channel is excluded, critical habitat for this species is designated for a portion of the IRL in the vicinity of the Fort Pierce Inlet. This site is located on the north side of the entrance channel just west of a small mangrove

vegetated island where the main entrance channel bifurcates to the north. This is approximately 2,500 feet east of the IWW channel. See figure 3 for confirmed locations of this species within the project area.

Figure 2. Project area seagrass coverage and smalltooth sawfish sitings map.

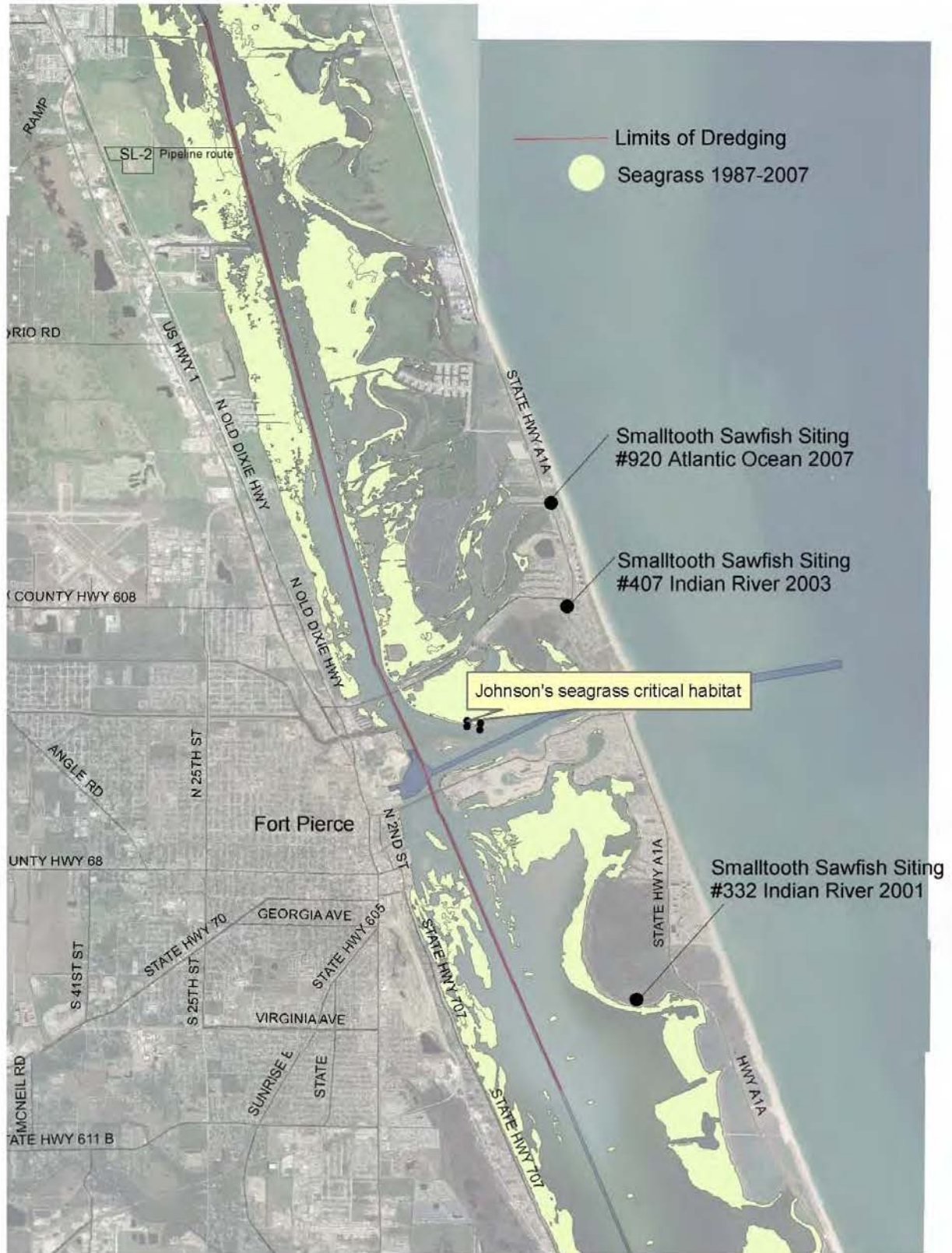


Figure 3. Confirmed locations of *H. Johnsonii* within the project area (NOAA 2007)



3.4 WATER QUALITY

3.4.1 WATER USE CLASSIFICATION

Waters within the proposed dredging area have been designated by the state of Florida as Class II - Shellfish Propagation or Harvesting Generally coastal waters where commercial shellfish harvesting occurs and Class III - Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife. The northern portion of the project is located within the Indian River – Vero Beach to Fort Pierce Aquatic Preserve while the southern portion lies within the Jensen Beach to Jupiter Inlet Aquatic Preserve. Both were established by the state of Florida in 1969. Additional information on these preserves, including maps, can be found at the following website: <http://www.dep.state.fl.us/coastal/sites/indianriversouth/>. The middle portion of the project lies within the corporate limits of the City of Ft. Pierce which acts as the demarcation line for the southern and northern limits of these two Aquatic Preserves respectively. Water quality within this middle portion of the project is greatly influenced by discharges from the C-25 canal. The C-25 is one of the primary Central & Southern Florida Project (C&SF) canals which were constructed to provide outlets for flood protection in the two northern drainage districts (Ft. Pierce Farms Water Control District and North St. Lucie River Water Control District) and other adjacent lands. These discharges are responsible for water quality degradation characterized primarily by salinity imbalances, nutrient enrichment, heavy metal and pesticide accumulation in the sediments, turbid water, and excessive accumulation rates of sediment (St. Lucie muck formations)(Corps, 2004).

3.4.2 SEDIMENT ANALYSIS

Analysis was performed by Ellis & Associates, Inc. on five sediment samples taken from the project area by Taylor Engineering in 1995. The results indicated that shoaling material from this portion of the IWW contained between 1.5-18.9% silt-sized particles (passing a #200 sieve), 7-55% shell, and was classified as fine to medium sand under the Unified Soils Classification (USC) system. Chemical analysis was completed on two of the samples by Savannah Laboratories & Environmental Services, Inc. in 1995. Of these two, only one sample contained metal concentrations above predicted natural ranges. However, the copper, lead, and zinc levels in the one exceedance were well below values considered to pose a threat to aquatic organisms. Additional information on this sediment analysis can be found in the Long-Range Plan.

3.5 ESSENTIAL FISH HABITAT

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1996, waters and substrate within the project area have been identified as Essential Fish Habitat (EFH) by the South Atlantic Fishery Management Council (1998). EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity. Estuarine/inshore EFH within the footprint of the project channel consists of estuarine water column with an unconsolidated substrate. There are also a wide bands

of seagrass paralleling the IWW, roughly 100 to 1,400 m wide mapped along the eastern and western shorelines of the IRL. Marine/offshore EFH within the boundaries of the Beach Placement Area consists of water column with an unconsolidated substrate, ocean high salinity surf zones, and live/hardbottom. Species managed by the National Marine Fisheries Service that may occur within the project channel and Beach Placement Area can be found in Table 3, and possible prey species in Table 4.

Table 3. Federally Managed Species of Fish that May Occur within the Project Area.

Species	Life Stage	Substrate Preference*			
		Unconsolidated Sediment	Seagrass	Ocean High Salinity Surf Zones	Live/Hardbottom
Brown shrimp <i>Farfantepenaeus aztecus</i>	A, J, L	A, J, L	J, L		
Pink shrimp <i>Farfantepenaeus duorarum</i>	A, J	A, J	J		
White Shrimp <i>Litopenaeus setiferus</i>	A, J	A, J	J, L		
Spiny Lobster <i>Panulirus argus</i>	A, J	A, J	A, J		A, J
Black seabass <i>Centropristis striata</i>	A, J	A, J			
Gag <i>Mycteroperca microlepis</i>	A, J	A, J			A, J
Cobia <i>Rachycentron canadum</i>	J	J		A, J	
Mutton snapper <i>Lutjanus analis</i>	A, J	J	J		A, J
Gray snapper <i>Lutjanus griseus</i>	A, J, L	A, J, L	A, J, L		A, J
Lane snapper <i>Lutjanus synagris</i>	A, J	A, J	J		A, J
Yellowtail snapper <i>Lutjanus chrysurus</i>	A, J	J	J		A, J
White grunt <i>Haemulon plumieri</i>	A, J	A, J	A, J		A, J
Sheepshead <i>Archosargus probatocephalus</i>	A, J, L	A, J	J, L		
Red drum <i>Sciaenops ocellatus</i>	A, J, L	A, J, L	J, L	A, J	
Hogfish <i>Lachnolaimus maximus</i>	A, J	J	J		A, J
Spanish mackerel <i>Scomberomorus maculatus</i>	A, J	A, J		A, J	
Black drum <i>Pogonias cromis</i>	A, J	A, J	A, J	A	A
Southern flounder <i>Paralichthys lethostigma</i>	A, J	A, J	J	A	

Table 4. Prey Species that May Occur within the Project Area.

Species	Life Stage	Substrate Preference*			
		Unconsolidated Sediment	Seagrass	Ocean High Salinity Surf Zones	Live/Hardbottom
Thinstripe hermit crab <i>Clibanarius vittatus</i>	A, J	A, J		A, J	
Horse conch <i>Pleuroploca gigantea</i>	A, J	A, J	A, J		A, J
Bay anchovy <i>Anchoa mitchilli</i>	A, J, L	A, J, L	L	A	
Sheepshead minnow <i>Cyprinodon variegatus</i>	A, J, L	A, J, L			A
Atlantic menhaden <i>Brevoortia tyrannus</i>	A, J, L	A	J, L	A	
Bay scallop <i>Argopecten irradians</i>	A, J, L	A, J	A, J, L		
Atlantic rangia <i>Rangia cuneata</i>	A, J, L	A, J, L			
Quahog <i>Mercenaria mercenaria</i>	A, J	A, J			
Grass shrimp <i>Palaemonetes pugio</i>	A, J		A, J		
Striped mullet <i>Mugil cephalus</i>	A, J	A, J	A, J	A, J	
Spot <i>Leiostomus xanthurus</i>	A, J	A	J		
Atlantic croaker <i>Micropogonias undulates</i>	A, J	A, J		A	A
Silversides <i>Menidia menidia</i>	A, J, L	A, J, L	A, J, L	A	
American eel <i>Anguilla rostrata</i>	A, J, L	J, L	A, J, L		

Source: South Atlantic Fishery Management Council 1998; Florida Museum of Natural History-Ichthyology website 2008.

*Substrate preference, unconsolidated sediment, seagrass, ocean high-salinity surf zones, and live/hardbottom habitats occur in or near the project area.

A=adult; J=juvenile; L=larvae

3.6 FISH AND WILDLIFE RESOURCES

Marine life common to east-central Florida can be found within the project channel and Beach Placement Area. The bottlenose dolphin is found throughout the Indian River Lagoon, with a resident population estimated to be between 200 and 800 individuals

(http://www.sms.si.edu/irlspec/Tursio_trunca.htm). Sub-tidal oyster beds should not occur within the project channel due to depth and vessel traffic. However, oyster beds can be found within the shallower IRL waters adjacent to the channel. Other macro invertebrates commonly found in soft-bottom estuarine habitat within Florida include annelids, a variety of mollusks besides oysters, arthropods, sponges and polyps (Hoffman and Olsen 1982). Extensive seagrass beds consisting of seven species of seagrasses occur within the IRL and serve as both habitat and food source for marine animals. Figure 2 depicts seagrass beds drawn from a compilation of survey data between 1987 and 2007.

Some species of migratory birds, especially common passerines, are likely to nest on the SL-2 DMMA. Colonial nesting species, such as wading birds or terns, have been observed there as well as the Beach Placement Area. In addition, a waterbird colony existed on a small spoil island on the east side of the channel immediately north of the north causeway in Ft. Pierce. Species present when this colony was last surveyed in 1999 consisted of Anhinga and Little Blue Heron (<http://www.myfwc.com/waders/colony.asp?atlas=616003>). Common species of mammals, amphibians, and reptiles known to occur in east-central Florida may be found at the disposal sites as well.

3.7 AIR QUALITY

According to the Florida Department of Environmental Protection, Florida is one of only three states east of the Mississippi River to meet all national air quality standards.

3.8 CULTURAL RESOURCES

The project consists of maintenance dredging of an existing channel with the use of existing and previously used dredge disposal areas. Prior consultation (DHR Project file number 2001-04772) for construction of SL-2 and the Ft. Pierce Beach SPP (DHR Project File number 2006-5948) determined that there would be no effect on historic properties.

3.9 RECREATION RESOURCES

Recreational boat traffic regularly transits the IWW and Ft. Pierce Inlet in order to access the IRL and the Atlantic Ocean. In addition to boating, other locally available recreational activities include fishing, beach and park sports.

3.10 AESTHETIC RESOURCES

The project area consists of a Federal navigation channel, upland DMMA and urban beach bordered by various types of natural areas and development. The IRL and Atlantic coastline in the vicinity of the project are considered to be picturesque waterways.

3.11 NOISE

Background noise from IWW vessel traffic, urban beach, and nearby roadways appears to be minimal.

3.12 SOCIO-ECONOMIC

Statewide, the IWW has been shown to increase property values by \$38.4 billion and provide \$18 billion in economic output which includes \$6 billion in personal wages and 203,519 jobs (FIND 2008). St. Lucie County specific beneficial economic impacts are summarized below:

- \$193.2 million in business volume
 - \$66.6 million in personal income
 - 2,359 jobs
 - \$155 to \$188 million in property values
- (source: GEC 2001)

3.13 NAVIGATION

The Intracoastal Waterway in Florida annually transports over 1.7 million tons of commercial cargo and over 500,000 recreational vessels (FIND 2008). There were 10,473 vessels registered in St. Lucie County in 1998/1999 (GEC 2001). The large HBOI ocean going research vessels transit from their berths at the Institute through the IWW and Ft. Pierce Inlet to the Atlantic Ocean.

4 ENVIRONMENTAL EFFECTS

This section is the scientific and analytic basis for the comparisons of the alternatives. See table 1 in section 2.0 Alternatives, for summary of impacts. The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects.

4.1 THREATENED AND ENDANGERED SPECIES

4.1.1 NO-ACTION ALTERNATIVE

There would be no effect on threatened and endangered species if the proposed maintenance dredging was not performed.

4.1.2 DREDGING ALTERNATIVE

In accordance with Section 7 of the Endangered Species Act, coordination with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) was performed. The Corps has determined that the proposed dredge work may affect, but is not likely to adversely affect sea turtles in the water (unless a hopper dredge is used in which case work may affect swimming sea turtles and the 1997 South Atlantic Division Regional Biological Opinion [SARBO] issued by the NMFS would apply), manatees, or the smalltooth sawfish and may affect Johnson's seagrass but would not be likely to adversely modify its designated critical habitat. These determinations were based on the implementation of species specific protective measures and the type of dredging equipment typically used to maintain the IWW. The NMFS concurred with these determinations in their 25 August 2010 biological opinion (BO), see appendix C.

4.1.2.1 Sea Turtles and Smalltooth Sawfish

Since it is likely that a hydraulic cutter suction pipeline dredge would be used for this project, adverse impacts or "takings" of sea turtles or smalltooth sawfish within the proposed work area would not be anticipated. Pursuant to the SARBO, these types of dredges do not pose a risk to sea turtles like hopper dredges do. However, in order to minimize potential adverse impacts to sea turtles and smalltooth sawfish, the following measures would be implemented:

- The contractor would instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel would be responsible for observing water-related activities for the presence of these species.
- The contractor would advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

- Siltation barriers would be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment.
- All vessels associated with the construction project would operate at “no wake/idle” speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels would preferentially follow deep-water routes (e.g., marked channels) whenever possible.
- If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions would be implemented to ensure its protection. These precautions would include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment would cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities would not resume until the protected species has departed the project area of its own volition.
- Any collision with and/or injury to a sea turtle or smalltooth sawfish would be reported immediately to the National Marine Fisheries Service’s Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

4.1.2.2 West Indian Manatee

Standard protective measures would be taken during dredging activities to ensure the safety of manatees. To make the contractor and his personnel aware of the potential presence of this species in the project area, their endangered status, and the need for precautionary measures, the contract specifications would include the following standard manatee protection clauses:

- The contractor would instruct all personnel associated with construction activities about the potential presence of manatees in the area and the need to avoid collisions with them.
- If siltation barriers are used, they shall be made of material in which manatees cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment. Barriers must not block manatee entry to or exit from essential habitat.
- If a manatee were sighted within 100 yards of the project area, all appropriate precautions would be implemented by the contractor to ensure protection of the manatee. These precautions would include the operation of all moving equipment no closer than 50 feet of a manatee. If a manatee were closer than 50 feet to moving equipment or the project area, the equipment would be shut down and all construction

activities would cease to ensure protection of the manatee. Construction activities would not resume until the manatee has departed the project area.

- All vessels associated with the project would operate at 'no wake' speeds at all times while in shallow waters or channels where the draft of the boat provides less than three feet clearance from the bottom. Boats used to transport personnel would be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any workboat would follow routes of deep water to the greatest possible extent. Shore crews would use upland road access if available.
- Mooring bumpers would be placed on all large vessels wherever and whenever there is a potential for manatees to be crushed between two moored vessels. The bumpers would provide a minimum stand-off distance of four feet.
- All personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act and the Marine Mammal Protection Act.

4.1.2.3 Johnson's Seagrass

Although Johnson's seagrass has not been mapped within the channel, it has been documented to occur within the project vicinity. In addition, it could occur within the 100-foot dredge anchoring zones adjacent to either side of the channel and within the pipeline routes. Hydraulic cutter suction pipeline dredges require anchors to position and advance the dredge along the channel. The project channel is approximately 9.8 miles long and a hydraulic dredge would require a floating and submerged pipeline of at least that length to transport the dredged material slurry to SL-2 or the beach placement area. Although it is expected that impacts to seagrass can be avoided, pre and post-construction seagrass surveys adjacent to the channel areas to be dredged would be performed. The Corps would propose appropriate mitigation for seagrass losses outside the channel that have not recovered within 1 year of impact and would focus on proven mitigation methods such as filling of dredged holes, scrape down of dredged material islands, and repair of prop scars.

4.1.3 MATERIAL PLACEMENT OPTIONS

As with the proposed dredging, the Corps also coordinated with the USFWS and NMFS on material placement within the beach area and DMMA SL-2. The Corps has determined that placement of dredged material into DMMA SL-2 would have no effect on Federally listed species. In addition, the Corps has determined that the placement of dredged material into the Ft. Pierce Beach placement area may affect, but is not likely to jeopardize the continued existence of nesting sea turtles. This determination was based on the implementation of protective measures for these species contained in the Statewide Programmatic Biological Opinion (SPBO) issued by the USFWS in 2011. Per the SPBO, a 30-day notification of application of this opinion would be sent to the USFWS prior to use of the beach placement area.

4.1.3.1 Sea Turtles

No beach placement activity would occur within the main portion of the sea turtle nesting season (May 1 - October 31). Beach placement could occur between November 1 - April 31 under the following conditions:

- Only beach compatible material containing no more than 10% fine material passing a #230 sieve would be placed on the beach.
- Daily sea turtle nest monitoring and relocation would be required. Only nests that would be affected by construction activities would be relocated to a nearby self-release beach site in a secure setting where artificial lighting would not interfere with hatchling orientation.
- Sand compaction and escarpment monitoring would occur post placement.
- Staging areas for construction equipment would be located off the beach to the maximum extent practicable.
- Direct lighting of the beach and near shore waters would be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all U.S. Coast Guard, EM 385-1-1, and Occupational Safety and Health Administration (OSHA) requirements.

4.2 WATER QUALITY

4.2.1 NO-ACTION ALTERNATIVE

There would be no change in water quality if the proposed maintenance dredging was not performed.

4.2.2 DREDGING ALTERNATIVE

The primary anticipated change in water quality at the dredging site would be a temporary increase in turbidity. According to the state of Florida's Class II and III water quality standards, turbidity levels during dredging or placement of dredged material are not to exceed 29 nephelometric turbidity units (NTUs) above background levels at the edge of normally a 150-meter mixing zone. In order to comply with this standard, turbidity will be monitored according to state protocols during the proposed dredging work. If at any time the turbidity standard were exceeded, those activities causing the violation would cease. Portions of the project lie within the Indian River – Vero Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic Preserve. Coordination will be conducted with the Florida Department of Environmental Protection in order to determine acceptable turbidity levels within the preserves prior to dredging. Since the shoal material sampled in the Long-Range Plan was classified as fine or medium sand, water quality impacts from the re-suspension of chemicals within the dredged material should not be a concern because chemical constituents do not adsorb

well to sand particles. However, a review of existing sediment and water quality information will be undertaken and if necessary additional sediment samples will be analyzed to establish the quality of the material to be dredged.

4.2.3 MATERIAL PLACEMENT OPTIONS

As with the dredging activity, the primary change in water quality during placement of dredged material within the beach area would be a temporary increase in turbidity. This activity as well as any discharge from the weirs at DMMA SL-2 would be monitored similar to the dredging activity.

4.3 ESSENTIAL FISH HABITAT

4.3.1 NO-ACTION ALTERNATIVE

There would be no impact to Essential Fish Habitat (EFH) if the proposed maintenance dredging was not performed.

4.3.2 DREDGING ALTERNATIVE

The proposed maintenance dredging of the project channel would impact approximately 144 acres of previously dredged estuarine/inshore water column and unconsolidated substrate. This dredging may also impact adjacent seagrass beds. In an effort to estimate potential seagrass impacts, the Corps analyzed existing seagrass survey data for the project area in ArcGIS. The data was downloaded from the Florida Fish and Wildlife Conservation Commission's (FWCC) Fish and Wildlife Research Institute (FWRI) website which stated: "This polygon GIS data set represents a compilation of statewide seagrass data from various source agencies and scales. The data were mapped from sources ranging in date from 1987 to 2007" (http://ocean.floridamarine.org/mrgis/Description_Layers_Marine.htm#seagrass).

Figures 4 depicts the results of this analysis. No seagrasses have been previously mapped within the 125-foot wide IWW channel nor in the approximate channel side-slope of 3 feet horizontal to 1 foot vertical or 36 feet wide. However, approximately 1.31 acres of continuous and 2.04 acres of discontinuous seagrass beds were previously mapped within the 100-foot dredge anchor zone adjacent to the channel. These were located only within the northern 4 miles of the proposed 9.8 mile project. Therefore, the Corps estimates that approximately 3.35 acres of seagrass could potentially be temporarily impacted from the proposed action. However, due to the patchiness of the previously mapped beds and their distance from the channel edges (45 feet or more), it should be practicable for the dredge contractor to avoid anchor placement within the majority of this habitat (*Avoidance and Minimization*).

