APPENDIX D

LAKE WORTH INLET

Palm Beach Harbor

SECTION 404(b) EVALUATION

I. Project Description

a. Location. Lake Worth Inlet and Palm Beach Harbor are on the Atlantic Coast of Florida, approximately 53 miles south of Ft. Pierce Harbor, and 71 miles north of Miami Harbor.

b. General Description. The U.S. Army Corps of Engineers (Corps), Jacksonville District, is proposing to widen and deepen the current Federal navigation channel at Lake Worth Inlet / Palm Beach Harbor. The proposed plan includes the following: addition of a new channel flare on the south side of the Entrance Channel, a widening of the Entrance Channel by either 40' or 60' to the north, widening of the Inner Harbor Cuts 1 and 2 to provide for a minimum channel width of 450', a 150' expansion of the Southern (Main) Turning Basin to the south, and an expansion of the Southern (Main) Turning Basin on the north side to remove a notch currently encroaching into the basin. The channel would be deepened to a project depth of 39 feet Mean Lower Low Water (MLLW) for the Inner Harbor and 41 feet MLLW for the Entrance Channel plus applicable allowances and overdepths discussed in the Engineering Appendix included in the integrated Feasibility Report and Environmental Impact Statement (FR/EIS).

In addition to the project improvements described above that are necessary to facilitate the safe and efficient navigation of the design vessel, there are other features needed to support the project. These features include North Jetty stabilization, reconfiguration of the advanced maintenance zones, reconfiguration of the settling basin, seagrass mitigation construction, and hardbottom mitigation construction as detailed in the integrated FR/EIS.

c. Authority and Purpose. See **Chapter 1** of the integrated FR/EIS.

d. General Description of Dredged Material

(1) General Characteristics of Material: Please see **Chapter 4.2** of the integrated FR/EIS for additional detail as well as **Figure 4-1** and **Table 4-1** in the integrated FR/EIS for a listing of material by location. Generally, the following material is expected within the project limits: sands, silty sands, and interfingering rock layers.

(2) Quantity of Material: The tentatively selected plan would dredge a total of approximately two million cubic yards of material. Please see **Chapter 4.2** of the integrated FR/EIS for additional detail.

(3) Source of Material: Dredged material would come from the Federal navigation channel for Lake Worth Inlet as well as the proposed widening and deeping locations shown in the reference map in **Chapter 4** of the integrated FR/EIS.

e. Description of the Proposed Discharge Site(s)

(1) Location. It is anticipated that all of the material to be excavated from the entrance channel up to Station 45+00 would be placed in nearshore placement area, located below mean high water line, with the exception of the amount which would be used to mitigate for seagrasses. The remainder of the material would be placed at the Palm

Beach Ocean Dredged Material Disposal Site (ODMDS). Please see also **Chapter 4.8** of the integrated FR/EIS.

(2) Size. Near shore quality sand would be placed in the near shore (below the MHW line) between DEP range monuments R-76 to R-79, used for mitigation, or placed in the designated ODMDS.

(3) Type of Site. Nearshore, ODMDS, or proposed mitigation site.

(4) Type(s) of Habitat. Nearshore consists of bare sand with no exposed hard bottom or resources within the footprint. ODMDS site is bare sand/silty substrate with no exposed hard bottom. Proposed mitigation sites consist of sandy/silty substrate within the inlet for seagrass mitigation, and nearshore sand substrate for hard bottom mitigation.

(5) Timing and Duration of Discharge. The exact timing of dredging operations is not known, although dredging activities are expected to occur in the winter months.

f. Description of Disposal Method. Disposal could be either from a pipeline via hydraulic dredging or clamshell dredge and transport barge.

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope: The material would be placed below mean low water to elevation -16.

(2) Sediment Type. The material to be disposed in the nearshore would be silty sand in nature. Rock and material not suitable for nearshore placement would be disposed of at the ODMDS.

(3) Dredged Material Movement: Material would settle and be moved to downdrift beaches by wave action if placed in nearshore. It is expected the material would remain in place if used for mitigation. Material deposited in the ODMDS would remain within the confines of the ODMDS.

(4) Physical Effects on Benthos: Some benthic organisms that are not mobile may be may be covered by the nearshore placement and/or the mitigation site material. Recolonization soon after project completion is expected to replace those organisms that do not survive project construction. It is anticipated that no long-term adverse impacts would occur.

(5) Other Effects: NA

(6) Actions Taken to Minimize Impacts: BMPs and other benthic protection measures have been coordinated with the resource agencies to minimize impacts

b. Water Circulation. Fluctuation and Salinity Determinations

(1) Water column: During nearshore disposal operations, turbidity would increase temporarily in the water column adjacent to the project. The increased turbidity would be short-term; therefore nearshore placement would have no long-term or significant impacts, if any, on salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients or eutrophication

(2) Current Patterns and Circulation : Net movement of water is from the north to the south. The project would have no significant effect on existing current patterns, current flow, velocity, stratification, or the hydrologic regime in the area.

(3) Normal Water Level Fluctuations: Mean tidal range in the project area is 3.5 feet with a spring tide range of approximately 4.1 feet.

(4) Salinity Gradients: Salinity is that of oceanic water. Dredged material placement would not affect normal tide fluctuations or salinity.

(5) Actions That Will Be Taken to Minimize Impacts: BMPs and other benthic protection measures have been coordinated with the resource agencies to minimize impacts.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site: There may be a temporary increase in turbidity levels in the project area along the disposal site during discharge. Turbidity would be short-term and localized and no significant adverse impacts are expected. State water quality standards for turbidity outside an allowable mixing zone would not be exceeded.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column: The sea floor, at this location, is characterized by a sandy substrate nearshore and sand/silt substrate at the ODMDS. There would be little, if any, adverse effects to chemical and physical properties of the water as a result of placing sandy material in the nearshore and sand/silt/rock material at the ODMDS.

(a) Light Penetration: Some decrease in light penetration may occur in the immediate vicinity of the disposal area. This effect would be temporary, limited to the immediate area of construction, and would have no adverse impact on the environment.

(b) Dissolved Oxygen: Dissolved oxygen levels would not be altered by this project due to the high energy wave environment and associated adequate reaeriation rates.

(b) Toxic Metals and Organics: No toxic metals or organics are expected to be released by the project.

(d) Pathogens: No pathogens are expected to be released by the project.

(e) Aesthetics: The aesthetic quality of the water in the immediate area of the project would be reduced during construction due to increased turbidity. This would be a short-term and localized condition. Material placed in the nearshore would likely provide improved beach width down drift of placement location.

(f) Others as Appropriate: None.

(3) Effects on Biota

(a) Primary Production, Photosynthesis: Primary productivity is not a recognized, significant phenomenon in the surf zone, where a temporarily increased level of suspended particulates would occur. There would be no effect on the nearshore productivity as a result of the proposed disposal area.

(b) Suspension/Filter Feeders: An increase in turbidity could adversely impact burrowing invertebrate filter feeders within and adjacent to the immediate construction area. It is not expected that a short-term, temporary increase in turbidity would have any long-term negative impact on these highly fecund organisms.

(c) Sight Feeders: No significant impacts on these organisms are expected as the majority of sight feeders are highly motile and can move outside the project area.

(4) Actions taken to Minimize Impacts: BMPs and other benthic protection measures have been coordinated with the resource agencies to minimize impacts.

d. Contaminant Determinations: The material that would be disposed would not introduce, relocate, or increase contaminants at the area. The material would consist of sandy material with some silt in the nearshore and material with higher concentrations of rock in the ODMDS.

e. Aquatic Ecosystem and Organism Determinations: The material that would be placed in the nearshore would be similar enough to the existing substrate so that no impacts are expected. The materials meet the exclusion criteria, therefore, no additional chemical-biological interactive testing would be required.

(1) Effects on Plankton: No adverse impacts on autotrophic or heterotrophic organisms are anticipated.

(2) Effects on Benthos: The material would bury some benthic organisms. Benthic organisms found in the intertidal areas along the project disposal area are adapted for existence in an area with considerable substrate movement, thus most would be able to burrow up through the disposed material. Recolonization is expected to occur within a year after construction activities cease. No adverse long-term impacts to non-motile or motile benthic invertebrates are anticipated.

(3) Effects on Nekton: No adverse impacts to nektonic species are anticipated.

(4) Effects on Aquatic Food Web: No adverse long-term impact to any trophic group in the food web is anticipated.

(5) Effects on Special Aquatic Sites: There are no hardground or coral reef communities located in the immediate nearshore area that would be impacted by disposal activities. **Chapter 5** of the integrated FR/EIS offers a more detailed discussion on impacts.

(6) Threatened and Endangered Species: Appropriate measures to avoid, minimize, and mitigate for impacts to listed species have been fully coordinated with NMFS and USFWS.

(7) Other Wildlife: No adverse impacts to small foraging mammals, reptiles, or wading birds, or wildlife in general are expected.

(8) Actions to Minimize Impacts: BMPs along with terms and conditions associated with ESA Biological Opinions would be followed.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination: Material placed in the nearshore would meet requirements outlined in the Water Quality Certificate. Placement would not cause unacceptable changes in the mixing zone water quality requirements as specified by the State of Florida's Water Quality Certification permit procedures. No adverse impacts related to depth, current velocity, direction and variability, degree of turbulence, stratification, or ambient concentrations of constituents are expected from implementation of the project.

(2) Determination of Compliance with Applicable Water Quality Standards: Because of the inert nature of the material to be to be disposed, Class III water quality standards would not be violated.

(3) Potential Effects on Human Use Characteristic

(a) Municipal and Private Water Supply: No municipal or private water supplies would be impacted by the implementation of the project.

(b) Recreational and Commercial Fisheries: Fishing in the immediate construction area would be prohibited during construction. Otherwise, recreational and commercial fisheries would not be impacted by the implementation of the project.

(c) Water Related Recreation: Beach/water related recreation in the immediate vicinity of construction would be prohibited during construction activities. This would be a short-term impact.

(d) Aesthetics: The existing environmental setting would not be adversely impacted. Construction activities would cause a temporary increase in noise and air pollution caused by equipment as well as some temporary increase in turbidity. These impacts are not expected to adversely affect the aesthetic resources over the long term and once construction ends, conditions would return to pre-project levels.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves: No such designated sites are located within the project area.

g. Determination of Cumulative Effects on the Aquatic Ecosystem: There would be no cumulative impacts that result in a major impairment in water quality of the existing aquatic ecosystem resulting from the placement of material at the project site.

h. Determination of Secondary Effects on the Aquatic Ecosystem: There would be no secondary impacts on the aquatic ecosystem as a result of the dredging.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(l) 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 practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States. Further, no less environmentally damaging practical alternatives to the proposed actions exist. To test the suitability upland sand sources the borrow areas proposed by the contractor would be used for this project. In addition, the impacts of using other sources on cultural resources, protected species, and other environmental factors would likely be equal to or greater than the impacts of the proposed action. The no action alternative would allow the present condition of the channel to need dredging at increased frequency compared to the preferred alternative.

c. Compliance with Applicable State Water Quality Standards: After consideration of disposal site dilution and dispersion, the discharge of dredged materials would not cause or contribute to, violations of any applicable State water quality standards for Class III waters.

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 disposal of dredged material would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended. Standard conditions for monitoring and relocating turtle nests would be employed.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection. Research, and Sanctuaries Act of 1972: No marine sanctuaries are located within the project area.

g. Evaluation of Extent of Degradation of the Waters of the United States: The placement of dredged material would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem: Appropriate steps have been taken to minimize the adverse environmental impact of the proposed action. Turbidity would be monitored so that if levels exceed State water quality standards of 29 NTU's above background, the contractor would be required to cease work until conditions return to normal. In the vicinity of reef and other hard grounds, measures would be taken to minimize sediment deposition on sensitive reef organisms.

i. On the basis of the guidelines, the proposed dredging and disposal sites are specified as complying with the requirements of these guidelines.

COASTAL ZONE MANAGEMENT ACT AND FLORIDA COASTAL MANAGEMENT PROGRAM FEDERAL CONSISTENCY DETERMINATION

LAKE WORTH INLET FEASIBILITY STUDY

Enforceable Policy. Florida State Statues considered "enforceable policy" under the Coastal Zone Management Act (www.dep.state.fl.us/cmp/federal/24_statutes.htm).
Applicability of the Coastal Zone Management Act. The following summarizes the process and procedures under the Coastal Zone Management Act for Federal Actions and for non-Federal Applicants*.

Item	Non-Federal Applicant (15 CFR 930, subpart D)	Federal Action (15 CFR 930, subpart C)
Enforceable Policies	Reviewed and approved by NOAA (in FL www.dep.state.fl.us/cmp/federal/24_statutes.htm)	Same
Effects Test	Direct, indirect (cumulative, secondary), adverse, or beneficial	Same
Review Time	Six (6) months from state receipt of Consistency Certification (30-days for completeness notice). Can be altered by written agreement between State and applicant	60 days, extendable (or contractible) by mutual agreement
Consistency	Must be fully consistent	To maximum extent practicable**
Procedure Initiation	Applicant provides Consistency Certification to State	Federal agency provides "Consistency Statement" to State
Appealable	Yes, applicant can appeal to Secretary (NOAA)	No (NOAA can "mediate")
Activities	Listed activities with their geographic location (State can request additional listing within 30 days)	Listed or unlisted activities in State program
Activities in Another State	Must have approval for interstate reviews from NOAA	Interstate review approval NOT required
Activities in Federal Waters	Yes, if activity affects State waters	Same

* There are separate requirements for activities on the Outer Continental Shelf (subpart E) and for "assistance to an applicant agency" (subpart F).
** Must be fully consistent except for items prohibited by applicable law (generally does not count lack of funding as prohibited by law, 15 CFR 930.32).

1. Chapter 161, Beach and Shore Protection. 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.

Consistency Statement: The purpose of the proposed action is to improve and maintain safe navigation depths in Palm Beach Harbor/Lake Worth Inlet, Palm Beach County, Florida. Information will be submitted to the State for a permit in compliance with this chapter.

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

Consistency Statement: The project meets the primary goal of the State Comprehensive Plan. The proposed work will be coordinated with the State through review of this document.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a State Emergency Management Agency, with authority to provide for the common defense; to protect the public peace, health and safety; and to preserve and protect the lives and property of the people of Florida.

Consistency Statement: This chapter does not apply.

4. Chapter 253, State Lands. This chapter governs the management of submerged State lands and resources within State lands. This includes archeological and historic 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; spoil islands; and artificial reefs.

Consistency Statement: The proposed activity will be coordinated with the State and appropriate State permits will be obtained. The proposed action will be consistent with the intent of this chapter.

5. Chapters 253, 259, 260 and 375, Land Acquisition. These chapters authorize the State to acquire land to protect environmentally sensitive areas.

Consistency Statement: The proposed action is being coordinated with the State of Florida. The project is consistent with this chapter.

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

Consistency Statement: The proposed action will not impact any State parks or preserves. This chapter is not applicable.

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

Consistency Statement: The proposed action has been coordinated with the State Historic Preservation Officer (SHPO) and is consistent with the intent of this chapter.

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

Consistency Statement: The proposed improvements and maintenance thereof are consistent with the goals of this chapter.

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

Consistency Statement: The proposed action will not adversely affect public transportation and therefore would be consistent with the goals of this chapter.

10. Chapter 370, Living Saltwater 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 of fisheries products; to secure and maintain statistical records of the catch of each such species; and to conduct scientific, economic and other studies and research.

Consistency Statement: Marine crustacean, shell, and andromous fishery resources will be temporarily impacted. Temporary and permanent impacts will occur within the marine and estuarine environment. These impacts will be mitigated.

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

Consistency Statement: The work in Lake Worth Inlet and Palm Beach Harbor will be consistent with the goals of this chapter.

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

Consistency Statement: This work does not involve water resources as described in 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.

Consistency Statement: This work does not involve the transportation or discharge of pollutants. Conditions will be placed in the contract to handle inadvertent spills of pollutants such as vehicle fuels. The proposed action will comply with this chapter.

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

Consistency Statement: The proposed action does not involve the exploration, drilling, or production of oil, gas, or other petroleum products; 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 of large-scale development.

Consistency Statement: The proposed action is consistent with the intent of this chapter.

16. Chapter 388, Arthropod Control. This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other arthropod pests within the State.

Consistency Statement: The work will not further the propagation of mosquitoes or other pest arthropods. The proposed action will be consistent with the goals of this chapter.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the State by the Department of Environmental Protection.

Consistency Statement: Appropriate State permits will be obtained for this project.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of State soils 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 on-site and on adjoining properties affected by the work. Particular attention will be given to work on or near agricultural lands.

Consistency Statement: The proposed action is not located near agricultural lands; therefore, this chapter does not apply.

APPENDIX D – MITIGATION PLAN

This report outlines compensatory mitigation for unavoidable impacts to seagrass and hardbottom habitats impacted by implementation of the Recommended Plan considered in the Draft Environmental Impact Statement (DEIS). Impacts to the total project include 4.5 acres of seagrass habitat and 4.9 acres of hardbottom habitat outside of or deeper than the present authorized channel width and depth. Of these impacts, mitigation will be required for seagrass and hardbottom habitats where new construction dredging is proposed. The South Atlantic Fishery Management Council (SAFMC) and National Marine Fisheries Service (NMFS) (SAFMC 1998) consider all of these habitat types Essential Fish Habitat (EFH). For dredging the rock/rubble and silt/sand/rubble bottom within the channel, mitigation is not proposed since dredging was previously performed in the channel and temporal impacts are minimal.

The following mitigation plan complies with the requirements of Section 2036 of the Water Resources Development Act of 2007 (WRDA 2007) and "complies with the mitigation standards and policies established pursuant to the regulatory programs".

Mitigation Options

A total of 10 options have been identified that could serve as full or partial mitigation for impacts to seagrasses and hardbottoms within Lake Worth Lagoon (Table 1, Figure 1). The amount of site specific information known at this time varies among projects listed below. Table 1 summarizes the mitigation potential of each site identified to date.

Submerged aquatic seagrass colonies occur within federal channels of the proposed project area where dredging will occur and on the immediately adjacent buffer. The search for available candidate sites was researched by contacting Palm Beach County Department of Environmental Resource Management, which has a proven success record with comparable restoration and mitigation. The site has significant need of restoration; thus, the US Army Corps of Engineers has the opportunity to contribute to the community as well as compensate for impact to seagrass within the Lake Worth Lagoon Watershed.

Based on previous coordination with Federal, state, and local resource agencies, in-kind restoration of seagrass and hardbottom habitat is the agency-preferred option for mitigating for said impacts.

Figure 1. Locations of proposed mitigation sites.

Project #	Project Name	Project Type	Site Conditions	Habitat Created
1	Little Lake Worth	Dredged Hole Capping/Filling	30 ac (-30'NGVD) ; contains muck sediments 900,000 cy3 capacity to -12' NGVD	Limited potential for seagrass Art hardbottom <10 ac
2	Turtle Cove	Dredged Hole Capping/Filling	+42 ac (-18'NGVD); contains muck sediments. 660,000 cy3 capacity to -4.5' NGVD	<10 ac seagrass 6-10 ac art hardbottom
3	Singer Island Seagrasses	Acquisition Conservation	147 ac of privately held submerged lands w/ healthiest seagrass bed in LWL	Purchase & Preservation by adjoining to J.D. MacArthur Beach State Park
4	Kelsey Park Hardbottom	Artificial Hardbottom	6 ac permitted site contains 2 ac art hardbottom 4 ac remain for new hardbottom creation	4 ac art hardbottom
5	Sugar Sands Hardbottom	Artificial Hardbottom	10 ac permitted site contains 7ac art hardbottom 3 ac remain for new hardbottom creation	3 ac art hardbottom
6	Singer Island Hardbottom Pods	Artificial Hardbottom	Permitted nearshore site 4ac art hardbottom built & under 5yr monitoring plan. 2 ac remain for new hardbottom creation	2 ac art hardbottom

Project #	Project Name	Project Type	Site Conditions	Habitat Created
7	Peanut Island shoal	-Dredging -Artificial Hardbottom	30 ac shoal >100,000 cy3 sand to be dredged	10 ac seagrass (temporary-may accrete) 1 ac art hardbottom
8	Peanut Island Breakwaters	Artificial Hardbottom	SE Peanut has existing breakwaters 3 ac remain for new hardbottom creation	3 ac area for additional breakwaters
9	Rybovich Hardbottom	Artificial Hardbottom	5 ac permitted site contains 3 ac art hardbottom 2 ac remain for new hardbottom creation	2 ac art hardbottom
10	Ibis Isle	-Filling/Capping	41 ac dredged hole, muck sediments Located 8.5 mi south of LW inlet >600,000 cy3 capacity	<20 ac seagrass
Note	All sites		Require verification of resources & conditions	

Table 1. Mitigation options and estimated available acres

3.0 Mitigation Requirements

3.1 Seagrass

Direct impacts to seagrass communities are restricted to the widening of Palm Beach Harbor entrance channel and widening of the existing turning basin to the north and south. Impacts include the permanent loss (removal) of 4.5 acres of mixed seagrass beds. Losses will occur from both the widening footprint and the natural equilibration of the side slopes as described in the EIS. Coordination with the Federal and state resource agencies will determine the final mitigation needed to compensate for these 4.5 acres of impacts to seagrasses within Lake Worth Inlet. Mitigation needs from impacts to seagrasses were calculated using the State of Florida Department of Environmental Protection (FDEP) model named UMAM. This model is the only accepted model by the FDEP to calculate mitigation requirements for seagrass impacts. Results from the Corps UMAM model run showed 8.25 acres of seagrass mitigation were needed to offset the impacts. The Corps used a larger mitigation number when estimating costs to represent worst case of 11.25 acres of mitigation. A final mitigation compensation between 8.25 – 11.25 acres for seagrass impacts will be determined during the public review of the document as the Corps and Federal/state agencies discuss the model results.

In order to replace local seagrass functions and values, restoration will be implemented within Lake Worth, preferably in areas where seagrass once occurred and is now absent due to past anthropogenic activities such as dredging. Seagrass habitat will be restored by filling old borrow areas located within Lake Worth to result in a minimum surface area of 8.25 acres of new seagrass beds. Based on a discussions with the Palm Beach County Department of Environmental Resource Management (ERM) in August of 21012, there are several old borrow areas which were considered suitable for filling with dredged material, capping with sand, and restoring seagrass habitat to an elevation consistent with the depths where adjacent seagrass beds are present (Table 2).

Restoration of seagrass communities, while still considered experimental by some resource agencies, can enhance habitat heterogeneity and the diversity of invertebrate and fish communities, if carefully implemented. The recent treatise on seagrass restoration entitled "Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters" by Fonseca et al. (1998) discusses the benefits, risks, and successful approaches associated with seagrass restoration. Given the documented success of more recent efforts to restore seagrass communities including those in South Florida, restoration is quickly becoming a proven resource management tool in some areas where conditions are appropriate.

Table 1 Dredging Impacts by Habitat Type

Habitat Type and Current Dredge Status	**Component**				
	B-2	**C**	**D**	**G**	**Total**
Seagrass- new impacts with project footprint and side slope equilibration (acres)	0.0	0.4	**2.0**	2.1	**4.5**

3.2 Hardbottom

To calculate the acreage of creation of artificial hardbottom required for compensation, the Corps performed a Visual Habitat Equivalency Analyses (HEA) (see NOAA 2000). The method used was designed to take into account both projected impact acreages for various habitats and recovery times to calculate the overall loss of habitat function that occurs from the time a new impact occurs to the time of full functional recovery. HEA is usually applied to situations where previously non-impacted habitats are damaged and was used, in this case, to calculate compensatory mitigation acreages for removal of habitat in previously undredged areas. Projected impact acreages were classified according to the method that would be applied to calculate functional loss. This was necessary because the proposed mitigation will be type-for-type, to reflect the need to mitigate for similar habitat types and expected species within the impacted area and the mitigation location.

Several assumptions are involved in the HEA method. These assumptions include (1) the relative functionality (usually expressed as a percentage) of both impact and mitigation areas at "time-0" (time zero) (i.e., at the initiation of mitigation operations or at the time the impact occurs to the habitat), (2) the relative functionality of both the impact and mitigation area at the completion of recovery of each area, (3) the form of the recovery function (e.g., linear, exponential, hyperbolic, etc.), and (4) the recovery/completion time for the impact area and mitigation area to reach full functionality (i.e., the level that existed prior to impact/mitigation activities

Based on the HEA calculations, direct impacts to hardbottom and hardbottom habitats would require the creation of artificial hardbottom habitat for low relief hardbottom habitat. The proposed mitigation will be type-for-type, to ensure impacted habitat will be mitigated for assuming similar species to colonize the created habitat. A range of 4.9 -9.8 acres is proposed representing a 1:1 – 2:1 ratio of impacts/mitigation. Final mitigation needs will be determined during the public review of the report between the Corps and Federal/state agencies. The tables and calculations of the HEA are included in Appendix ZZ.

4.0 PROPOSED PLAN

This mitigation plan focuses on compensation options available for unavoidable impacts associated with implementation of the recommended plan to seagrass and hardbottom habitats located within Lake Worth. Other options evaluated did not provide in-kind type-for-type replacement of habitat lost and may not be acceptable to the resource agencies unless opportunities to provide like replacement were not available or did not have a likely probability of success.

4.1 Seagrass Restoration

In order to replace local seagrass functions and values, restoration will be implemented in an area near Lake Worth within an area that has been anthropogenically disturbed in the past (Fonseca et al. 1998). Several previously identified dredge hole sites located throughout Lake Worth are

being considered (see Figure 1/Table 1). The final site will be determined based on several factors including:

- a good candidate for cost-effective hauling or pumping of borrow material from the project site for the purpose of topographic restoration (subject to a cost-feasibility analysis),
- experience a relatively calm but well-circulated tidal current and little or no daily perturbations from boating activities, and,
- there are sites within the hole that can be restored to seagrass over a sufficient area to achieve the desired amount of mitigation.

Based on the combined observations of the latest bathymetry and the subsequent discussions with the Town of Palm Beach Environmental Resource Management Davison, the following screening criteria were developed to assist in locating a specific seagrass restoration site within the Lake Worth area. The preferred site should:

- maximize the facilitation of natural recruitment from adjacent *Johnson's* beds,
- avoid impacts to existing seagrass both outside and within the site,
- have sufficient access and working area for the required equipment with no risk of damage to adjacent shallow resources.

The preferred seagrass restoration site should have the following characteristics:

- The site varies in depth from about 12 to 17 feet.
- Portions of the site are bordered by steep walls while other portions are bordered by sloping topography.
- Those portions of the site below the 16 to 17 foot contour are unvegetated.
- Areas of natural grade adjacent to the site are dominated by Johnson's with *H. decipiens* and *H. wrightii* also being present.

4.1.1 Conceptual Seagrass Site Design

The goal of the mitigation is to compensate for the loss of climax-community seagrass habitat at the impact site by restoring a productive climax-community seagrass habitat at the mitigation site. To compensate for 4.5 acres of projected seagrass losses at the impact site, a minimum of 8.25 acres of seagrass habitat are expected to be constructed within the Proposed Seagrass Mitigation Site . However, the Corps has the option to construct more than 8.25 acres of habitat if he sees it economically feasible. The Corps has the option of conducting mitigation prior to construction or simultaneously.

A pre-construction survey will be conducted within a reference site that will serve as a background area for comparison of species composition, density, patchiness, and other characteristics. The reference site should be located within the same general vicinity of the mitigation site and be at a comparable depth to the final target elevation of the mitigated

seagrass. Success is defined as achievement of the target acreage of seagrass coverage within 5 years of site construction. Success will be determined by coverage based on the Braun-Blanquet technique (Braun-Blanquet 1965) comparing the mitigated site to reference sites of similar species composition in the surrounding area.

Cover Class	Description
0	Absent or no measurable cover
0.1	Solitary shoot with small cover
0.5	Few shoots, less than 5% cover
1	Numerous shoots, less than 5% cover
2	Any number of shoots but with 5% to 25% cover
3	Any number of shoots but with 25% to 50% cover
4	Any number of shoots but with 50% to 75% cover
5	Any number of shoots but with >75% cover

Success determination will be accomplished by counts of plant shoots and estimation of percent coverage within sample quadrat and sub-quadrat to determine density and percent coverage (in contrast to bare areas). The success criteria for vegetation establishment within restored areas include:

- Braun-Blanquet score within 1 unit of reference site within 3 years
- Contingency measures as part of the Adaptive Management Plan will be implemented if indicators determine that success criteria are not being met, and that the restoration is determined to be failing.

To achieve success, the following objectives will be implemented:

1. Fill unvegetated areas of Mitigation site with native material (dredge material) to restore topography for climax community seagrasses (target elevation).
2. Utilize dredged material of a consistency that will allow for settling and achievement of stable slopes and for support of the maximum possible surface area of fine capping fill material.
3. Using finer capping fill material, create a stabilized surface treatment of approximately 12 acres in size (target acreage) to achieve an elevation and substrate composition suitable for recruitment of seagrasses.
4. Design the site to maximize facilitation of recruitment from adjacent seagrass beds but also incorporate strategic planting to achieve recovery if not already done so within the desired timeframe.

5. Possible use of bird roosting stakes can also promote the recruitment of seagrasses within the mitigation area with a high level of reliability and low expense (Kenworthy, 2000).

To achieve these objectives, dredged material would either be hauled up the ICW or pumped to the mitigation site. The site boundaries will be clearly delineated in the field prior to deposition of fill. The first step will be to fill the holes to the base fill elevation. The base fill elevation is estimated to be between (-) 5 to (-) 7 feet MLLW, or the elevation below which seagrass communities no longer grow. Based on data from a latest bathymetry survey conducted by the Town of Palm Beach, the available capacity at the target elevation of (-) 6 feet MLLW is approximately 12 acres. Where the delineated site border meets a steep pit wall the fill will be leveled as closely as possible to adjacent seagrass elevation (target elevation) in order to encourage recruitment and also to improve connectivity of the restoration site to the adjacent seagrass bed community. In these specific areas, some resources may be covered by material on the narrow eroded shelf described earlier that occurs between natural grade and the sharp drop (see Figure 4). Wherever the delineated site border does not meet a steep wall the fill will be sloped up from the base fill elevation in order to avoid impacting existing seagrasses. The material will be deposited in two phases: coarse fill phase and capping phase. The material will be placed in a manner beginning at the most eastern edge of the mitigation area filling up to the target elevation, then continuing westward until the required acres of mitigation area is achieved. This placement method will help reduce the amount of sedimentation on nearby seagrass resources. The coarse fill phase will attempt to utilize dredge spoil, or may allow quarried native material, for the purpose of providing a supporting base for the site. Any mixture of rock and/or sandy material is acceptable for this phase provided that stable compaction and slopes are achieved. The coarse fill will be brought to within a minimum two feet of the final target elevation for the site, approximately (-) 6 to (-) 8 feet MLLW. The capping phase will utilize finer grain material suitable for seagrass recruitment and will be brought up to the target elevation, approximately (-) 4 to (-) 6 feet MLLW. The capping material will be constructed to an elevation between (-) 4 to (-) 6 feet MLLW maximum, with a minimum two-foot depth. The contractor will be provided with criteria that will limit the quality of the material to be placed in the mitigation site. At this time, there are no specific criteria provided by resource agencies, therefore USACE will develop standards to be followed. At a minimum, material will have less than 20% fines, and will be required to match as closely as possible to characteristics of surrounding material; however, turbidity standards will be the ultimate controlling parameter. Further details limiting composition will be provided in the project plans and specifications. Although the site design does not specifically seek to provide seagrass or other communities on the side slopes of the mounded areas, it is likely that either seagrass and/or hardbottom communities (calcareous algae and sponges) will grow on the side slopes, based on observations in the field of similar features as the mitigation site.

As a potential option to further increase the growth rate of seagrass, the use of bird roosting stakes may be explored. Bird stakes provide an inexpensive option to help promote seagrass growth by increasing nutrient loading through nitrogen and phosphorus enriched feces. Bird roosting stakes should be constructed using ½ - ¾ inch diameter PVC pipe capped with a pressure treated wooden block, ranging in size from 2 in. by 2 in. by 4in, or alternatively 4 in. by 4 in. by 2 in (Kenworthy et al. 2000 and FP&L 2010). Roosting stakes should be placed in a uniform grid across the mitigation area with no greater than ½ acre by ½ acre cells. Stakes

should remain in place for up to two years, pending achievement of success criteria (FLP, 2010). Coordination with the U.S. Coast Guard will be required to ensure bird stakes are clearly marked as navigational hazards with the use of "No Boating" signs in the mitigation area.

It is currently envisioned that the construction of the site would incorporate the following features:

- Transport: Barge access would be restricted to deep water. It appears that, should the barge transport method be used, there is more than sufficient depth and area to push the barge along the ICW, enter and exit the site, and turn the barge within the site. Additional channel surveys will need to be conducted prior to transport to verify depths. Barges may need to be light-loaded in the event the channel depths are not sufficient to accommodate full loads. If a piping method is used, the pipe could be placed in deep water wherever possible. The transport method is not expected to have significant impacts on surrounding seagrass beds adjacent to the transport route or the mitigation site.
- Turbidity Control: Some method of turbidity control such as curtains would be employed at the site in order to ensure compliance with state water quality standards. Significant turbidity is not expected during construction since the majority of the fill will consist of coarse grain material that will drop quickly during deployment. The calm conditions that make this site a good seagrass restoration candidate will also help to contain turbidity.
- Site Grading: Regardless of the method used to transport and deploy the fill, site finishing and grading will need to achieve the target elevation as closely as possible. A flat-blade excavator will most likely be used to grade the site to the specified elevation, but a combination of methods may be used.
- Planting: Planting will not initially be conducted with the assumption that natural recruitment will be successful. Monitoring will be conducted up to 5 years to ensure growth progress and success. In the event seagrass does not recruit as anticipated after 3 years, planting will be considered. Individual plots of *H. wrightii* and/or *Johnson's* may be distributed over portions of the site in areas where recruitment may otherwise be slow to occur based on post construction monitoring reports.

Once constructed, the site will be monitored. Monitoring will be designed to evaluate achievement of the following:

- recruitment of the site with seagrasses within 3 years, and
- Achievement of the target acreage of seagrass coverage within 5 years.

It is anticipated that seagrass recruitment will occur rapidly by *Johnson's* and *H. decipiens*. Other species including *H. wrightii* are expected to colonize the site at a slower rate.

In order to ensure the mitigation design is properly achieved, surveys will be taken after each stage of construction. Once the coarse fill material is placed, a survey will be taken to verify the target elevation of (-) 6 to (-) 8 feet MLLW is achieved. Any fill material will be removed or added in the event the target elevation is not successfully met. An additional survey will be conducted once the capping material has been placed to ensure accuracy. Sedimentation monitoring will be conducted in the adjacent seagrass beds to ensure material from the construction mitigation site is not shifting to existing areas, and will also ensure capping material

is not significantly shifting once the site is completed. Sedimentation traps will be placed throughout the surrounding area and data will be collected regularly based on the schedule provided in a detailed monitoring plan which will be completed once the actual site is chosen. Upon completion, the seagrass mitigation site will be monitored on a monthly basis for the first year, then twice a year for years two and three, and once a year for years four and five. Specific details of physical and sedimentation monitoring will be further outlined in the detailed monitoring plan once the site is chosen.

4.2 Artificial Hardbottom Creation

The proposed mitigation for hardbottom impacts will be type-for-type to ensure proper species recruitment is achieved. A total of 4.9 acres of low relief-low complexity (LRLC) hardbottom will be impacted by the widening and depending footprint and associated side sloe equilibrium. To compensate for these impacts, coordination with the Federal/state agencies will determine the mitigation acreage. A range of 4.9 – 9.8 acres is proposed representing a 1:1-2:1 ratio of impact/mitigation. The proposed location for mitigation of hardbottom, Singer Island Artificial Reef is found in Figure 1 and Figure 4. The Corps has the option of conducting mitigation prior to construction or simultaneously. Specific design requirements and the hardbottom design are described in this section.

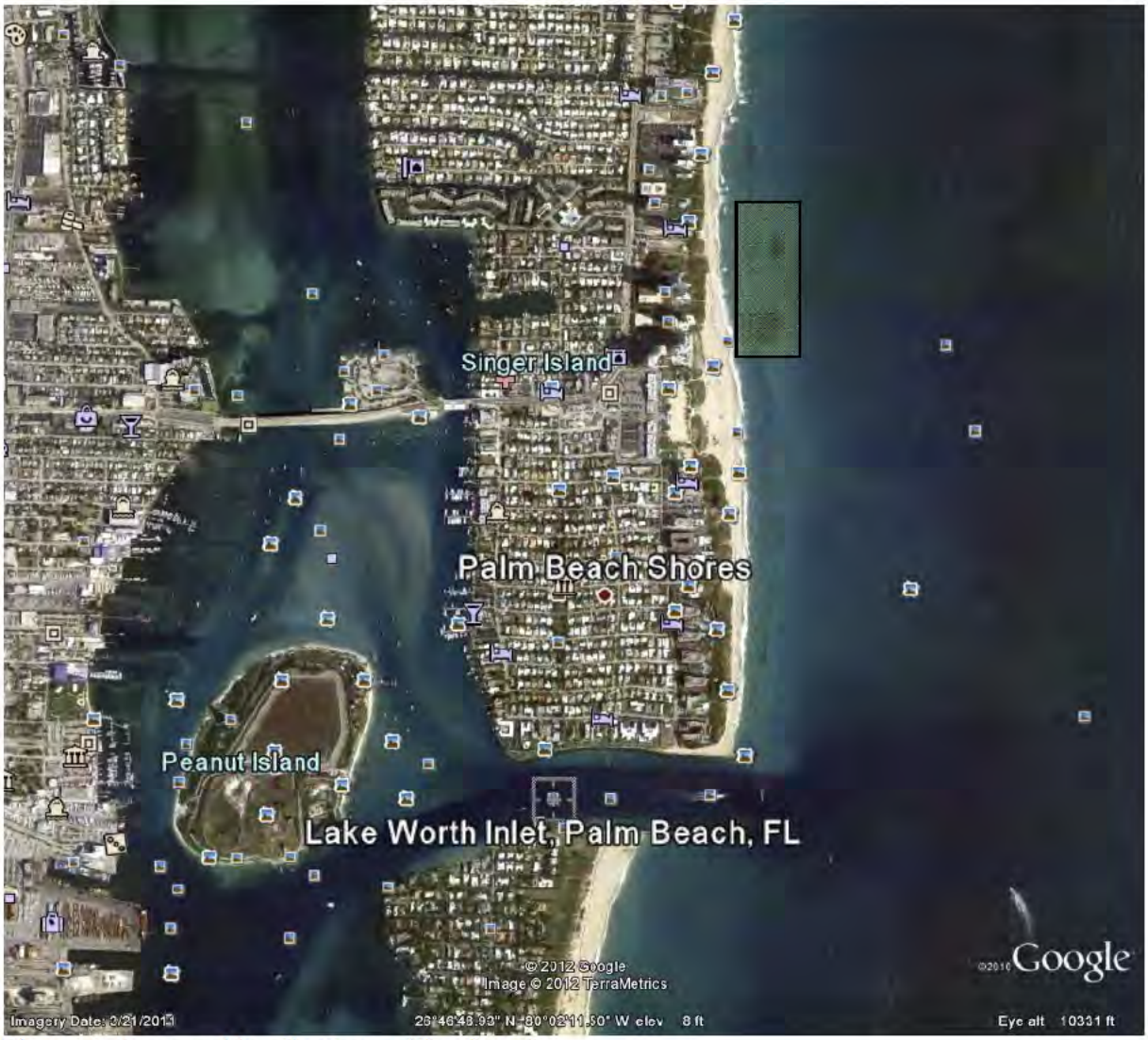

Figure 4. Proposed hardbottom mitigation site

4.2.1 General Design Requirements

Artificial hardbottoms are often proposed for mitigating impacts to natural hardbottom habitats as a result of construction project (Lutz 1998). Artificial hardbottoms have been used successfully for many years to mitigate impacts in sheltered waters (Duffy 1985; Davis 1985) or in relatively deep water offshore (Mostkoff 1993). Palm Beach County has had considerable success with deploying shallow water artificial hardbottoms as mitigation measures. The proposed design reflects the limitations on design and placement imposed by navigation regulations, liability issues, construction limitations, and stability concerns.

The most desirable areas for creation of hardbottom are areas that have a thin veneer of sand over bedrock, which limits the extent that deployed materials will settle. After reviewing the Palm Beach county permitted sites, it was determined that one of the sites (Singer Island Artificial Reef) already has some artificial hardbottom located within the boundaries, which would allow for quicker colonization of artificial hardbottom material, as well as allowing for easier monitoring since it is adjacent to a county mitigation site that is currently monitored. Water depths of this site are similar to the depths of low relief hardbottoms being impacted by the proposed project (8-12 feet). Several other permitted sites were reviewed for potential use but all had smaller capacities for additional artificial hardbottom than is needed for this project.

4.2.2 Hardbottom Design

Clean limestone rock excavated from the Entrance Channel or quarried native limestone will be used in hardbottom construction. The material will be deployed to mimic the orientation of typical natural hardbottoms. This hardbottom design will have a vertical relief of 3 to 4 feet and rocks will be deployed to provide the maximum structural complexity and to provide refugia for cryptic and reclusive species. As interstitial sand patches associated with hardbottom habitat are thought to be important in the ecological function of the hardbottom habitat, the hardbottom footprint will be 20 by 40 feet with space between modules consisting of mainly sand. Temporary buoys delineating the deployment strip will mark areas for deployment. Corner buoys for the sites shall be placed using Differential Global Positioning System (DGPS) with sub-meter accuracy. Natural limestone provides an ideal substrate for the establishment of a fouling community and colonization by the common hardbottom community species. Rock will be placed by crane and barge to ensure proper placement within the site.

Construction of mitigation hardbottoms may take place during dredging of the project, such that suitable rock material excavated from the channel may be used for hardbottom building.

4.2.3 Hardbottom Monitoring

The monitoring program for the mitigation hardbottoms will consist of both physical and biological components. An initial pre-construction monitoring event will be performed to provide baseline conditions for future comparison. Physical monitoring will assess the degree of settling of the hardbottom materials after the first year, and biological monitoring will assess populations of algae, invertebrates, and fishes, as compared with concurrent control sampling of natural hardbottoms for five years. Monitoring will be conducted annually in the summer months. In order to provide a permanent record of hardbottom conditions and biota, each sampling effort will include video transects covering representative areas of the mitigation hardbottoms.

Fish population evaluations will be based on visual censuses conducted via point-count method (Bohnsack and Bannerot 1986) used for fish assessment. This method has the advantage of gathering quantitative data in a relatively short time in a very repeatable pattern that is relatively insensitive to differences in habitat structure. Each census will have durations of 5 minutes and a

radius (the distance from the stationary observer) of 10 feet. Ten censuses will be collected on the mitigation site. Data from these types of censuses are rarely distributed, so the Wilcoxon Rank-Sum or a similar nonparametric test will be used for significance testing.

Results of all mitigation hardbottom-monitoring efforts will be summarized in an annual report to be completed by December 31 of each year the monitoring program is in place. Copies of the report will be distributed to all agencies and interested parties.

Success of mitigation site will be determined by comparison to natural communities of similar biologic assemblages within the project area. Transects (quadrats) will be compared at reference sites and mitigation site for species composition, percent cover and benthic assemblages. At each sampling location, a 0.7 m2 (1.0 × 0.7 m) PVC quadrat will be placed on the substrate. For each quadrat in situ mapping was conducted of all species including the dominant groups of Porifera and Hydroids, macroalgae, and other sessile invertebrates to lowest possible taxonomic rank. In addition to the in situ mapping of each quadrat, photographs will be taken to serve as a permanent visual record of the quadrats and qualitatively document the benthic community development on the artificial reef material. Bray-Curtis similarity indices (Bray and Curtis, 1957), which incorporate both species richness and species density into the calculations, will be used for analysis. Success is determined as a 75% similarity to the natural reference sites in terms of benthic assemblages and Bray-Curtis analysis.

5.00 Adaptive Management Plan

In the event that restoration measures fail to meet the goals as established by the success criteria as documented by monitoring event data, Adaptive management measures will be enacted and include:

- Plant seagrass species by shoot transplanting or re-seeding.
- Placement of bird stakes to encourage seagrass recruitment
- Utilize additional injury sites that show more promise of successful establishment than those currently in use
- Additional monitoring events or prolonged schedule until success criteria is documented as accomplished
- Create additional hardbottom habitat at a different location

6.00 Entity Responsible for Monitoring

All monitoring associated with this mitigation plan will be completed by or under the direction of the US Army Corps of Engineers; if the monitoring event is completed by a third party, this activity will be conducted under the direction and on behalf of the US Army Corps of Engineers. Therefore, the US Army Corps of Engineers will retain total responsibility of all activities related to the monitoring of this mitigation.

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St Petersburg, FL

Attachment 4

COST EFFECTIVE INCREMENTAL COST ANAYLSIS (CEICA)

FOR MITIGATION

1 COST EFFECTIVE INCREMENTAL COST ANALYSIS (CEICA) METHODOLGY OVERVIEW

The purpose of this CEICA document is to show that multiple mitigation sites were considered, and the sites that were most practical and still cost effective were chosen as the preferred sites. The Mitigation Plan, Section 3 of the Environmental Appendix, can and should be referenced for the specific details of the mitigation itself.

Three important ideas should be highlighted for the methodology of choosing the mitigation sites in this document.

First, the number of acres to mitigate for is a set number, determined by the HEA and UMAM models and refined through negotiations with the agencies. Therefore, each site will produce the required outputs. When outputs are the same, the basis of comparison for cost-effectiveness is cost per acre.

Second, project impacts are due to widening, not deepening. Therefore, since all the alternatives used the same widening footprint, this CEICA was only done for the NED/TSP plan.

Third, this document shows the "menu" of currently known and available sites in the Lake Worth Lagoon area and discusses the merits and costs of each. Sites will require verification of resources and conditions during the pre-construction, engineering, and design (PED) phase.

2 SEAGRASS MITIGATION

2.1 METHODOLOGY OF ESTABLISHING SEAGRASS

Throughout the Lake Worth Lagoon, there are several previously dredged holes which are suitable candidates for seagrass restoration. Their suitability is based on correspondence with Palm Beach County, Environmental Resources Management (ERM), and due to evidence that seagrasses currently grow just outside the holes at the natural, shallower, elevations. Palm Beach County, ERM, has had success regarding filling dredged holes (with no planting) to promote seagrass restoration within the Lake Worth lagoon, and it is this specific experience which especially supports the mitigation rationale for this project.

This project would fill dredged holes with dredged project material (any material will work, per ERM), and then would cap the top two feet with clean project sand. The combination of bringing the dredged hole(s) back up to their original elevation of surrounding landscape, and capping with sand, would allow optimum conditions for the existing seagrasses on the outer portions of the hole to grow.

2.2 SEAGRASS MITIGATION BENEFITS

The impact to seagrasses has been estimated at 4-5 acres, based on HEA model output. Assuming a 2.5 ratio, up to 11.25 acres or functional units, may be required.

2.3 SEAGRASS ALTERNATIVES

The locations of the potential seagrass and hardbottom mitigation sites are shown below in sites were immediately ruled out. Peanut Island Shoal is an area of shoaled sand, and would need to be dredged for seagrass restoration. There is a higher risk that the area would not support seagrasses and furthermore, that the area would soon beginning accumulating material. This area had a higher risk of not performing the function of supporting seagrass mitigation, and therefore was not considered further. Singer Island seagrass sanctuary was also ruled out because it would involve acquisition of privately owned land, which would be cost prohibitive.

The information, including distance from the project, cost per acre, and available capacity for the remaning five sites under consideration is listed in Table 1.

Figure 1. Two sites were immediately ruled out. Peanut Island Shoal is an area of shoaled sand, and would need to be dredged for seagrass restoration. There is a higher risk that the area would not support seagrasses and furthermore, that the area would soon beginning accumulating material. This area had a higher risk of not performing the function of supporting seagrass mitigation, and therefore was not considered further. Singer Island seagrass sanctuary was also ruled out because it would involve acquisition of privately owned land, which would be cost prohibitive.

The information, including distance from the project, cost per acre, and available capacity for the remaning five sites under consideration is listed in Table 1.