In order to identify and avoid seagrass, the Corps shall survey the area adjacent to the channel prior to construction. This same area would be surveyed after construction to determine if any adverse impact had occurred. The surveys would be conducted during the seagrass growing season, or summer months. The Corps would propose appropriate mitigation for seagrass losses outside the channel that have not recovered

within 1 year of impact. However, as previously stated, it is the Corps' intention to avoid impacts to this resource.

Species managed by the NMFS that may occur within the project area can be found in Table 4, and prey species in Table 5. The Corps has determined that the proposed action would not have a substantial adverse impact on EFH or federally managed fisheries along the eastern coast of Florida. This determination was based on the fact that the substrate of the project area is comprised of a naturally dynamic unconsolidated substrate, and measures shall be taken to protect seagrass habitat. Turbidity would affect vision of marine life within the sediment plume as well as those marine organisms with gills, but these effects would be temporary as they would be limited to the actual dredging and placement operations. Routine maintenance dredging may suppress re-colonization of certain benthic organisms and therefore could impact other trophic levels within the food chain. However, it is important to note that the IWW is a man-made channel, maintenance events are anticipated to occur every 10 to 20 years, the actual channel width encompasses a fraction of the entire water body, and similar habitat occurs immediately adjacent to the channel. EFH coordination with the NMFS was initiated by Corps public notice dated November 5, 2008 and completed by NMFS letter dated January 29, 2009. Per commitments made during that coordination, the Corps will continue to work with the NMFS HCD on seagrass survey protocols and conceptual mitigation strategies for this project.

4.3.3 MATERIAL PLACEMENT OPTIONS

Placement of dredged material into the Beach Placement Area would impact approximately 6 acres of marine/offshore water column and unconsolidated substrate and ocean high salinity surf zone. Placement at this site has occurred on multiple occasions in the past. Sand is placed on the beach every two years or so for the SPP and, therefore, the possibility of longer term adverse impacts, i.e. suppression of re-colonization of the area by indigenous species, is greater than at the dredging area. Information on the marine resources of the beach can be found in the Environmental Impact Statement prepared for the Ft. Pierce Beach SPP (Corps 2002).

4.4 FISH AND WILDLIFE RESOURCES

4.4.1 NO-ACTION ALTERNATIVE

There would be no impact to fish and wildlife resources if the proposed maintenance dredging was not performed.

4.4.2 DREDGING ALTERNATIVE

As previously stated, dredging the project channel would result in impacts to benthos. The bottom of the channel would normally be re-colonized with organisms such as annelids and arthropods from adjacent similar habitats. In addition, since the channel is anticipated to be dredged every 10-20 years, benthic organisms should fully recover. Sub-tidal oyster beds should not occur within the project footprint but these and other resources would be identified for avoidance during the pre-dredge seagrass survey.

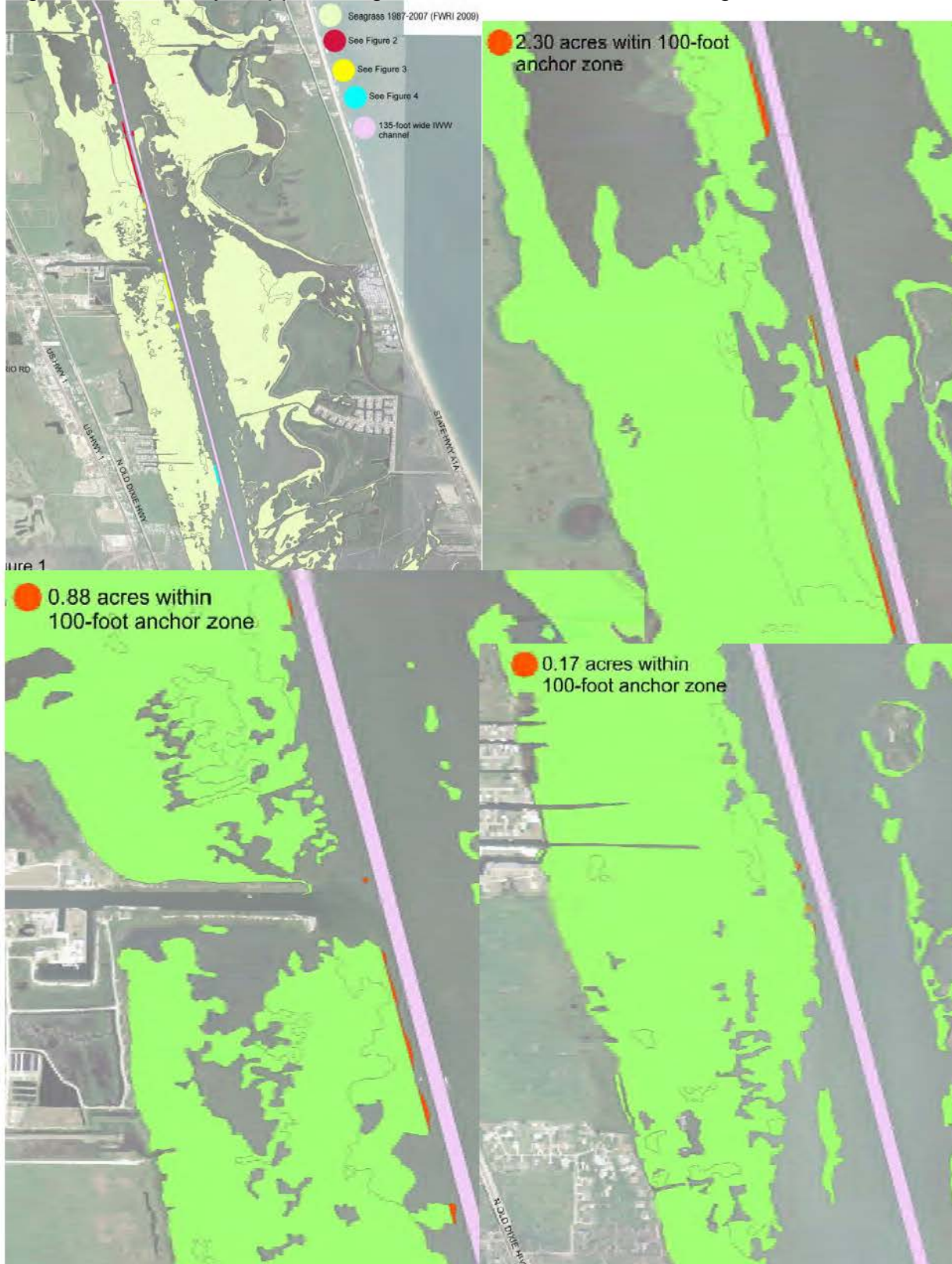
The bird rookery on the spoil island north of the north causeway in Ft. Pierce is approximately 300 feet east of the channel. It is unlikely that the rookery would be disturbed by dredging activity but the Corps migratory bird protection plan would be implemented during construction.

4.4.3 MATERIAL PLACEMENT OPTIONS

This project would not place dredged material within the beach every year so re-colonization of the area by benthic organisms could occur. However, this beach is critically eroding and requires sand placement every two years as part of the SPP. Therefore, although the IWW project would most likely play a minor role, long-term impacts to benthic species re-colonization of the beach could occur.

The Corps would implement its migratory bird protection plan if work is performed at the upland disposal site during the nesting season, April 1 through August 31. The plan would include monitoring the site during the nesting season. If nests were found, then a buffer zone of at least 200 feet would be placed around each nest. Clearing of vegetation from within the basin or the dikes would be performed outside the nesting season. It is anticipated that the containment basin within DMMA SL-2 will attract foraging wading birds and nesting shorebirds and become useful habitat for these species between dredging events. No adverse impacts to migratory birds are anticipated with the migratory bird protection plan in effect. Other types of wildlife that utilize the sites would be temporarily displaced during construction. However, these sites would be infrequently used and therefore should be re-colonized by wildlife.

Figure 4. Previously mapped seagrass beds within 100-foot dredge anchor zones.



4.5 AIR QUALITY

4.5.1 NO-ACTION ALTERNATIVE

There would be no impact to air quality if the proposed maintenance dredging was not performed.

4.5.2 DREDGING ALTERNATIVE

Dredging equipment would emit exhaust fumes, but this would be a very temporary and minor degradation of local air quality.

4.5.3 MATERIAL PLACEMENT OPTIONS

Construction equipment at the upland disposal sites would emit exhaust fumes and could create dust clouds. The contract specifications would require the contractor to minimize pollution of air resources such as controlling particulates, i.e. dust, or excess machinery emissions.

4.6 CULTURAL RESOURCES

The Corps contracted Panamerican Consultants, Inc. (PCI) to conduct a survey and produce a report of the results (*Historic Assessment and Remote Sensing Survey of the Intracoastal Waterway near Ft. Pierce Inlet, St. Lucie County, Florida*). PCI identified 191 magnetic anomalies, 139 side scan sonar anomalies and 52 sub-bottom profiler anomalies. None of the anomalies were considered significant and no further archaeological work was recommended. Based on this survey, the Corps made a determination of “no historic properties” for the proposed maintenance dredge work on the IWW in the vicinity of Ft. Pierce, Florida and use of the upland disposal site SL-2. The Corps sent this determination to the State Historic Preservation Officer (SHPO) via letter dated 4 February 2010 and the SHPO concurred via letter dated 29 March 2010.

4.7 RECREATION RESOURCES

4.7.1 NO-ACTION ALTERNATIVE

There would be a moderate adverse impact to recreational boating if the proposed maintenance dredging was not performed.

4.7.2 DREDGING ALTERNATIVE

Maintenance dredging of the project channel would provide a moderate long-term benefit to recreational boating. Recreational traffic within the IWW channel would be temporarily disrupted due to construction activities.

4.7.3 MATERIAL PLACEMENT OPTIONS

The upland disposal site SL-2 is not open to the public, and therefore the use of that site would not impact recreational resources. Recreational use of the beach area would be temporarily disrupted if dredged material was placed at this location.

4.8 AESTHETIC RESOURCES

4.8.1 NO-ACTION ALTERNATIVE

There would be no impact to aesthetic resources if the proposed maintenance dredging was not performed.

4.8.2 DREDGING ALTERNATIVE

Construction activities within the IWW channel would temporarily impact the aesthetics of the area.

4.8.3 MATERIAL PLACEMENT OPTIONS

The upland disposal site SL-2 is not open to the public nor is it located in an area where construction activity would adversely impact aesthetic resources of adjacent areas. Aesthetic resources, or visual appeal, of the beach area would be temporarily adversely impacted if dredged material was placed at this location.

4.9 NOISE

4.9.1 NO-ACTION ALTERNATIVE

There would be no increased levels of noise if the proposed maintenance dredging was not performed.

4.9.2 DREDGING ALTERNATIVE

Construction activity would result in a minor short term increase over the existing background level.

4.9.3 MATERIAL PLACEMENT OPTIONS

The upland disposal site is not adjacent to residential neighborhoods or commercial enterprises, and therefore the noise created by construction equipment would have no effect on the surrounding area. However, the beach placement area is an urban beach surrounded by commercial and residential development. The minimal noise created by construction equipment could have a minor effect on the local community.

4.10 SOCIO-ECONOMIC

4.10.1 NO-ACTION ALTERNATIVE

There would be a long-term adverse impact to commercial shipping and other marine related business if the IWW channel was not maintained. The estimated adverse impacts to St. Lucie County are summarized below:

- Decrease of \$119.6 million in business volume
- Decrease of \$40.0 million in personal income
- Decrease of 1,426 jobs
- Decrease of \$57.5 million in property values

(source: GEC 2001)

4.10.2 DREDGING ALTERNATIVE

Commercial shipping and other marine related business would benefit if the proposed work was performed. There were 14,154 vessels registered in St. Lucie County in 2007 (PBS&J 2008).

4.10.3 MATERIAL PLACEMENT OPTIONS

There would be no impact to the local, regional and statewide economies with the use of SL-2. Beach placement would help maintain a recreational beach which generates revenue from tourism.

4.11 NAVIGATION

4.11.1 NO-ACTION ALTERNATIVE

If the authorized depth of the project channel was not maintained, then shoaling would eventually make the IWW un-navigable for vessel traffic including commercial ships and unsafe for shallow-draft vessels.

4.11.2 DREDGING ALTERNATIVE

Performing the proposed work would result in safer navigation conditions. Vessel traffic within the IWW channel would be temporarily disrupted due to construction activities.

4.11.3 MATERIAL PLACEMENT OPTIONS

The use of the beach area would have minimal impact on navigation. However, if a hydraulic pipeline dredge is used, temporary impacts to vessel traffic within the Ft. Pierce Inlet could occur due to the presence of the floating and submerged pipeline.

4.12 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Table 5 summarizes the impact of such cumulative actions by identifying the past, present, and reasonably foreseeable future condition of the various resources which are directly or indirectly impacted by the proposed action and its alternatives. The table also illustrates the with-project and without-project condition (the difference being the incremental impact of the project). Also illustrated is the future condition with any reasonable alternatives (or range of alternatives).

TABLE 5: SUMMARY OF CUMULATIVE IMPACTS (NOTE: The IWW was completely man made. Dredging of the IWW to it's current depths was completed by 1961. Therefore, the timeline for this cumulative impacts analysis is from 1961 to the present, and is limited in space to the project area.)

	Past (historical project impacts)	Present (current project impacts)	Future without project	Future with Proposed Dredging and beach disposal	Future with Proposed Dredging and upland disposal
Sea turtles	Construction of Ft. Pierce Inlet and Jetties disrupted sand transfer affecting nesting areas. Inlet created access point to IRL habitat.	Use of clamshell or cutterhead results in no mortalities. Sand bypass and SPP compensates for sand disruption.	No effect.	Minimal effect from use of clamshell or cutterhead dredge. Temporary impact to nesting while berm equilibrates.	Minimal effect with use of clamshell or cutterhead dredge.
Manatees	Dredging of the IWW increased vessel traffic.	Minimal effect with use of standard protection measures.	Channel depths would decrease.	Minimal effect with use of standard protection measures.	Minimal effect with use of standard protection measures.
Smalltooth sawfish	Mortality from commercial fishing by-catch.	Minimal effect.	Minimal effect.	Minimal effect.	Minimal effect.
Johnson's seagrass	Historic impact unknown.	Minimal effect occurring with avoidance measures.	No effect.	Minimal effect occurring with avoidance measures.	Minimal effect occurring with avoidance measures.
Water quality	Temporary increase in turbidity with past dredging events. Long-term alteration of the historic water quality conditions from construction of Ft. Pierce inlet.	Pollution prevention measures have resulted in Class II and III designation. Temporary increase in turbidity with dredging.	Pollution prevention measures should continue. Decreased depths could lead to chronic turbidity from prop dredging.	Temporary increase in turbidity with dredging.	Temporary increase in turbidity with dredging.

	Past (historical project impacts)	Present (current project impacts)	Future without project	Future with Proposed Dredging and beach disposal	Future with Proposed Dredging and upland disposal
Essential Fish Habitat	Inlet and channels increased saltwater flow. No substantial effect on Federally managed fish species	No substantial effect on Federally managed fish species with avoidance of seagrass.	No effect.	No substantial effect on Federally managed fish species with avoidance of seagrass. Benthic recovery post placement.	No substantial effect on Federally managed fish species with avoidance of seagrass.
Fish and Wildlife Resources	Loss of terrestrial habitat with construction inlet and upland disposal site.	Minimal impact on migratory birds with protective measures. Other wildlife temporarily displaced when upland site is used.	No effect.	Maintenance dredging and beach placement would impact benthic organisms. Minimal impact on migratory birds with protective measures. Other wildlife temporarily displaced when beach site is used.	Maintenance dredging would impact benthic organisms. Minimal impact on migratory birds with protective measures. Other wildlife temporarily displaced when upland site is used.
Air Quality	Local emissions increased with creation of inlet and navigation channels. Minor emissions from dredging equipment.	Minor emissions from dredging equipment. In attainment with air quality standards.	No effect.	Minor emissions from dredging equipment. Expected to be in attainment.	Minor emissions from dredging equipment. Expected to be in attainment.
Cultural Resources	No Historic Properties affected.	No Historic Properties affected.	No Historic Properties affected.	No Historic Properties affected.	No Historic Properties affected.
Recreation Resources	Construction of inlet and navigation channels created recreational opportunities (boating).	Dredging beneficial to recreational boating. Equipment disrupts boat traffic.	Impact to recreational boating from channel shoaling.	Dredging beneficial to recreational boating. Equipment would disrupt boat traffic.	Dredging beneficial to recreational boating. Equipment would disrupt boat traffic.
Aesthetic Resources	Construction of inlet affected local aesthetic resources.	Equipment temporarily affects aesthetic resources.	No effect.	Equipment would temporarily affect aesthetic resources.	Equipment would temporarily affect aesthetic resources.

	Past (historical project impacts)	Present (current project impacts)	Future without project	Future with Proposed Dredging and beach disposal	Future with Proposed Dredging and upland disposal
Noise	Construction of inlet and navigation channels minimally increased local noise levels.	Equipment noise is minimal.	No effect.	Equipment noise would be minimal.	Equipment noise would be minimal.
Socio-Economics	Construction of inlet and navigation channels created a significant positive economic stimulus.	IWW continues to provide an economic stimulus.	There would be a significant adverse economic impact if the proposed work was not performed.	There would be a significant positive economic impact if the proposed work was performed.	There would be a significant positive economic impact if the proposed work was performed.
Navigation	Construction of inlet and channels improved navigation along the east-central coast of Florida.	Continued maintenance dredging of the IWW provides safe navigation.	There would be a significant adverse impact to navigation if the proposed work was not performed.	There would be a significant beneficial impact to navigation if the proposed work was performed.	There would be a significant beneficial impact to navigation if the proposed work was performed.

4.13 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.13.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. Other than the use of fuel, equipment and supplies, there would be no irreversible commitment of resources.

4.13.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. Dredging would temporarily disrupt navigation and recreational activities.

4.14 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The dredging of the project channel and placement of dredged material into the beach would adversely impact benthic organisms and some fish species. Use of the upland disposal site could adversely impact wildlife.

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

The proposed maintenance work is typically of short duration. Adversely affected benthos would be expected to recover in less than a year, possibly longer. However, some benthic species in the beach placement area may not achieve full recovery since sand placement occurs on an biennial basis. Most fish species and other motile organisms like crabs should be able to avoid the dredging equipment. Since the project area is limited in size, the long-term productivity of fish and other motile species should not be significantly affected. Placement of dredged material within the upland disposal site is also typically of short duration but could adversely impact wildlife. As this site is only periodically used, the wildlife would re-colonize the interior of the property and habituate the site between dredging events.

4.16 INDIRECT EFFECTS

Maintaining the authorized depth of the project channel would benefit the shipping industry and local and statewide economies. This may contribute to increased development in adjacent areas.

4.17 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

This project has wide support and is compatible with federal, state, and local objectives.

4.18 CONFLICTS AND CONTROVERSY

Dredging of the IWW would be done in a manner that would avoid, or minimize impacts, to seagrass. Surveys would be performed before dredging and after the work has been

completed in order to attempt to determine if any impact had occurred. Appropriate mitigation would be proposed if seagrass were impacted. Dredging in the vicinity of the Indian River – Vero Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic Preserve would be performed in compliance with the State water quality standards.

4.19 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

There are no uncertain, unique or unknown risks associated with the proposed work.

4.20 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

As this project involves maintenance dredging, there would be no precedent and or principle for future actions established.

4.21 ENVIRONMENTAL COMMITMENTS

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications:

1. A clamshell or cutterhead dredge would most likely be used to perform the proposed work; therefore, adverse impacts to sea turtles would not be anticipated. Dredged material would only be placed on the beach pursuant to the conditions listed in section 4.1.3.1 above; therefore adverse impacts to nesting sea turtles would be minimized. Other sea turtle protective measures, such as informing contract personnel of the presence of sea turtles in the area and the need to avoid collisions with them as well as equipment lighting requirements shall also be implemented.
2. Standard protective measures for manatees shall be required.
3. The District's migratory bird protection policy shall be implemented.
4. The work shall be performed in compliance with state water quality statutes.
5. A pre- and post-construction seagrass survey shall be performed adjacent to the channel area to be dredged. If the surveys show that the dredging has impacted seagrass, then appropriate mitigation shall be proposed.
6. Air emissions such as vehicular exhaust and dust shall be controlled.
7. The contracting officer would notify the contractor in writing of any observed noncompliance with federal, state, or local laws or regulations, permits and other elements of the contractor's Environmental Protection Plan. The contractor would, after receipt of such notice, inform the contracting officer of proposed corrective action and take such action as may be approved. If the contractor fails to comply promptly, the contracting officer would issue an order stopping all or part of the work until satisfactory

corrective action has been taken. No time extensions would be granted or costs or damages allowed to the contractor for any such suspension.

8. The contractor would train his personnel in all phases of environmental protection. The training would include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities to insure adequate and continuous environmental pollution control. Quality control and supervisory personnel would be thoroughly trained in the proper use of monitoring devices and abatement equipment, and would be thoroughly knowledgeable of federal, state, and local laws, regulations, and permits as listed in the Environmental Protection Plan submitted by the contractor.

9. The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract would be protected during the entire period of this contract. The contractor would confine his activities to areas defined by the drawings and specifications.

10. As stated in the standard contract specifications, the disposal of hazardous or solid wastes would be in compliance with federal, state, and local laws. A spill prevention plan would also be required.

4.22 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.22.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project was compiled and a draft Environmental Assessment was noticed on 5 November 2008. Comments and information received have been incorporated into this final EA. The project is in compliance with the National Environmental Policy Act.

4.22.2 ENDANGERED SPECIES ACT OF 1973

Consultation was completed with the NMFS on 25 August 2010 and the USFWS in 22 August 2011. This project has been fully coordinated under the Endangered Species Act and therefore, is in full compliance with the act.

4.22.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A Coordination Act Report (CAR) is not required for the proposed work. This project is in full compliance with the act.

4.22.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

(PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order 11593) Archival research, and consultation with the SHPO, was conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. The project would not affect

historic properties included in or eligible for inclusion in the National Register of Historic places. The SHPO concurred with this determination via letter dated 29 March 2010 and the project is in compliance with each of these federal laws.

4.22.5 CLEAN WATER ACT OF 1972

The project is in compliance with this act. A F.S. 373.406(6) dredging exemption verification shall be obtained from the Florida Department of Environmental Protection prior to dredging. All state water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A. A public notice was issued in a manner which satisfies the requirements of Section 404 of the Clean Water Act.

4.22.6 CLEAN AIR ACT OF 1972

Vehicular emission and airborne dust particulates resulting from construction activities shall be controlled. This project was coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the act. No correspondence from EPA was received as a result of the public notice dated 5 November 2008.

4.22.7 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. State consistency review was performed during the coordination of the draft EA. Based on the information contained in the draft EA and state agency comments; the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting stage.

4.22.8 FARMLAND PROTECTION POLICY ACT OF 1981

Coordination with the Natural Resources Conservation Service (NRCS) was completed on October 1, 2003 for the SL-2 DMMA. In addition, no prime or unique farmland would be impacted by the IWW dredging. Therefore, the work is in compliance with this act.

4.22.9 WILD AND SCENIC RIVER ACT OF 1968

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

4.22.10 MARINE MAMMAL PROTECTION ACT OF 1972

Protective measures for marine mammals such as manatees and dolphins shall be implemented. This project was coordinated with the USFWS and NMFS. The work is in full compliance with the act.

4.22.11 ESTUARY PROTECTION ACT OF 1968

The IRL is considered the most biologically diverse estuary in North America. The protective measures described in section 4 would insure avoidance and minimization of impacts to this estuary from the proposed dredging. This project is in compliance with this act.

4.22.12 FEDERAL WATER PROJECT RECREATION ACT

Although the IWW provides recreational benefits, the principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, are not applicable to this project which is Operations and Maintenance of an existing Federal navigation channel.

4.22.13 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the state of Florida. The project was coordinated with the state and is in compliance with the act.

4.22.14 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

The southern portion of the project lies within CBRA unit P-11. Maintenance dredging of the IWW is consistent with provisions of the CBRA which excepts "maintenance of existing channel improvements... and including the disposal of dredge materials related to such improvements". CBRA has no requirement to dispose of the material within the same CBRA Unit. CBRA does not otherwise regulate how the maintenance material may be used. This CBRA exemption was verified by Service letter dated 25 September 2003.

4.22.15 RIVERS AND HARBORS ACT OF 1899

The proposed work could temporarily obstruct navigable waters of the United States but would ultimately improve navigability of these waters. The proposed action was subject to a public notice. The project is in full compliance.

4.22.16 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project was coordinated with the NMFS and is in compliance with the act.

4.22.17 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

Measures shall be taken to protect migratory birds, i.e. avoiding nesting sites. The project is in compliance with these acts.

4.22.18 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (33 U.S.C. 1402)(f) does not apply to the disposal of material for beach nourishment or to the placement of material for a purpose other than disposal (i.e. placement of rock material as an artificial reef or the construction of artificial reefs as mitigation). Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project. The disposal activities addressed in this EA have been evaluated under Section 404 of the Clean Water Act.

4.22.19 MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT

The Corps has determined that the project would not have a substantial adverse impact on Essential Fish Habitat or federally managed fish species occurring along the east-central coast of Florida. The proposed work was fully coordinated with the National Marine Fisheries Service which ended with their final letter dated 29 January 2009. The project is in full compliance with the act.

4.22.20 E.O. 11990, PROTECTION OF WETLANDS

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

4.22.21 E.O. 11988, FLOOD PLAIN MANAGEMENT

This project would have no adverse impacts to flood plain management.

4.22.22 E.O. 12898, ENVIRONMENTAL JUSTICE

The proposed action would not result in adverse human health or substantial environmental effects. The work would not impact "subsistence consumption of fish and wildlife".

4.22.23 E.O. 13089, CORAL REEF PROTECTION

This project would not impact those species, habitats, and other natural resources associated with coral reefs.

4.22.24 E.O. 13112, INVASIVE SPECIES

This project would not introduce any invasive species. Exotic invasive species of plants such as Brazilian pepper are well established at the upland disposal site.

5 LIST OF PREPARERS

5.1 PREPARERS

Preparer	Discipline	Role
Paul DeMarco, U.S. Army Corps of Engineers	Biologist	Principal Author
Dan Hughes, U.S. Army Corps of Engineers	Archaeologist	Cultural Resources

5.2 REVIEWERS

This Environmental Assessment has been reviewed by the supervisory chain of the Environmental Branch, as well as the Construction-Operations Division, Programs and Project Management, and the Office of Counsel of the US Army Corps of Engineers, Jacksonville District.

6 PUBLIC INVOLVEMENT

6.1 SCOPING AND DRAFT EA

A Public Notice was issued for this action on 5 November 2008. The draft EA and Finding of No Significant Impact (FONSI) was made available to the public.

6.2 AGENCY COORDINATION

Coordination was conducted with appropriate agencies and described in this report. Agency coordination letters are located in Appendix C.

6.3 LIST OF RECIPIENTS

Per the Public Notice, copies of the draft EA were made available to appropriate stakeholders. A list of stakeholders receiving notification can be found within the Public Notice.

6.4 COMMENTS RECEIVED AND RESPONSE

The following comments were received in response to the public notice:

The Florida DEP Bureau of Beaches and Coastal Systems suggests that, although upland disposal is appropriate for nominal amounts of beach-quality sand, the possibility of creating a separate stockpile area should be explored if a small but significant amount of beach-quality material is available in a consolidated area (3,000 to 10,000 cubic yards). This quantity could then be truck-hauled to the beach. Staff notes that the total estimated volume of material that could currently be dredged is approximately 69,000 cy, which is very close to the 50-year design capacity of SL-2 DMMA. If the existing DMMA capacity, including the minimum freeboard and bulking factors, cannot accommodate all 69,000 cy, an alternative disposal site or plans to increase the capacity of SL-2 (e.g., construction of higher dikes or a rejuvenation plan) should be identified and evaluated for impacts. In addition, the turbidity mixing zone is normally 150 meters, but staff suggests that it be limited to the edge of seagrass resources, particularly any Johnson's seagrass beds. The GPS location of all anchoring sites outside of the channel should be required to ensure that known seagrass beds are avoided.

- The Corps notes that during hydraulic placement of dredged material into DMMA's, stratification of the coarse material typically occurs immediately adjacent to the dredge pipe outfall with the fines typically settling closer to the weirs. This could allow for offloading of the beach quality material from the DMMA in the future. Since the project qualifies for a F.S. 373.406(6) dredging exemption, the 150 meter mixing zone should apply. Coordination with DEP during the exemption verification process will be conducted prior to dredging.

The DEP Office of Coastal and Aquatic Managed Areas also notes that the project is located within two state aquatic preserves- the Indian River-Vero Beach to Fort Pierce Aquatic Preserve and Indian River-Jensen Beach to Jupiter Inlet Aquatic Preserve. Activities conducted within these waters are subject to the higher water quality standards outlined in the Aquatic Preserve (Chapter 18-20, *Florida Administrative Code*) and Outstanding Florida Waters (Section 62-4.242, *F.A. C.*) rules. The seagrass map provided in the Draft EA depicts the extent of seagrass beds located between the Intracoastal Waterway and SL-2 DMMA. Impacts to these resource areas should be avoided and minimized once detailed pre-dredging seagrass surveys are conducted. Staff recommends that dredged material be allowed to settle and evaporate in the DMMA prior to discharge and that floating dredge pipes be utilized to avoid impacts to dense patches of seagrass.

- As stated above a F.S. 373.406(6) dredging exemption verification would be obtained from DEP prior to dredging. An exemption verification was obtained for a IWW dredging project north of this project which is within the Indian River-Malabar to Vero Beach Aquatic Preserve and the 150 meter mixing zone was approved for that project. Therefore, it is anticipated that would also apply to this project. Seagrasses outside the channel will be avoided to the maximum extent possible. DMMA IR-2 is designed to provide sufficient retention such that the dredged materials will settle out of the return water prior to its discharge over the weir stack and flow back to the IWW.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

MAINTENANCE DREDGING INTRACOASTAL WATERWAY REACH I AND PORTION OF REACH II ST. LUCIE COUNTY, FLORIDA

I. Project Description

a. Location. The proposed work would be performed within Reach I and a portion of Reach II of the IWW federal navigation channel in the vicinity of Ft. Pierce Inlet, St. Lucie County, Florida. Placement operations would occur at designated locations (please see Figure 1).

b. General Description. The work would involve periodic maintenance dredging of up to 78,000 cubic yards of material from the project channels. Dredged material would be placed in the beach or upland disposal site.

c. Authority and Purpose. Spanning nearly the entire length of Florida from Jacksonville to Miami, an 8 ft deep x 75 ft wide channel was authorized January 21, 1927 by House document 586, 69th Congress, 2nd Session. The present configuration (12 ft deep x 125 ft wide) was authorized by House Document 740, 79th Congress, 2nd Session, 2 March 1945. Maintenance of the channel is the responsibility of the Corps. The Florida Inland Navigation District (FIND) serves as the local sponsor and is responsible for providing and maintaining the DMMA's. Maintenance dredging would maintain the authorized depths of the project channels.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Dredged material from the project channel typically consists of shoal material containing silt, clay, sand and shell. Silt content generally ranges between 1.3-5.7% (please see Section 3.2 for more information).

(2) Quantity of Material. Up to 78,000 cubic yards would be periodically removed.

(3) Source of Material. From Reach I and a portion of Reach II of the IWW federal navigation channel within the vicinity of Ft. Pierce Inlet (please refer to Section 1.1 for more information)

e. Description of the Proposed Discharge Site(s).

(1) Location. The beach and upland disposal site (please

see Figure 1. Project Map and Section 2 for more information).

(2) Size. Beach Area: 6 acres; SL-2 DMMA: 13.1 acres.

(3) Type of Site: Beach Area: open water (ocean) and sand beach berm; DMMA SL-2: confined upland areas.

(4) Type(s) of Habitat. Beach Area is open water habitats with unconsolidated substrate and high-energy surf zone; DMMA SL-2 is confined, disturbed upland habitats (please see Section 3 for more information).

(5) Timing and Duration of Discharge. Timing is undetermined and duration is generally less than four months. Beach placement would occur between November 1 - April 31.

f. Description of Disposal Method. Dredging is typically performed by cutterhead suction pipeline dredge. Material is hydraulically pumped via pipeline to Beach Area or SL-2 for disposal.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The project channel has a sloped bottom with varying authorized depths (please see Section 1.1 for more information). Actual depths vary widely though due to shoaling.

(2) Sediment Type. Unconsolidated with sand, silt, clay and shell (please see Section 3.2 for more information).

(3) Dredged/Fill Material Movement. Material placed in the Beach Area becomes part of the littoral drift system. Material placed in SL-2 could be mechanically offloaded by others for secondary uses offsite.

(4) Physical Effects on Benthos. Benthic organisms would be impacted by dredging activity and beach placement operations. Re-colonization should begin in less than one year. However, full recovery may not occur within the beach placement area since material is placed there on a biennial basis.

(5) Actions to minimize impacts. Dredge location and placement operations would be monitored to ensure that construction activities are performed in authorized project areas only.

b. Water Circulation, Fluctuation and Salinity Determinations.

(1) Water Column Effects.

- (a) Salinity: No significant effect.
- (b) Water Chemistry: No significant effect.
- (c) Clarity: Turbidity would temporarily decrease clarity.
- (d) Color: Turbidity would temporarily change color.
- (e) Odor: No significant effect.
- (f) Taste: No significant effect.
- (g) Dissolved Gas Levels: No significant effect.
- (h) Nutrients: No significant effect.

(2) Current Patterns and Circulation.

- (a) Current Patterns and Flow: Currents in the project area are primarily tidal. Dredging and placement operations would not affect current patterns or flow.
- (b) Velocity: No significant effect.
- (c) Stratification: No significant effect.
- (d) Hydrologic Regime: No significant effect.

(3) Normal Water Level Fluctuations. Tides in the project area are semi diurnal with varying levels throughout the year. The project would not affect normal water level fluctuations.

(4) Salinity Gradients. The project would not affect salinity gradients.

(5) Actions to minimize impacts. The project would not affect water levels or flow patterns. Turbidity would be monitored per the requirements of the state permit or F.S. 403.813(3). If at any time the turbidity standard were exceeded, those activities causing the violation would cease.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site. There will be an increase in suspended particulates and turbidity levels in the vicinity of the disposal site.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column.

- (a) Light Penetration: Light penetration would decrease during dredging and placement operations.
- (b) Dissolved Oxygen: Dissolved oxygen levels would not be significantly altered by this project.

(c) Toxic Metals and Organics: Pending a review of existing sediment and water quality data, additional sampling of the sediments in the vicinity of Taylor Creek may be required prior to dredging.

(d) Pathogens: This project would not cause any release of pathogens.

(e) Aesthetics: Turbidity would temporarily impact aesthetic quality of the project channel and beach placement area.

(3) Effects on Biota.

(a) Primary Production, Photosynthesis: The project would not have a significant impact on primary production or photosynthesis.

(b) Suspension/Filter Feeders: Turbidity would affect suspension/filter feeders, but the effects would not be significant.

(c) Sight Feeders: Sight feeders would be affected by turbidity, but the effects would not be significant.

(4) Actions to minimize impacts. As stated earlier, turbidity would be monitored per either the requirements of the state permit or F.S. 403.813(3). If at any time the turbidity standard were exceeded, those activities causing the violation would cease.

d. Contaminant Determinations. Levels of contaminants are not expected to have a significant impact on plankton, benthos, nekton, or the aquatic food web. Re-suspension of sediment within the IWW channel is expected to have minimal impact on these organisms. Additional sampling of the IWW sediments in the vicinity of Taylor Creek may be required.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton: Significant effects on plankton are not anticipated.

(2) Effects on Benthos: Benthos would be impacted by the project, but benthic organisms would be expected to begin recovery within one year. However, full recovery may not occur in the beach placement area since material would be placed there on a biennial basis.

(3) Effects on Nekton: Significant effects on nekton are not anticipated.

(4) Effects on Aquatic Food Web: As stated earlier, benthos would be impacted, but additional significant effects on the food web are not anticipated.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Refuges: Dredging of the IWW is not expected to have a significant impact on the adjacent Indian River – Vero

Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic Preserve. This work would be performed in compliance with either the Water Quality Certification issued by the state of Florida or F.S. 403.813(3).

(b) Wetlands: The proposed work would not affect wetlands.

(c) Mud Flats: The proposed work would not affect mud flats.

(d) Vegetated Shallows: Measures shall be implemented to avoid and minimize impacts to seagrass adjacent to the IWW channel. If inadvertent impacts occur, then appropriate mitigation would be proposed.

(e) Coral Reefs: There are no coral reefs in the project area.

(f) Riffle and Pool Complexes: There are no riffle and pool complexes in the project area.

(3) Threatened and Endangered Species. The project would not have a significant impact on threatened and endangered species.

(4) Other Wildlife. Use of the upland disposal site and beach placement area could adversely impact wildlife. Re-colonization of these sites should occur between maintenance events.

(5) Actions to Minimize Impacts. Measures shall be taken to avoid or minimize impacts to threatened and endangered species as well as other wildlife (please refer to Section 4 and 4.21).

e. Proposed Disposal Site Determinations

(1) Mixing Zone Determination. This determination will be in accordance with either the Water Quality Certification issued for this project or F.S. 403.813(3).

(2) Determination of Compliance with Applicable Water Quality Standards. The work would be conducted in accordance with either the Water Quality Certification issued for this project or F.S. 403.813(3).

(3) Potential Effects on Human Use Characteristic.

(a) Municipal and Private Water Supply: No effects are anticipated.

(b) Recreational and Commercial Fisheries: Impacts to fisheries would not be significant (please see Sections 3.5 and 4.3).

(c) Water Related Recreation: Construction activities would temporarily disrupt water related recreation.

(d) Aesthetics: Construction would temporarily impact aesthetics.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves: The IWW lies adjacent to the Indian River – Vero Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic

Preserve. Work in this area would be conducted in compliance with either the Water Quality Certification issued by the state of Florida or F.S. 403.813(3).

f. Determination of Cumulative Effects on the Aquatic Ecosystem. Periodic maintenance dredging and placement operations would have impacts on the aquatic ecosystem. Most impacts should be relatively short-term; however, populations of benthic organisms within the beach placement area may never fully recover because sand is placed there every 2 years from the SPP (please see Section 4.12 for more information).

h. Determination of Secondary Effects on the Aquatic Ecosystem. Maintaining the authorized depths of the channel may provide a stimulus for economic growth, which could encourage additional vessel traffic on the IWW. These actions could further impact the aquatic ecosystem.

III. Findings of Compliance or Non-Compliance With the Restrictions on Discharge 3/

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation: No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem: No practical alternative exists which meets the project objectives that do not involve discharge of fill into waters of the United States.

c. Compliance with Applicable State Water Quality Standards: After consideration of material placement site dilution and dispersion, the discharge of fill materials would not cause or contribute to, violations of any applicable state water quality standards for Class II and III Waters. Dredging of the IWW which is adjacent to the Indian River – Vero Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic Preserve would be performed in compliance with the Water Quality Certification issued by the state of Florida or F.S. 403.813(3).

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 Of the Clean Water Act: The discharge operation would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. Compliance with Endangered Species Act of 1973: The proposed project would not jeopardize the continued existence of any species listed as threatened or endangered or result in the destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972: This act does not apply to this project.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

(a) Municipal and Private Water Supplies: No effect.

(b) Recreation and Commercial Fisheries: No substantial adverse impacts are anticipated.

(c) Plankton: No substantial adverse impacts are anticipated.

(d) Fish: No substantial adverse impacts are anticipated.

(e) Shellfish: No substantial adverse impacts are anticipated.

(f) Wildlife: Use of SL-2 and the beach placement area could adversely impact wildlife. Re-colonization of these sites should occur between maintenance events.

(g) Special Aquatic Sites: No substantial adverse impacts are anticipated.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems: Most impacts should be relatively short-term; however, populations of benthic organisms within the beach placement area may never fully recover because sand is placed there every 2 years.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability: Certain benthos may not fully recover at the beach placement area, so productivity and stability of these species may decline due to biennial sand placement.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Values: Recreation and aesthetic values would be temporarily disrupted due to construction activity.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem: Measures shall be taken to minimize impacts (please see Section 4.21 for more information).

i. On the basis of the guidelines the proposed disposal site(s) for the discharge of dredged or fill material is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

FINDING OF COMPLIANCE
FOR
MAINTENANCE DREDGING
IWW REACH I AND PORTION OF REACH II
ST. LUCIE COUNTY, FLORIDA

1. No significant adaptations of the guidelines were made relative to this evaluation.
2. One beach placement and one upland disposal site is available for this project. Use of either of these sites (Figure 1) would not result in significant impacts to water level fluctuation, circulation or currents.
3. The planned disposal of dredged material at either site would not violate any applicable state water quality standards with the possible exception of turbidity. Therefore, turbidity standards would be monitored per either the Water Quality Certification issued by the state of Florida or F.S. 403.813(3). If a turbidity violation is noted, then those activities causing the violation shall be terminated. The disposal operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.
4. Use of the selected disposal sites will not harm any endangered species or their critical habitat or violate protective measures for the Indian River – Vero Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic Preserve.
5. The proposed disposal of dredged material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on life stages of aquatic life and other wildlife, aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values will not occur.
6. Appropriate steps shall be taken to minimize potential adverse impacts of the discharge on aquatic systems.
7. On the basis of the guidelines the proposed disposal sites for the discharge of dredged material are specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

APPENDIX B - COASTAL ZONE MANAGEMENT CONSISTENCY

**FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES**

**MAINTENANCE DREDGING
IWW REACH I AND PORTION OF REACH II
ST. LUCIE COUNTY, FLORIDA**

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 voluntarily submitted to the state in compliance with this chapter.

2. Chapters 163(part II), 186, and 187, County, Municipal, State and Regional Planning. These chapters establish the Local Comprehensive Plans, the Strategic Regional Policy Plans, and the State Comprehensive Plan (SCP). The SCP sets goals that articulate a strategic vision of the state's future. It's 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 shall be coordinated with various federal, state and local agencies during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the shorefront development and infrastructure.

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: The proposed project involves the maintenance dredging of the IWW in order to maintain safe navigation conditions. Therefore, this project would be consistent with the efforts of Division of Emergency Management.

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 would comply with state regulations pertaining to the above resources. The work would comply with the intent 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: Since the affected property already is in public ownership or is under an easement for public placement use, this chapter does not apply.

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: The proposed project shall be coordinated with the State of Florida regarding project activities adjacent to the Indian River – Vero Beach to Fort Pierce Aquatic Preserve and the Jensen Beach to Jupiter Inlet Aquatic Preserve. The project shall be consistent with this chapter.

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

Response: This project shall be coordinated with the State Historic Preservation Officer (SHPO). Because of the nature of the project there is little potential for the presence of historic properties. The project will be consistent with 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 maintenance dredging encourages commercial and recreational use that in turn provides economic benefits to the area. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

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

Response: No public transportation systems would be impacted by this 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: The proposed maintenance dredging would not have a substantial adverse impact on saltwater living resources. Benthic organisms may be adversely affected by the work, and may not fully recover at the beach placement area due to the fact that sand is placed there from the SPP on a biennial basis. However, the project footprint is relatively small and lies adjacent to similar habitat. Therefore, substantial impacts to the aquatic ecosystem are not anticipated. Based on the overall impacts of the project, the project is consistent with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Fish and Wildlife Conservation 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 project would not have a substantial adverse impact on living land and freshwater resources. Use of the upland disposal site could adversely impact wildlife, but this area should be re-colonized as it is only periodically used.

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

Response: This 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.

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: This project does not involve the exploration, drilling or production of gas, oil or petroleum product and 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. This chapter

also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The proposed maintenance dredging project shall be coordinated with the local regional planning commission. Therefore, the project shall be consistent with the goals of this chapter.

16. Chapters 381 (selected subsections on on-site sewage treatment and disposal systems) and 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project shall not further the propagation of mosquitoes or other pest arthropods.

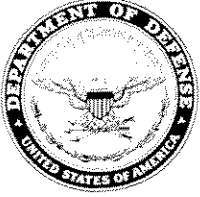
17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: An Environmental Assessment addressing project impacts has been prepared and will be reviewed by the appropriate resource agencies including the Florida Department of Environmental Protection. Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. Either a Water Quality Certification or a F.S. 403.813(3) maintenance dredging exemption will be sought from the state prior to construction. The project complies with the intent 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: Agricultural lands do occur in the vicinity of the project; Construction and use of SL-2 has been coordinated with the NRCS, therefore the project complies with the intent of this chapter.