Figure 1: Location of potential Seagrass and Hardbottom Mitigation Sites

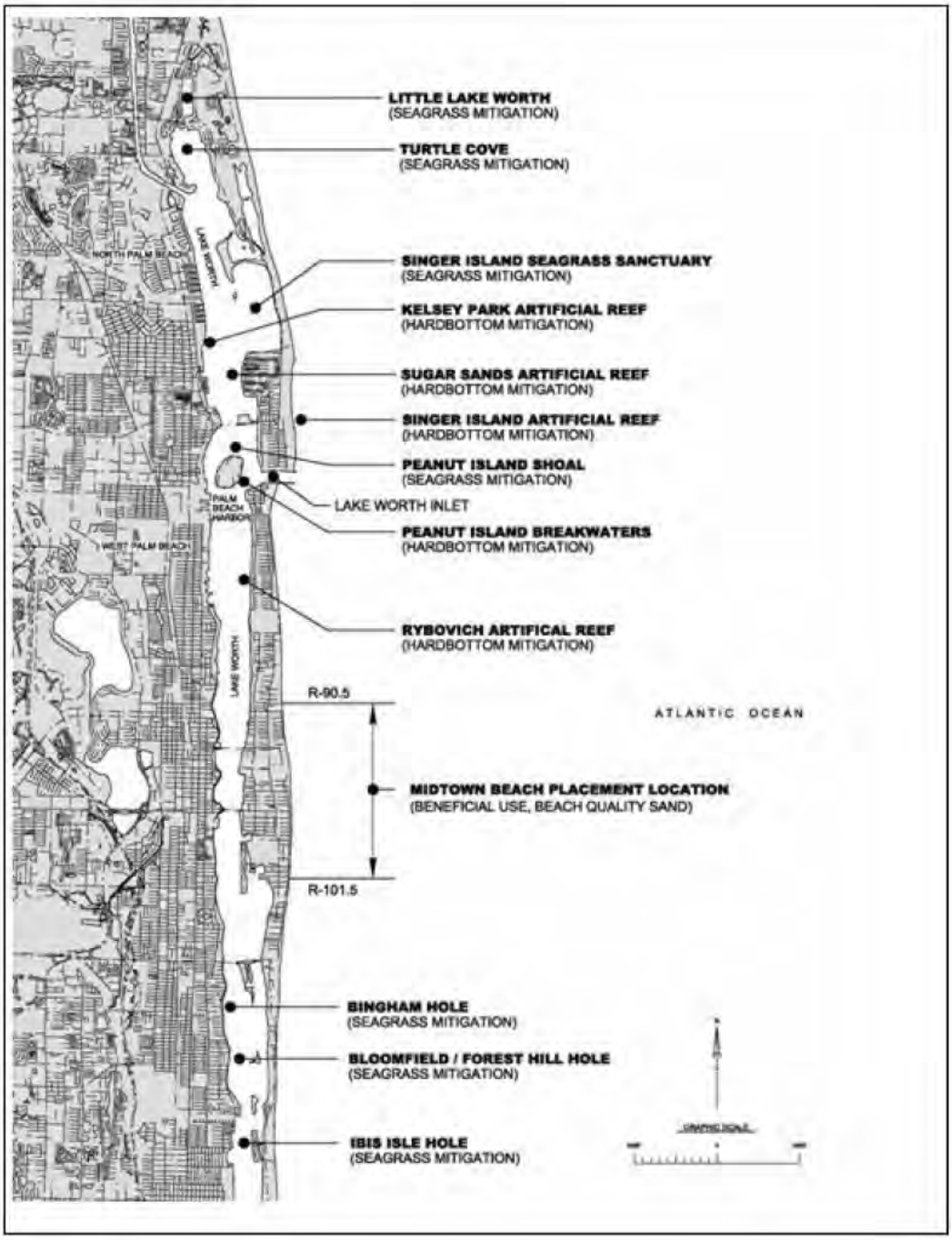

Table 1: Seagrass Mitigation Alternatives

Alt	Site	Distance (mi)	cost/acre	acres available
Alt 1	Little Lake Worth	5.81	488,889	11.25
Alt 2	Turtle Cove	5	204,444	11.25
Alt 3	Ibis Isle	8.83	306,667	11.25
Alt 4	Bingham	7.03	166,667	9
Alt 5	Bloomfield/Forest Hill	7.65	240,000	11.25

2.4 SEAGRASS SITE

All alternative sites have adequate capacity, with the exception of Alt 4, Bingham hole. Therefore, this was combined with the next most cost effective alternative, and plans were developed.

Table 2 shows that when the plans are compared, Plan 1 has the least average cost per acre, and therefore the least total cost. However, plan is the least cost but logistically and environmentally it does not make sense to go to two separate sites, when the next least cost site, Turtle Cove, which is also closer distance, can accommodate all the mitigation.

Therefore, Plan 2, Turtle Cove, is the mitigation site which is currently used in the cost estimate. This is the next most cost effective site, has a closer distance, and can accommodate all mitigation. It is more environmentally acceptable to do all the mitigation at one site and the county has had high success with seagrass restoration projects around this area.

Table 2: Seagrass Mitigation Plans

Plan	Alt	Site	Distance (mi)	cost/acre	Avg Cost/acre	Acres used	Subtotal cost	TOTAL cost
1	Alt 4	Bingham	7.03	166,667		9	$1,500,003	$1,960,002
	Alt 2	Turtle Cove	5	204,444	174,222	2.25	$459,999	
2	Alt 2	Turtle Cove	5	204,444	204,444	11.25		$2,299,995
3	Alt 5	Bloomfield/Forest Hill	7.65	240,000	240,000	11.25		$2,700,000
4	Alt 3	Ibis Isle	8.83	306,667	306,667	11.25		$3,450,004
5	Alt 1	Little Lake Worth	5.81	488,889	488,889	11.25		$5,500,001

3 HARD BOTTOM MITIGATION

Hard bottom mitigation will be required as a result of the combined effect of loss of habitat in Area C and loss of service in Area B2 due to the widening footprint is estimated to be 4-5 acres, based on HEA model output. Assuming a 2.5 ratio, up to 11.25 acres or functional units, may be required.

More detailed information on the analyses which determined the required mitigation can be found in Appendix D, Section 3, Mitigation Plan.

3.1 METHODOLOGY OF ESTABLISHING HARDBOTTOMS

MATERIAL

Two main options exist for the reef mitigation construction material:

1. Bring in an another source of material to serve as an artificial reef (quarry limestone rock or pre-fabricated material)
2. Use project rock to serve as the artificial reef

Material Option 1 would bring in an outside source of substrate for artificial reef creation. This could be any hard substrate, but most likely would be quarry limestone rock, which has had proven successful for other mitigation projects in the area.

Material Option 2 preserves the live hard bottom habitat as much as possible and would keep project rock within the lagoon system. With this option, at this stage in the feasibility study, there is uncertainty of what size of rock will be obtained with the dredge.

Material Option 1, using quarry limestone rock will be pursued as it is the most reliable means of establishing mitigation at this time. Option 2 may be revisited during the project pre-construction, engineering and design phase (PED) when geotechnical properties of the project rock are better understood.

PLACEMENT METHODS

Two broad options exist for mitigation placement methods, listed below, assuming that quarry limestone is being brought in from outside the project:

1. Crane-barge and scow barge
2. Diver placement

Placement Method 1 would be used if a source of rock was brought in, such as limestone boulders. An excavator and clamshell would still be used for the dredging portion, but would also require additional equipment consisting of a crane at the dockside loading location for picking up the mitigation material, loading the mitigation material on barges or split-hull scows, and using a crane-barge at the mitigation site to place the mitigation material from the barge.

For Placement Method 2, the excavator and clamshell would still be used for the dredging portion. Divers would be used to place each piece of hard bottom, rather than the split hull barges. This method would be extremely costly and potentially unsafe.

It is most likely, for performance and cost, that placement method 1 would be an acceptable method. Therefore, the crane-barge and scow barge will be assumed.

3.2 HARDBOTTOM ALTERNATIVES

The locations of the potential hardbottom mitigation sites are shown in sites were immediately ruled out. Peanut Island Shoal is an area of shoaled sand, and would need to be dredged for seagrass restoration. There is a higher risk that the area would not support seagrasses and furthermore, that the area would soon beginning accumulating material. This area had a higher risk of not performing the function of supporting seagrass mitigation, and therefore was not considered further. Singer Island seagrass sanctuary was also ruled out because it would involve acquisition of privately owned land, which would be cost prohibitive.

The information, including distance from the project, cost per acre, and available capacity for the remaning five sites under consideration is listed in Table 1.

Figure 1. The information, including distance from the project, cost per acre, and available capacity for five sites under consideration is listed in Table 3.

Table 3: Hardbottom Mitigation Alternatives

Alt	Site	Distance (mi)	cost/acre	acres available
Alt 1	Kelsey Park Artificial Reef	2.5	612,500	4
Alt 2	Sugar Sands Artificial Reef	1.8	683,333	3
Alt 3	Peanut Island Breakwaters	0.6	1,250,000	1
Alt 4	Singer Island Artificial Reef	2.4	995,556	11.25
Alt 5	Rybovich Reef	1.2	725,000	2

3.3 HARDBOTTOM SITE

Out of the five sites, only one (Singer Island Artificial Reef) has enough capacity for the currently assumed mitigation of 11.25 acres. Therefore, this was combined with the next most cost effective alternative, and plans were developed.

Table 4 shows that when the plans are compared, Plan 1 has the least average cost per acre, and therefore the least total cost. However, this plan is not logistically favorable as it includes palcing material at 4 different sites. These sites include Keslea Park Artifical Reef and Rybovich artifical reef. Both of these sites are unlikely to recruit the same species as are impacted (per the county), and are therefore less likely to be accepted by agencies. Plan 4 is the next most cost-effective, but again is not logistically favorable as it still includes placement at 3 different sites. Plan 3 allows all the needed mitigation to occur at one site, and has the highest chance of success due to the proven pod formations which currently exist, as well as for availability at the time of project construction.

Table 4: Hardbottom Mitigation Plans

Plan	Alt	Site	Distance (mi)	cost/acre	Avg Cost/acre	acres used	Subtotal cost	TOTAL cost
1	Alt 1	Kelsey Park Artificial Reef	2.5	612,500	728,000	4	$2,450,000	$8,190,000

	Alt 2	Sugar Sands Artificial Reef	1.8	683,333		3	$2,049,999	
	Alt 5	Rybovich Reef	1.2	725,000		2	$1,450,000	
	Alt 4	Singer Island Artificial Reef	2.4	995,556		2.25	$2,240,001	
2	Alt 4	Singer Island Artificial Reef	2.4	995,556		10.25	$10,204,449	
	Alt 3	Peanut Island Breakwaters	0.6	1,250,000	1,018,173	1	$1,250,000	$11,454,449
3	Alt 4	Singer Island Artificial Reef	2.4	995,556	995,556	11.25	$11,200,005	$11,200,005
4	Alt 2	Sugar Sands Artificial Reef	1.8	683,333		3	$2,049,999	
	Alt 4	Singer Island Artificial Reef	2.4	995,556		7.25	$7,217,781	
	Alt 3	Peanut Island Breakwaters	0.6	1,250,000	934,914	1	$1,250,000	$10,517,780

Therefore, Plan 3, Singer Island Artificial Reef, is the mitigation site which was used in the cost estimate. This is still a cost effective site, and can accommodate all mitigation. It is more environmentally acceptable to do all the mitigation at one site and it has had proven success.

4 CONCLUSION

In conclusion, a "menu" of potential candidate sites have been researched for seagrass and hardbottom mitigation sites. The site used for the cost estimate for seagrass mitigation is Turtle Cove, and the site used for hardbottom mitigation is Singer Island Artificial Reef. In both cases, these sites can

accommodate the full mitigation of 11.25 acres, which is assumed at this time, and have had proven success for the species needed. If the required mitigation is determined to be less, or if these sites are not available at the time of construction, then many other potential candidate sites which have been mentioned in this document can be referenced and may be used.

Seagrass Survey,
Federal Navigation Channel and Harbor Area,
Lake Worth Inlet, Palm Beach Harbor, FL

Final Report

January 2012

Prepared for:
U.S. Army Corps of Engineers
Jacksonville District
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1.0 INTRODUCTION

Dial Cordy and Associates Inc. (DC&A) was contracted under contract No. GS-10F-0124L (Jacksonville District Work Order W912EP.11-F-0016) by the U.S. Army Corps of Engineers (USACE) to determine the pre-construction condition of the benthic environment with respect to seagrasses and hardbottom resources surrounding the existing federal navigation channel and harbor area in Lake Worth Inlet, Palm Beach County, FL (Figure 1).

The Lake Worth Inlet, within Palm Beach County is within the *Halophila johnsonii* critical habitat. *H. johnsonii* was listed as a threatened species by National Marine Fisheries Service (NMFS) on September 14, 1998 (63 FR 49035) and a re-proposal to designate critical habitat pursuant to Section 4 of the Endangered Species Act (ESA) was published on December 2, 1998 (64 FR 64231). The final rule for critical habitat designation for *H. johnsonii* was published April 5, 2000 (Federal Register, vol. 65, No. 66). *H. johnsonii* has one of the most limited geographic ranges of all seagrass species. It is only known to occur between Sebastian Inlet and northern Biscayne Bay on the east coast of Florida (Kenworthy 1997). This report and others (PBS&J 2009) document the occurrence of *H. johnsonii* within the project area (Figure 1).

2.0 TECHNICAL APPROACH

This section describes the technical approach used to collect and analyze data associated with the benthic surveys conducted in August of 2011 in Lake Worth Inlet, Palm Beach County, FL.

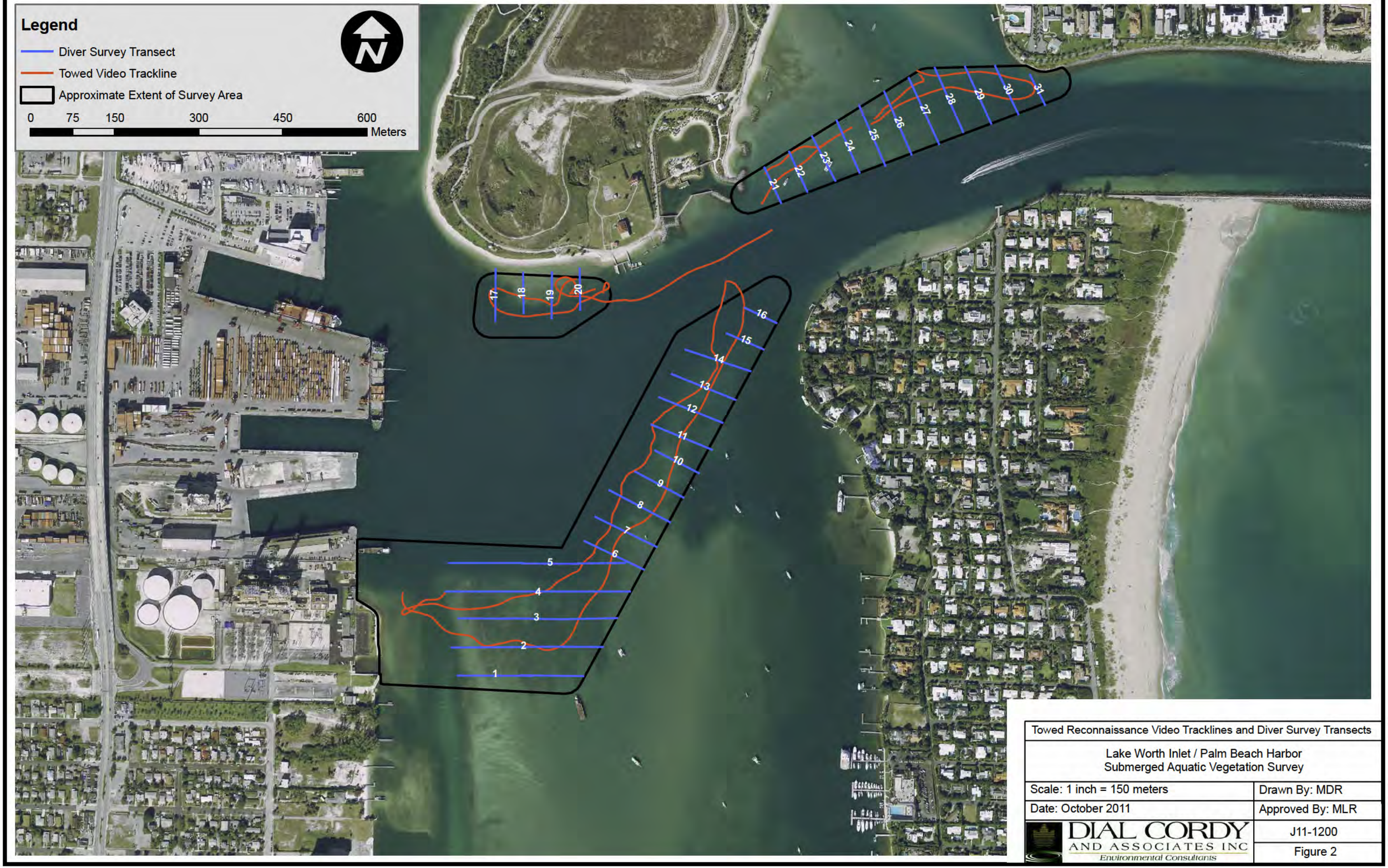
2.1 Marine Resource Survey

A description of methods utilized to document and characterize marine benthic resources within the study area (Figure 1) is provided below. The survey was conducted from August 17-30, 2011.

2.1.1 Reconnaissance Survey

A towed video reconnaissance survey was performed utilizing an integrated towed calibrated video system which records high definition digital video and is linked to geo-referenced navigational software and a precision positioning system (DGPS) with sub-meter accuracy. Such geo-referenced navigational software programs display the geographical coordinates in real time. The calibrated video system included a single camera facing forward and downward at a ~315° angle and traveled at a speed of 1-2 knots behind the vessel. The video was viewed in real time aboard the survey vessel's video screen and recorded directly to mini-DVs, and later transferred to CD. Continuous video transects were towed sinuously across the project site (Figure 2) (Appendix A).

Survey Area Location Map	
Lake Worth Inlet / Palm Beach Harbor Submerged Aquatic Vegetation Survey	
Scale: 1 inch = 250 meters	Drawn By: MDR
Date: October 2011	Approved By: MLR
DIAL CORDY AND ASSOCIATES INC Environmental Consultants	J11-1200
	Figure 1



Towed Reconnaissance Video Tracklines and Diver Survey Transects	
Lake Worth Inlet / Palm Beach Harbor Submerged Aquatic Vegetation Survey	
Scale: 1 inch = 150 meters	Drawn By: MDR
Date: October 2011	Approved By: MLR
DIAL CORDY AND ASSOCIATES INC Environmental Consultants	J11-1200
	Figure 2

2.1.2 Scientific Diver Survey

Scientific diver surveys were conducted in areas where seagrasses were identified as present during the towed video reconnaissance survey and followed the "Recommendation for Sampling *Halophilia johnsonii* at a project site" (Fonseca et al. 1998). Since seagrasses were pervasive except in the northeastern portion of the project area, survey transects were placed in all project site polygons. Per the NOAA recommended survey protocol for "large sites," 28 survey transects were placed within polygons C, D, F, and G, perpendicular to the axis of the channel, every 50 meters (150 feet) (Fonseca et al. 1998). Transect lengths included the project area and a 15m (50 foot) buffer on the landward side and where feasible on the channelward side (Figure 2). Divers swam between transects noting the extent of seagrass beds between transects.

Line-intercept and point quadrat data were collected to quantitatively and qualitatively describe the substrate types, assess percent cover, frequency of occurrence, abundance and density of seagrass and species composition within the survey area.

Transects were generally surveyed beginning at the channel edge and proceeded in a landward direction. Transect beginning and end points were recorded using DGPS with sub-meter accuracy in Hypack navigational software. Along each transect, quantitative data were recorded within $1m^2$ square quadrats (centered on the transect line), every 5m, starting at meter mark zero. Each quadrat was subdivided into 100 10 x 10cm sub-units. Data collected within each $1m^2$ quadrat included the number of 10 x 10cm sub-units that contained at least one seagrass shoot, marine benthic invertebrate or macroalgae) (Virnstein 1995; Fonseca et al. 1998; Braun-Blanquet 1965). The Braun-Blanquet abundance scale was also used to estimate the abundance and density of seagrass species (Table 1).

Table 1. Braun-Blanquet Abundance Scale Values

0	Species absent from quadrat
0.1	Species represented by a solitary short shoot, <5% cover
0.5	Species represented by a few (< 5%) short shoots, <5% cover
1.0	Species represented by many (> 5%) short shoots, <5% cover
2.0	Species represented by many (> 5%) short shoots 5% - 25% cover
3.0	Species represented by many (> 5%) short shoots 25%- 50% cover
4.0	Species represented by many (> 5%) short shoots 50%- 75% cover
5.0	Species represented by many (> 5%) short shoots 75%-100% cover

2.1.3 Seagrass Quantitative Data

Quantitative seagrass data were processed to provide transect frequency of occurrence, abundance, and density for each seagrass species as follows:

Frequency of occurrence = Number of occupied sub-units/total number of sub-units
Abundance = Sum of abundance scale values/number of occupied quadrats
Density = Sum of abundance scale values/total number of quadrats

2.1.4 Hardbottom Quantitative Data

Quantitative data collected for hardbottom habitat included percent cover of each group encountered within the sampled $1m^2$ quadrats, which were placed every 5m along a transect. Data collected for hardbottom benthic invertebrates and algae were collected at the lowest possible taxonomic level and are presented as functional groups in the results. All hard corals encountered, whether or not they fell within the surveyed $1m^2$ quadrat, were recorded by species and size.

2.1.5 Transect Qualitative Data

Qualitative line-point intercept data were collected within a 2m swath along the centerline of each transect. Scientific divers surveyed each transect noting the linear extent of bottom type within a 2m wide area swath, centered on the transect line. Habitat classifications were developed from the qualitative data collected and used for habitat mapping (Table 2).

Table 2. Habitat Classification System Used for Mapping of Habitat Types

Habitat Types	Description
Halophila decipiens	Monospecific bed of this species
Halophila decipiens/Halophila johnsonii	Mixed beds of these species
Halophila johnsonii	Monospecific bed of this species
Halophila johnsonii/Halodule wrightii	Mixed beds of these species
Sand	Sand with no seagrass or live bottom
Sand with cyanobacteria	Sand with cyanobacteria cover
Shell hash	Sand and shell mixture
Sand with scattered hardbottom	Mix of hardbottom and sand
Hardbottom	Continuous hardbottom
Hardbottom ledge	Vertical hardbottom ledge

2.2. Analysis and Interpretation of Marine Habitat Data

Distribution of habitat types and their potential occurrence in an area were mapped for each transect from survey data.

3.0 RESULTS

This section includes a description and review of the results of the benthic community survey, including acreages of marine resources surveyed, percent cover, species occurrence, abundance, and density for seagrasses and hardbottom communities.