APPENDIX C - PERTINENT CORRESPONDENCE



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

November 5, 2008

Operations Division, Navigation Section
Public Notice No. PN-CO-IWW-284

PUBLIC NOTICE

TO WHOM IT MAY CONCERN: The District Engineer, Jacksonville District, U.S. Army Corps of Engineers, will be coordinating with the State of Florida, Department of Environmental Protection regarding water quality certification for the maintenance dredging of the Federal Intracoastal Waterway in the vicinity of Ft. Pierce Inlet, St. Lucie County, Florida. The dredged material would be placed either on the beach starting just south of Ft. Pierce Inlet or in Dredged Material Management Area (DMMA) SL-2. This Federal project is currently being evaluated and coordinated pursuant to 33 CFR 335 through 338.

Comments regarding the project should be submitted either in writing or e-mail to the District Engineer at the above address within 30 days from the date of this notice. Any person who has an interest, which may be affected by the construction of this project, may request a public hearing. The request must be submitted in writing to the District Engineer within 30 days of the date of this notice and must clearly set forth the interest, which may be affected and the manner in which the interest may be affected by this activity.

If you have any questions concerning this project, you may contact Mr. Robert Riddell of this office, telephone 904-232-2451; or E-mail: robert.c.riddell@usace.army.mil.

WATERWAY & LOCATION: Federal Intracoastal Waterway in the vicinity of Ft. Pierce Inlet, St. Lucie County, Florida.

WORK & PURPOSE: The proposed work consists of performing maintenance dredging of the federally authorized Intracoastal Waterway in the vicinity of Ft. Pierce Inlet, St. Lucie County, Florida. Beach quality sand could be placed on the Fort Pierce Beach between DEP monuments R-34 and R-37. Alternately, the dredged material could be placed in the previously constructed DMMA SL-2. Approximately 69,000 cubic yards of material will likely be dredged from cuts SL-1 through SL-5, Station 130+00 by hydraulic cutter-suction dredge. All dredging operations will conform to the provisions of either the State Water Quality Certificate or F.S. 403.813(3). The purpose of the maintenance dredging is to restore full navigation depth of the Federal navigation project. Dredging will serve to eliminate the hazardous, and in some instances impassable navigation conditions created by shoaling.

PROJECT AUTHORIZATION: Rivers and Harbors Act of 2 March 1945, House Document 740, 79th Congress; and House Resolution Number 95-1247, 18 October 198, 95 Congress, 2nd Session.

APPLICABLE LAWS: The following laws are, or may be, applicable to the review of the proposed disposal sites and to the activities affiliated with this Federal project:

1. Section 404 of the Clean Water Act of 1977 (PL 95-217) (33 U.S.C. 1344).
2. Section 302 of the Marine Protection, Research, and Sanctuaries Act of 1972 (PL 92-532, 86 Stat. 1052).
3. The National Environmental Policy Act of 1969 (PL 91-190) (42 U.S.C. 4321-4347).
4. Sections 307(c) (1) and (2) of the Coastal Zone Management Act of 1972 (16 U.S.C. 1456(c) (1) and (2), 86 Stat. 1280).
5. The Fish and Wildlife Act of 1956 (16 U.S.C. 472a et seq).
6. The Migratory Marine Game-Fish Act of 1959 (16 U.S.C. 760c-760g).
7. The Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-666c).
8. The Endangered Species Act of 1973 (PL 93-205) (16 U.S.C. 668aa-668cc-6, 87 Stat. 884).
9. The National Historic Preservation Act of 1966 (16 U.S.C. 470, 80 Stat. 915).
10. Section 313 of the Clean Water Act of 1977 (33 U.S.C. 1323, 85 Stat. 816).
11. The Magnuson-Stevens Fishery Conservation and Management Act of 1966 (16 USC 1801 et seq. PL 104-208).

EVALUATION FACTORS: All factors, which may be relevant to the proposal, will be considered including the cumulative effects thereof. Among these are conservation, economics, aesthetics, general environmental concerns, wetlands, historic resources, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, sea grasses, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, consideration of property ownership and, in general, the needs and welfare of the public.

EVALUATION:

a. Environmental Assessment (EA): A draft EA for the Intracoastal Waterway, Vicinity of Ft. Pierce Inlet, St. Lucie County maintenance dredging has been prepared and is available for review online at:
ftp://ftp.saj.usace.army.mil/pub/Public_Dissemination/IWW%20Reach%20I%20St.%20Lucie%20County/or a copy of this draft EA can be made available upon request.

b. Environmental Impact Statement (EIS): The evaluation of the proposed maintenance dredging and beach or DMMA SL-2 placement suggests that the proposed action would have no

significant impacts on the quality of the human environment and an Environmental Impact Statement, pursuant to the National Environmental Policy Act (NEPA), will not be required.

c. Threatened or Endangered Species: Consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act will be conducted. Beach placement activities may affect nesting sea turtles and therefore the appropriate protection measures shall be implemented. Channel dredging occurs within the known range of Johnson's sea grass (*Halophila Johnsonii*), therefore dredging operations will be conducted in accordance with the conditions of the 2001 NMFS Biological Opinion. In addition, manatees and the endangered small tooth sawfish (*Pristis pectinata*) may occur in the vicinity of the project. Therefore, standard protective measures would be taken during dredging activities.

d. Coastal Zone Management: The Florida Department of Environmental Protection (FDEP) will be contacted regarding permitting for maintenance dredging of the Federal channel and for the proposed sediment placement alternatives. Issuance of a permit signifies consistency with CZM.

e. Essential Fish Habitat: This notice initiates the Essential Fish Habitat (EFH) consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. The proposal could impact estuarine water column with an unconsolidated substrate, sea grass, and ocean high salinity surf zone habitat considered EFH by the NMFS. Our initial determination is that the proposed action would not have a substantial adverse impact on EFH or federally managed fisheries along the eastern coast of Florida. However, our final determination is subject to review by and coordination with the National Marine Fisheries Service.

f. Cultural Resources: A survey and impact analysis has been completed for DMMA SL-2 (Department of Historic Resources file number 2001-04772) and the Ft. Pierce Beach SPP (DHR no. 2006-5948) with a determination that no historic properties would be affected. Potential effects from the vicinity of Ft. Pierce Inlet dredging will be coordinated with the Florida State Historic Preservation Officer.

DISSEMINATION OF NOTICE: You are requested to communicate the information contained in this notice to any other parties whom you deem likely to have an interest in this matter.

COORDINATION: This notice is being sent to the following agencies:

FEDERAL AGENCIES:

FEDERAL HIGHWAY ADMINISTRATION
U.S. COAST GUARD
U.S. FISH & WILDLIFE SERVICE
ATLANTIC MARINE CENTER
NATIONAL MARINE FISHERIES SERVICE
NATIONAL PARK SERVICE
U.S. GEOLOGICAL SURVEY
FEDERAL ENERGY REGULATIONS

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION
FEDERAL MARITIME COMMISSION
U.S. DEPARTMENT OF AGRICULTURE

STATE AGENCIES:

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF SOLID WASTE MANAGEMENT
FLORIDA INLAND NAVIGATION DISTRICT
FLORIDA GAME & FRESH WATER FISH COMMISSION
DIVISION OF ARCHIVES, HISTORY & RECORDS
STATE HISTORIC PRESERVATION OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION
PLANNING MANAGER BUREAU OF SUBMERGED LANDS DEPARTMENT
BUREAU OF SOIL AND WATER CONSERVATION
FLORIDA OFFICE OF ENTOMOLOGY
FLORIDA WATER MANAGEMENT DISTRICTS
FLORIDA STATE CLEARINGHOUSE
FLORIDA MARINE PATROL
BUREAU OF STATE PLANNING
FLORIDA DIVISION OF RECREATION
NORTHEAST FLORIDA REGIONAL PLANNING COUNCIL
HABITAT CONSERVATION SERVICE
FLORIDA STATE CONSERVATION SERVICE

ENVIRONMENTAL ORGANIZATIONS:

FLORIDA AUDUBON SOCIETY
NATIONAL AUDUBON SOCIETY
FLORIDA WILDLIFE FEDERATION
SIERRA CLUB
FLORIDA DEFENDERS OF THE ENVIRONMENT
NATIONAL ESTUARY PROGRAM
SAVE THE MANATEE CLUB
NATURE CONSERVANCY

LOCAL GOVERNMENTS:

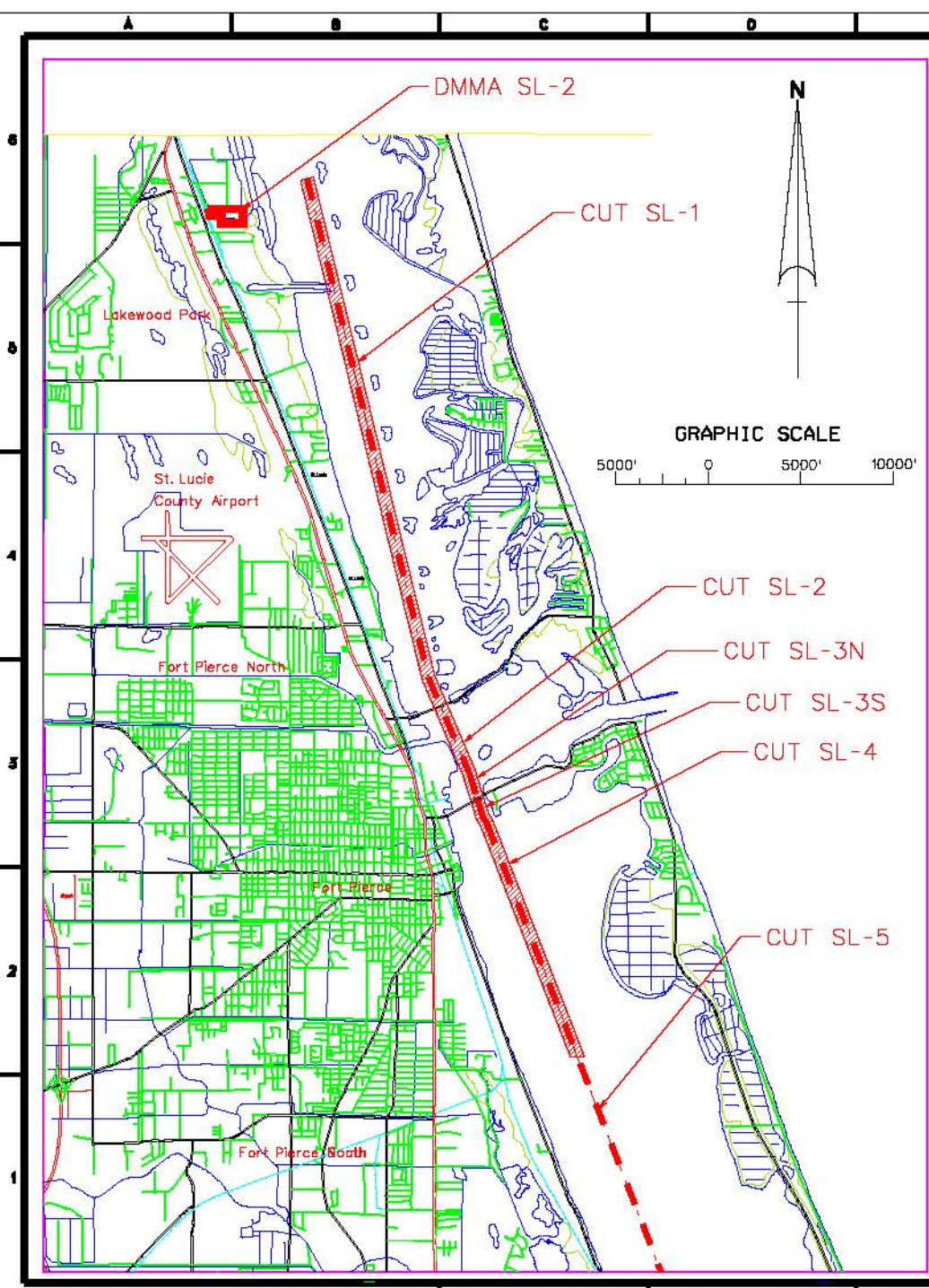
ST. LUCIE COUNTY, FT. PIERCE, FL
CITY OF FT. PIERCE, FT. PIERCE, FL

FOR THE COMMANDER:

Encl


JIM W. JEFFORDS, P.E.
Chief, Operations Division

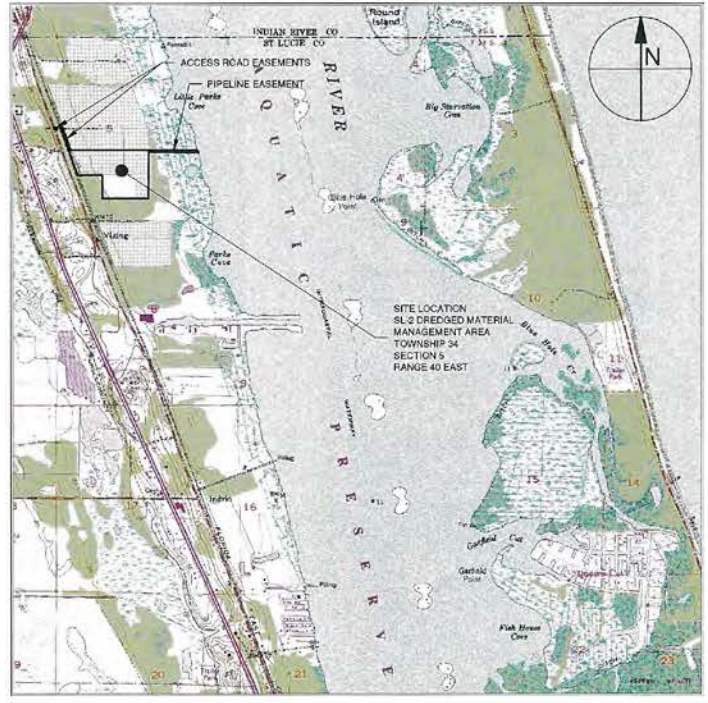
bcc:
CESAJ-DP-C (Trulock)



LEGEND
 AREA TO BE DREDGE



**INTRACOASTAL WATERWAY
 JACKSONVILLE TO MIAMI, FLORIDA
 IWW VICINITY OF FT. PIERCE INLET
 ST. LUCIE COUNTY, FL**



U.S. Army Corps of Engineers
 Jacksonville District
 1000 NE 11th St
 Jacksonville, FL 32209

DEPARTMENT OF THE ARMY
 Jacksonville District, Corps of Engineers
 Jacksonville, Florida

Drawn by: [Name]
 Checked by: [Name]
 Date: [Date]
 Scale: [Scale]

APPROVED TO SUBMIT TO FLORIDA COUNTY
 DRAWINGS TO ACCOMPANY
 THE APPLICATION FOR WATER
 QUALITY CERTIFICATE

DRAWING NO.

SHEET 1 of 1



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

January 7, 2009

Mr. Paul M. DeMarco, Biologist
Jacksonville District, Planning Division
U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers – Draft
Environmental Assessment, Maintenance Dredging the Intracoastal Waterway in
the Vicinity of Ft. Pierce Inlet, with Placement in DMMA SL-2 and Ft. Pierce Beach
St. Lucie County, Florida.
SAI # FL200811124491C

Dear Mr. DeMarco:

The Florida State Clearinghouse has coordinated a review of the referenced Draft
Environmental Assessment (EA) under the following authorities: Presidential Executive
Order 12372; Section 403.061(40), *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, 4331-4335, 4341-4347, as amended.

The Florida Department of Environmental Protection's (DEP) Bureau of Beaches and
Coastal Systems suggests that, although upland disposal is appropriate for nominal
amounts of beach-quality sand, the possibility of creating a separate stockpile area should
be explored if a small but significant amount of beach-quality material is available in a
consolidated area (3,000 to 10,000 cubic yards). This quantity could then be truck-hauled
to the beach. Staff notes that the total estimated volume of material that could currently
be dredged is approximately 69,000 cy, which is very close to the 50-year design capacity
of SL-2 DMMA. If the existing DMMA capacity, including the minimum freeboard and
bulking factors, cannot accommodate all 69,000 cy, an alternative disposal site or plans to
increase the capacity of SL-2 (e.g., construction of higher dikes or a rejuvenation plan)
should be identified and evaluated for impacts. In addition, the turbidity mixing zone is
normally 150 meters, but staff suggests that it be limited to the edge of seagrass resources,
particularly any Johnson's seagrass beds. The GPS location of all anchoring sites outside
of the channel should be required to ensure that known seagrass beds are avoided.

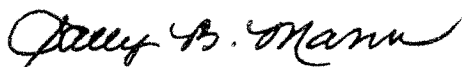
Mr. Paul M. DeMarco
January 7, 2009
Page 2 of 2

DEP's Office of Coastal and Aquatic Managed Areas also notes that the project is located within two state aquatic preserves - the Indian River-Vero Beach to Fort Pierce Aquatic Preserve and Indian River-Jensen Beach to Jupiter Inlet Aquatic Preserve. Activities conducted within these waters are subject to the higher water quality standards outlined in the Aquatic Preserve (Chapter 18-20, *Florida Administrative Code*) and Outstanding Florida Waters (Section 62-4.242, *F.A.C.*) rules. The seagrass map provided in the Draft EA depicts the extent of seagrass beds located between the Intracoastal Waterway and SL-2 DMMA. Impacts to these resource areas should be avoided and minimized once detailed pre-dredging seagrass surveys are conducted. Staff recommends that dredged material be allowed to settle and evaporate in the DMMA prior to discharge and that floating dredge pipes be utilized to avoid impacts to dense patches of seagrass. Please refer to the enclosed DEP memoranda for further comments and recommendations.

Based on the information contained in the Draft EA and enclosed state agency comments, the state has determined that, at this stage, the proposed activities are consistent with the Florida Coastal Management Program (FCMP). The concerns identified by DEP staff must, however, be addressed prior to project implementation. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting stage.

Thank you for the opportunity to review the proposed project. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

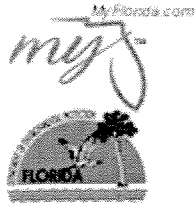
Yours sincerely,



Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

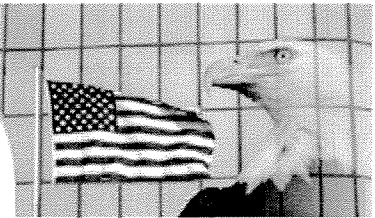
cc: Roxane Dow, DEP, BBCS
Penny Isom, DEP, CAMA
Laura Herren, DEP, CAMA



Florida

Department of Environmental Protection

"More Protection. Less Process"



Categories

DEP Home | OIP Home | Contact DEP | Search | DEP Site Map

Project Information	
Project:	FL200811124491C
Comments Due:	12/19/2008
Letter Due:	01/09/2009
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - DRAFT ENVIRONMENTAL ASSESSMENT, MAINTENANCE DREDGING THE INTRACOASTAL WATERWAY IN THE VICINITY OF FT. PIERCE INLET, WITH PLACEMENT IN DMMA SL-2 AND FT. PIERCE BEACH - ST. LUCIE COUNTY, FLORIDA.
Keywords:	ACOE - DEA, MAINTENANCE DREDGING THE IWW NEAR FT. PIERCE INLET - ST. LUCIE CO.
CFDA #:	12.107
Agency Comments:	
TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL	
The proposed project is not inconsistent or in conflict with the Strategic Regional Policy Plan.	
ST. LUCIE - ST. LUCIE COUNTY	
FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION	
NO COMMENT BY CHRIS BOLAND ON 11/21/2008.	
STATE - FLORIDA DEPARTMENT OF STATE	
No Comment/Consistent	
ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	
<p>The DEP Bureau of Beaches and Coastal Systems suggests that, although upland disposal is appropriate for nominal amounts of beach-quality sand, the possibility of creating a separate stockpile area should be explored if a small but significant amount of beach-quality material is available in a consolidated area (3,000 to 10,000 cubic yards). This quantity could then be truck-hauled to the beach. Staff notes that the total estimated volume of material that could currently be dredged is approximately 69,000 cy, which is very close to the 50-year design capacity of SL-2 DMMA. If the existing DMMA capacity, including the minimum freeboard and bulking factors, cannot accommodate all 69,000 cy, an alternative disposal site or plans to increase the capacity of SL-2 should be identified and evaluated for impacts. In addition, the turbidity mixing zone is normally 150 meters, but staff suggests that it be limited to the edge of seagrass resources, particularly any Johnson's seagrass beds. The GPS location of all anchoring sites outside of the channel should be required to ensure that known seagrass beds are avoided. DEP's Office of Coastal and Aquatic Managed Areas also notes that the project is located within two state aquatic preserves - the Indian River-Vero Beach to Fort Pierce Aquatic Preserve and Indian River-Jensen Beach to Jupiter Inlet Aquatic Preserve. Activities conducted within these waters are subject to the higher water quality standards outlined in the Aquatic Preserve (Chapter 18-20, F.A.C.) and Outstanding Florida Waters (Section 62-4.242, F.A.C.) rules. The seagrass map provided in the Draft EA depicts the extent of seagrass beds located between the Intracoastal Waterway and SL-2 DMMA. Impacts to these resource areas should be avoided and minimized once detailed pre-dredging seagrass surveys are conducted.</p>	
SOUTH FLORIDA WMD - SOUTH FLORIDA WATER MANAGEMENT DISTRICT	
Released Without Comment	

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
 TALLAHASSEE, FLORIDA 32399-3000
 TELEPHONE: (850) 245-2161
 FAX: (850) 245-2190

Memorandum

Florida Department of Environmental Protection

TO: Lauren Milligan, Office of Intergovernmental Programs

FROM: Roxane Dow, Bureau of Beaches and Coastal Systems

SUBJECT: Draft Environmental Assessment for Maintenance Dredging the Intracoastal Waterway in the Vicinity of Ft. Pierce Inlet. SAI # FL08-4491C

DATE: December 19, 2008

The Bureau appreciates the explanation of “overdredging” provided in the draft EA and the efforts to locate all seagrass surveys. We have the following recommendations.

1) Dredge placement [Section 2.1.2.2.] suggests that limited beach-quality sand will be available; though the only sediment analysis that is presented reveals silt content (passing the #200 sieve) as 1.3% to 18.9% [Section 3.2.1]. A rough estimate of the volume of the potential beach quality material should be evaluated prior to discounting the beach disposal option. If a nominal amount is present, as the Corps expects, then upland disposal is appropriate, and we would expect to have the DEP Southeast District Office process the requisite Environmental Resource Permit (ERP). If a small but significant amount of beach-quality sand is attainable in a consolidated area (3,000 to 10,000 cy), we recommend that the Corps explore the possibility of creating a separate stockpile area, which can then be truck-hauled to the beach. The actual beach placement might occur under a separate permit, such as the existing Joint Coastal Permit (JCP) for the Ft. Pierce Beach Nourishment Project (0269646-001-JC), or even a Coastal Construction Control Line (CCCL) permit (outside the area covered by an existing JCP).

2) The 50-year design capacity of the SL-2 DMMA is estimated to handle 78,000 cy for “Reach I,” but has any material been placed in there since time of design (approximately 2001)? The plan is also to dredge about a mile from Reach II; how does this affect the 50-year design capacity, which apparently only accounted for Reach I? The total estimated volume that could currently be dredged is about 69,000 cy, which is very close to the design capacity, so if material was previously placed or a bulking factor needs to be considered (particularly for hydraulic dredging), then the capacity of SL-2 DMMA may not be sufficient. The capacity should also accommodate a minimum freeboard of at least two (2) feet, per the recent (DRAFT) DMMA design memorandum, dated July 2007. If the existing SL-2 capacity, including the minimum freeboard and bulking factors, cannot accommodate all 69,000 cy, then an alternative disposal site or plans to increase the capacity of SL-2 (e.g., construction of higher dikes or a rejuvenation plan) should be identified and evaluated for impacts.

3) The mixing zone is normally 150 meters, but we would suggest that it be further limited to the edge of seagrass resources if at all practicable, particularly any Johnson's seagrass. If anchoring is required outside the channel for a small hydraulic dredge, then we would recommend recording of GPS location of anchor drops to ensure that they were not placed in known seagrass beds.

Thank you for the opportunity to comment.

cc: Mike Barnett, Bob Brantly, Steve MacLeod, Paden Woodruff

Memorandum

Florida Department of Environmental Protection

TO: Lauren Milligan, Florida State Clearinghouse

FROM: Laura Herren, Coastal and Aquatic Managed Areas

DATE: December 18, 2008

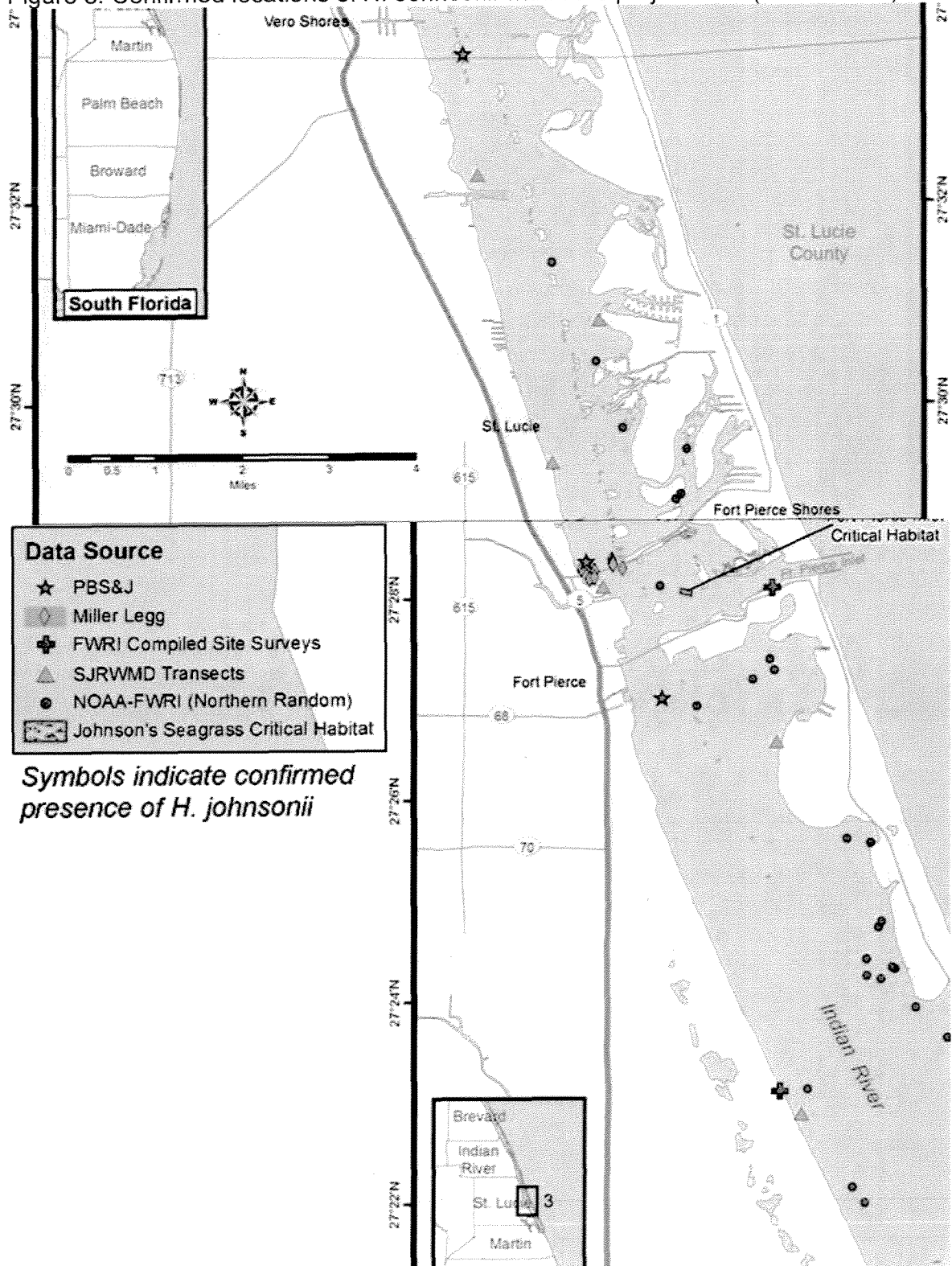
PROJECT: USACE – Draft Environmental Assessment, Maintenance Dredging the Intracoastal Waterway in the Vicinity of Fort Pierce Inlet with Placement in DMMA SL-2 and Fort Pierce Beach – St. Lucie County, Florida.
SAI # FL08-4491C

Thank you for the opportunity to comment on the USACE Intracoastal Waterway (ICW) Dredging Project in St. Lucie County. The project boundary spans two Indian River Lagoon Aquatic Preserves, IRL – Vero Beach to Fort Pierce and IRL – Jensen Beach to Jupiter Inlet. Activities conducted within these waters are subject to higher standards outlined in the Aquatic Preserve (Chapter 18-20, F.A.C.) and Outstanding Florida Waters (Section 62-4.242, F.A.C.) rules.

In section 4.2.2 (Water quality) of the Draft Environmental Assessment (DEA), it states that coordination shall be conducted with the Florida Department of Environmental Protection in order to determine acceptable turbidity levels within the two Indian River Lagoon Aquatic Preserves prior to dredging. The turbidity standards outlined in Rule 62-4.242, F.A.C., should be implemented at the DMMA SL-2 discharge site/mixing zone and while dredging sections of the ICW located within the two aquatic preserves.

The compiled seagrass map provided in the DEA shows the extensive nature of seagrass between the ICW and DMMA SL-2 where proposed discharge and piping (submerged and floating) activities will occur. Impacts to this area should be avoided and minimized once detailed pre-dredging seagrass surveys are conducted (Chapter 18-20, F.A.C.). Suggestions include, but are not limited to, allowing for maximum settling and evaporation prior to discharge from the DMMA and use of floating pipes that avoid dense patches of seagrass.

Figure 3. Confirmed locations of *H. Johnsonii* within the project area (NOAA 2007)



COUNTY: ST. LUCIE

DATE: 11/10/2008

COMMENTS DUE DATE: 12/19/2008

CLEARANCE DUE DATE: 1/9/2009

SAI#: FL200811124491C

REFER TO: FL200610062821C

MESSAGE: 2008-07254

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
ENVIRONMENTAL PROTECTION	SOUTH FLORIDA WMD		
FISH and WILDLIFE COMMISSION			
X STATE			

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - DRAFT ENVIRONMENTAL ASSESSMENT, MAINTENANCE DREDGING THE INTRACOASTAL WATERWAY IN THE VICINITY OF FT. PIERCE INLET, WITH PLACEMENT IN DMMA SL-2 AND FT. PIERCE BEACH - ST. LUCIE COUNTY, FLORIDA.

To: Florida State Clearinghouse

EO. 12372/NEPA Federal Consistency

AGENCY CONTACT AND COORDINATOR (SCH)
 3900 COMMONWEALTH BOULEVARD MS-47
 TALLAHASSEE, FLORIDA 32399-3000
 TELEPHONE: (850) 245-2161
 FAX: (850) 245-2190

- No Comment
- No Comment/Consistent
- Comment Attached
- Consistent/Comments Attached
- Not Applicable
- Inconsistent/Comments Attached
- Not Applicable

From:

Division/Bureau: Historical Resources

Reviewer: Michael Hart

Laura R. Kammerer,
Deputy SHPO
12.9.2008

Date: 12/4/08

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FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Eric Summa
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

March 29, 2010

Re: DHR Project File No.: 2010-00831 / Received by DHR: February 11, 2010
1A-32 Permit No.: 0809.0106
Historic Assessment and Remote Sensing Survey of the Intracoastal Waterway near Ft. Pierce Inlet, St. Lucie County, Florida

Dear Mr. Summa:

Our office received and reviewed the above referenced survey report in accordance with Section 106 of the *National Historic Preservation Act of 1966* (Public Law 89-665), as amended in 1992, and *36 C.F.R., Part 800: Protection of Historic Properties*, and Chapter 267, *Florida Statutes*, for assessment of possible adverse impact to cultural resources (any prehistoric or historic district, site, building, structure, or object) listed, or eligible for listing, in the National Register of Historic Places (NRHP).

In June 2009, Panamerican Consultants, Inc. (PCI) conducted an archaeological and historical underwater remote sensing survey of a proposed dredge area within the Intracoastal Waterway near Ft. Pierce Inlet. The study was completed on behalf of G.E.C., Inc. and the U.S. Army Corps of Engineers. PCI identified one hundred ninety-one (191) magnetic anomalies, one hundred thirty-nine (139) sidescan sonar targets, and fifty-two (52) subbottom profiler features within the project area during the investigation.

PCI determined that none of the identified anomalies appear to have characteristics representative of historic shipwrecks or other submerged cultural resources. PCI recommends no additional archaeological investigation in association with the proposed dredging project.

The U.S. Army Corps of Engineers determined that no historic properties will be affected by the proposed maintenance dredge on the IWW in the vicinity of Ft. Pierce, Florida and use of the upland disposal site SL-2.

500 S. Bronough Street • Tallahassee, FL 32399-0250 • <http://www.flheritage.com>

Director's Office
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Archaeological Research
850.245.6444 • FAX: 245.6452

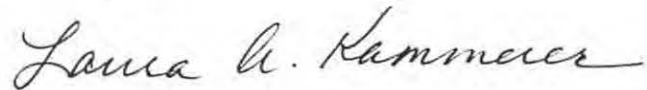
Historic Preservation
850.245.6333 • FAX: 245.6437

Mr. Summa
March 29, 2010
Page 2

Based on the information provided, our office concurs with these determinations and finds the submitted report complete and sufficient in accordance with Chapter 1A-46, *Florida Administrative Code*.

For any questions concerning our comments, please contact Rudy Westerman, Historic Preservationist, by electronic mail at rjwesterman@dos.state.fl.us, or by phone at 850.245.6333. We appreciate your continued interest in protecting Florida's historic properties.

Sincerely,

A handwritten signature in cursive script that reads "Laura A. Kammerer".

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

Pc: Louis Tesar, Interoffice Mail Station 8B
Dr. Michael Faught, Panamerican Consultants, Inc. – Memphis, TN office



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

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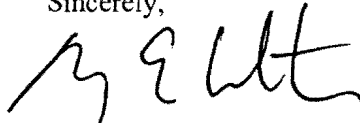
Mr. Eric Summa
Planning Division, Environmental Branch
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Summa:

This constitutes the National Marine Fisheries Service's (NMFS) biological opinion based on our review of the U.S. Army Corps of Engineers, Jacksonville District's (COE) proposed action to maintenance dredge Reach I and portions of Reach II in the Intracoastal Waterway in the vicinity of the Ft. Pierce Inlet, St. Lucie County, Florida. A cutterhead dredge is proposed to remove approximately 70,000 cubic yards of material that will be placed at an upland disposal site. This biological opinion analyzes the project's effects on Johnson's seagrass (*Halophila johnsonii*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, and is based on information provided in the COE's February 2009 Final Environmental Assessment; subsequent information provided by the COE to NMFS in phone and e-mail correspondence on March 18, March 23, April 29, May 13, May 19, September 14, September 16-18, and September 24, 2009; the bounce-dive seagrass survey (conducted on November 19, 2009) that was submitted to NMFS via e-mail on December 18, 2009; the Recovery Plan for Johnson's Seagrass (*Halophila johnsonii* Eiseman); the Endangered Species Act 5-year Review for Johnson's Seagrass; and information from previous NMFS' consultations involving Johnson's seagrass. It is NMFS' biological opinion that the action, as proposed, is likely to adversely affect Johnson's seagrass, but is not likely to jeopardize its continued existence.

We look forward to further cooperation with you on other COE projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Audra Livergood, fishery biologist, at (954) 356-7100, or by e-mail at Audra.Livergood@noaa.gov.

Sincerely,



Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

Ref: F/SER/2009/00832
File: 1514.F.4.FL

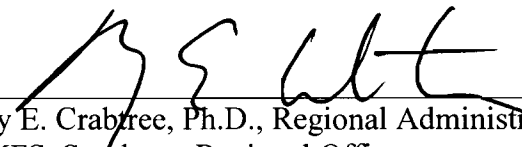


**Endangered Species Act - Section 7 Consultation
Biological Opinion**

Agency: United States Army Corps of Engineers, Jacksonville District (COE)

Activity: Maintenance dredge Reach I and portions of Reach II in the Intracoastal Waterway in the vicinity of the Ft. Pierce Inlet, St. Lucie County, Florida (Consultation Number F/SER/2009/00832)

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

Approved By: 

Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: **'AUG 25 2010**

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Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (FWS) share responsibilities for administering the ESA.

Consultation is required when a federal action agency determines that a proposed action “may affect” listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a biological opinion (opinion) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further conserve the species.

This document represents NMFS’ opinion based on our review of impacts associated with the proposed action to maintenance dredge Reach I and portions of Reach II in the Intracoastal Waterway (IWW) in the vicinity of the Ft. Pierce Inlet in St. Lucie County, Florida. This opinion analyzes the project’s effects on Johnson’s seagrass, in accordance with section 7 of the ESA, and is based on project information provided by the COE and other sources of information including the published literature cited herein.

BIOLOGICAL OPINION

1 CONSULTATION HISTORY

NMFS received a request for ESA consultation from the COE by letter dated February 10, 2009, which included the COE's Final Environmental Assessment (EA), dated February 2009. The COE stated that the EA constitutes their Biological Assessment (BA). The COE determined that the project "may affect Johnson's seagrass, but would be not likely to adversely modify its critical habitat." The COE also determined that the proposed action may affect, but is not likely to adversely affect smalltooth sawfish and five species of sea turtles (loggerhead, green, leatherback, hawksbill, and Kemp's ridley) and requested NMFS' concurrence. NMFS requested additional information via e-mail on March 18, 2009, to which the COE responded on the same day. On May 13, 2009, NMFS contacted the COE by phone to discuss information contained in the EA/BA and to request additional information, to which the COE responded on the same day. Further information was requested by e-mail from NMFS to the COE on September 14, 2009, to which the COE responded on the same day. Additional information was received from the COE via e-mail on September 24, 2009. On December 18, 2009, the COE provided NMFS with a copy of the bounce-dive seagrass survey report [the bounce-dive seagrass survey was conducted by Dial Cordy and Associates, Inc. (Dial Cordy) on November 19, 2009], and NMFS initiated formal consultation on the same day.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The proposed action is to maintenance dredge Reach I and portions of Reach II of the Intracoastal Waterway (IWW) in the vicinity of the Ft. Pierce Inlet in St. Lucie County, Florida. The proposed action would remove approximately 70,000 cubic yards of material and dispose of the dredged material in an upland disposal area. Maintenance dredging to -12 feet mean low water (plus 2 feet of overdepth) is proposed from the Indian River/St. Lucie County line south to the Ft. Pierce Harbor Project turning basin (IWW mile 225.24), and dredging to -10 feet mean low water (plus 2 feet of overdepth) is proposed from Ft. Pierce Harbor to the southern terminus of the project. This segment of the IWW was last dredged in 1972. Since that time, the accumulation of sediment (commonly referred to as shoaling) has restricted the width of the project channel and significantly reduced its depth (EA/BA, p. 1). The EA/BA states that minimum depths recorded from the channel are less than -7.1 feet causing navigation problems for commercial and larger recreational vessels. Furthermore, the EA/BA states that vessels are currently being forced outside the authorized channel in search of deeper water, waiting for high tide, or propeller dredging through the channel. The COE proposes maintenance dredging with a cutterhead dredge in order to remove the shoal material and restore a navigable channel. In addition, the EA/BA states that a drag bar, chain, or other leveling device may be dragged along the channel bottom to smooth down high spots and fill in low spots (post-dredging). According to the COE, this finishing technique may be more cost effective by reducing the need for additional dredging (EA/BA, p. 7).

Turbidity monitoring will be required, and the COE will follow NMFS' "Sea Turtle and Sawfish Construction Conditions" (enclosed). Although the construction time frame is still tentative, the COE believes that construction will take place during the winter of 2010 and the estimated duration of construction is approximately three months.

2.2 Action Area

50 CFR 404.02 defines action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area for this project includes the waters and submerged lands within and in the immediate vicinity of the federal channel to be dredged, located in the IWW in the vicinity of the Ft. Pierce Inlet. Dredging is proposed in Reach I (which extends from the Indian River/St. Lucie County line south to Bear Point) and the northern mile of Reach II south to IWW mile 228.27 in St. Lucie County, Florida.

3 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

The following endangered (E) and threatened (T) species under the jurisdiction of NMFS may occur in or near the action area:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status</u>
Sea Turtles		
Loggerhead sea turtle	<i>Caretta caretta</i> ¹	E/T
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	E
Green sea turtle	<i>Chelonia mydas</i> ²	E/T
Fish		
Smalltooth sawfish	<i>Pristis pectinata</i>	E
Plants		
Johnson's seagrass	<i>Halophila johnsonii</i>	T

Critical Habitat

No ESA-designated critical habitat occurs within the action area.

¹ NMFS and USFWS published a proposed rule in the Federal Register on March 16, 2010, to list nine Distinct Population Segments (DPSs) of loggerhead turtles worldwide, seven of which are endangered (including the Northwest Atlantic Ocean DPS) and two of which are threatened (75 FR 12598).

² Green turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered.

3.1 Species Not Likely to be Adversely Affected

Smalltooth Sawfish

Smalltooth sawfish may be found in or near the action area. The project may affect smalltooth sawfish by injury or death as a result of interactions with dredging equipment. However, the chance of injury or death from interactions with dredging equipment is discountable as this species is highly mobile and can easily avoid these interactions; also, the COE will require the dredge contractor to follow NMFS' March 23, 2006, Sea Turtle and Smalltooth Sawfish Construction Conditions, which will further reduce the chance of an interaction. Smalltooth sawfish may be affected by being temporarily unable to use the site due to potential avoidance of dredging operations and related noise, but these effects will be insignificant. Disturbance from dredging and related noise will be intermittent and will not appreciably interfere with use of the area by smalltooth sawfish. Impacts to smalltooth sawfish habitat are not proposed. Turbidity and degraded water clarity from dredging should be temporary, and water clarity should return to normal based on the tidal flushing in the project area and compliance with state water quality standards. Based on the reasons stated, the effects of the proposed action on smalltooth sawfish will be discountable or insignificant.

Sea Turtles

Five species of sea turtles (loggerhead, hawksbill, leatherback, Kemp's ridley, and green) may be found in or near the action area. Sea turtles may be affected by the proposed dredge equipment (i.e., a cutterhead dredge) and associated activities. In 1991, NMFS determined that cutterhead dredges are unlikely to adversely affect sea turtles because this type of dredge is relatively stationary and only influences small areas at any given time. For a sea turtle to be taken by a cutterhead 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 (NMFS 1991). NMFS is not aware of any new information that would change the basis of this determination. Furthermore, the COE will follow NMFS' March 23, 2006, Sea Turtle and Smalltooth Sawfish Construction Conditions, which will further reduce the chance of an interaction. Although we believe that the chance of an interaction between sea turtles and the cutterhead dredge is discountable, any potential sea turtle take associated with the proposed action is covered under the September 25, 1997, Regional Biological Opinion to the COE South Atlantic District concerning the use of hopper dredges in channels and borrow areas along the southeast U.S. Atlantic coast (NMFS 1997).

3.2 Species Likely to be Adversely Affected

Johnson's Seagrass

NMFS believes Johnson's seagrass may be adversely affected by the proposed action. A pre-dredge seagrass survey in accordance with NMFS' recommended protocol for sampling Johnson's seagrass (*Halophila johnsonii*) at a project site (NMFS 2002) has not yet been conducted. However, as per NMFS' Habitat Conservation Division's and NMFS' Protected Resources Division's recommendations, the COE plans to conduct a pre-dredge seagrass survey (in accordance with the aforementioned protocol) during the summer of 2010. In lieu of a

quantitative survey, a bounce-dive or spot-check seagrass survey was conducted by Dial Cordy on November 19, 2009. Dial Cordy used SCUBA equipment to survey 20 locations in Indian River and St. Lucie Counties. The purpose of the survey was to determine seagrass presence/absence within the survey area. The report concludes that seagrasses were not found in the survey area. However, the methods employed did not follow NMFS' recommended survey protocol for Johnson's seagrass. In addition, the survey report notes that the visibility was poor on the day of the survey. Because of these reasons, NMFS believes that seagrasses, including Johnson's seagrass, may have been overlooked during the spot-check survey. In lieu of a quantitative seagrass survey conducted in accordance with NMFS' recommended survey protocol for Johnson's seagrass, NMFS and the COE agreed to use the best available data, which we believe is data from the St. John's River Water Management District's (SJRWMD) permanent monitoring stations located in the Indian River Lagoon (IRL) in the northern range of Johnson's seagrass (between Sebastian Inlet and Jupiter Inlet).

Since 1994, the SJRWMD has monitored 73 permanent transects in the IRL in both summer (June-July) and winter (January-February) (Virnstein et al. 1997; Virnstein and Morris 2007). Thirty-five of the 73 permanent transects are located south of Sebastian Inlet, and data from this extensive monitoring effort show that Johnson's seagrass was found at 31 of the 35 transects (between Sebastian Inlet and Jupiter Inlet) during 1994-2007 (NMFS 2007). The project area, which is located in the vicinity of the Ft. Pierce Inlet, is between Sebastian Inlet and Jupiter Inlet, in the northern range of Johnson's seagrass.