3.1. Reconnaissance Survey Results

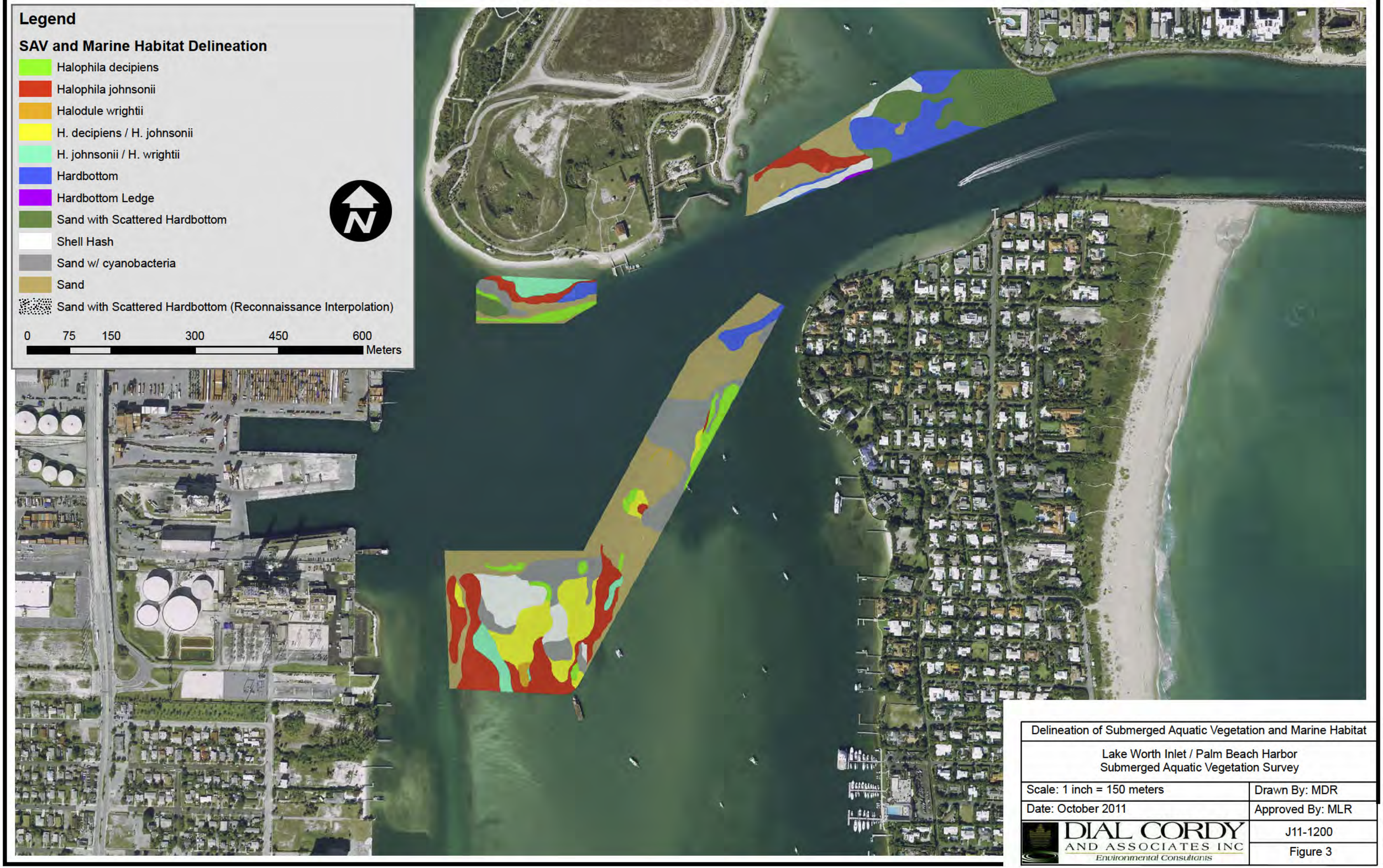
The towed video reconnaissance survey revealed widespread seagrass and hardbottom communities. Video was qualitatively analyzed aboard the vessel to determine the extent of habitat encountered throughout the survey area. Start and stop GPS points were recorded along the towed trackline to mark habitat types for verification during diver surveys.

3.2. Marine Resource Habitat Types

Seagrass, hardbottom, and sand habitats were identified and assessed within the Lake Worth survey area in August 2011. Of the nearly 50 acres surveyed, 14.6 acres were comprised of seagrasses including the species *Halophila johnsonii, H. decipiens* and *Halodule wrightii.* Over ten acres included hardbottom habitat, which included continuous hardbottom, sand with scattered hardbottom, and hardbottom ledge habitats. Nearly half of the survey area consisted of sand, sand covered by cyanobacteria, or shell hash (Table 3 and Figure 3). Photographs were taken to characterize the habitat qualitatively and the complete set of photographs is included as Appendix B.

Table 3. Acreage of marine resources community types including seagrasses, hardbottom, and abiotic bottom by zone.

Community Type	Zone C	Zone D	Zone F	Zone G	Total
Halophila decipiens	0	0.7	1.0	0.5	2.2
Halophila decipiens/Halophila johnsonii	0	0	0.3	3.6	3.9
Halophila johnsonii	1.1	0.6	0.1	4.9	6.7
Halophila johnsonii/Halodule wrightii	0	0.8	0	1.0	1.8
Halodule wrightii	0	0	0.0	0.2	0.2
Sand	2.7	0.8	8.0	3.2	14.7
Sand with cyanobacteria	0	0.4	3.4	2.4	6.2
Shell hash	1.1	0	0	2.4	3.5
Sand with scattered hardbottom	5.4	0.4	0	0	5.8
Hardbottom	3.6	0.3	0.7	0	4.6
Hardbottom ledge	0.1	0	0	0	0.1
TOTAL	**14.0**	**4.0**	**13.5**	**18.1**	**49.6**



Delineation of Submerged Aquatic Vegetation and Marine Habitat	
Lake Worth Inlet / Palm Beach Harbor Submerged Aquatic Vegetation Survey	
Scale: 1 inch = 150 meters	Drawn By: MDR
Date: October 2011	Approved By: MLR
DIAL CORDY AND ASSOCIATES INC Environmental Consultants	J11-1200
	Figure 3

3.3 Seagrass Communities

Seagrass habitat cover type, abundance, and density for the study area are described below. Distribution and occurrence observations for the 2011 survey included surveys areas C, D, F, and G (Figure 3). In general, seagrasses occurred throughout the entire project area, with the exception of the northeastern portion of the project area, where hardbottom predominated (Figure 3).

3.3.1 Seagrass Species Frequency of Occurrence, Abundance, and Density

General Occurrence

Marine seagrass species observed within the study area included *Halodule wrightii*, *Halophila decipiens*, and *Halophila johnsonii*. Of the 28 transects surveyed, marine seagrass species were observed at 19 transects, or 68% of transects. One or more species of seagrass occurred within every zone, C, D, F and G. *H. johnsonii* was present within all zones to some extent. A summary of occurrence records for each transect where seagrass was found is presented in Table 4. Seagrass habitat maps are included in Figure 3.

Frequency of Occurrence

H. johnsonii

H. johnsonii occurred within 16 of the 28 transects sampled. Frequency of occurrence values ranged from 0 to 0.12 with a mean of 0.07. *H. johnsonii* was often growing under filamentous red algae and cyanobacteria (Figure 4a, b).

Other species

H. decipiens occurred within 14 transects sampled, while *H. wrightii* occurred within only seven transects. Frequency of occurrence for *H. decipiens* values ranged between 0 to 0.12 with a mean of 0.03. In comparison, *H. wrightii* had a range of occurrence values between 0 and 0.20 with a mean of 0.07 over the study area.

Abundance

H. johnsonii

Abundance values for *H. johnsonii* ranged from 0.1 to 1.38 among transects. The average abundance for *H. johnsonii* was 0.6 (< 5% cover). *H. johnsonii* had the lowest abundance values of all species over all transects.

Other Species

Cover abundance for *H. wrightii* was low and ranged from 0.5 to 1.2 with a mean 0.66. *H. decipiens* had the highest abundance score for all seagrasses, ranging from 0.5 to 2.33 with a mean of 1.03.

Table 4. Summary of seagrass frequency of occurrence, abundance, and density for each transect where seagrasses were documented.

		Halodule wrightii	Holophila decipiens	Halophila johnsonii	Halodule wrightii	Holophila decipiens	Halophila johnsonii	Halodule wrightii	Holophila decipiens	Halophila johnsonii
Zone	**Transect**	**Frequency of Occurrence**			**Abundance**			**Density**		
G	T01	0.04	0.03	0.12	0.67	2.33	0.56	0.08	0.14	0.34
G	T02	0.02	0.02	0.06	0.50	1.75	0.55	0.05	0.06	0.19
G	T03		0.12	0.08		1.59	0.68		0.29	0.19
G	T04	0.01	0.02	0.05	0.50	1.17	0.50	0.01	0.10	0.14
G	T05		0.00	0.00		0.30	0.50		0.01	0.01
F	T06		0.00	0.01		0.50	0.50		0.02	0.02
F	T08		0.01	0.00		0.75	0.10		0.06	0.00
F	T10	0.00	0.01		0.50	0.50		0.02	0.06	
F	T11		0.07	0.01		1.30	0.50		0.30	0.05
F	T12		0.07			1.25			0.20	
F	T13		0.07			1.33			0.32	
D	T17	0.04	0.03	0.01	1.0	0.33	0.50	0.05	0.05	0.05
D	T18	0.20		0.36	0.71		1.06	0.33		0.57
D	T19	0.18	0.01	0.07	1.21	0.50	0.50	0.47	0.06	0.28
D	T20	0.03	0.03	0.01	0.50	0.50	0.37	0.09	0.16	0.07
C	T21			0.01			0.50			0.03
C	T22			0.07			0.75			0.18
C	T23			0.27			1.38			0.72
C	T24			0.02			0.70			0.14

* Species present but quantity was below 0.01

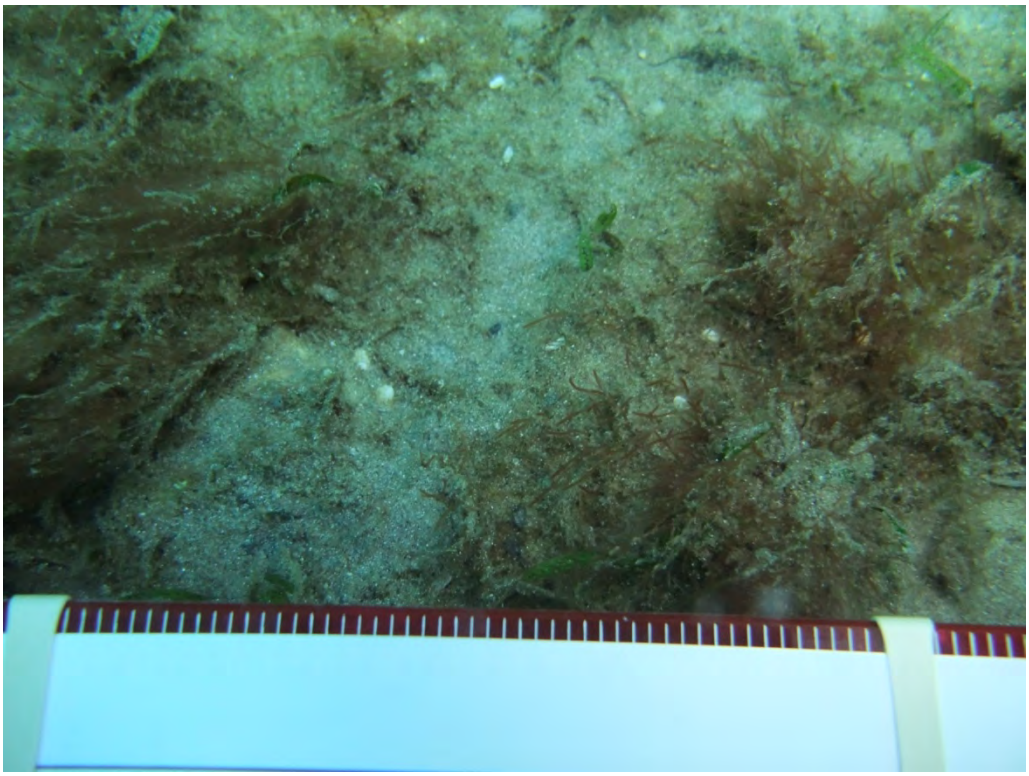


Figure 4 a ***Halophila johnsonii*** **covered in filamentous red algae and cyanobacteria.**

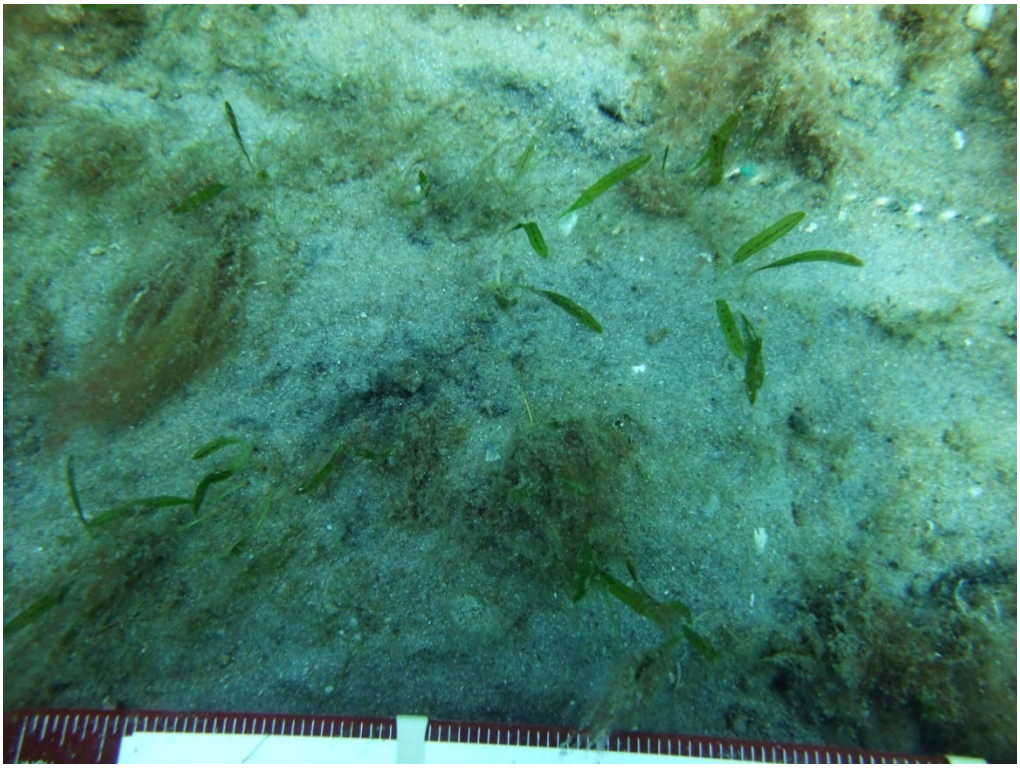


Figure 4 b ***Halophila johnsonii*** **(Braun Blanquet score 1 (<5% cover).**

Density

H. johnsonii

Density for *H. johnsonii* was the highest of all species in the study area, with an average value of 0.17. The range of density values for *H. johnsonii* was 0 to 0.57.

Other Species

H. wrightii had the second highest density values encountered, with a range of 0.01 to 0.47 with an average of 0.15. *Halophila decipiens* had the lowest density of the three species with values ranging from 0.01 to 0.3 with a mean of 0.13.

3.4 Hardbottom Communities

Hardbottom communities occurred in the northeastern portion of the project area within Zones C, D and F, along portions of Transects 15, 16, 17, 20, 25, 26, 27, and 28. Hardbottom communities included areas of continuous hardbottom, sand with scattered hardbottom, and hardbottom ledges (cut edge of channel). Continuous hardbottom areas were places where limestone hardbottom was at the surface or under a thin veneer (>1cm) of sand (Figure 5). The sand with scattered hardbottom habitat type included areas where sand pockets were interspersed with pockets of hardbottom (Figure 6). All hardbottom habitat types supported mixed juvenile and adult reef fish. Some transects had a mix of seagrass and hardbottom habitat types (e.g. T21).

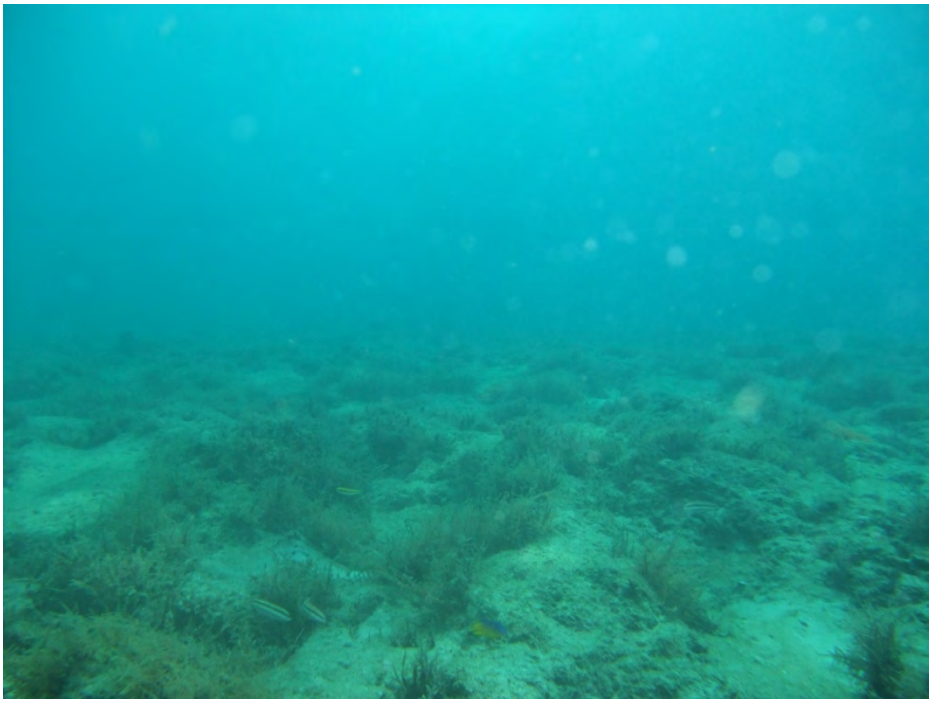


Figure 5 Continuous Hardbottom Habitat with Juvenile Reef Fish in the Foreground.

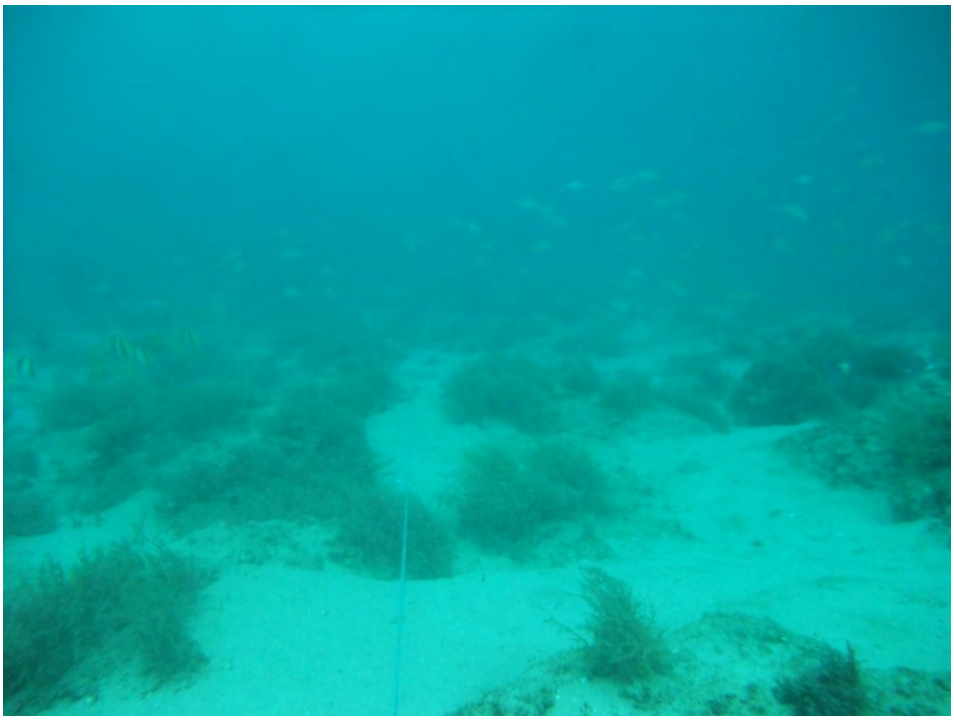


Figure 6 Sand with scattered hardbottom habitat with reef fish.

Continuous hardbottom, sand with scattered hardbottom and hardbottom ledge habitat included a number of benthic organisms unique to hardbottom habitat which were not found in seagrass habitats. Hardbottom benthic organisms were documented to the lowest taxonomic level and are listed in Table 5. Fish populations associated with hardbottom habitat were also documented (Table 6).

Table 5. List of benthic invertebrates and macroalgae documented along transects.

Common Name	Species Name
Sponge	
Black ball sponge	*Ircinia strobilina*
Orange boring sponge	*Cliona delitrix*
Lumpy overgrowing sponge	*Holopsamma helwegi*
Hard Corals	
Lesser starlet coral	*Siderastrea siderea*
Greater starlet coral	*Siderastrea radians*
Hydroids	
Feather bush hydroids	*Dentitheca dendritica*
Macroalgae	
Geen feather algae	*Caulerpa sertularoides*
Y branched algae	*Dictyota* sp.
Oval Blade algae*	*Caulerpa prolifera*

*Documented in seagrass habitat and hardbottom habitat.

Table 6. Fish species documented within project area.

Fish Common Name	Fish Species
Porkfish	*Anisotremus virgincus*
Gray Angelfish	*Pomacanthus arcuatus*
Stoplight Parrotfish	*Sparisoma viride*
Tomtates	*Haemulon aurolineatum*
Grunts (j)	*Haemulon* (spp.)
Blue tang	*Acanthurus coeruleus*
Bluehead wrasse (j,a)	*Thalassoma bifasciatum*

The relative abundance of hardbottom benthic organisms to each other and the percent cover of functional groups along transects is described in Table 7. Hardbottom habitat occurred in Zones C, D, and F, but was not documented in G. Zone C had the greatest cover of hardbottom habitat, followed by Zones F and D. Hard corals were noted along transects, whether or not they fell within $1m^2$ quadrats. A total of five hard corals were documented along all transects surveyed and included *Siderastrea siderea* and *S. radians* (Table 8; Figure 7). Noteably, no soft corals were documented during this survey.

Table 7. Percent cover of hardbottom constituents including hydroids, sponge, hard coral, macroalgae, tunicates and bare space along each transect where hardbottom was documented. Transect totals add to 100% only if the entire transect consisted of hardbottom.

Zone	Transect	Hydroid	Sponge	Hard Coral	Macroalgae	Tunicate	Bare	Total
F	**T14**	0	2.3	0	0.5	0.01	2.3	5.11
F	**T15**	3.3	3.3	0	0	0	6.6	13.2
F	**T16**	4.6	2	0	1.2	0.23	12.8	20.83
D	**T17**	0.8	0.8	0	0	0	1.6	3.2
D	**T20**	9.4	3.8	0	0	0.38	24.0	37.58
C	**T21**	0	6.6	0	0	0	10	16.6
C	**T22**	1.6	2	0	0	0	4.4	8
C	**T25**	17.0	1.4	0.05	0	0.05	34.1	52.6
C	**T26**	16.8	0.66	0.06	1.33	0	33.4	52.25
C	**T27**	15.7	3.9	0.04	0	0	71.5	91.14
C	**T28**	18.7	0.83	0	0	0	76.3	95.83

Table 8. Number and size of corals encountered along transects.

Zone	Transect	Species	Size (cm)
D	T20	*Siderastrea radians*	2
C	T25	*Siderastrea radians*	5
C	T25	*Siderastrea radians*	2
C	T26	*Siderastrea radians*	2
C	T26	*Siderastrea siderea*	3

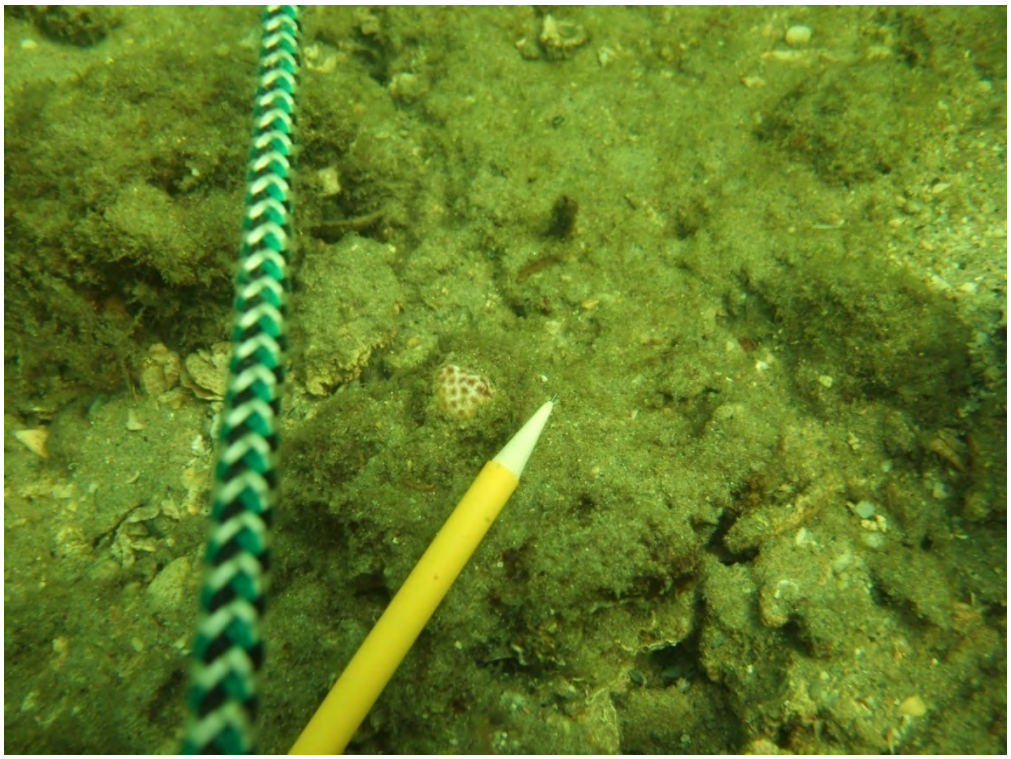


Figure 7 Small *Sidereastrea radians* colony found along Transect 25.