Along transects in the northern range, Johnson's seagrass was routinely observed to be patchy, and percent cover varied along the length of the transects. It averaged only 4.3 percent cover over all sampling dates on the 35 transects within the northern range and only 0.6 percent cover when averaged IRL-wide over all 73 transects monitored since 1994 (NMFS 2007). Johnson's seagrass is a perennial species showing no consistent seasonal or year-to-year pattern in these surveys (NMFS 2007). In order to be conservative and err on the side of the species, NMFS and the COE agreed to a reasonable, worst-case estimate of the percent coverage of Johnson's seagrass that may occur in the project area. According to the data obtained from the SJRWMD's permanent transects in the northern range of Johnson's seagrass, the highest percent cover estimate recorded for Johnson's seagrass was in the winter of 2004 with an average percent cover of 12.8 (see Table 1 below).

Table 1. Total number of sites and quadrats with *Halophila johnsonii* (*Hj*) from 1994 to 2007. The average percent cover is calculated as the average of all sites within *H. johnsonii*'s range (not the seasonal average). Bottom panel shows summary of summer-winter comparisons of frequency of occurrence at transect sites and within quadrats from transects within *H. johnsonii*'s range from 1994-2007 (# = number of transects or quadrats with *H. johnsonii* present and n = total sample size). Source: NMFS 2007.

SEASON / YEAR	Total sites with <i>Hj</i> (out of 35)	Total quadrats sampled	Total quadrats with <i>Hj</i>	Average % cover	% Occurrence of <i>Hj</i> within quadrats
Summer 1994	12	460	31	3.8	6.7
Winter 1995	7	419	8	1.0	1.9
Summer 1995	7	399	9	1.0	2.3
Winter 1996	4	348	5	0.2	1.4

Summer 1996	9	490	17	3.3	3.5
Winter 1997	10	487	29	4.4	6.0
Summer 1997	15	529	56	4.7	10.6
Winter 1998	15	525	30	4.1	5.7
Summer 1998	16	543	58	8.2	10.7
Winter 1999	9	525	26	2.3	5.0
Summer 1999	10	483	38	1.5	7.9
Winter 2000	7	429	19	1.4	4.4
Summer 2000	14	504	42	3.6	8.2
Winter 2001	9	441	29	3.3	6.6
Summer 2001	14	519	29	5.1	5.6
Winter 2002	11	410	25	4.1	6.1
Summer 2002	12	457	32	1.8	7.0
Winter 2003	8	69	13	7.9	18.8
Summer 2003	14	483	47	3.8	9.7
Winter 2004	11	70	19	12.8	27.1
Summer 2004	23	513	82	7.4	16.0
Winter 2005	1	65	1	0.9	1.5
Summer 2005	10	458	21	3.0	4.6
Winter 2006	5	109	7	3.9	6.4
Summer 2006	14	513	45	6.0	8.8
Winter 2007	9	139	15	9.3	10.8
SUMMARY	276 of 910	10,387	733	4.3	7.1

PARAMETER	SUMMER			WINTER		
	#	n	%	#	n	%
Transects with <i>H. johnsonii</i>	170	455	37.4	106	455	23.3
Quadrats with <i>H. johnsonii</i>	507	6,351	8.0	226	4,036	5.6

NMFS and the COE agreed to use the highest average percent cover of 12.8 percent (winter 2004) as a reasonable, worst-case estimate in order to quantify how much Johnson's seagrass may be adversely affected by the proposed dredging. The Florida Fish and Wildlife Research Institute (FWRI) previously mapped approximately 3.35 acres of seagrasses in the project area. Based on a 12.8 percent average percent cover (i.e., reasonable, worst-case estimate), the proposed action may adversely affect approximately 0.43 acre of Johnson's seagrass (i.e., 12.8 percent multiplied by 3.35 acres of previously mapped seagrass = 0.4288 or 0.43 acre of Johnson's seagrass).

Johnson's seagrass (*Halophila johnsonii*) is the first marine plant ever listed under the Endangered Species Act (ESA). It was listed as threatened under the ESA on September 14, 1998, based on the results of fieldwork and a status review initiated in 1990. Kenworthy (1993,

1997, 1999) and NMFS (2007) discuss the results of the field studies and summarize an extensive literature review regarding the status of Johnson's seagrass. In addition to the published literature, the Johnson's Seagrass Recovery Implementation Team (Recovery Team) is in the process of updating the 2002 Recovery Plan for Johnson's Seagrass. The updated Recovery Plan will contain the latest information concerning the status of this species and potential threats to its persistence and recovery. The updated Recovery Plan is in review, but much of the information contained in this opinion that updates our knowledge of the status of and threats to the species, life history information, and cumulative impacts, has been gleaned from discussions with Dr. W. Judson Kenworthy (Team Leader) and other NMFS members of the Recovery Team. That information is attributed throughout this opinion to the Recovery Team. The following discussion summarizes those findings relevant to our evaluation of the proposed action.

Life History and Population Biology

Based on the current knowledge of the species, Johnson's seagrass reproduction is believed to be entirely asexual, and dispersal is by vegetative fragmentation. Sexual reproduction in Johnson's seagrass has not been documented. Female flowers have been found; however, dedicated surveys in the Indian River Lagoon have not discovered male flowers, fertilized ovaries, fruits, or seeds either in the field or under laboratory conditions (Jewett-Smith et al. 1997; Hammerstrom and Kenworthy 2002, NMFS 2007). Searches throughout the range of Johnson's seagrass have produced the same results, suggesting either that the species does not reproduce sexually or that the male flowers are difficult to observe or describe, as noted for other *Halophila* species (Kenworthy 1997). Surveys to date indicate that the incidence of female flowers appears to be much higher near the inlets leading to the Atlantic Ocean.

Throughout its range, Johnson's seagrass occurs in dynamic and disjunct patches. It spreads rapidly, growing horizontally from dense apical meristems with leaf pairs having short life spans (Kenworthy 1997). Kenworthy suggested that the observed horizontal spreading, rapid growth patterns, and high biomass turnover could explain the dynamic patches observed in distribution studies of this species. While patches may colonize quickly, they may also disappear rapidly. Sometimes they will disappear for several years and then reestablish: a process referred to as "pulsating patches" (Heidelbaugh et al. 2000; Virnstein and Morris 2007; Virnstein et al. 2009). Mortality, or the disappearance of patches, can be caused by a number of processes, including burial from bioturbation and sediment deposition (Heidelbaugh et al. 2000), erosion, herbivory, desiccation, and turbidity. In the absence of sexual reproduction, one possible explanation for the pulsating patches is dispersal and reestablishment of vegetative fragments, a process that commonly occurs in aquatic plants and has been demonstrated in other seagrasses (Philbrick and Les 1996, DiCarlo et al. 2005), and was also recently confirmed by experimental mesocosm studies with Johnson's seagrass (Hall et al. 2006).

Johnson's seagrass is a shallow-rooted species and vulnerable to uprooting by wind, waves, storm events, tidal currents, bioturbation, and motor vessels. It is also vulnerable to burial by sand movement and siltation (Heidelbaugh et al. 2000). Having a canopy of only 2-5 cm, it may be easily covered by sediments transported during storms or redistributed by macrofaunal bioturbation during the feeding activities of benthic organisms. Mesocosm experiments indicate

that clonal fragments can only survive burial for up to a period of 12 days (W.J. Kenworthy, CCFHR, NOAA, Beaufort, NC, unpublished). Mechanisms capable of disturbing patches may create clonal fragments that become dispersed. Hall et al. (2006) showed that drifting fragments of Johnson's seagrass can remain viable for 4 to 8 days, during which time they can settle, root, and grow. The process of asexual fragmentation can occur year-round. Fragments could drift several kilometers under the influence of wind and tidally-driven circulation, providing potential recruits for dispersal and new patch formation. In the absence of sexual reproduction, these are likely to be the most common forms of dispersal and patch maintenance.

Population Status and Distribution

Johnson's seagrass occurs in a variety of habitat types, including on intertidal wave-washed sandy shoals, on flood deltas near inlets, in deep water, in soft mud, and near the mouths of canals and rivers, where presumably water quality is sometimes poor and where salinity fluctuates widely. It is an opportunistic plant that occurs in a patchy, disjunct distribution from the intertidal zone to depths of approximately 2-3 meters in a wide range of sediment types, salinities, and in variable water quality conditions (NMFS 2007).

Johnson's seagrass exhibits a narrow geographical range of distribution and has only been found growing along approximately 200 kilometers (km) of coastline in southeastern Florida north of Sebastian Inlet, Indian River County, south to Virginia Key in northern Biscayne Bay, Miami-Dade County. This apparent endemism suggests that Johnson's seagrass has the most limited geographic distribution of any seagrass in the world. Kenworthy (1997, 1999) confirmed its limited geographic distribution in patchy and vertically disjunct areas throughout its range. Since the last status review (NMFS 2007), there have not been any reported reductions in the geographic range of the species. In fact, the SJRWMD observed Johnson's seagrass approximately 21 km north of the Sebastian Inlet mouth on the western shore of the IRL – a discovery that slightly extends the species' known northern range (Virnstein and Hall 2009).

Two survey programs regularly monitor the presence and abundance of Johnson's seagrass within this range. One program, conducted by the SJRWMD since 1994, covers the northern section of the species' geographic range between Sebastian Inlet and Jupiter Inlet (Virnstein and Morris 2007, Virnstein et al. 2009). The second recently initiated survey (2006) is of the southern range of the species between Jupiter Inlet and Virginia Key in Biscayne Bay (Kunzelman 2007). Johnson's seagrass is a perennial species (meaning it lasts for greater than two growing seasons), showing no consistent seasonal or year-to-year pattern based on the northern transect surveys, but has exhibited some winter decline (NMFS 2007). However, during exceptionally mild winters, Johnson's seagrass can maintain or even increase in abundance from summer to winter. In the surveys conducted between 1994 and 2007, it occurred in 7.1 percent of the 1-m² quadrats in the northern range. Depth of occurrence within these surveys ranged from 0.03 to 2.5 m. Where it does occur, its distribution is patchy, both spatially and temporally. It frequently disappeared from transects only to reappear several months or several years later (NMFS 2007).

Based on the results of the southern transect sampling, it appears there is a relatively continuous, although patchy, distribution of the species from Jupiter Inlet to Virginia Key (NMFS 2007).

The largest reported contiguous patch of Johnson's seagrass in the southern range was observed in Lake Worth Lagoon and was estimated to be 30 acres (Kenworthy 1997). Eiseman and McMillan (1980) documented Johnson's seagrass in the vicinity of Virginia Key (Latitude 25.75°N); this location is considered to be the southern limit of the species' range. There have been no reports of this species further south of the currently known southern distribution. The presence of Johnson's seagrass in northern Biscayne Bay (north of Virginia Key) is well documented. In addition to localized surveys, the presence of Johnson's seagrass has been documented by various field experiences and observations of the area by federal, state, and county entities. Johnson's seagrass has been documented in various COE and U.S. Coast Guard permit applications reviewed by NMFS. Findings from the southern transect sampling (summer 2006 and winter 2007) show little difference in the species' frequency or abundance between the summer and winter sampling period. The lower frequencies of Johnson's seagrass occurred at those sites where larger-bodied seagrasses (e.g., *Thalassia testudinum* and *Syringodium filiforme*) were more abundant (NMFS 2007). The southern range transect data support some of the conclusions drawn from previous studies and other surveys. This is a rare species; however, it can be found in relatively high abundance where it does occur. Based on the results of the southern transect sampling, it appears that, although it is disjunctly distributed and patchy, there is some continuity in the southern distribution, at least during periods of relatively good environmental conditions and no significant large-scale disturbances (NMFS 2007).

Information on the species' distribution and results of limited experimental work suggest that Johnson's seagrass has a wider tolerance range for salinity, temperature, and optical water quality conditions than other species such as paddle grass, *Halophila decipiens* (Dawes et al. 1989, Kenworthy and Haurert 1991, Gallegos and Kenworthy 1996, Kenworthy and Fonseca 1996, Durako et al. 2003, Kunzelman et al. 2005, Torquemada et al. 2005). Johnson's seagrass has been observed near the mouths of freshwater discharge canals (Gallegos and Kenworthy 1996), in deeper turbid waters of the interior portion of the Indian River Lagoon (Kenworthy 2000, Virnstein and Morris 2007), and in clear water associated with the high energy environments and flood deltas inside ocean inlets (Kenworthy 1993, 1997; Virnstein et al. 1997; Heidelbaugh et al. 2000; Virnstein and Morris 2007). It can colonize and persist in high tidal-energy environments and has been observed where tidal velocities approach the threshold of motion for unconsolidated sediments (35-40 cm s⁻¹). The persistent presence of high-density, elevated patches of Johnson's seagrass on flood tidal deltas near inlets suggests that it is capable of sediment stabilization. Intertidal populations of Johnson's seagrass may be completely exposed at low tides, suggesting high tolerance to desiccation and wide temperature tolerance.

In Virnstein's study areas within the IRL, Johnson's seagrass was found associated with other seagrass species or growing alone in the intertidal and, more commonly, at the deep edge of some transects in water depths down to 180 centimeters. In areas in which long-term poor water and sediment quality have existed until recently, Johnson's seagrass appears to occur in relatively higher abundance, perhaps due to the inability of the larger species to thrive. Johnson's seagrass appears to be out-competed in seagrass habitats where environmental conditions permit the larger seagrass species to thrive (Virnstein et al. 1997, Kenworthy 1997). When the larger, canopy-forming species are absent, Johnson's seagrass can grow throughout the full seagrass depth range of the IRL (NMFS 2007, Virnstein et al. 2009).

Observations by researchers have suggested that Johnson's seagrass exploits unstable environments or newly-created unvegetated patches by exhibiting fast-growth and support for all local ramets in order to exploit areas in which it could not otherwise compete. It may quickly recruit to locally uninhabited patches through prolific lateral branching and fast horizontal growth. While these attributes may allow it to compete effectively in periodically disturbed areas, if the distribution of this species becomes limited to stable areas it may eventually be out-competed by more stable-selected plants represented by the larger-bodied seagrasses (Durako et al. 2003). In addition, the physiological attributes of Johnson's seagrass may limit growth (i.e., spreading) over large areas of substrate if the substrate is somehow altered (e.g., dredged to a depth that would preclude future recruitment of Johnson's seagrass); therefore, its ability to recover from widespread habitat loss may be limited. The clonal and reproductive growth characteristics of Johnson's seagrass result in its distribution being patchy, non-contiguous, and temporally fluctuating. These attributes suggest that colonization between broadly disjunct areas is likely difficult and that the species is vulnerable to becoming endangered if it is removed from large areas within its range by natural or anthropogenic means.

Threats

The emerging consensus among seagrass experts on the Recovery Team is that the possibility of mortality due to reduced salinity over long periods of time is the most clearly identified threat to the species' long-term persistence. Some studies have shown that Johnson's seagrass has a wide tolerance for salinity. However, short-term experiments have shown reduced photosynthesis and increased mortality at low salinities (< 10 psu). Longer duration mesocosm experiments have resulted in 100 percent mortality of Johnson's seagrass after 10 days at salinities < 10 psu (Kahn and Durako 2008). The Recovery Team has recently determined that the most significant threat to the species is the present or threatened destruction, modification or curtailment of its habitat or range through water management practices and stochastic environmental factors which can alter the salinity of its habitat. Given that it is not uncommon for salinities to decline below 15-20 psu in its range (Steward et al. 2006), and that a number of natural and human-related factors can affect salinity throughout its range, the Recovery Team identified reduced salinity as a potential significant threat to the species because the potential for long-term mortality over a large scale could counteract the life history strategy the species uses to persist in the face of numerous, ongoing environmental impacts. In previous reviews, including the critical habitat listing rule and the 2002 Recovery Plan, several additional factors were considered threats, including: 1) dredging and filling, 2) construction and shading from in- and over-water structures, 3) propeller scarring and anchor mooring, 4) trampling, 5) storms, and 6) siltation. In reviewing all information available since the original listing, the Recovery Team conducted assessments of each of these factors and has been unable to confirm that any of these pose a significant threat to the persistence and recovery of the species. A brief discussion of these factors follows.

Routine maintenance dredging associated with the constant movement of sediments in and around inlets may affect seagrasses by direct removal, light limitation due to turbidity, and burial from sedimentation. The disturbance of sediments can also destabilize the benthic community. Altering benthic topography or burying the plants may remove them from the photic zone. Permitted dredging of channels, basins, and other in- and on-water construction projects cause loss of Johnson's seagrass and its habitat through direct removal of the plants, fragmentation of

habitat, shading, turbidity, and sedimentation. Although dredge and fill activities can and do adversely affect Johnson's seagrass and its designated critical habitat, these activities and the construction of in- and over-water structures are closely scrutinized through federal, state, and local permitting programs. The COE, under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, has federal authority over the issuance of dredge and fill permits. This permitting process includes language to protect and conserve seagrasses through field evaluations, consultations, and recommendations to avoid, minimize, and mitigate for impacts to seagrasses.

The COE's State (Florida) Programmatic General Permit Program (SPGP) authorizes permits for the construction of docks, boat ramps, piers, maintenance dredging, and the construction of other minor over-water structures. The SPGP has had an increase in the number of permits authorized between 2000 and 2006 (based on data provided by the COE), except for periods when the U.S. Fish and Wildlife Service (FWS) was involved in litigation over the manatee (*Trichechus manatus latirostris*). Additional levels of consultation by NMFS staff may directly address permits involving Johnson's seagrass, depending on the location and size of the project and if the project is proposed in critical habitat. The Recovery Team has worked with NMFS' Protected Resources and Habitat Conservation staff to develop and improve guidelines for site monitoring methods (Greening and Holland 2003), dock construction guidelines (NMFS and COE 2002, Shafer et al. 2008), and best management practices to minimize the impact of docks on Johnson's seagrass (Landry et al. 2008).

Height, width, and orientation have been identified as the three most important factors affecting seagrass growth and abundance under and around over-water structures (Burdick and Short 1999; Beal and Schmit 2000). Landry et al. (2008) stated there is a compelling argument supporting prior studies which indicate that docks can have negative impacts on seagrasses by reducing their abundance and in some cases, preventing seagrass from growing. Their study found evidence that all species of seagrass were impacted by docks. However, they found that although it is reduced in frequency under grated docks, Johnson's seagrass was observed in higher densities under the grated docks compared to non-grated docks. Furthermore, their results suggest that Johnson's seagrass does benefit from the light-transmitting characteristics of grated decking. Landry et al. (2008) found that grated docks were more similar to the adjacent and the reference transects (for seagrass) than non-grated docks. This suggests that while both grated and non-grated docks can have detrimental effects on seagrass beds, grated docks are relatively less detrimental to seagrass beds than non-grated docks. Given the supporting experimental evidence that fiberglass grating does improve the incident solar radiation penetrating under structures (Shafer and Robinson 2001), continuing to require grated decking will benefit most seagrasses. Landry et al. (2008) recommend that grated decking should be used for any dock construction to take place over seagrasses, most importantly Johnson's seagrass.

In the results from their study evaluating the regulatory construction guidelines to minimize impacts to seagrasses from single-family residential dock structures in Florida and Puerto Rico, Shafer et al. (2008) emphasized avoidance of seagrasses as a first priority. Avoidance may be achieved by relocating or realigning the structure. It is important to note that Shafer et al. (2008) observed that in the majority of cases, permit applicants and regulatory agencies are, when practicable, generally succeeding in avoiding seagrass impacts by extending the length of

the access walkway so that the terminal platform is constructed in deep water that is not conducive to seagrass growth. If avoidance is not possible, Shafer et al. (2008) recommend revising the COE-NMFS dock construction guidelines to prioritize dock orientation (in a north-south direction) and height (minimum of 5 feet above mean high water) as the most important specifications for the survivorship of seagrasses under docks.

While most dock construction is subject to the construction guidelines (i.e., the COE and NMFS jointly developed October 2002, *Key for Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's Seagrass* and the associated August 2001, *Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation, Marsh, or Mangrove Habitat*), some docks meeting certain provisions, are exempt from state permitting (<http://www.dep.state.fl.us/central/Home/SLERP/Docks/sfdock.pdf>) and contribute to loss of Johnson's seagrass through construction impacts and shading. The COE's State (Florida) Programmatic General Permit Program (SPGP) authorizes permits for the construction of docks, boat ramps, piers, maintenance dredging, and the construction of other minor over-water structures. The COE is required to consult with NMFS in order to implement the SPGP; therefore, anticipated effects to Johnson's seagrass from implementation of the SPGP would be considered during consultation between the COE and NMFS. NMFS may provide conservation recommendations in its biological opinion that (if implemented) would benefit Johnson's seagrass.

The Recovery Team has identified weaknesses in the oversight practices of state and federal agencies in the permitting process for some or all of the activities discussed above, due to budget, staffing, and technological limitations, and the need for post-construction permit compliance and enforcement for dock structures in Florida and Puerto Rico has been discussed in Shafer et al. (2008). The Recovery Team also identified difficulties in monitoring a rare and patchily-distributed species in single-event surveys associated with permit applications and continues to work with collaborators to improve monitoring methods. While it is recognized that dredging and filling and construction and shading from in- and over-water structures can adversely affect Johnson's seagrass and its habitat, the Recovery Team determined that these activities are typically local and small-scale and the deficiencies in the permitting process were not presently a significant threat to the survival of Johnson's seagrass because they will not individually or cumulatively result in long-term, large-scale mortality of Johnson's seagrass, and preclude the species from its strategy of recolonizing areas.

Propeller scarring and improper anchoring are known to adversely affect seagrasses (Sargent et al. 1995. Kenworthy et al. 2002). These activities can severely disrupt the benthic habitat by uprooting plants, severing rhizomes, destabilizing sediments, and significantly reducing the viability of the seagrass community. Propeller dredging and improper anchoring in shallow areas are a major disturbance to even the most robust seagrasses. This destruction is expected to worsen with the predicted increase in boating activity within Florida. The most complete records available indicate that in 2006, the Florida Department of Motor Vehicles registered 184,138 commercial/recreational vessels (DHSMV 2006). This number is likely to increase based on Florida's projected population growth of 18 million in 2006 to 25 million in 2025 (www.propertytaxreform.state.fl/docs/eo06141.pdf). An increase in the number of registered

vessels will likely lead to an increase in adverse effects to seagrasses caused by propeller dredging/scarring. Other indirect effects associated with motor vessels include turbidity from operating in shallow water, dock construction and maintenance, marina expansion, and inlet maintenance dredging. These activities and impacts are also likely to increase (NMFS 2007). Damage to seagrasses from propeller scarring and improper anchoring by motor vessels is recognized as a significant resource management problem in Florida (Sargent et al. 1995). A number of local, state, and federal statutes prohibit damaging seagrasses through vessel impacts, and a number of conservation measures, including the designation of vessel control zones, signage, mooring fields, and public awareness campaigns, are directed at minimizing vessel damage to seagrasses. Despite these efforts, vessel damage can have significant local and small-scale (1 m² to 100 m²) impacts on seagrasses (Kirsch et al. 2005), but there is no direct evidence that these small-scale local effects are so widespread that they are a threat to the persistence and recovery of Johnson's seagrass.