Hardbottom habitat was mostly bare, covered with a thin veneer of sand (<1cm) (Table 7). The dominant hardbottom benthic organisms were feather bush hydroids and sponges. Macroalgae cover was low and patchy in distribution. Solitary tunicates and hard corals were also present.

4.0 DISCUSSION

The benthic survey conducted within the Lake Worth Inlet, Palm Beach Harbor, Palm Beach Florida for the USACE documented seagrass and hardbottom communities within the project area. The surveyed site, nearly 50 acres, included Zones C, D, F, and G (Figure 1). Almost 20 acres, or 40% of the project area surveyed consisted of sand, sand with cyanobacteria, and shell hash habitat type, which were devoid of macro-epibenthic communities. Seagrass beds comprised of *Halophila johnsonii, H. decipiens* and *Halodule wrightii* covered 14.6 acres of the project area, while over ten acres included hardbottom habitat types. Seagrass communities were found throughout the project area (Zones C, D, F and G), except within the extreme northeastern portion of the project area (Zone C), where only hardbottom habitat was documented. Hardbottom habitat increased toward the inlet, to the northeast and was not documented in the southern portion of the project area (Zone G) (Figure 3).

Seagrass communities were dominated by sparse cover of *H. johnsonii* in single species and mixed beds in shallow to mid-water depth (0-4m), while *H. decipiens* predominated in water depth greater than 4m. *Halodule wrightii* was also found in shallow water, primarily less than 2m. Frequency of occurrence, cover abundance scores, and density were relatively low for all seagrass beds documented. Frequency of occurrence across an entire transect was highest for *H. johnsonii* along Transect 18, with a value of 0.36 out of a possible 1.0. Cover abundance scores for all species, *H. johsonii*, *H. decipiens* and *Halodule wrightii* were less than 26% cover (maximum of 2.33; Table 4) across all transects; which means that seagrasses covered less than 26% of the bottom where they were found. The highest density score, which is the sum of cover abundance scores for a species, divided by the total number of quadrats within a transect, was 0.72. Overall, seagrass were present in 14.6 acres, but their coverage was low throughout that 14.6 acres.

Hardbottom habitat types including continuous hardbottom, sand with scattered hardbottom, and hardbottom ledge were present within the northeastern portion of the project area and covered nearly 10 acres of the survey area. Bare space, which was limestone rock covered by a thin veneer of sand with no benthic organisms attached to it, was the dominant feature of the hardbottom habitat documented. Hydroids and sponges were the predominant benthic organisms encountered in hardbottom habitat. Hard corals were present, but octocorals were absent. Abundant juvenile and adult reef fish populations utilized all hardbottom habitat types.

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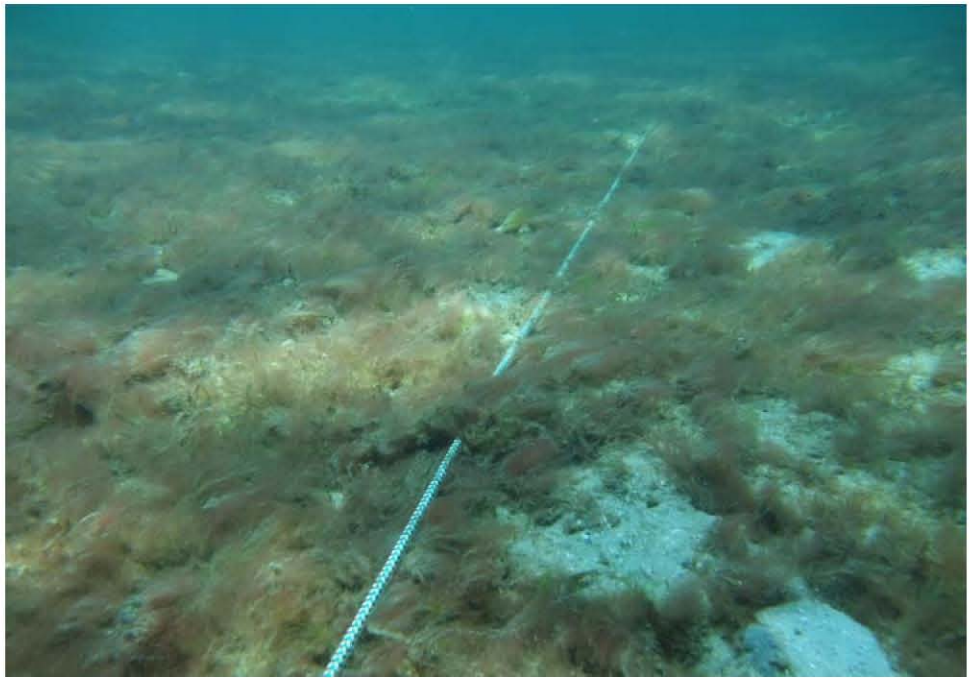
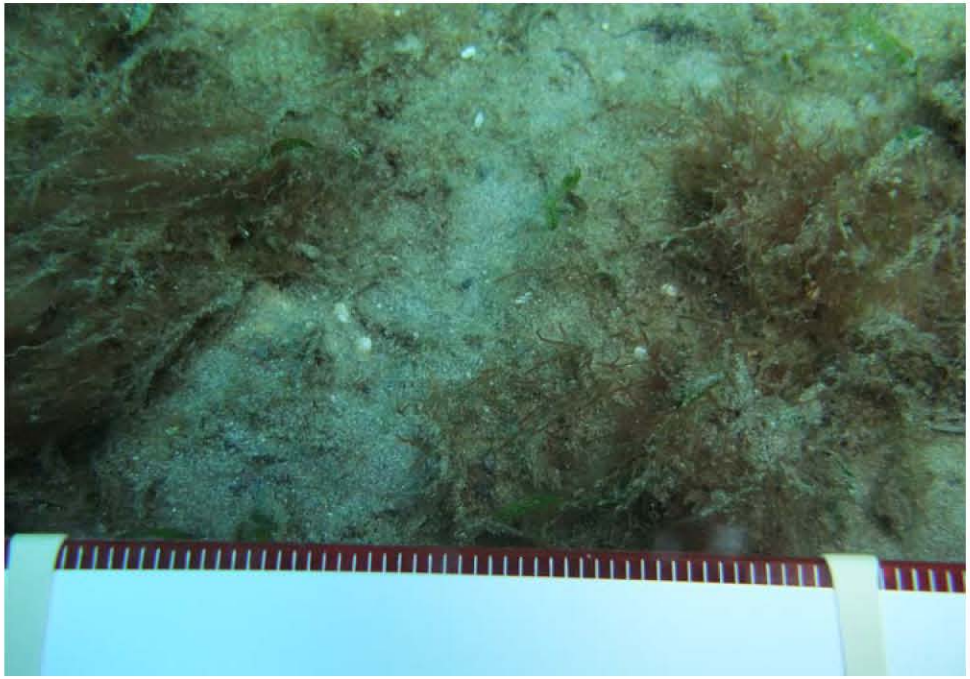
APPENDIX A

Reconnaissance Towed Video Survey (DVD)

APPENDIX B

Habitat Photographs





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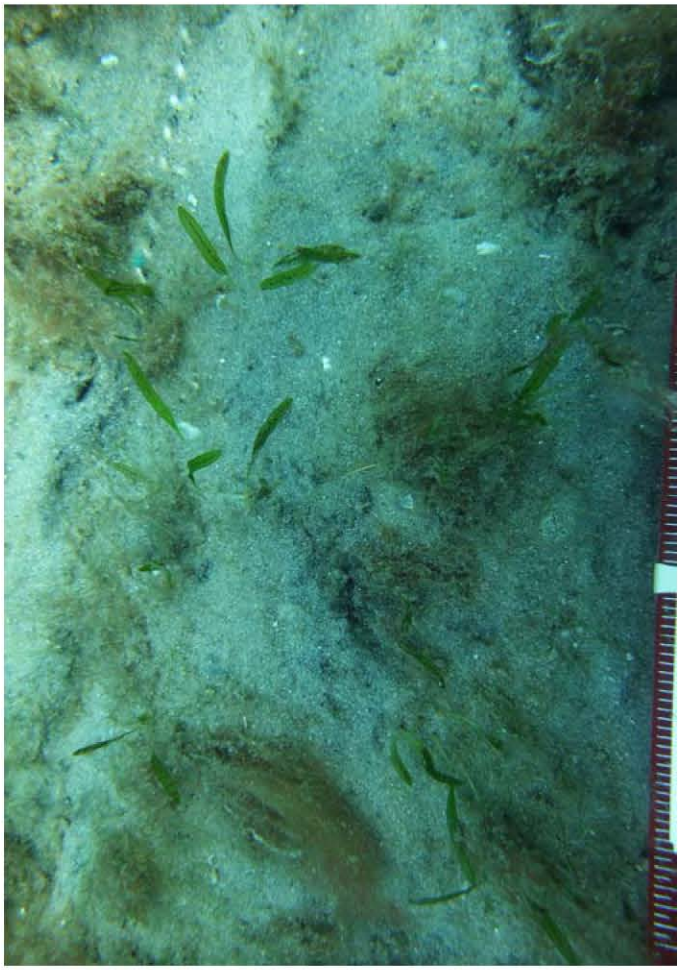
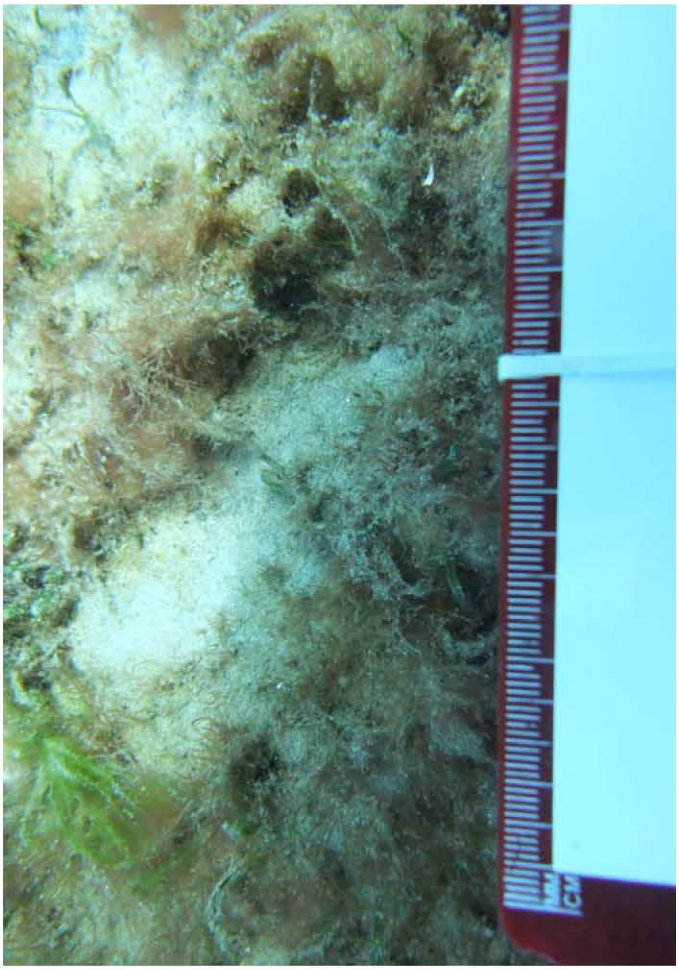
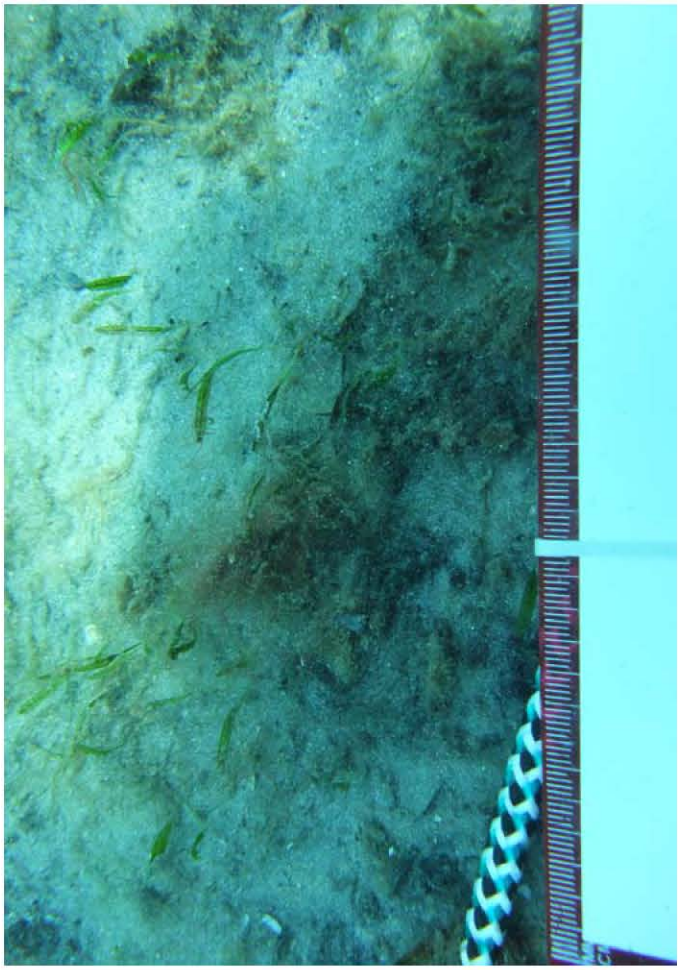
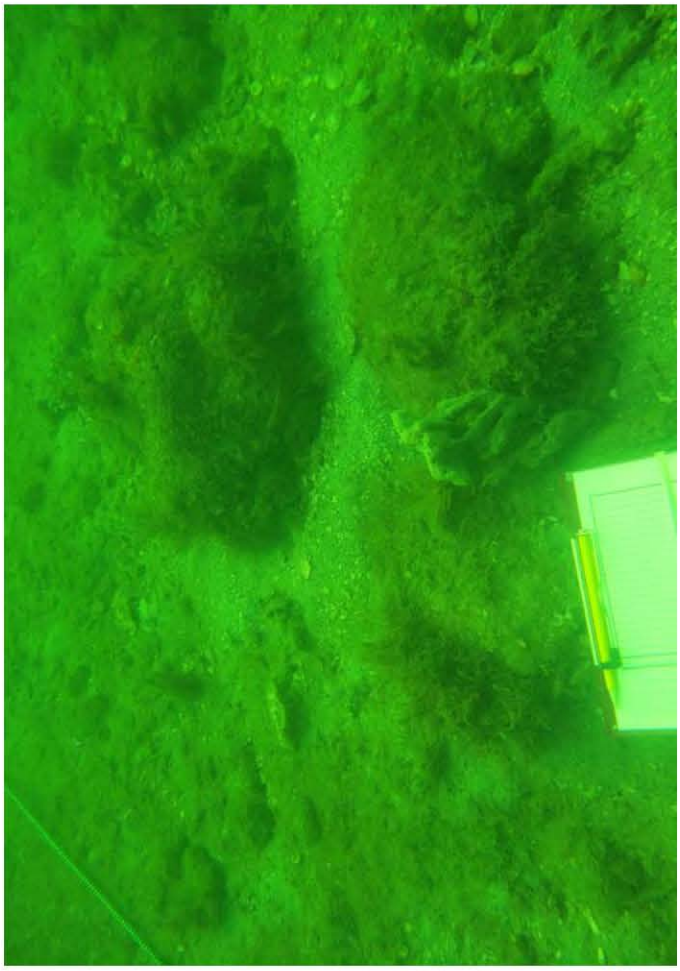
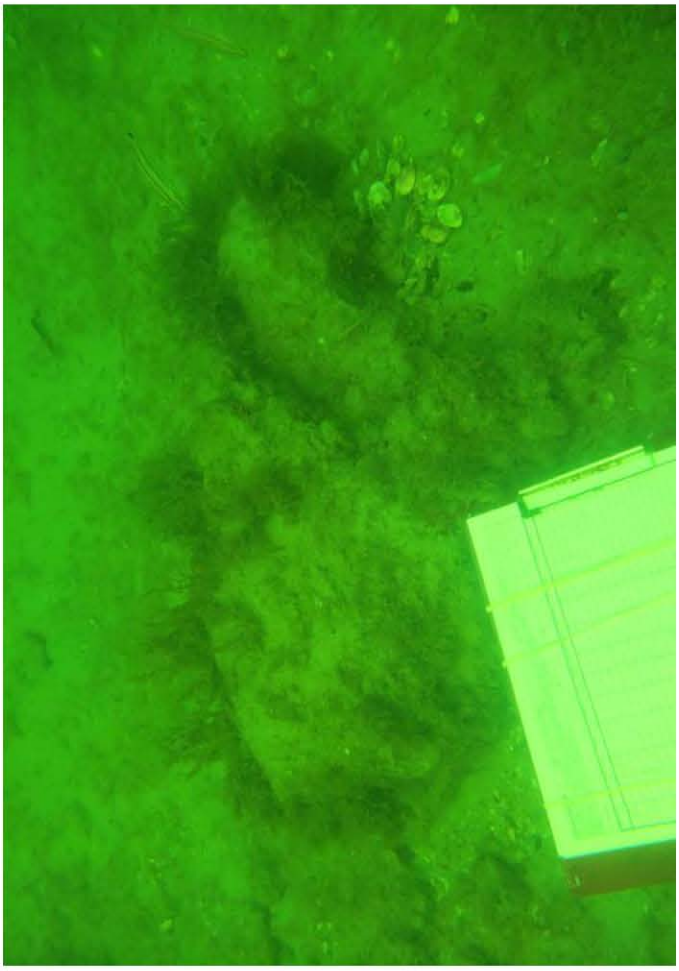
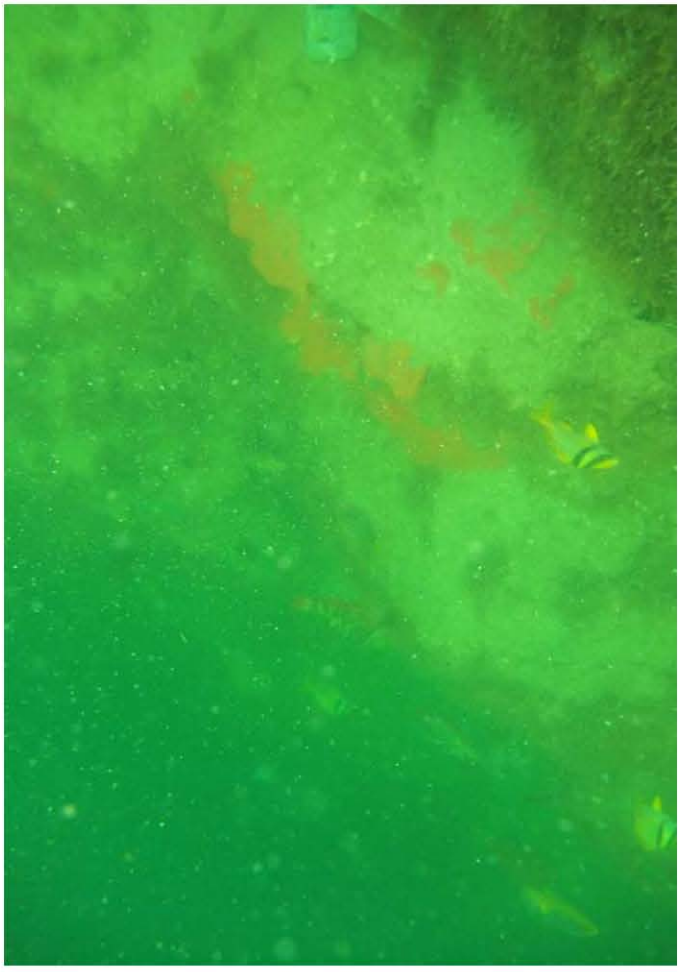