Trampling of seagrass beds, a secondary effect of recreational boating, also disturbs seagrass habitat, but is a lesser concern. Trampling damages seagrasses by pushing leaves into the sediment and crushing or breaking the leaves and rhizomes. Since the designation of critical habitat, however, there have been no documented observations or reports of damage by trampling, and if there was, it would be small-scale and local. Therefore, the Recovery Team determined that trampling does not constitute a significant threat to the survival or recovery of Johnson's seagrass.

Large-scale weather events, such as tropical storms and hurricanes, while they often generate runoff conditions that decrease water quality, they also produce conditions (wind setup and abrupt water elevation changes) that can increase flushing rates. The effects of storms can be complex. Specifically documented storm effects on seagrasses include: 1) scouring and erosion of sediments, 2) erosion of seeds and plants by waves, currents, and surge, 3) burial by shifting sand, 4) turbidity, and 5) discharge of freshwater, including inorganic and organic constituents in the effluents (Steward et al. 2006). Storm effects may be chronic, e.g., due to seasonal weather cycles, or acute, such as the effects of strong thunderstorms or tropical cyclones. Studies have demonstrated that healthy, intact seagrass meadows are generally resistant to physical degradation from severe storms, whereas damaged seagrass beds may not be as resilient (Fonseca et al. 2000, Whitfield et al. 2002). In the late summer and early fall of 2004, four hurricanes passed directly over the northern range of Johnson's seagrass in the Indian River Lagoon. A post-hurricane random survey in the area of the Indian River Lagoon affected by the four hurricanes indicated the presence of Johnson's seagrass was similar to that reported by the SJRWMD transect surveys prior to the storms. This indicates that while the species may temporarily decline, under the right conditions it can return quickly (Virnstein and Morris 2007). Furthermore, despite evidence of longer-term reductions in salinity, increased water turbidity, and increased water color associated with higher than average precipitation in the spring of 2005, there was no evidence of long-term chronic impacts to seagrasses and no direct evidence of damage to Johnson's seagrass that could be considered a threat to the survival of the species (Steward et al. 2006).

Silt derived from adjacent land and shoreline erosion, river and canal discharges, inlets, and internally resuspended materials can lead to the accumulation of material on plant leaves causing

light deprivation. Deposition of silt can also lead to the burial of plants, accumulation of organic matter, and anoxic sediments. Johnson's seagrass grows in a wide range of environments, including those that are exposed to siltation from all the potential sources. Documentation of the direct effects of siltation on seagrasses are generally unavailable. The absence of seagrass has been associated with the formation of muck deposits, however, and localized areas of flocculent, anoxic sediments in isolated basins and segments of the Indian River Lagoon have been observed. Furthermore, sustained siltation experimentally simulated by complete burial for at least 12 days may cause mortality of Johnson's seagrass (W.J. Kenworthy, CCFHR, NOS, Beaufort, NC, unpublished data). In general, the effects of siltation are localized and not widespread and are not likely to threaten the survival of the species.

In addition to the six factors discussed above, we also consider the effects of altered water quality on Johnson's seagrass. Availability of light is one of the most significant environmental factors affecting the survival, growth, and distribution of seagrasses (Bulthuis 1983; Dennison 1987; Abal et al. 1994; Kenworthy and Fonseca 1996). Water quality and the penetration of light are affected by turbidity (suspended solids), color, nutrients, and chlorophyll, and are major factors controlling the distribution and abundance of seagrasses (Dennison et al. 1993, Kenworthy and Haurert 1991, Kenworthy and Fonseca 1996). Increases in color and turbidity values throughout the range of Johnson's seagrass are generally caused by high flows of freshwater discharged from water management canals, which can also reduce salinity. Wastewater and stormwater discharges, as well as from land runoff and subterranean sources, are also causes of increased turbidity. Degradation of water quality due to increased land use and poor water management practices continues to threaten the welfare of seagrass communities. Declines in water quality are likely to worsen, unless water management and land use practices can curb or eliminate freshwater discharges and minimize inputs of sediments and nutrients. A nutrient-rich environment caused by inorganic and organic nitrogen and phosphorous loading via urban and agricultural runoff stimulates increased algal growth that may smother or shade Johnson's seagrass, or shade rooted vegetation, and diminish the oxygen content of the water. Low oxygen conditions have a demonstrated negative impact on seagrasses and associated communities.

Based on a Trophic State Index (TSI) of ambient water quality obtained in the northern and central region of Johnson's seagrass geographic range provided in a long-term monitoring program implemented by the SJRWMD, overall estuarine water quality was assessed as mostly good (67 percent) (Winkler and Ceric 2006). Only 28 percent of the stations sampled had fair water quality, while 6 percent had poor quality. Fifty percent of the sampled estuarine sites were improving, while 6 percent were degrading, so many more sites were improving than were degrading. Forty-two percent of the lagoon sites had an insignificant trend while 3 percent had insufficient data to determine a trend. As water management experts have now become confident in the association between water quality and seagrass depth distribution, they have begun establishing water quality targets for the Indian River Lagoon based on seagrass as an indicator (Steward et al. 2005). There is a strong positive correlation between seagrass depth distribution and water quality, which enables managers to predict where seagrasses will grow based on water quality and the availability of light. Given that at least half of the sampling stations were indicating long-term improvements in water quality, it can be assumed that seagrass abundance should not be negatively impacted if water and land use management

programs continue to be effective. For example, carefully controlling or reducing water flows from discharge canals will moderate salinity fluctuations and reduce turbidity, color, and light attenuation values. However, there may be localized degradation near urbanized sites with multiple water quality problems that are more difficult to manage, such as the vicinity of the St. Lucie Inlet where the discharges from Lake Okeechobee have had significant impacts on water quality and seagrasses (Becky Robbins, South Florida Water Management District, West Palm Beach, Florida, personal communication).

There has not been a comprehensive assessment of water quality published or reported for the southern range of Johnson's seagrass similar to the SJRWMD study. However, personal communication with water quality experts at the South Florida Water Management District (SFWMD) (Dan Crean, SFWMD, West Palm Beach, Florida) confirm that efforts are underway to synthesize water quality information and to gain a more comprehensive understanding of the long-term status and trends of water quality in the southern range of Johnson's seagrass. Of particular concern is an assessment of the impacts of fluctuations in water quality corresponding with variation in climatology, especially "wet years" versus "dry years" variation. Future recovery efforts should include close coordination with the SFWMD and county environmental management agencies in Palm Beach and Dade counties to evaluate the status and trends of water quality in these regions of the species' distribution.

Here, we consider the possible effects of climate change (i.e., rising temperatures and sea levels) on seagrasses in general and on Johnson's seagrass in particular. The earth is projected to warm between 2°-4°C by 2100, and similar projections have been made for marine systems (Sheppard and Rioja-Nieto 2005). At the margins of temperate and tropical bioregions and within tidally-restricted areas where seagrasses are growing at their physiological limits, increased temperatures may result in losses of seagrasses and/or shifts in species composition (Short et al. 2007). The response of seagrasses to increased water temperatures will depend on the thermal tolerance of the different species and their optimum temperature for photosynthesis, respiration, and growth (Short and Neckles 1998). With future climate change and potentially warmer temperatures, there may be a 1-5 m rise in the seawater levels by 2100 when taking into account the thermal expansion of ocean water and melting of ocean glaciers. Rising sea levels may adversely impact seagrass communities due to increases in water depths above present meadows reducing available light. Climate change may also reduce light by shifting weather patterns to cause increased cloudiness. Changing currents may cause erosion and increased turbidity and seawater intrusions higher up on land or into estuaries and rivers, which could increase landward seagrass colonization (Short and Neckles 1998). A landward migration of seagrasses with rising sea levels is a potential benefit, so long as suitable substrate is available for colonization.

It is uncertain how Johnson's seagrass will adapt to rising sea levels and temperatures. Much depends on how much temperatures increase and how quickly. For example, Johnson's seagrass that grows intertidally (e.g., in some parts of the Lake Worth Lagoon) may be affected by a slight change in temperature (since it may already be surviving under less than optimal conditions); however, this may be ameliorated with rising sea levels, assuming Johnson's seagrass would migrate landward with rising sea levels and assuming that suitable substrate would be available for a landward migration. However, rising sea levels could also adversely impact seagrass communities due to increases in water depths above present meadows reducing available light.

Reduction in light availability may benefit some seagrass species (e.g., *Halophila* species that require less light compared to the larger, canopy-forming species); therefore, much depends on the thermal tolerance of the different seagrass species and their optimum temperature for photosynthesis, respiration, and growth (Short and Neckles 1998). While sea level has changed many times during the evolutionary history of Johnson's seagrass and it seems to handle temperature changes fairly well (Jud Kenworthy, NOAA National Ocean Service, pers. comm. e-mail, March 1, 2010, to Audra Livergood, NMFS), it is uncertain how this species will fare when considering the combined effects of rising temperatures and sea levels (in conjunction with other stressors, such as reduced salinity from freshwater runoff). It has been shown that evolutionary change in a species can occur within a few generations (Rice and Emery 2003), thus making it possible for seagrasses to cope if the changes occur at a rate slow enough to allow for adaptation.

3.2.1 Status Summary

Based on the results of 14 years of monitoring in the species' northern range (1994-2007) and 3 years of monitoring in the species' southern range (2006-2009), there has been no significant change in the northern or southern range limits of Johnson's seagrass (NMFS 2007). It appears that the populations in the northern range are stable and capable of sustaining themselves despite stochastic events related to severe storms (Steward et al. 2006) and fluctuating climatology. Longer-term monitoring data are needed to confirm the stability of the southern distribution of the species (NMFS 2007). However, based on the results of the southern transect sampling, it appears there is a relatively continuous, although patchy, distribution of Johnson's seagrass from Jupiter Inlet to Virginia Key, at least during periods of relatively good environmental conditions and no significant large-scale disturbances (NMFS 2007). Larger seagrasses, predominantly turtle grass (*Thalassia testudinum*), begin to out-compete Johnson's seagrass in this area. While there has been a slight extension in the known northern range (Vimstein and Hall 2009), the limits of the southern range appear to be stable (Latitude 25.75°N in the vicinity of Virginia Key). There have been no reports of this species further south of the currently known southern distribution.

As discussed in the *Threats* section, the Recovery Team has determined that the possibility of mortality due to reduced salinity over long periods of time is potentially a significant threat to the species. The other potential threats discussed above (i.e., dredging/filling, construction and shading from in and over-water structures, propeller scarring and anchor mooring, trampling, storms, and siltation) were determined to be local and small-scale and are not considered threats to the persistence and recovery of the species. It is uncertain how Johnson's seagrass will be affected by the synergistic effects of rising temperatures and sea levels associated with climate change (in conjunction with other stressors, such as reduced salinity from freshwater runoff). It has been shown that evolutionary change in a species can occur within a few generations (Rice and Emery 2003), thus making it possible for seagrasses to cope if the changes occur at a rate slow enough to allow for adaptation.

4 Environmental Baseline

This section is a description of the past and ongoing human and natural factors leading to the current status of the species and its designated critical habitat within the action area. The environmental

baseline is a “snapshot” of the action area at a specified point in time and includes state, tribal, local, and private actions already affecting the species and its critical habitat that will occur contemporaneously with the consultation in progress. Unrelated federal actions affecting Johnson’s seagrass and its designated critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are federal and other actions within the action area that may benefit the species or its critical habitat. This opinion describes these activities’ effects in the sections below.

A wide range of activities funded, authorized, or carried out by federal agencies may affect the essential habitat requirements of Johnson's seagrass. These include dredging, dock/marina construction, boat shows, bridge/highway construction, residential construction, shoreline stabilization, breakwaters, and the installation of subaqueous cables or pipelines. Other federal actions (or actions with a federal nexus) that may affect Johnson’s seagrass include actions by the Environmental Protection Agency and the COE to manage freshwater discharges into waterways; regulation of vessel traffic by the U.S. Coast Guard (USCG); management of national refuges and protected species by the USFWS; management of vessel traffic (and other activities) by the U.S. Navy; and authorization of state coastal zone management plans by NOAA’s National Ocean Service. Although these actions have probably removed Johnson’s seagrass and affected its critical habitat, none of these past actions have jeopardized the continued existence of Johnson’s seagrass, or destroyed or adversely modified its critical habitat.

A total of 179 activities occurred between January 2005 and March 1, 2010, on activities which may affect Johnson’s seagrass and its designated critical habitat. The majority of these projects were single- or multi-family dock construction projects that each resulted in a few hundred square feet of impacts to Johnson’s seagrass and/or its designated critical habitat. Other types of projects fall into one of the categories listed in the previous paragraph and the majority of these projects resulted in impacts to less than 0.1 acre of Johnson’s seagrass or its designated critical habitat. However, a few projects resulted in more significant impacts. In the following section, we will discuss some of the more significant projects within the range of Johnson’s seagrass for which NMFS completed ESA section 7 consultation.

Watson Island dredging and marina expansion

The COE issued a permit for the Watson Island Marina, located in Biscayne Bay, Miami-Dade County, Florida, authorizing the reconfiguration and expansion of an existing marina to accommodate mega-yachts (vessels up to 475 feet). The action area includes the dredge site (approximately 15.81 acres), the Julia Tuttle mitigation site, and the Brickell Artificial Reef mitigation site. In addition to dredging, the project proposed dock reconstruction and slip expansion from 43 to 50 wet slips. As proposed, the project would have permanently impacted 15.81 acres of Johnson’s seagrass designated critical habitat (proposed water depths, post-dredging, ranged from -18 to -25 feet NGVD). The applicant proposed to conduct mitigation through artificial reef construction (i.e., the Brickell Artificial Reef mitigation site) and filling of a large, deep dredge hole within Biscayne Bay from -25 to -5 feet NGVD in order to provide suitable habitat for seagrass colonization (the seagrass mitigation site is located within Johnson’s seagrass critical habitat and is referred to as the Julia Tuttle mitigation site). The seagrass mitigation proposed positive impacts to 3.62 acres of Johnson’s seagrass critical habitat through improved water transparency and light penetration. The overall project would have resulted in

permanent impacts to one of the essential features of critical habitat (i.e., water transparency) through reduction or elimination of light penetration (i.e., proposed dredge depths would be too deep to support future recruitment of Johnson's seagrass). NMFS determined that the project would result in permanent impacts to 11.72 acres of Johnson's seagrass designated critical habitat. NMFS also concluded that this would not constitute a reduction in area of critical habitat as there are expansive areas remaining adjacent to the project area which would still provide all four of the essential features of critical habitat. To date, the project has not been constructed; however, COE permits are valid for a period of 5 years and the applicant can always apply for an extension. Therefore, the project could potentially still be constructed as described, sometime in the foreseeable future.

Sebastian Inlet channel dredging

A COE-permitted dredging project proposed in 2007 to extend the Sebastian Inlet Channel would directly and indirectly impact between 1.7 and 3.07 acres of seagrass habitat, including 0.0167 acre of Johnson's seagrass. The dredging portion of the project was to be located directly adjacent to Johnson's seagrass designated critical habitat units A and B. The project included conservation projects to protect approximately 22.78 acres of seagrass habitat and rehabilitate previously damaged seagrass habitats, prevent future damage, and improve water quality. The rehabilitation would include repairing prop scars and blowout holes (approximately 0.7 acre) by filling the areas and transplanting seagrasses from the dredge site. Approximately 0.02 of the 0.7 acre to be rehabilitated would occur within Johnson's seagrass critical habitat. NMFS determined that all four of the essential features of critical habitat were present in the project area, but expected no effects from the channel extension to the adjacent critical habitat, and beneficial effects to Johnson's seagrass critical habitat would result from the mitigation projects. NMFS' biological opinion stated the proposed action was likely to adversely affect, but not jeopardize, the continued existence of Johnson's seagrass.

Miami and Palm Beach boat shows

Other projects of interest involve temporary, but recurring impacts. The international boat shows held in Palm Beach and Miami Beach affect large areas of shallow seagrass habitat. The Miami Beach Yacht and Brokerage show project area is located within Johnson's seagrass designated critical habitat, but the Palm Beach show is not. The shows have been occurring annually for over 20 years. Impacts occur during the installation and removal of the pilings used to hold temporary floating docks in place during the events. Piling barges install pilings using a vibratory hammer and can cause adverse effects that disturb bottom sediments while driving the pilings into the substrate, and also from propeller wash while maneuvering into position for pile driving. Approximately 600 yachts up to 180 feet in length are showcased during the events. The docks are in place for less than 30 days, but together with the moored boats, cause large-scale, albeit temporary, shading impacts (e.g., 2.99 acres associated with the Palm Beach show and 33.88 acres with the Miami show). While piling installation and shading cause event-related impacts, the greatest impact to seagrass habitat may occur from propeller dredging when the boats are backing into their slips and then later when exiting the slips following conclusion of the events. Physical damage to seagrass from propeller dredging associated with the Palm Beach show has been documented. Propeller dredging can occur when large deep-draft vessels, such as

the type on exhibit, are moored in shallow waters. Surveys conducted from 2003-2006 in the Miami project area found Johnson's seagrass growing in patches adjacent to the seawall out to approximately 40 feet from the seawall in depths ranging from 3 to 8 feet. Johnson's seagrass was not found in deeper depths in the Miami action area and subsequent surveys performed in 2007 to 2009 did not document the presence of Johnson's seagrass, and observed an overall decrease in abundance of all species of seagrass formerly noted. During the Miami event, some of the vessels are moored in slips along the seawall and may cause destabilization of bottom sediments when the boats are moved into and out of their slips. Previous permits issued for the events (permits for these events are 5 years in duration), stipulated that pre-and post-show seagrass surveys were a condition of the permit. However, the surveys did not have a good sampling design and have not provided a good spatial account of the occurrence of Johnson's seagrass within the action areas. Using the results of surveys conducted by previous researchers, impacts associated with the two shows over the course of the permitted action (5 years) have been estimated to range from 1,385 square feet for the Palm Beach show to 1.46 acres for the Miami show. NMFS determined that for the Palm Beach show, only the physical impacts from installing piles and propeller wash would adversely affect Johnson's seagrass and that adverse effects from shading would be temporary and insignificant. It is anticipated that NMFS will determine that the Miami show may affect Johnson's seagrass but is not likely to jeopardize its continued existence. The action is also likely to adversely affect its designated critical habitat, but will not result in its destruction or adverse modification. To date, no mitigation has been proposed for the impacts to Johnson's seagrass or its critical habitat, although current permit applications for future boat shows scheduled for the next 5 years propose a compensatory mitigation component.

Single-family residence on stilts (Jerner)

NMFS issued a biological opinion to the COE on June 20, 2008, for the subject project. Our opinion concluded that the proposed action is likely to adversely affect Johnson's seagrass and its designated critical habitat, but would not jeopardize its continued existence or result in destruction or adverse modification of critical habitat. The proposed action was issuance of a permit to Mr. Bruce Jerner for the construction of a pile-supported, single-family residence in the Indian River Lagoon, Martin County, Florida. The project site supports seagrass habitat, including Johnson's seagrass and its designated critical habitat. NMFS determined the proposed action would impact approximately 3,435 square feet (0.1 acre) of critical habitat by displacement and shading (i.e., 960 square feet from construction of the access walkway and 2,475 square feet from construction of the residence). NMFS determined that Johnson's seagrass critical habitat is likely to be adversely affected due to negative impacts on water transparency from installation of the pile-supported residence, which would result in shading of the lagoon bottom. Johnson's seagrass was observed within the proposed footprint of the pile-supported residence and the access walkway (Holly Boyett, Florida Department of Environmental Protection, pers. comm. e-mail, March 25, 2008, to Audra Livergood, NMFS). FDEP estimated less than 1 percent coverage of Johnson's seagrass within the proposed footprint of the residence. However, FDEP did not estimate the percent coverage of Johnson's seagrass within the proposed footprint of the access walkway. Because there is less than 1 percent coverage of Johnson's seagrass within the proposed footprint of the residence and because the residence would be constructed waterward and immediately adjacent to the access walkway, NMFS presumed there was also less than 1 percent coverage of Johnson's seagrass within the proposed footprint of the access walkway. Based on this, we estimated that existing Johnson's seagrass within the

proposed footprint of the residence would die as a result of long-term shading. In addition, the shading that would occur from the pile-supported residence would likely preclude future recruitment of Johnson's seagrass and other seagrass species within the footprint of the residence (approximately 2,475 square feet). Therefore, there would be a permanent loss of 2,475 square feet (0.06 acre) of critical habitat due to shading from the pile-supported residence. In addition, approximately 960 square feet of critical habitat would be shaded by the access walkway. However, because the access walkway would be elevated approximately 5 feet above mean high water, constructed of grated decking, and limited to 4 feet in width, NMFS concluded that the walkway is not likely to adversely affect Johnson's seagrass.

City of West Palm Beach dredging

NMFS issued a biological opinion to the COE on August 26, 2009, for the subject project. Our opinion concluded that the proposed action was likely to adversely affect Johnson's seagrass, but would not jeopardize its continued existence. The project site is not located within critical habitat. The proposed action was dredging of 1,220 cubic yards of sediment from within a 33,210-square-foot area adjacent to six stormwater outfall culverts within the Lake Worth Lagoon in Palm Beach County, Florida. Dredging would impact approximately 5,879 square feet (0.13 acre) of seagrasses, dominated by Johnson's seagrass. However, because the proposed dredge depths were between -2 and -4 feet NGVD, it is possible that Johnson's seagrass could recruit back to the area post-dredging.

FDOT SR 80 Southern Boulevard Bridges

NMFS issued a biological opinion to the Federal Highway Administration on May 22, 2009, for the subject project. Our opinion concluded that the proposed action was likely to adversely affect Johnson's seagrass and its designated critical habitat, but would not jeopardize its continued existence or result in destruction or adverse modification of critical habitat. The proposed action was demolition and reconstruction of two Southern Boulevard bridges in the Lake Worth Lagoon, Palm Beach County, Florida. The project site supports seagrass habitat, including Johnson's seagrass and its designated critical habitat. NMFS estimated that the project would impact 0.438 acre of Johnson's seagrass and approximately 0.117 acre of critical habitat (i.e., 0.017 acre will be covered by new bridge structures and 0.1 acre will be affected by scouring associated with barge operation).