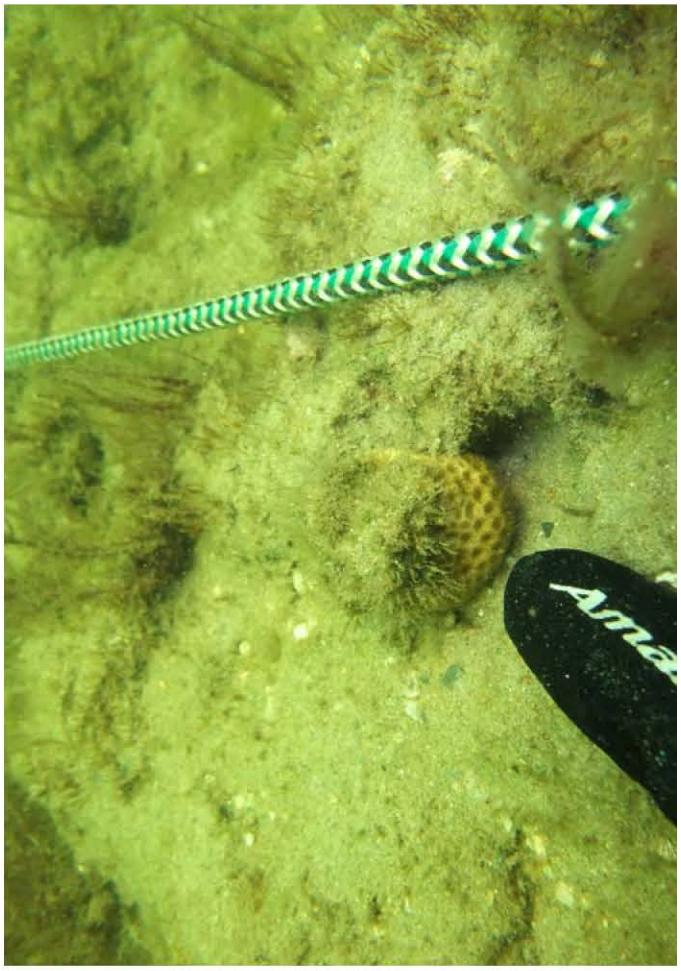


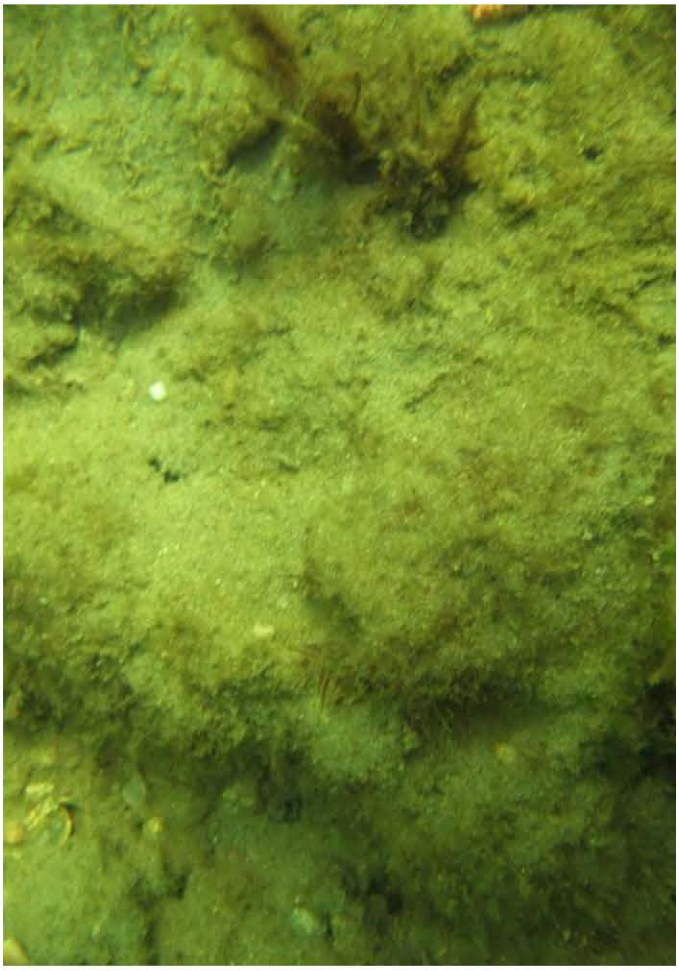


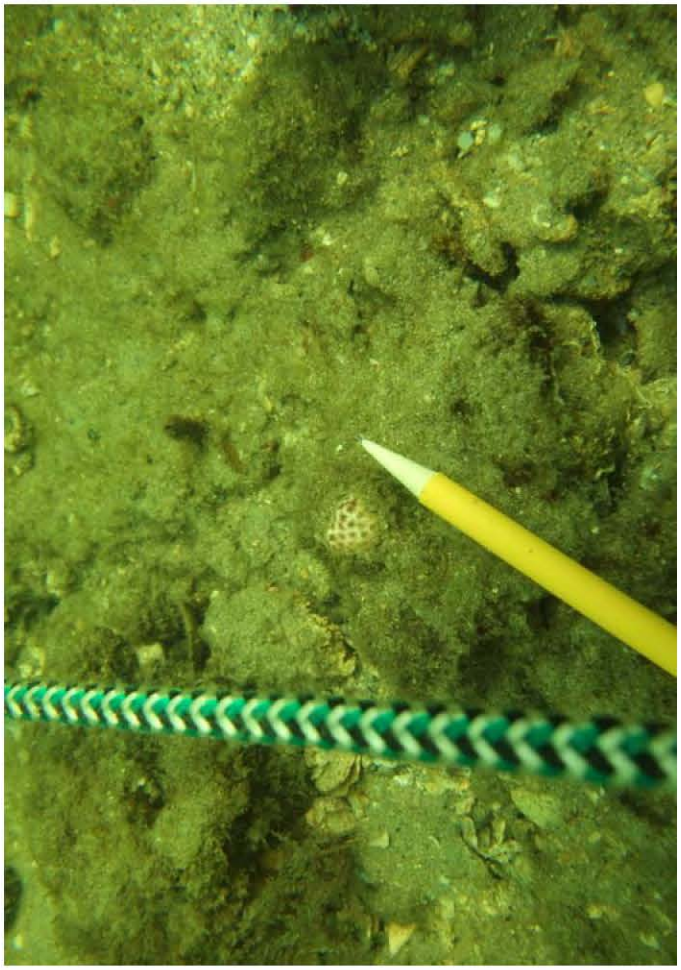


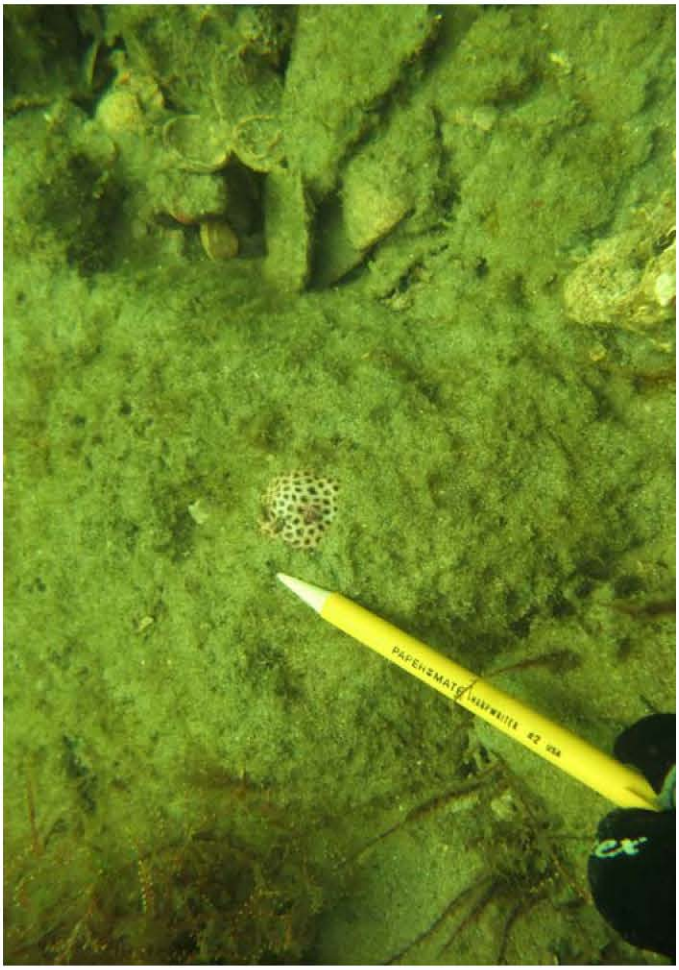


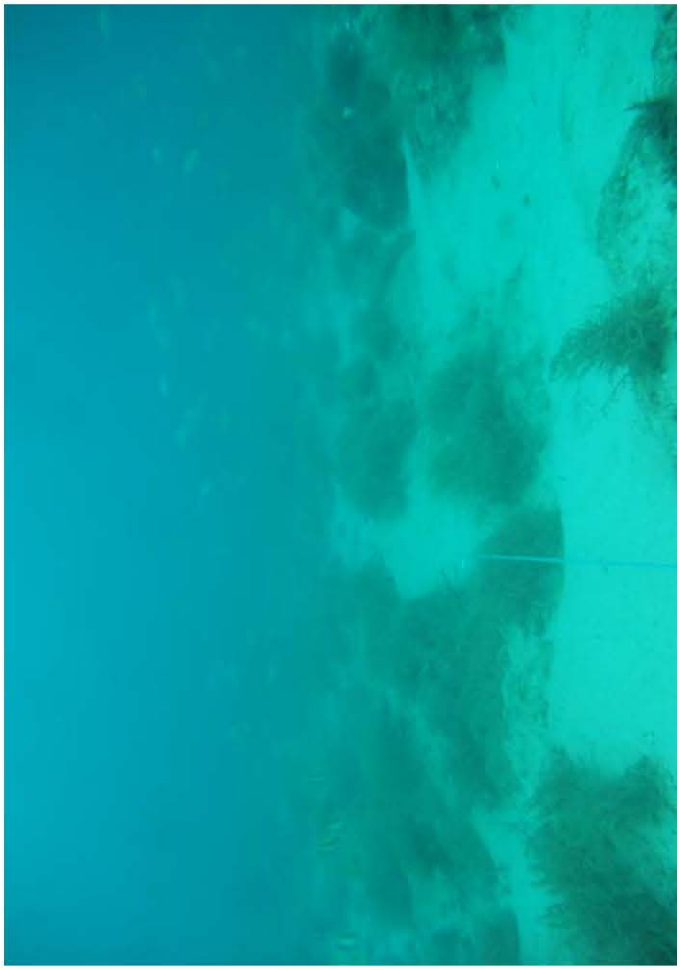


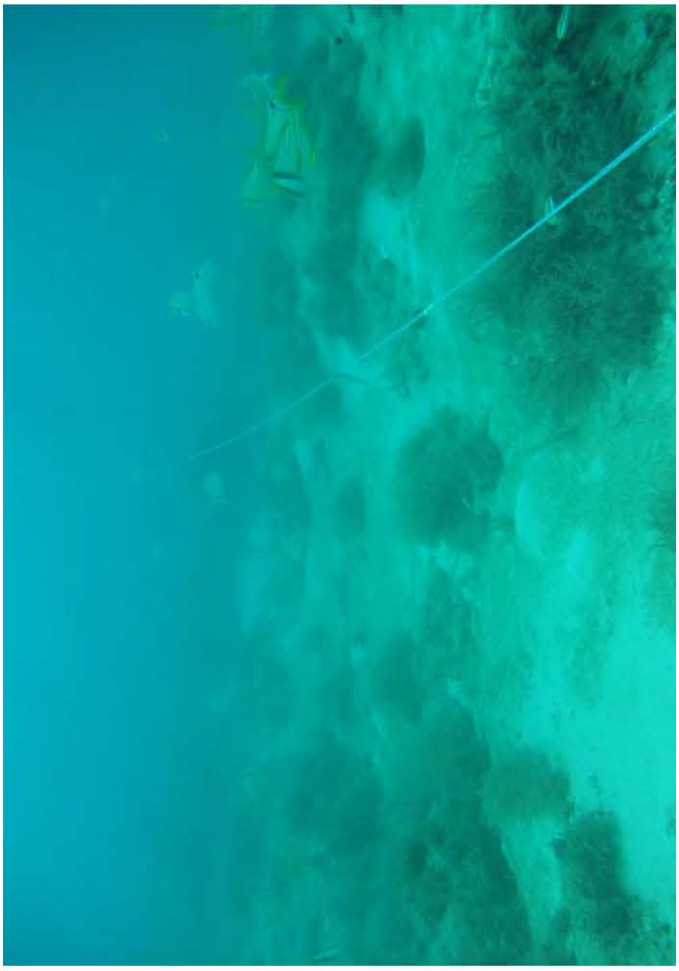


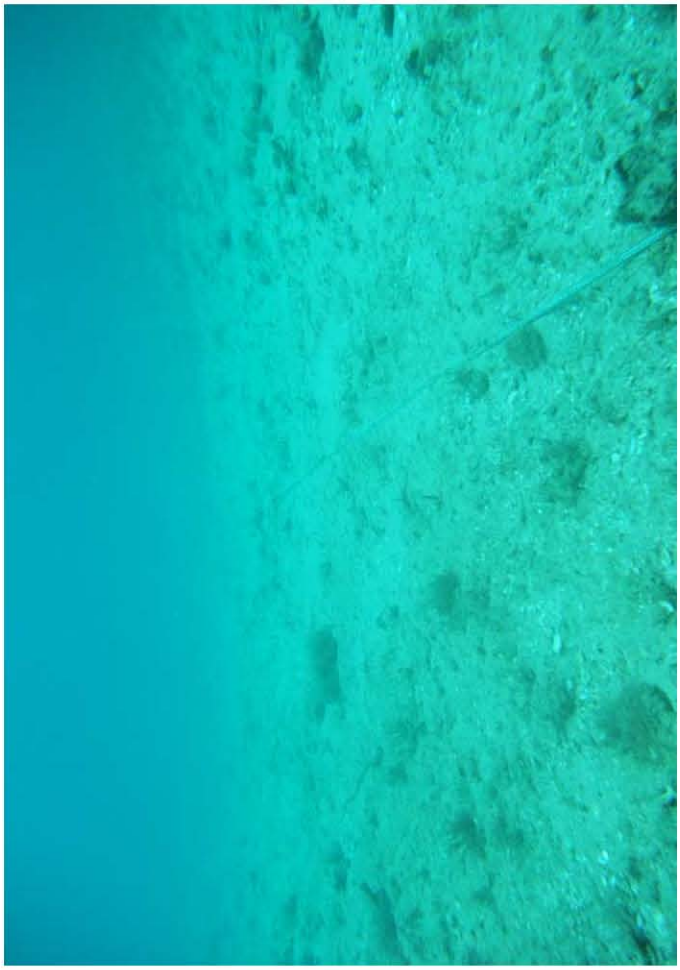












DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

JUL 06 2012

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

Mr. David Bernhart
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
Saint Petersburg, FL 33701

Dear Mr. Bernhart:

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment for the Lake Worth Inlet Widening and Deepening addressing the concerns of the threatened and endangered species under the purview of the National Marine Fisheries Service (NMFS). Listed species which may occur in the vicinity of the proposed work and are under the jurisdiction of the NMFS are: green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), Hawksbill sea turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), Johnson's seagrass (*Halophila johnsonii*), blue (*Balenoptera musculus*), humpback, (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), fin (*Balenoptera physalus*) and sperm (*Physeter macrocephalus*) whales and smalltooth sawfish (*Pristis pectinata*). Based on the enclosed Biological Assessment, the Corps has determined that the proposed expansion of Lake Worth Inlet may adversely affect Johnson's seagrass within the action area. The proposed project may affect, but not likely to adversely affect; the green turtle, loggerhead turtle, Kemp's ridley turtle, Hawksbill turtle, leatherback turtle, humpback whale, sperm whale, and smalltooth sawfish. The Corps requests your written concurrence on this determination.

If you have any questions or need further information, please contact Mr. Pat Griffin at 904-232-2286 or by email: Patrick.M.Griffin@usace.army.mil.

Sincerely,

Kenneth R Quigley
for Eric P. Summa
Chief, Environmental Brach
Planning Division

Enclosure

Biological Assessment to
National Marine Fisheries Service
Lake Worth Inlet Widening and Deepening
Palm Beach County, Florida

Description of the Project Area – Palm Beach Harbor is on the Atlantic coast of Florida, approximately 53 miles south of Fort Pierce Harbor, and 71 miles north of Miami Harbor. The harbor entrance (also known as Lake Worth Inlet) is an artificial cut through the barrier beach and limestone formation connecting Lake Worth, a coastal lagoon, with the Atlantic Ocean. Communities bordering Palm Beach Harbor are Palm Beach Shores on the barrier beach to the north, Riviera Beach on the west shore of Lake Worth, and the town of Palm Beach to the south. West Palm Beach is located immediately south of Riviera Beach and is the largest community in the area. Lake Worth Inlet contains a federally autheroized channel and associated features which support a deepwater port located on the Atlantic Ocean in Palm Beach County, Florida.

Lake Worth is an estuary that exhibits characteristics typical of estuarine systems in southeast Florida. Much of the beach and dune ecosystem in this vicinity has been altered by development. Structures such as seawalls and bulkheads have reduced a significant amount of the vegetation that would naturally occur here (Applied Technology and Management Inc. 1995).

The existing channel sediments in the Inlet are predominantly sand and shell and are subject to considerable shifting by wave and tidal action. Limestone rock outcrops are found on either side of the Federal channel at the interface between the Inlet channel and the Intracoastal Waterway (IWW). Littoral drift in the area is predominantly north to south. The mean tidal range is 2.8 feet and the spring tidal range is 3.3 feet. Shoaling continues to be a recurring problem in Palm Beach Harbor.

A sand transfer plant is located on the north jetty of the inlet. The sand transfer plant takes the sand that accumulates on the north jetty, slurries the material with sea water, and passes it under the inlet and to the beach south of the south jetty. Sand continues to accumulate at a rapid rate in this area. The areas to be dredged are located within the Federal project limits.

Action Area

The project proposes to widen and deepen Lake Worth Inlet navigation channel (Figure 1). The authorized project depths are as follows: entrance channel to a depth of 37 feet (from STA 30+00 to STA 47+00); from the inner channel to a depth of 33 feet; from the turning basin to a depth of 33 feet; and to a depth of 25 feet in the extended turning basin located north of the existing project basin. The existing settling basin and the extended settling basin are maintained at 35 feet and are located adjacent to the entrance channel and north jetty.

Deepening will occur within the entrance channel from the current 37 feet to 47 feet, with depths within the turning basin increasing from 33 feet to 43 feet deep. Widening is needed in certain areas of the project for safe navigation of larger vessels. The entrance channel requires a flare to the south as prevailing currents cause navigation hazards entering the channel as currently

configured. The flare starts at the south jetty and extends approximately 2500 feet to the southeast. Within the entrance channel, the northern channel wall would be widened by 60 feet from the north jetty to the beginning of the turn to the southwest. At the turn, the northern side of the channel would be widened 150 feet to ensure a 400 foot channel width throughout. The area at the southern edge of Peanut Island would be deepened to 43 feet. Finally, the southern edge of the turning basin would be widened 150 feet to the south.

Based on geotechnical boring data from the entrance channel and turning basin, sand and rock of varying hardness are expected to be encountered during widening and deepening. Sand, soft rock and rock fragments will be removed via traditional dredging methods. Where hard rock is encountered, the Corps anticipates that contractors could utilize other methods, including confined blasting or large cutterhead dredge equipment to pre-treat the rock prior to removal. Dredged material would be deposited at up to four locations. All beach quality sand material shall be placed on the existing beach disposal template just south of the inlet (figure 2). Sandy material not considered beach quality under the existing permit will be placed in the authorized nearshore placement site south of the inlet. Other rock/coarse materials would likely be placed in a previously dredged depression within Lake Worth as part of construction to create seagrass habitat as compensatory mitigation for seagrass impacts. Dredged rock and other materials that cannot be beneficially utilized for mitigation may be transported to the Ocean Dredged Materials Disposal Site (ODMDS) or placed in a permitted, upland disposal site on Peanut Island.

Figure 1: Current project and proposed changes in yellow

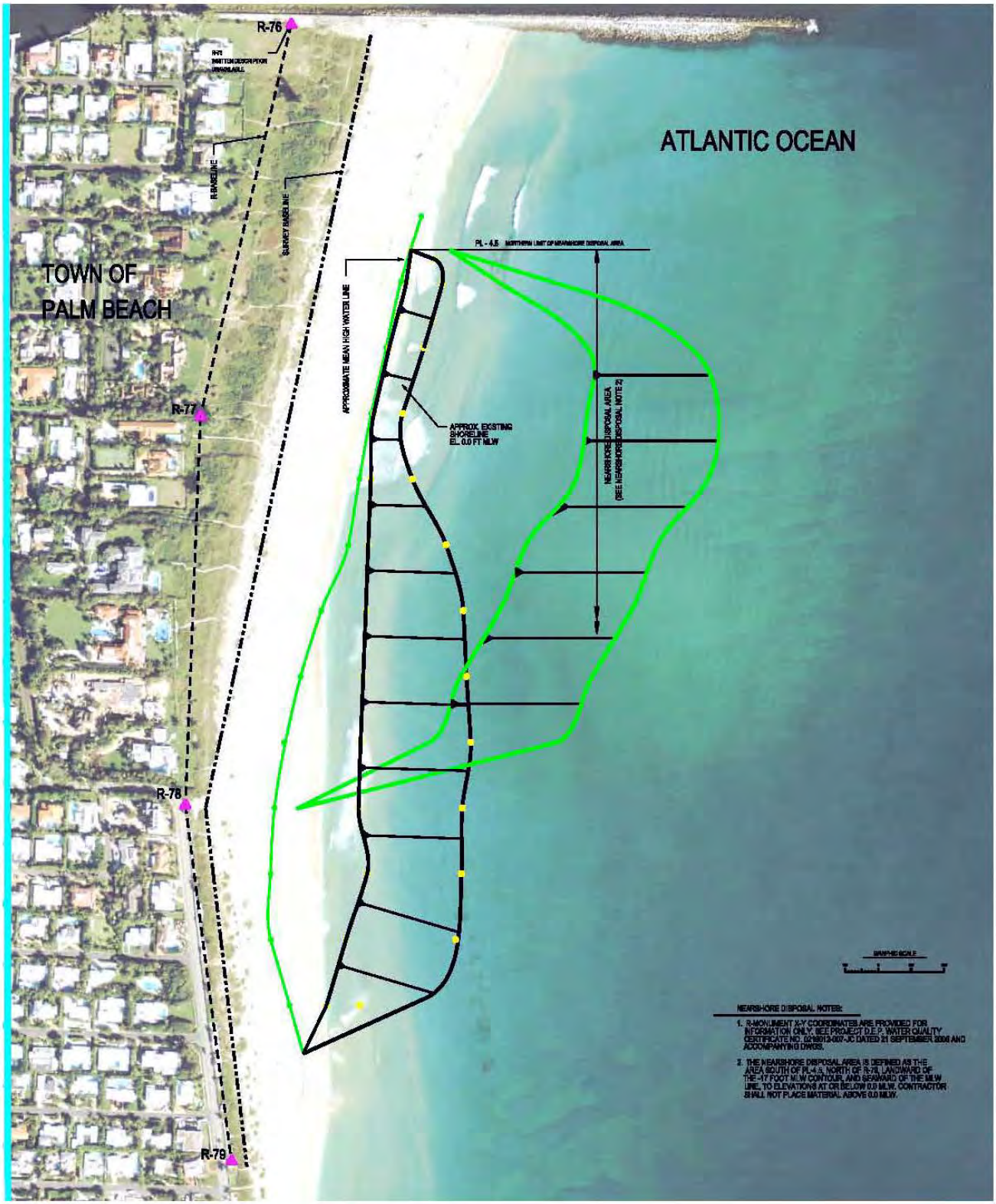


Figure 2. Beach placement site south of inlet

Protected Species Included in this Assessment

The U.S. Army Corps of Engineers, Jacksonville District (Corps) has determined that the following listed species under the jurisdiction of the National Marine Fisheries Service (NMFS) occur in the action area: green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), Kemp's ridley turtle (*Lepidochelys kempii*), Hawksbill sea turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), Johnson's seagrass (*Halophila johnsonii*), blue (*Balenoptera musculus*), humpback, (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), fin (*Balenoptera physalus*) and sperm (*Physeter macrocephalus*) whales and smalltooth sawfish (*Pristis pectinata*). The Corps has relied heavily upon the Surtass LFA Biological Opinion that was completed by NMFS on May 31, 2002 for biological information concerning the biology, life history and status for the large whale species discussed in this assessment. This document was accessed from the NMFS website at:
http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/7pr_surtass-2020529.pdf.

The Corps has reviewed the biological, status, threats and distribution information presented in this assessment and believes that the following species will be in or near the action area and thus may be affected by the proposed project: the five sea turtle species; humpback and sperm whales, Johnson's seagrass and smalltooth sawfish.

Six species of endangered marine mammals may be found seasonally in the waters offshore southeastern Florida. The Corps believes that only the sperm and humpback whales may be adversely affected by activities associated with the proposed action. These effects would be a result of acoustic harassment.

The blue, fin, northern right and sei whales are not discussed in detail because they are unlikely to be within the vicinity of the project. Additional information on blue, fin and sei whales can be found in Waring *et al*. (1999). Due to the rarity of sightings of these four whale species near the project area, the Corps believes that any effects to them by the project are discountable. Discountable effects under Section 7 of the ESA are those "extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur."

The endangered Florida manatee (*Trichecus manatus*) and the American crocodile (*Crocodylus acutus*) also occur with the action area and the Corps has initiated consultation with the U.S. Fish and Wildlife Service concerning the effects of the proposed action on these species.

Status and Distribution of the Species

Green Turtle

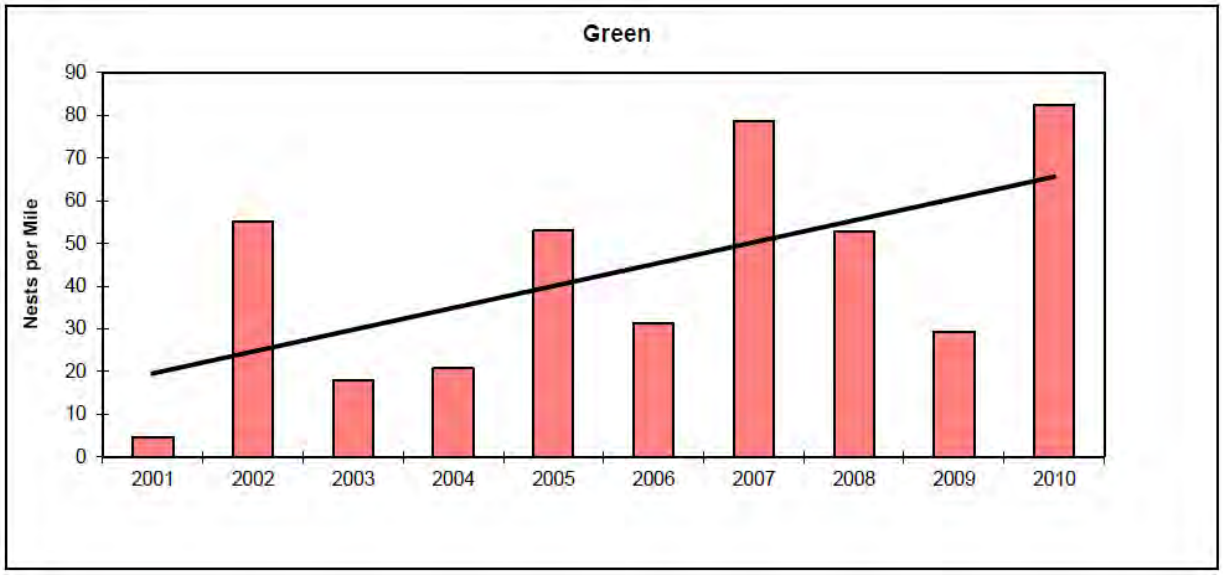
Distribution. Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz, 1999). Several major nesting assemblages have been identified and studied in the western Atlantic (Peters 1954; Carr and Ogren, 1960; Carr *et al.*, 1978). Most green turtle nesting in the continental United States occurs on the Atlantic Coast of Florida (Ehrhart 1979). Green turtles are the largest of the hard-shelled

sea turtles. Adult male green turtles are smaller than adult females whose lengths range from 92 to 110 cm (36 to 43 in.) and weights range from 119 to 182 kg (200 to 300 lbs). Their heads are small compared to other sea turtles and the biting edge of their lower jaws is serrated.

Green turtles have a more tropical distribution than loggerhead turtles; they are generally found in waters between the northern and southern 20°C isotherms (Hirth 1971). Green turtles, like most other sea turtles, are distributed more widely in the summer when warmer water temperatures allow them to migrate north along the Atlantic coast of North America. In the summer, green turtles are found around the U.S. Virgin Islands, Puerto Rico, and continental North America from Texas to Massachusetts. Immature greens can be distributed in estuarine and coastal waters from Long Island Sound, Chesapeake Bay, and the North Carolina sounds south throughout the tropics (Musick and Limpus, 1997). In the United States, green turtles nest primarily along the Atlantic Coast of Florida, the U.S. Virgin Islands, and Puerto Rico. In the winter, as water temperatures decline, green turtles that are found north of Florida begin to migrate south into subtropical and tropical water.

Status and Population Trends. The green turtle was protected under the ESA in 1978; breeding populations off the coast of Florida and the Pacific coast of Mexico are listed as endangered, all other populations are listed as threatened. Recent population estimates for the western Atlantic area are not available. However, there is evidence that green turtle nesting has been on the increase during the past decade. Recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches where most green turtle nesting activity occurs have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the six years of regular monitoring since establishment of the index beaches in 1989. A nesting summary for the county in which the proposed project resides is found in Table 1.

Table 1: Summary of Green Turtle (*Chelonia mydas*) Nesting in Palm Beach County, 2001-2010



Natural History. While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida, the northwestern coast of the Yucatan Peninsula, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). Post-pelagic green turtles feed primarily on sea grasses and benthic algae but also consume jellyfish, salps, and sponges. In the western Atlantic region, the summer developmental habitat encompasses estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds, and south throughout the tropics (Musick and Limpus, 1997). Like loggerheads and Kemp's ridleys, green sea turtles that use northern waters during the summer must return to southern waters in autumn, or face the risk of cold stunning.

Threats. The greatest threat to this species is the loss of its nesting habitat. Throughout the tropical and subtropical distribution of this species, beaches are eroded, armored, renourished, or converted for residential or commercial purposes. Green turtles are also threatened by fibropapilloma disease; incidental takes in commercial or recreational fishing gear; and poaching (although poaching is infrequent in the United States). Green turtles are harvested in some nations for food, leather, and jewelry. Green turtles are also threatened by natural causes including hurricanes; predation by fire ants, raccoons, and opossums; and poaching of eggs and nesting females.

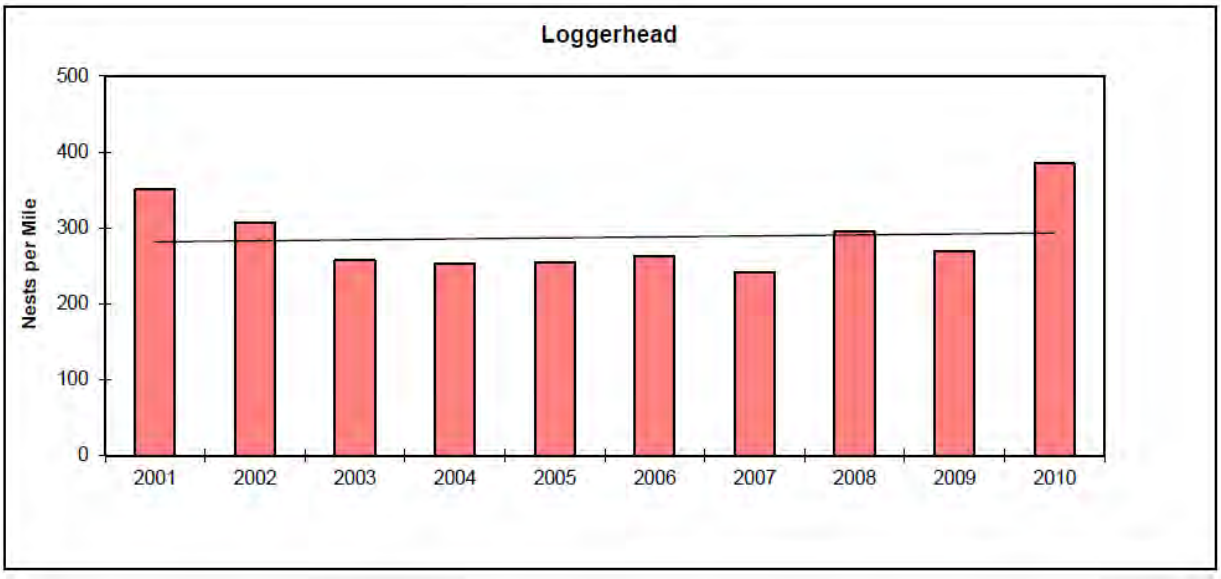
Anthropogenic impacts to the green turtle population are similar to those for other sea turtle species. Sea sampling coverage in the pelagic driftnet, pelagic longline, scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. In addition, the NMFS/Northeast Fisheries Science Center (NEFSC) is conducting a review of bycatch levels and patterns in all fisheries in the western Atlantic for which observer data is available. Bycatch estimates will be made for all fisheries for which sample sizes are sufficiently large to permit reasonable statistical analysis. This will be compiled into an assessment report. Until that analysis is completed, the only information on the magnitude of takes available for fisheries in the action area are unextrapolated numbers of observed takes from the sea sampling data. Preliminary sea sampling data summary (1994-1998) shows the following total take of green turtles: one (anchored gillnet), two (pelagic driftnet), and two (pelagic longline). Stranding reports indicate that between 200-300 green turtles strand annually from a variety of causes (Sea Turtle Stranding and Salvage Network, unpublished data). As with the other species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality.

Critical Habitat. In 1998, NMFS designated the waters surrounding the islands of Culebra, Puerto Rico as critical habitat for the green turtle. This area supports major seagrass beds and reefs that provide forage and shelter habitat. The action area does not comprise critical habitat for green turtles.

Loggerhead Turtle

Distribution. Loggerhead turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Loggerheads concentrate their nesting in the north and south temperate zones and subtropics, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (NRC 1990). The largest known nesting aggregation of loggerhead turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani, 1982). In the western Atlantic, most loggerhead turtles nest from North Carolina to Florida and along the gulf coast of Florida. The best scientific and commercial data available on the genetics of loggerhead turtles suggests there are four major subpopulations of loggerheads in the northwest Atlantic: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29° N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); and (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990) (approximately 1,000 nests in 1998, according to TEWG, 2000). This biological assessment will focus on the northwest Atlantic subpopulations of loggerhead turtles, which occur in the action area. A nesting summary for the county in which the action is proposed is included in Table 2.

Table 2: Summary of Loggerhead (*Caretta caretta*) Nesting in Palm Beach County, 2001-2010



Although NMFS and FWS have not completed the administrative processes necessary to formally recognize populations or subpopulations of loggerhead turtles, these sea turtles are generally grouped by nesting locations. Based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG, 1998; TEWG 2000), NMFS and FWS treat these loggerhead turtle nesting aggregations as distinct subpopulations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will focus on the four nesting aggregations of loggerhead turtles identified in the preceding paragraph (which occur in the action area) and treat them as subpopulations for the purposes of this analysis. Natal homing to the nesting beach provides the genetic barrier between these subpopulations, preventing recolonization from turtles from other nesting beaches. The importance of maintaining these subpopulations in the wild is shown by the many examples of extirpated nesting assemblages in the world. In addition, recent fine-scale analysis of mtDNA work from Florida rookeries indicate that population separations begin to appear between nesting beaches separated by more than 50-100 km of coastline that does not host nesting (Francisco *et al.* 2000) and tagging studies are consistent with this result (Richardson 1982, Ehrhart 1979, CMTTP: in NMFS SEFSC 2001). Nest site relocations greater than 100 km occur, but generally are rare (Ehrhart 1979; CMTTP; Bjorndal *et al.* 1983: *in* NMFS SEFSC 2001).

The loggerhead turtles in the action area are likely to represent differing proportions of the four western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9% of the loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead turtles in this area are from the northern subpopulation (NMFS SEFSC 2001; Bass *et al*., 1998; Norrgard, 1995; Rankin-Baransky, 1997; Sears 1994, Sears *et al.*, 1995). In the Carolinas, the northern subpopulation is estimated to make up from 25% to 28% of the loggerheads (NMFS

SEFSC 2001; Bass *et al.* 1998, 1999). About ten percent of the loggerhead turtles in foraging areas off the Atlantic coast of central Florida are from the northern subpopulation (Witzell *et al*., in prep). In the Gulf of Mexico, most of the loggerhead turtles in foraging areas will be from the South Florida subpopulation, although the northern subpopulation may represent about 10% of the loggerhead sea turtles in the Gulf (Bass pers. comm). In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads are from the South Florida subpopulation and about two percent are from the northern subpopulation, while only about 51% originated from Mediterranean nesting beaches (Laurent *et al.*, 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19% of the pelagic loggerheads are from the northern subpopulation, about 71% are from the South Florida subpopulation, and about 11% are from the Yucatán subpopulation (Bolten *et al*., 1998).

Natural History. Loggerhead turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years. Turtles in this life history stage are called "pelagic immatures" and are best known from the eastern Atlantic near the Azores and Madeira and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal *et al*., in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm SCL they recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder *et al.*, 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals actually are more abundant in these areas or just more abundant within the area relative to the smaller turtles. Benthic immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool (Epperly *et al.*, 1995; Keinath, 1993; Morreale and Standora, 1999; Shoop and Kenney, 1992), and migrate northward in spring. Given an estimated age at maturity of 21-35 years (Frazer and Ehrhart, 1985; Frazer and Limpus, 1998), the benthic immature stage must be at least 10-25 years long. NMFS SEFSC 2001 analyses conclude that juvenile stages have the highest elasticity and maintaining or decreasing current sources of mortality in those stages will have the greatest impact on maintaining or increasing population growth rates.

Like other sea turtles, the movements of loggerheads are influenced by water temperature. Since they are limited by water temperatures, sea turtles do not usually appear on the summer foraging grounds until June, but are found in Virginia as early as April. The large majority leaves the Gulf of Maine by mid-September but may remain in these areas until as late as November and December. Loggerhead sea turtles are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (Wynne and Schwartz, 1999). Under certain conditions they may also scavenge fish, particularly if they are easy to catch (e.g., caught in nets) (NMFS and USFWS, 1991).

Adult female loggerheads in the western Atlantic come ashore to nest primarily from North Carolina southward to Florida. Additional nesting assemblages occur in the Florida Panhandle

and on the Yucatán Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Threats. Loggerhead sea turtles face a number of human-related threats in the marine environment, including oil and gas exploration, development, and transportation; marine pollution; trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries (see below); underwater explosions; dredging, offshore artificial lighting; power plant entrapment; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching.

Although loggerhead turtles are most vulnerable to pelagic longlines during their pelagic, immature life history stage, there is some evidence that benthic immatures may also be captured, injured, or killed by pelagic fishery operations. Recent studies have suggested that not all loggerhead turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, followed by permanent settlement into benthic environments. Some may not totally circumnavigate the North Atlantic. In addition, some of these turtles may either remain in the pelagic habitat in the North Atlantic longer than hypothesized or they may move back and forth between pelagic and coastal habitats (Witzell , 1999.). Any loggerhead turtles that follow this developmental model would be adversely affected by shark gill nets and shark bottom longlines set in coastal waters, in addition to pelagic longlines.

On their nesting beaches in the U.S., loggerhead turtles are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; exotic dune and beach vegetation; predation by fire ants, raccoons, armadillos, opossums; and poaching. Elimination/control of these threats are especially important because, from a global perspective, the southeastern U.S. nesting aggregation is critical to the survival of this species: it is second in size only to the nesting aggregations in the Arabian Sea off Oman and represents about 35 and 40 percent of the nests of this species. The status of the Oman nesting beaches has not been evaluated recently, but they are located in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills), the resulting risk facing this nesting aggregation and these nesting beaches is cause for considerable concern (Meylan *et al*., 1995).

Loggerhead turtles also face numerous threats from weather and coastal processes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November) and loggerhead turtle nesting season (March to November); hurricanes can have potentially disastrous effects on the survival of eggs in sea turtle nests. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida; all of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane (Milton *et al*., 1992). On Fisher Island near Miami, Florida, 69% of the eggs did not hatch after Hurricane Andrew, probably because they were drowned by the storm surge. Nests from the northern subpopulation were destroyed by hurricanes, which made landfall in North Carolina in

the mid to late 1990's. Sand accretion and rainfall that result from these storms can appreciably reduce hatchling success. The recent landfall of Hurricane Charley on Florida's southwest coast and the impending landfall of Hurricane Frances will also have adverse effects on nest success. These natural phenomena probably have significant, adverse effects on the size of specific year classes; particularly given the increasing frequency and intensity of hurricanes in the Caribbean Sea and northwest Atlantic Ocean.

Status and Population Trends. The loggerhead turtle was listed as threatened under the ESA on July 28, 1978. The most recent work updating what is known regarding status and trends of loggerhead sea turtles is contained in NMFS SEFSC 2001. The recovery plan for this species (NMFS and USFWS 1991) state that southeastern U.S. loggerheads can be considered for delisting if, over a period of 25 years, adult female populations in Florida are increasing and there is a return to pre-listing annual nest numbers totaling 12,800 for North Carolina, South Carolina, and Georgia combined. This equates to approximately 3,100 nesting females per year at 4.1 nests per female per season. NMFS SEFSC 2001 concludes, "…nesting trends indicate that the numbers of females associated with the South Florida subpopulation are increasing. Likewise, nesting trend analyses indicate potentially increasing nest numbers in the northern subpopulation" (TEWG 2000). However, NMFS SEFSC 2001 also cautions that given the uncertainties in survival rates (of the different life stages, particularly the pelagic immature stage), and the stochastic nature of populations, population trajectories should not be used now to quantitatively assess when the northern subpopulation may achieve 3,100 nesting females.

Several published reports have presented the problems facing long-lived species that delay sexual maturity in a world replete with threats from a modern, human population (Crouse *et al.*, 1987, Crowder *et al.*, 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high, annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general tenet of population ecology originated in studies of sea turtles (Crouse *et al.*, 1987, Crowder *et al.*, 1994, Crouse 1999). Crouse (1999) concluded that relatively small changes in annual survival rates of both juvenile and adult loggerhead sea turtles would adversely affect large segments of the total loggerhead sea turtle population.

The four major subpopulations of loggerhead sea turtles in the northwest Atlantic, northern, south Florida, Florida panhandle, and Yucatán are all subject to fluctuations in the number of young produced annually because of natural phenomena like hurricanes as well as human-related activities. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. Sea turtles nesting in the southern and central counties of Florida can be affected by beach armoring, beach renourishment, beach cleaning, artificial lighting, predation, and poaching (NMFS & FWS 1991).

As discussed previously, the survival of juvenile loggerhead sea turtles is threatened by a completely different set of threats from human activity once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these four subpopulations circumnavigate the North

Atlantic over several years (Carr 1987, Bjorndal 1994). During that period, they are exposed to a series of long-line fisheries that include an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar *et al*., 1995, Bolten *et al.*, 1994, Crouse 1999). Based on their proportional distribution, the capture of immature loggerhead sea turtles in long-line fleets in the Azores and Madiera Archipelagoes and the Mediterranean Sea will have a significant, adverse effect on the annual survival rates of juvenile loggerhead sea turtles from the western Atlantic subpopulations, with a disproportionately large effect on the northern subpopulation that may be significant at the population level.

In waters off coastal U.S., a suite of fisheries in Federal and State waters threatens the survival of juvenile loggerhead sea turtles. Loggerhead turtles are captured, injured, or killed in shrimp fisheries off the Atlantic coast; along the southeastern Atlantic coast, loggerhead turtle populations are declining where shrimp fishing is intense off the nesting beaches (NRC 1990). Conversely these nesting populations do not appear to be declining where nearshore shrimping effort is low or absent. The management of shrimp harvest in the Gulf of Mexico demonstrates the correlation between shrimp trawling and impacts to sea turtles. Waters out to 200nm are closed to shrimp fishing off of Texas each year for approximately a three-month period (mid-May through mid-July) to allow shrimp to migrate out of estuarine waters; sea turtle strandings decline dramatically during this period (NMFS, STSSN unpublished data). Loggerhead sea turtles are captured in fixed pound-net gear in the Long Island Sound, in pound-net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, in gill net fisheries in the mid-Atlantic and elsewhere, in fisheries for monkfish and for spiny dogfish, and in northeast sink gillnet fisheries (see further discussion in the *Environmental Baseline* of this Opinion). Witzell (1999) compiled data on capture rates of loggerhead and leatherback turtles in U.S. longline fisheries in the Caribbean and northwest Atlantic; the cumulative takes of these fisheries approach those of the U.S. shrimp fishing fleet (Crouse 1999, NRC 1990).

Based on the data available, it is not possible to estimate the size of the loggerhead population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead turtles. However, an important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females, but it may not reflect overall population growth rates. Given this, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,016-89,034 annually, representing, on average, an adult female population of 44,780 [(nests/4.1) * 2.5]. On average, 90.7% of the nests were from the South Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle subpopulation. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation they belong. Based on the above, there are only an estimated 3,800 nesting females in the northern loggerhead subpopulation. The status of this population, based on number of loggerhead nests, has been classified as stable or declining (TEWG 2000). Another consideration adding to the vulnerability of the northern subpopulation is that NMFS scientists estimate, using genetic data from Texas, South Carolina, and North Carolina in combination with juvenile sex ratios from those states, that the northern

subpopulation produces 65% males, while the Florida subpopulation is estimated to produce 80% females (NMFS SEFSC 2001, Part I).

Critical Habitat. No critical habitat has been designated for loggerhead turtles.

Leatherback Turtle

Distribution. The leatherback is the largest living turtle. Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972).

Leatherback turtles undertake the longest migrations of any other sea turtle and exhibit the broadest thermal tolerances (NMFS and USFWS 1998). Leatherback turtles are able to inhabit intensely cold waters for a prolonged period of time because leatherbacks are able to maintain body temperatures several degrees above ambient temperatures. Leatherback turtles are typically associated with continental shelf habitats and pelagic environments, and are sighted regularly in offshore waters (>328 ft). Leatherback turtles regularly occur in deep waters (>328 ft), and an aerial survey study in the north Atlantic Ocean sighted leatherback turtles in water depths ranging from 3 to 13,618 ft, with a median sighting depth of 131.6 ft (CeTAP 1982). This same study found leatherbacks in waters ranging from 7 to 27.2°C.

Natural History. Although leatherbacks are a long lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported as about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996).

Leatherback sea turtles are predominantly distributed pelagically where they feed on jellyfish such as *Stomolophus, Chryaora,* and *Aurelia* (Rebel 1974). Leatherbacks are deep divers, with recorded dives to depths in excess of 1000 m, but they may come into shallow waters if there is an abundance of jellyfish nearshore. They also occur annually in places such as Cape Cod and Narragansett bays during certain times of the year, particularly the fall.

Status and Threats. The leatherback was listed as endangered on June 2, 1970 and a recovery plan was issued in 1998. Leatherback turtles are included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, which effectively bans trade.

Globally, leatherback turtle populations have been decimated worldwide. The global leatherback turtle population was estimated to number approximately 115,000 adult females in 1980 (Pritchard 1982), but only 34,500 in 1995 (Spotila *et al*. 1996). The decline can be attributed to many factors including fisheries as well as intense exploitation of the eggs (Ross 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert 1996). Eckert (1996) and Spotila *et al*. (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries.

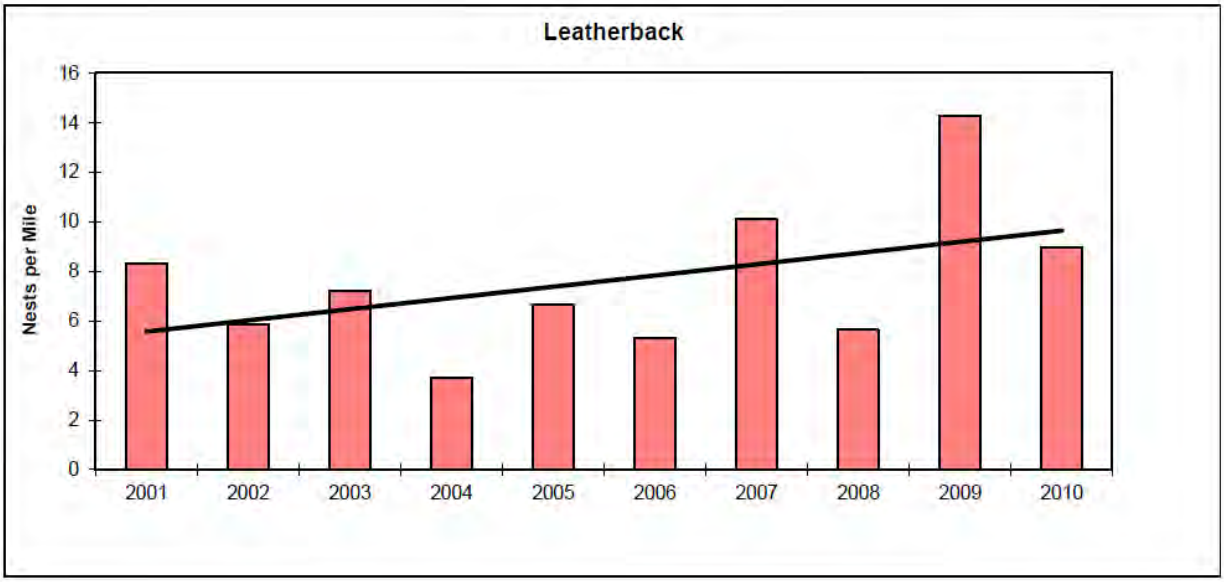
The status of the Atlantic population is not clear. In 1996, it was reported to be stable, at best (Spotila 1996), but numbers in the Western Atlantic at that writing were reported to be on the

order of 18,800 nesting females. According to Spotila (pers. com.), the Western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (i.e. off Africa, numbering ~ 4,700) have remained consistent with numbers reported by Spotila *et al*. in 1996. Between 1989 and 1995, marked leatherback returns to the nesting beach at St. Croix averaged only 48.5%, but that the overall nesting population grew (McDonald, et. al 1993). This is in contrast to a Pacific nesting beach at Playa Grande, Costa Rica, where only 11.9% of turtles tagged in 1993-94 and 19.0% of turtles tagged in 1994-95 returned to nest over the next five years. Characterizations of this population suggest that it has a very low likelihood of survival and recovery in the wild under current conditions.

Spotila *et al*. (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species= natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e. egg, hatchling, and juvenile) remained static, stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing.

The primary threats to leatherback turtles are entanglement in fishing gear (e.g., gillnets, longlines, lobster pots, weirs), boat collisions, and ingestion of marine debris (NMFS and USFWS 1997). The foremost threat is the number of leatherback turtles killed or injured in fisheries. Spotila (2000) states that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls and gillnets) in the Pacific during the 1990s is 1,500 animals. He estimates that this represented about a 23% mortality rate (or 33% if most mortality was focused on the East Pacific population). As noted above, leatherbacks normally live at least 30 years, usually maturing at about 12-13 years. Such long-lived species cannot withstand such high rates of anthropogenic mortality.

Table 3: Summary of Leatherback (*Dermochelys coriacea*) Nesting in Palm Beach County, 2001-2010



Critical Habitat. NMFS and FWS designated certain areas of the US Virgin Islands as critical habitat for the leatherback turtle. The action area does not comprise designated critical habitat for the species.

Hawksbill Turtle

Distribution. Hawksbill turtles occur in tropical and subtropical waters of the Atlantic, Pacific, and Indian Oceans. Recognized subspecies occupy the Atlantic Ocean (ssp. *imbricata*) and the Pacific Ocean (ssp. *squamata*). Richardson *et al*. (1989) estimated that the Caribbean and Atlantic portions of the U.S. support a minimum of 650 hawksbill turtle nests each year. In the United States, hawksbill turtles have been recorded in all states along the Gulf of Mexico and along the Atlantic coast from Florida to Massachusetts. United States populations nest primarily in the U.S. Virgin Islands and Puerto Rico, but occasionally on the Atlantic coast of Florida. Two hawksbill turtle carcasses have been found in the vicinity of the action area (Wendy Teas, pers com, 2002, NMFS - SEFSC Miami Laboratory).

Natural History. Hawksbill turtles use different habitats for different stages in their life cycles. Post-hatchling hawksbill turtles remain in pelagic environments to take shelter in weedlines that accumulate at convergence points. Juvenile hawksbill turtles (those with carapace lengths of 20-25 cm) re-enter coastal waters where they become residents of coral reefs, which provide sponges for food and ledges, and caves for shelter. Hawksbill turtles are also found around rocky outcrops, high-energy shoals, and mangrove-fringed bays and estuaries (particularly in areas where coral reefs do not occur). Hawksbill turtles remain in coastal waters when they become subadults and adults.