Coastal Construction and Urban Development

As described above, dock construction, dredging, etc. within the range of Johnson's seagrass will continue, as the shoreline is highly prized for residential and commercial development. Newer construction is encouraged to follow the NMFS-COE dock construction guidelines and the Johnson's Seagrass Key in order to minimize shading impacts to Johnson's seagrass and its critical habitat. Nevertheless, loss of Johnson's seagrass will continue due to shading and the installation of pilings, even if docks are designed in full compliance with the dock construction guidelines.

Urban development since the 1960s has affected inshore water quality throughout the range of Johnson's seagrass. However, Woodward-Clyde (1994) opined that improvements in erosion and sediment control in association with urban development in the 1980s and 1990s may have been responsible for reduced turbidity in those decades as compared to the previous two decades

of development. Reductions in seagrasses were apparent in the 1970s, along with areas of highly turbid water. Increases in submerged aquatic vegetation were noted until coverage and density peaked in 1986, albeit at levels remaining below those observed in the decades prior to 1960. In association with upland development, water quality and transparency within the range of Johnson's seagrass are affected by storm water and agricultural runoff, wastewater discharges, and other point and non-point source discharges. The most clearly identified and manageable threat to the persistence and recovery of Johnson's seagrass is the possibility of mortality due to reduced salinity over long periods of time. High-volume freshwater discharges from Lake Okeechobee flow downstream to the mouth of the St. Lucie River and have the potential to adversely affect Johnson's seagrass. The Comprehensive Everglades Restoration Plan (CERP) may help to alleviate the frequency of high-volume freshwater discharges from Lake Okeechobee; however, the success of CERP is uncertain because many of the projects are still in the planning or early implementation phase.

Recreational Vessel Traffic

Increasing recreational vessel traffic in the range of Johnson's seagrass results in marina and dock construction, improper anchoring, and propeller scarring. Propeller scarring and improper anchoring are known to adversely affect seagrasses (Sargent et al. 1995, Kenworthy et al. 2002). These activities can severely disrupt the benthic habitat by uprooting plants, severing rhizomes, destabilizing sediments, and significantly reducing the viability of the seagrass community. Propeller dredging and improper anchoring in shallow areas are a major disturbance to even the most robust seagrasses. A number of local, state, and federal statutes prohibit damaging seagrasses through vessel impacts, and a number of conservation measures, including the designation of vessel control zones, signage, mooring fields, and public awareness campaigns, are directed at minimizing vessel damage to seagrasses. Despite these efforts, vessel damage can have significant local and small-scale (1 m² to 100 m²) impacts on seagrasses (Kirsch et al. 2005), but there is no direct evidence that these small-scale local effects are so widespread that they are a threat to the survival of Johnson's seagrass.

Natural Disturbances

Large-scale weather events, such as tropical storms and hurricanes, while they often generate runoff conditions that decrease water quality, also produce conditions (wind setup and abrupt water elevation changes) that can increase flushing rates. The effects of storms can be complex. Specifically documented storm effects on healthy seagrass meadows have been relatively minor and include: 1) scouring and erosion of sediments, 2) erosion of seeds and plants by waves, currents, and surge, 3) burial by shifting sand, 4) turbidity, and 5) discharge of freshwater, including inorganic and organic constituents in the effluents (Oppenheimer 1963, van Tussenbroek 1994, Whitfield et al. 2002, Steward et al. 2006). Storm effects may be chronic, e.g., due to seasonal weather cycles, or acute, such as the effects of strong thunderstorms or tropical cyclones. Studies have demonstrated that healthy, intact seagrass meadows are generally resistant to physical degradation from severe storms, whereas damaged seagrass beds may not be as resilient (Fonseca et al. 2000, Whitfield et al. 2002). In the late summer and early fall of 2004, four hurricanes passed directly over the northern range of Johnson's seagrass in the IRL. A post-hurricane random survey in the area of the IRL affected by the four hurricanes indicated the presence of Johnson's seagrass was similar to that reported by the SJRWMD transect surveys prior to the storms. This indicates that while the species may temporarily decline, under the right

conditions it can recover quickly (Virnstein and Morris 2007). Furthermore, despite evidence of longer-term reductions in salinity, increased water turbidity, and increased water color associated with higher than average precipitation in the spring of 2005, there was no evidence of long-term chronic impacts to seagrasses and no direct evidence of damage to Johnson's seagrass that could be considered a threat to the survival of the species (Steward et al. 2006).

State and federal activities that may benefit Johnson's seagrass

State and federal conservation measures exist to protect Johnson's seagrass and its habitat under an umbrella of management and conservation programs that address seagrasses in general (Kenworthy et al. 2006). Johnson's seagrass habitat is also included in the designation of critical habitat for the Florida manatee and is therefore subject to ESA section 7 consultation by the USFWS, which has ESA jurisdiction over the manatee. These conservation measures must be continually monitored and assessed to determine if they will ensure the long term protection of the species and the maintenance of environmental conditions suitable for its continued existence throughout its geographic distribution.

5 EFFECTS OF THE ACTION

NMFS believes that the proposed project is likely to adversely affect Johnson's seagrass, which is listed as a threatened species under the ESA. NMFS believes the project is likely to adversely affect approximately 0.43 acre of Johnson's seagrass (this is a reasonable, worst-case estimate; see discussion in Section 3.2 above under *Johnson's Seagrass*) via direct removal from dredging and potential (albeit short-term) indirect impacts associated with turbidity (which may temporarily affect water clarity) and sedimentation. This is a reasonable, worst-case estimate and the actual amount of Johnson's seagrass affected may be less since Johnson's seagrass may not be growing in the channel itself; however, it may be present in deeper water near the IWW (Bob Virnstein, retired from SJRWMD, pers. comm. e-mail, July 16, 2008, to Paul DeMarco, COE). In addition, NMFS believes Johnson's seagrass may be present in some of the areas that have experienced shoaling and are located within the proposed dredge area. Without the benefit of a quantitative, pre-dredge seagrass survey that adheres to NMFS' recommended survey protocol for Johnson's seagrass (NMFS 2002), we must err on the side of the species and use a reasonable, worst-case estimate based on the best available information.

Johnson's seagrass has a reduced capacity to repopulate an area if lost due to human or environmental perturbations (NMFS 2002). However, Johnson's seagrass may re-colonize some areas of the channel (post-dredging) so long as conditions are favorable for re-colonization. Johnson's seagrass has been recorded in water depths up to 3-4 meters (10-13 feet) (NMFS 2007; Kenworthy 2000; Hammerstrom et al. 2006). The proposed action entails dredging to depths of up to -12 feet at mean low water; therefore, if conditions are favorable, it is possible that Johnson's seagrass could re-colonize some areas of the channel, post-dredging.

6 CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, or local private actions that are reasonably certain to occur in the action area considered in this opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

No categories of effects beyond those already described are expected in the action area. The creation, widening, and deepening of inlets and channels will continue to remove and/or bury Johnson's seagrass and its designated critical habitat, destabilize sediments, and decrease water transparency. However, dredge/fill activities that may affect Johnson's seagrass and/or its designated critical habitat are subject to COE permitting and ESA section 7 consultation.

NMFS and the COE have developed and are working on updating protocols to encourage the use of light-transmitting materials in future construction of docks within the range of Johnson's seagrass. However, even if all new docks are constructed in full compliance with NMFS-COE dock construction guidelines, there will still be shading impacts to Johnson's seagrass and its designated critical habitat from new docks (but shading impacts would be reduced if guidelines are followed). Landry et al. (2008) found that Johnson's seagrass persisted under docks constructed of grated decking versus non-grated decking. Although it was reduced in frequency under grated docks, Johnson's seagrass was observed in higher densities under grated versus non-grated docks. NMFS acknowledges that shading impacts to Johnson's seagrass and its designated critical habitat will continue via dock construction; however, if NMFS and the COE continue to encourage permit applicants to design and construct new docks in full compliance with the NMFS-COE dock construction guidelines, the Johnson's Seagrass Key, and the recommendations in Landry et al. 2008 and Shafer et al. 2008, NMFS believes that shading impacts to Johnson's seagrass and its designated critical habitat will be reduced in the short- and long-term.

Upland development and associated runoff will continue to degrade water quality and decrease water clarity necessary for growth of seagrasses. Flood control and imprudent water management practices will continue to result in freshwater inputs into estuarine systems, thereby degrading water quality and altering salinity. Long-term, large-scale reduction in salinity has been identified as a potentially significant threat to the persistence and recovery of Johnson's seagrass

Increased recreational vessel traffic will continue to result in damage to Johnson's seagrass and its designated critical habitat by improper anchoring, propeller scarring, and accidental groundings. However, it is expected that ongoing boater education programs and posted signage about the dangers to seagrass beds from propeller scarring and improper anchoring may reduce impacts to Johnson's seagrass and its designated critical habitat.

Natural disturbances, such as tropical storms and hurricanes, are expected to continue. Documented storm effects on seagrasses include scouring and erosion of sediments; erosion of seeds and plants by waves, currents, and surge; burial by shifting sand; turbidity; and discharge of freshwater, including inorganic and organic constituents in the effluents (Steward et al. 2006). Based on Virnstein and Morris' (2007) results from sampling in the IRL following a very active 2004 hurricane season, there was no evidence of long-term chronic impacts to seagrasses and no direct evidence of damage to Johnson's seagrass that could be considered a threat to the persistence of the species (Steward et al. 2006).

7 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of Johnson's seagrass. In Section 5, we have outlined how the proposed action can affect Johnson's seagrass. Now we turn to an assessment of the species' response to these impacts, in terms of overall population effects, and whether those effects of the proposed action, when considered in the context of the status of the species (Section 3), the environmental baseline (Section 4), and the cumulative effects (Section 6), will jeopardize the continued existence of the affected species.

"To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Thus, in making this determination, we must first determine whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in one or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

Based on our current knowledge of the species, Johnson's seagrass reproduction is entirely asexual, occurring through prolific, year-round fragmentation, and growth appears to be rapid. Johnson's seagrass occurs in dynamic and disjunct patches throughout its range, and it occupies a wide range of habitat conditions. The most recent expert opinion suggests that actions that would cause long-term mortality over a large scale are of greatest concern for the persistence and recovery of the species, given its life history strategy.

The proposed action may adversely affect up to 0.43 acre of Johnson's seagrass that may be found within and the vicinity of the proposed maintenance dredging in the IWW. This constitutes a reduction in the numbers of the species. However, we believe this is a reasonable, worst-case estimate based on the best available information. The actual amount of Johnson's seagrass that will be affected by the proposed action may be less. In addition, the proposed action is dredging to between -10 feet and -12 feet at mean low water, which is within the maximum depth range of occurrence for Johnson's seagrass; thus, it is possible that Johnson's seagrass could re-colonize the area, post-dredging, if conditions are favorable for re-colonization. Even if 0.43 acres of Johnson's seagrass is removed by the dredging and conditions do not provide for any recolonization of the project area, NMFS believes that the reduction in numbers of Johnson's seagrass that may result will not cause or contribute to long-term or large-scale mortality of the species, and will not appreciably reduce the likelihood of survival of Johnson's seagrass in the wild.

Reproduction will be minimally reduced by the aforementioned reduction in Johnson's seagrass numbers, but NMFS considers that this reproductive loss does not appreciably reduce the likelihood of survival of Johnson's seagrass in the wild. Johnson's seagrass will continue to reproduce and spread since it is likely to persist in the vicinity of the proposed dredging (and may re-colonize the area, post-dredging); therefore, the reproductive potential of the species in the action area, and in this portion of its range, will persist.

The action will not result in a reduction of Johnson's seagrass distribution. Johnson's seagrass will continue to exist in areas in and surrounding the action area and throughout its 200-km range. Likewise, this potential loss of Johnson's seagrass will not cause a fragmentation of the

range because some Johnson's seagrass patches will likely still remain within and in the vicinity of the action area, and unaffected patches are capable of spreading via asexual fragmentation.

NMFS concludes that the proposed action will not appreciably reduce the likelihood of survival of Johnson's seagrass in the wild.

Recovery for Johnson's seagrass, as described in the recovery plan, will be achieved when the following recovery objectives are met: 1) The species' present geographic range remains stable for at least 10 years, or increases; 2) self-sustaining populations are present throughout the range at distances less than or equal to the maximum dispersal distance to allow for stable vegetative recruitment and genetic diversity; and 3) populations and supporting habitat in its geographic range have long-term protection (through regulatory action or purchase acquisition).

NMFS believes that the proposed action will not appreciably reduce the likelihood of recovery of Johnson's seagrass in the wild. NMFS' recent (2007) 5-year review of the status of the species concluded that the first recovery objective has been achieved. In fact, the range has increased slightly northward. The proposed action will not impact the status of this objective. Self-sustaining populations are present throughout the range and in the IWW surrounding the action area. The species' overall reproductive capacity will be only minimally reduced by the potential loss of 0.43 acre of Johnson's seagrass. The proposed action may remove a small amount of Johnson's seagrass, but unaffected patches of Johnson's seagrass will likely persist in the vicinity of the project area; thus, the proposed action will not lead to separation of self-sustaining Johnson's seagrass patches to the extent that might lead to adverse effects to one or more of these patches. Similarly, the availability of habitat in which the species can spread/flow in the future will not be adversely affected by the proposed action (i.e., the maximum proposed dredge depth of -12 feet at mean low water is still within the known depth range recorded for Johnson's seagrass). While additional individual impacts may occur, and will likely continue to occur, over the last decade the species has not demonstrated any declining trends. Thus, the current rate of Johnson's seagrass loss from individual project impacts appears to be sustainable at the current rate that projects are permitted, even when considered cumulatively.

Since the proposed action will disturb only a small amount of Johnson's seagrass and since Johnson's seagrass has the potential to re-colonize the area (post-dredging), the potential for a self-sustaining population is not removed from this portion of the range. Based on this information, the proposed action will not reduce or destabilize the present range of Johnson's seagrass. The proposed action will not have an adverse effect on the long-term protection of the species. Therefore, the project will not appreciably reduce the likelihood of recovery of Johnson's seagrass in the wild.

8 CONCLUSION

We have analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of Johnson's seagrass. Because the proposed action will not reduce the likelihood of survival and recovery of Johnson's seagrass, it is our opinion that the proposed action is also not likely to jeopardize the continued existence of the species.

9 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

NMFS believes the following conservation recommendations are reasonable, necessary, and appropriate to conserve and recover Johnson's seagrass. NMFS strongly recommends that these measures be considered and adopted.

1. NMFS recommends that a report of all current and proposed COE projects in the range of Johnson's seagrass be prepared and used by the COE to assess impacts on the species from these projects, to assess cumulative impacts, and to assist in early consultation that will avoid and/or minimize impacts to Johnson's seagrass and its critical habitat. Information in this report should include location and scope of each project and identify the lead federal agency for each project. The information should be made available to the Water Management Districts and NMFS.
2. NMFS recommends that the COE conduct and support research to assess trends in the distribution and abundance of Johnson's seagrass. Data collected should be contributed to the Florida Fish and Wildlife Conservation Commission's Florida Wildlife Research Institute to support ongoing GIS mapping of Johnson's and other seagrass distribution.
3. NMFS recommends that the COE, in coordination with seagrass researchers and industry, support ongoing research on light requirements and transplanting techniques to preserve and restore Johnson's seagrass, and on collection of plants for genetics research, tissue culture, and tissue banking.
4. NMFS recommends that the COE prepare an assessment of the effects of other actions under its purview on Johnson's seagrass for consideration in future consultations.
5. NMFS recommends that the COE promote the use of the October 2002, *Key for Construction Conditions for Docks or other Minor Structures Constructed in or over Johnson's Seagrass* as the construction methodology for proposed docks located in the range of Johnson's seagrass.
6. NMFS recommends that the COE review and implement the recommendations in the July 2008 report, *The Effects of Docks on Seagrasses, With Particular Emphasis on the Threatened Seagrass, Halophila Johnsonii* (Landry et al. 2008).
7. NMFS recommends that the COE review and implement the Conclusions and Recommendations in the October 2008 report, *Evaluation of Regulatory Guidelines to Minimize Impacts to Seagrasses from Single-family Residential Dock Structures in Florida and Puerto Rico* (Shafter et al. 2008).

10 REINITIATION OF CONSULTATION

As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the proposed action is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In the case of the proposed action, a pre-dredge seagrass survey is planned for the summer of 2010. If the results of the pre-dredge seagrass survey reveal that more than 0.43 acre of Johnson's seagrass may be adversely affected by the proposed action, then the COE will be required to reinitiate ESA section 7 consultation with NMFS.

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January 29, 2009

F/SER4:JK/pw

Colonel Paul L. Grosskruger
District Engineer, Jacksonville District
Department of the Army Corps of Engineers
Planning Division, Environmental Branch
PO Box 4970
Jacksonville, Florida 32232

Attention: Paul DeMarco

Dear Colonel Grosskruger:

NOAA's National Marine Fisheries Service (NMFS) reviewed the Jacksonville District's letter dated January 9, 2009, regarding maintenance dredging of the Atlantic Intracoastal Waterway (AIWW) in the vicinity of Fort Pierce Inlet (PN-CO-IWW-284) and the corresponding "*Draft Environmental Assessment, Maintenance Dredging the Intracoastal Waterway in the Vicinity of Fort Pierce Inlet, St. Lucie County, Florida*" (EA). Your letter transmits the Jacksonville District's reply to the conservation recommendation that NMFS provided by letter dated December 12, 2008, to protect essential fish habitat (EFH).

In our letter, NMFS indicated the EFH consultation could not be completed due to insufficient information, and we recommended that the Department of the Army not authorize the project until the following changes were made to protect EFH:

1. Seagrass surveys shall be conducted within and adjacent to the Atlantic Intracoastal Waterway (AIWW) pre- and post-construction to determine the amount of seagrass habitat impacted from the dredging. Before surveys are conducted, the Jacksonville District shall coordinate survey methods and data analysis with NMFS.
2. Before proceeding with the maintenance dredging, the Jacksonville District shall prepare a mitigation plan that would compensate for seagrass impacts within and adjacent to the AIWW, including the temporal loss of seagrass habitat. The plan shall be submitted to NMFS for review and approval; and NMFS offers to assist the Jacksonville District in the development of this plan.

GIS Analysis and Seagrass Avoidance During Anchor Placement

In addition to your letter, the Jacksonville District staff provided supplemental information that contained results from a GIS analysis that used existing data from Florida Wildlife Research Institute (FWRI) to develop a "worst case scenario" for potential seagrass impacts. FWRI's data show no seagrass occurring within the 135-foot wide AIWW channel or within the channel's side slope. However, the GIS analysis shows approximately 1.31 acres of continuous and 2.04 acres of discontinuous seagrass beds within the 100-foot dredge anchor zone adjacent to the channel. These areas are located within the northern 4 miles



of the proposed 9.8-mile project, and the Jacksonville District believes it is practicable for the dredge contractor to avoid anchor placement in the majority of the habitat. We appreciate the Jacksonville Districts commitment to avoiding seagrass during anchor placement.

While NMFS agrees it is appropriate to utilize the existing FWRI data for planning purposes, we note that the level of survey effort is unclear (e.g., areas that were surveyed and seagrass was documented versus areas that were not surveyed and represent data gaps). This emphasizes the need for pre- and post-construction surveys, which is discussed in the section below.

Jacksonville District Response to EFH Recommendation #1

Your letter states that the Jacksonville District agrees to conduct pre-and post-construction surveys for seagrass within and adjacent to the AIWW. In addition, results from these surveys will be provided on project plan sheets and the dredge contractor will be provided the spatial data to aid in avoidance. Further, the Jacksonville District will coordinate the survey methods and data analysis with NMFS. During a teleconference on January 13, 2009, NMFS and the Jacksonville District discussed the timeframe for construction and associated pre-dredge surveys. The Jacksonville indicated that the work is scheduled for 2010, hence the pre-construction survey would occur in the 2009 or 2010 seagrass growing season (April 1 – August 30 for *Halophila johnsonii*). If the survey is planned for 2009, we recommend the Jacksonville District coordinate survey plans with NMFS as soon as practicable.

Jacksonville District Response to EFH Recommendation #2

Your letter states that the Jacksonville District will, prior to dredging, coordinate with NMFS on the development of a conceptual mitigation plan for seagrass. The Jacksonville District typically mitigates for seagrass losses that have not recovered within one year of impact. NMFS recommends modifying the success criteria to *the unassisted persistence of the required acreage of seagrass coverage for a prescribed period of time (suggested minimum of five years)*, based on Fonseca et al. (1998)¹. This timeframe is important because there are cases where *Halophila decipiens* failed to become established despite the area exhibiting appropriate physical conditions and initial colonization occurring (the disappearance is believed to reflect an inadequate seed bank). It is important to evaluate the persistence of restored seagrass coverage over a fixed (absolute minimum of three years) period of time (Fonseca, M. pers. comm., 2003).

Summary

We believe the Jacksonville District addressed our EFH recommendations, and we look forward to continuing to work with the District in the development of seagrass survey and mitigation plans. We recommend:

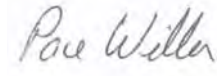
1. In the case that survey work is planned for the 2009 growing season, the Jacksonville District should coordinate survey and mitigation plans with NMFS as soon as practicable.
2. The Jacksonville District adopt the success criteria described in Fonseca et al. (1998), *the unassisted persistence of the required acreage of seagrass coverage for a prescribed period of time (suggested minimum of five years)*.

In the interim, we conclude the goals of the Magnuson-Stevens Fishery Conservation and Management Act and the regulations for implementing the EFH requirements of the Act will be met for this project. We appreciate the efforts by the applicant and your staff to protect NOAA trust resources.

¹ Fonseca, M.S., W.J. Kenworthy, and G.W. Thayer. 1998. Guidelines for the conservation and restoration of seagrasses in the United States and adjacent waters. NOAA Coastal Ocean Program Decision Analyses Series No. 12. NOAA Coastal Ocean Office, Silver Spring, MD. 222 pp.

Thank you for the opportunity to provide comments. Related correspondence should be directed to the attention of Ms. Jocelyn Karazsia at our West Palm Beach office, which is co-located with the US Environmental Protection Agency at USEPA, 400 North Congress Avenue, Suite 120, West Palm Beach, Florida, 33401. She may be reached by telephone at (561) 616-8880, extension 207, or by e-mail at Jocelyn.Karazsia@noaa.gov.

Sincerely,



/ for

Miles M. Croom
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cc: (via electronic mail)

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