Status and Threats. The hawksbill turtle was listed as an endangered species on June 2, 1970 (35 FR 8491). Populations are threatened by significant modifications of its coastal habitat throughout its range. The National Research Council (1990), and NMFS/FWS (1993) have published general overviews of the effects of habitat alteration on hawksbill turtles. In the U.S. Virgin Islands, problems such as egg poaching, domestic animals, beach driving, litter, and recreational use of beaches have presented problems for nesting hawksbill turtles. In addition,

beachfront lights appear to pose a serious problem for hatchling hawksbill (and other) turtles in the U.S. Virgin Islands. At sea, activities that damage coral reefs and other habitats that are important to the hawksbill turtle threaten the continued existence of this species. Hawksbill turtles are also threatened by stochastic events (e.g., hurricanes); predation by fire ants, raccoons and opossums; and by poaching of eggs and nesting females by humans.

Critical Habitat. In 1998, NMFS designated the waters surrounding Mona and Monito Islands, Puerto Rico as critical habitat for the hawksbill turtle. The action area does not comprise designated critical habitat for the species.

Kemp's Ridley Sea Turtle

Status and Population Trends. Of the seven extant species of sea turtles of the world, the Kemp's ridley has declined to the lowest population level. The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempi*) (USFWS and NMFS 1992) contains a description of the natural history, taxonomy, and distribution of the Kemp's ridley turtle. Kemp's ridleys nest in daytime aggregations known as *arribadas*. The primary arribada in the Gulf of Mexico is at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nest in this single locality (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970's, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and there is cautious optimism that the population is now increasing.

After unprecedented numbers of Kemp's ridley carcasses were reported from Texas and Louisiana beaches during periods of high levels of shrimping effort, NMFS established a team of population biologists, sea turtle scientists, and managers, known as the Turtle Expert Working Group (TEWG) to conduct a status assessment of sea turtle populations. Analyses conducted by the group have indicated that the Kemp's ridley population is in the early stages of recovery; however, strandings in some years have increased at rates higher than the rate of increase in the Kemp's population (TEWG 1998).

The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the U.S. Fish and Wildlife Service (FWS) and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the

introduction of turtle excluder devices (TEDs). Adult ridley numbers have now grown from a low of approximately 1,050 adults producing 702 nests in 1985, to greater than 3,000 adults producing 1,940 nests in 1995 and about 3,400 nests in 1999.

The TEWG (1998) was unable to estimate the total population size and current mortality rates for the Kemp's ridley population. However, the TEWG listed a number of preliminary conclusions. The TEWG indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Over the period 1987 to 1995, the rate of increase in the annual number of nests accelerated in a trend that would continue with enhanced hatchling production and the use of TEDs. Nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and a low of 702 nests in 1985. This trajectory of adult abundance tracks with trends in nest abundance from an estimate of 9,600 in 1966 to 1,050 in 1985. The TEWG estimated that in 1995 there were 3,000 adult ridleys. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994. The population model in the TEWG projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. It determined that the data reviewed suggested that adult Kemp's ridley turtles were restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20-60 cm straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic.

The TEWG (1998) identified an average Kemp's ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular inter-nesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

Hurricane Gilbert expanded the area surveyed for ridley nests in Mexico in 1990 due to destruction of the primary nesting beach. The TEWG (1998) assumed that the increased nesting observed particularly since 1990 was a true increase, rather than the result of expanded beach coverage. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. As noted by TEWG, trends in Kemp's ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

Natural History. Juvenile Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Post-pelagic ridleys feed primarily on crabs, consuming a variety of species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal,

1997). Juvenile ridleys migrate south as water temperatures cool in fall, and are predominantly found in shallow coastal embayments along the Gulf Coast during fall and winter months. Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 centimeters in carapace length, and weighing less than 20 kilograms (Klinger and Musick 1995). Next to loggerheads, they are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June, and migrating to more southerly waters from September to November (Keinath *et al.*, 1987; Musick and Limpus, 1997). In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick, 1985; Bellmund *et al.*, 1987; Keinath *et al.*, 1987; Musick and Limpus, 1997). The juvenile population in Chesapeake Bay is estimated to be 211 to 1,083 turtles (Musick and Limpus, 1997).

Research being conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine Pass and the entrance to Galveston Bay. Between 1989 and 1993, Galveston NMFS Laboratory staff tracked 50 of these turtles using satellite and radio telemetry. The tracking study was designed to characterize sea turtle habitat and to identify small and large-scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NMFS Galveston Laboratory, pers. comm.).

Threats. Observations in the northeast otter trawl fishery, pelagic longline fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles. As with loggerheads, a large number of Kemp's ridleys are taken in the southeast shrimp fishery each year. Kemp's ridleys were also affected by the apparent large-mesh gillnet interaction that occurred in spring off of North Carolina. A total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. This is expected to be a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all carcasses washed ashore. Stranding events illustrate the vulnerability of Kemp's ridley and loggerhead turtles to the impacts of human activities in nearshore Gulf of Mexico waters as well (TEWG 1998). While many of the stranded turtles observed in recent years in Texas and Louisiana have been incidentally taken in the shrimp fishery, other sources of mortality, such as those observed in the northeastern and southeastern Atlantic zones, exist in these waters.

Critical Habitat. No critical habitat has been designated for the Kemp's ridley turtle.

Smalltooth Sawfish

All modern sawfish belong to the Suborder Pristoidea, Family Pristidae, and Genus *Pristis*. Although they are rays, sawfish appear to be more shark-like than ray-like, with only the trunk and especially the head ventrally flattened. The snout of all sawfish is extended as a long narrow flattened rostral blade with a series of transverse teeth along either edge, hence the vernacular name. Species in the genus *Pristis* are separable into two groups according to whether the caudal fin has a distinct lower lobe or not. The smalltooth sawfish, *Pristis pectinata*, is the sole known representative on the western side of the Atlantic of the group lacking a defined lower caudal lobe (NMFS, 2000).

Distribution. The smalltooth sawfish has a circumtropical distribution and has been reported from shallow coastal and estuarine habitats. In U.S. waters, *P. pectinata* historically occurred from North Carolina south through the Gulf of Mexico, where it was sympatric with the largetooth sawfish (west and south of Port Arthur, TX) (Adams and Wilson, 1995. It also was an occasional visitor to waters as far north as New York. As with all sawfishes, it is euryhaline, occurring in fresh water, nearshore estuaries and in coastal waters to depths of 25 meters.

Pristis pectinata is the largest of the sawfishes, reported to reach 760 cm while more commonly growing to 550 cm (Last and Stevens 1994). Bigelow and Schroeder (1953) reported litter size of 15-20 embryos. Overall, life history parameters for this species are largely unknown.

Smalltooth sawfish were once common in Florida as detailed by the Final Smalltooth Sawfish Recovery Plan (NMFS, 2009) and are very rarely reported in southeast Florida. Their core range extends along the Everglades coast from the Ten Thousand Islands to Florida Bay, with moderate occurrence in the Florida Keys and at the mouth of the Caloosahatchee River. Outside of these areas, sawfish are rarely encountered and appear to be relatively rare (Simpfendorfer, 2006). It does not appear to be a coincidence that the core range of smalltooth sawfish corresponds to the section of Florida with the smallest amount of coastal habitat modification.

In the United States, smalltooth sawfish are generally a shallow water fish of inshore bars, mangrove edges, and seagrass beds, but are occasionally found in deeper coastal waters. Records indicate that smalltooth sawfish have been found in the lower reaches of the St. Johns River and the Indian River lagoonal system. Individuals have also historically been reported to migrate northward along the Atlantic seaboard in the warmer months.

Updated collection records from the Florida Museum of Natural History of the University of Florida include 13 records of *P. pectinata* from 1912 to 1998 (with one record not dated). Nine of these specimens were recorded from the Gulf of Mexico off Florida, three came from the Atlantic side of Florida, and one animal was caught in Pacific waters off Ecuador. Three additional records of smalltooth sawfish from the Atlantic coast of Florida have yet to be cataloged in this collection: one specimen is from 1979; the second is not dated (the Museum received both these fish from the Harbor Branch Oceanographic Institute); a third specimen was landed May 22, 1998 from the Indian River (Burgess, pers. comm.). There are eight reports of smalltooth sawfish along the Florida east coast in the 1990's, most from coastal rather than lagoonal areas.

General Human-related impacts. The principal habitats for smalltooth sawfish in the southeast U.S. are the shallow coastal areas and estuaries, with some specimens moving upriver in freshwater (Bigelow and Schroeder, 1953). The continued urbanization of the southeastern coastal states has resulted in substantial loss of coastal habitat through such activities as agricultural and urban development; commercial activities; dredge and fill operations; boating; erosion and diversions of freshwater run-off (SAFMC, 1998). Smalltooth sawfish may be especially vulnerable to coastal habitat degradation due to their affinity to shallow, estuarine systems. With the K-selected life history strategy of smalltooth sawfish, including slow growth, late maturation, and low fecundity, long-term commitments to habitat protection are necessary

for the eventual recovery of the species.

A complete review of the factors contributing to the decline of the smalltooth sawfish can be found in the "Status Review of Smalltooth Sawfish (*Pristis pectinata*)", (NMFS, 2000) and will not be repeated in detail here.

Status and Trends. The smalltooth sawfish was added to the list of species as candidates under the ESA in 1991, removed in 1997, and placed back on the list again in 1999. In November 1999, NMFS received a petition from the Center of Marine Conservation requesting that this species be listed as endangered under the ESA. NMFS completed a status review for smalltooth sawfish in December 2000, and published a proposed rule to list this the U.S. population of this species as endangered under the ESA on April 16, 2001. On April 1, 2003, the National Marine Fisheries Service (NOAA Fisheries) announced its final determination to list smalltooth sawfish as an endangered species under the Endangered Species Act (ESA).

According to NMFS (2000) "The U.S. DPS of smalltooth sawfish has experienced a ninety percent curtailment of its range and severe declines in abundance. Agriculture, urban development, commercial activities, channel dredging, boating activities, and the diversion of freshwater run-off have resulted in the destruction and modification of smalltooth habitat throughout the southeastern U.S. Although habitat degradation is not likely the primary reason for the decline of smalltooth sawfish abundance and their contracted distribution, it has likely been a contributing factor. Over 50% of the U.S. human population lives within fifty miles of the ocean or Great Lakes. Migration to the coastlines for home, livelihood or recreation is predicted to increase by the year 2010 (National Ocean Service, 2000). Increases in coastal human populations will likely result in additional losses of marine habitats and increased pollution, further threatening the survival of smalltooth sawfish."

Simpfendorfer (2000) used a demographic approach to estimate intrinsic rate of natural increase and population doubling time. Since there are very limited life history data for smalltooth sawfish, much of the data (e.g. reproductive periodicity, longevity and age-at-maturity) were inferred from the more well-known largetooth sawfish. The litter size of smalltooth sawfish in the literature is given as 15 – 20 and Simpfendorfer used a mean of 17.5. However, the data on which this litter size is based are somewhat dubious. To account for uncertainty in the life-history parameters several different scenarios were tested, covering longevities from 30 to 70 years and ages-at-maturity from 10 to 27 years. The results indicated that the intrinsic rate of population increase ranged from 0.08/year to 0.13/ year, and population-doubling times ranged from 5.4 years to 8.5 years. These models assume the literature value for litter size is correct; doubling times would be longer if litter sizes are more in the range observed for largetooth sawfish (1 to 13, with a mean of 7.3). Simpfendorfer concluded:

> The estimated population doubling times for smalltooth sawfish indicate that the recovery times for this population will be very long. There are no data available on the size of the remaining populations, but anecdotal information indicates that smalltooth sawfish survive today in small fragmented areas where the impact of humans, particularly from net fishing, has been less severe. Fragmenting of the population will increase the time that it takes for recovery since the demographic models used in the study above assume a

single inter-breeding population. The genetic effects of recovery from very small population sizes may also impact conservation efforts. It is likely that even if an effective conservation plan can be introduced in the near future, recovery to a level where the risk of extinction is low will take decades, while recovery to pre-European settlement levels would probably take several centuries.

Humpback Whale

Species description and distribution. Humpback whales typically migrate between tropical/sub-tropical and temperate/polar latitudes. Humpback whales feed on krill and small schooling fish on their summer grounds. The whales occupy tropical areas during winter months when they are breeding and calving, and polar areas during the spring, summer, and fall, when they are feeding, primarily on small schooling fish and krill (Caldwell and Caldwell 1983).

In the Atlantic Ocean, humpback whales feed in the northwestern Atlantic during the summer months and migrate to calving and mating areas in the Caribbean. Six separate feeding areas are utilized in northern waters after their return. This area will not be affected because it is within the biologically important area defined by the 200-m (656-ft) isobath on the North American east coast. Humpback whales also use the mid-Atlantic as a migratory pathway and apparently as a feeding area, at least for juveniles. Since 1989, observations of juvenile humpbacks in that area have been increasing during the winter months, peaking January through March (Swingle *et al.* 1993). Biologists theorize that non-reproductive animals may be establishing a winter-feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for the associated prey. Humpback whales have also been observed feeding on krill.

Life History. Humpback whale reproductive activities occur primarily in winter. They become sexually mature at age four to six. Annual pregnancy rates have been estimated at about 0.40-0.42 (NMFS unpublished and Nishiwaki 1959). Cows will nurse their calves for up to 12 months. The age distribution of the humpback whale population is unknown, but the portion of calves in various populations has been estimated at about 4B12% (Chittleborough 1965, Whitehead 1982, Bauer 1986, Herman *et al.* 1980, and Clapham and Mayo 1987).

The information available does not identify natural causes of death among humpback whales or their number and frequency over time, but potential causes of natural mortality are believed to include parasites, disease, predation (killer whales, false killer whales, and sharks), biotoxins, and entrapment in ice.

Humpback whales exhibit a wide range of foraging behaviors, and feed on a range of prey types including small schooling fishes, euphausiids, and other large zooplankton. Fish prey in the North Pacific include herring, anchovy, capelin, pollack, Atka mackerel, eulachon, sand lance, pollack, Pacific cod, saffron cod, arctic cod, juvenile salmon, and rockfish. In the waters west of the Attu Islands and south of Amchitka Island, Atka mackerel were preferred prey of humpback

whales (Nemoto 1957). Invertebrate prey includes euphausiids, mysids, amphipods, shrimps, and copepods.

Diving and social behavior. In Hawaiian waters, humpback whales remain almost exclusively within the 1820 m isobath and usually within 182 m. Maximum diving depths are approximately 150 m (492 ft) (but usually <60 m [197 ft]), with a very deep dive (240 m [787 ft]) recorded off Bermuda (Hamilton *et al.* 1997). They may remain submerged for up to 21 min (Dolphin 1987). Dives on feeding grounds ranged from 2.1-5.1 min in the north Atlantic (Goodyear unpubl. manus.). In southeast Alaska average dive times were 2.8 min for feeding whales, 3.0min for non-feeding whales, and 4.3 min for resting whales (Dolphin 1987). In the Gulf of California humpback whale dive times averaged 3.5 min (Strong 1989). Because most humpback prey is likely found above 300 m depths most humpback dives are probably relatively shallow.

Clapham (1986) reviewed the social behavior of humpback whales. They form small stable groups during the breeding season. During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of times. There is good evidence of some territoriality on feeding grounds (Clapham 1994, 1996), and on wintering ground (Tyack 1981). On the breeding grounds males sing long complex songs directed towards females, other males or both. The breeding season can best be described as a floating lek or male dominance polygyny (Clapham 1996). Intermale competition for proximity to females can be intense as expected by the sex ratio on the breeding grounds that may be as high as 2.4:1.

Vocalizations and hearing. Humpbacks produce a wide variety of sounds. During the breeding season males sing long, complex songs, with frequencies in the 25-5000 Hz range and intensities as high as 181 dB (Payne 1970; Winn *et al.* 1970a; Thompson *et al.* 1986). Source levels average 155 dB and range from 144 to 174 dB (Thompson *et al.* 1979). The songs appear to have an effective range of approximately six to 12 miles (10 to 20 km). Animals in mating groups produce a variety of sounds (Tyack 1981; Tyack and Whitehead 1983, Silber 1986). Sounds are produced less frequently on the summer feeding grounds. Feeding groups produce distinctive sounds ranging from 20 Hz to 2 kHz, with median durations of 0.2-0.8 sec and source levels of 175-192 dB (Thompson *et al.* 1986). These sounds are attractive and appear to rally animals to the feeding activity (D=Vincent *et al.* 1985; Sharpe and Dill 1997). In summary, humpback whales produce at least three kinds of sounds: 1) complex songs with components ranging from at least 20Hz B 4 kHz with estimated source levels from 144 B 174 dB, which are mostly sung by males on the breeding grounds (Payne 1970; Winn *et al.* 1970a; Richardson *et al.* 1995); 2) social sounds in the breeding areas that extend from 50Hz B more than 10 kHz with most energy below 3kHz (Tyack and Whitehead 1983, Richardson *et al.* 1995); and 3) Feeding area vocalizations that are less frequent, but tend to be 20Hz B 2 kHz with estimated sources levels in excess of 175 dB re 1 µPa-m (Thompson *et al.* 1986; Richardson *et al.* 1995). Sounds often associated with possible aggressive behavior by males (Tyack 1983; Silber 1986) are quite different from songs, extending from 50 Hz to 10 kHz (or higher), with most energy in components below 3 kHz. These sounds appear to have an effective range of up to 9 km (Tyack and Whitehead 1983). A general description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. Humpback whales respond to low frequency sound. Humpback whales have been known to react to low frequency industrial noises at estimated

received levels of 115 B 124 dB (Malme *et al.* 1985), and to conspecific calls at received levels as low as 102dB (Frankel *et al.* 1995). Humpback whales apparently reacted to 3.1 B 3.6 kHz sonar by changing behavior (Maybaum 1990 1993). Malme *et al.* (1985) found no clear response to playbacks of drill ship and oil production platform noises at received levels up to 116dB re 1 µPa. Studies of reactions to airgun noises were inconclusive (Malme *et al.* 1985). Humpback whales on the breeding grounds did not stop singing in response to underwater explosions (Payne and McVay 1971). Humpback whales on feeding grounds did not alter short-term behavior or distribution in response to explosions with received levels of about 150dB re 1 µPa/Hz at 350Hz (Lien *et al.* 1993; Todd *et al.* 1996). However, at least two individuals were likely killed by the high intensity, impulsed blasts and had extensive mechanical injuries in their ears (Ketten *et al.* 1993; Todd *et al.* 1996). The explosions may also have increased the number of humpback whales entangled in fishing nets (Todd *et al.* 1996). Frankel and Clark (1998) showed that breeding humpbacks showed only a slight statistical reaction to playback of 60 B 90 Hz bounds with a received level of up to 190 dB. While these studies have shown short-term behavioral reactions to boat traffic and playbacks of industrial noise, the potential for habituation, and thus the long term effects of these disturbances are not known.

Status and Trends. Humpback whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA. Critical habitat has not been designated for the species.

New information has become available on the status and trends of the humpback whale population in the North Atlantic (NMFS, 2001). Although current and maximum net productivity rates are unknown at this time, the population is apparently increasing. It has not yet been determined whether this increase is uniform across all six feeding stocks (Waring *et al. in prep.*). Katona and Beard (1990) estimated the rate of increase at 9.0 percent, while Barlow and Clapham (1997) reported a 6.5 percent rate for the Gulf of Maine using data through 1991. The rate reported by Barlow and Clapham (1997) may roughly approximate the rate of increase for the portion of the population within the action area. The best estimate of abundance for the North Atlantic humpback whale population is 10,600 animals (CV=0.067; Smith *et al.* 1999), while the minimum population estimate used for NMFS management purposes is 10,019 animals (CV = 0.067; Waring *et al. in prep.*). The Northeast Fisheries Science Center is considering recommending that NMFS identify the Gulf of Maine feeding stock as the management stock for this population in U.S. waters. A population estimate for the Gulf of Maine portion of the population is not available.

Threats. In the 1990s, no more than 3 humpback whales were killed annually in U.S. waters by commercial fishing operations in the Atlantic and Pacific Oceans. Between 1990 and 1997, no humpback whale deaths have been attributed to interactions with groundfish trawl, longline and pot fisheries in the Bering Sea, Aleutian Islands, and Gulf of Alaska (Hill and DeMaster 1999). Humpback whales have been injured or killed elsewhere along the mainland U.S. and Hawaii (Barlow *et al.* 1997). In 1991, a humpback whale was observed entangled in longline gear and released alive (Hill *et al.* 1997). In 1995, a humpback whale in Maui waters was found trailing numerous lines (not fishery-related) and entangled in mooring lines. The whale was successfully released, but subsequently stranded and was attacked and killed by tiger sharks in the surf zone.

Humpback whales seem to respond to moving sound sources, such as whale-watching vessels, fishing vessels, recreational vessels, and low-flying aircraft (Beach and Weinrich 1989, Clapham *et al.* 1993, Atkins and Swartz 1989). Their responses to noise are variable and have been correlated with the size, composition, and behavior of the whales when the noises occurred (Herman *et al.* 1980, Watkins *et al.* 1981, Krieger and Wing 1986). Several investigators have suggested that noise may have caused humpback whales to avoid or leave feeding or nursery areas (Jurasz and Jurasz 1979b, Dean *et al.* 1985), while others have suggested that humpback whales may become habituated to vessel traffic and its associated noise. Still other researchers suggest that humpback whales may become more vulnerable to vessel strikes once they habituate to vessel traffic (Swingle *et al.* 1993; Wiley *et al.* 1995).

Many humpback whales are killed by ship strikes along both coasts of the U.S. On the Atlantic coast, 6 out of 20 humpback whales stranded along the mid-Atlantic coast showed signs of major ship strike injuries (Wiley *et al.* 1995). Almost no information is available on the number of humpback whales killed or seriously injured by ship strikes outside of U.S. waters.

Sperm Whale

Species description and distribution. Sperm whales are distributed in the entire world's oceans. Sperm whales have a strong preference for the 3,280 ft (1,000 m) depth contour and seaward. Berzin (1971) reported that they are restricted to waters deeper than 300 m (984 ft), while Watkins (1977) and Reeves and Whitehead (1997) reported that they are usually not found in waters less than 3,281 ft (1,000m) deep. While deep water is their typical habitat, sperm whales have been observed near Long Island, NY, in waters of 41-55 m (135-180 ft) (Scott and Sadove 1997). When found relatively close to shore, sperm whales are usually associated with sharp increases in bottom depth where upwelling occurs and biological production is high, implying the presence of a good food supply (Clarke 1956). They can dive to depths of at least 2000 m (6562 ft), and may remain submerged for an hour or more (Watkins *et al.* 1993). Sperm whales feed primarily on buoyant, relatively slow-moving squid (Clark *et al.* 1993), but may also eat a variety of fish, including salmon (*Oncorhynchus* spp.), rockfish (*Sebastes* spp.), and lingcod (*Ophiodon elongatus*) (Caldwell and Caldwell 1983).

In the Atlantic Ocean, NMFS' most recent stock assessment report notes that sperm whales are distributed in a distinct seasonal cycle, concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight. There is also a very large population of sperm whales found in the Gulf of Mexico near the Mississippi River delta.

Life History. Female sperm whales take about 9 years to become sexually mature (Kasuya 1991, as cited in Perry *et al.* 1999). Male sperm whales take between 9 and 20 years to become sexually mature, but will require another 10 years to become large enough to successfully compete for breeding rights (Kasuya 1991). Adult females give birth after about 15 months gestation and nurse their calves for 2 - 3 years. The calving interval is estimated to be about four to six years (Kasuya 1991). The age distribution of the sperm whale population is unknown, but sperm whales are believed to live at least 60 years (Rice 1978). Estimated annual mortality rates

of sperm whales are thought to vary by age, but previous estimates of mortality rate for juveniles and adults are now considered unreliable (IWC 1980, as cited in Perry *et al.* 1999). Sperm whales are known for their deep foraging dives (in excess of 3 km). They feed primarily on mesopelagic squid, but also consume octopus, other invertebrates, and fish (Tomilin 1967, Tarasevich1968, Berzin 1971). Perez (1990) estimated that their diet in the Bering Sea was 82% cephalopods (mostly squid) and 18% fish. Fish eaten in the North Pacific included salmon, lantern fishes, lancetfish, Pacific cod, pollack, saffron cod, rockfishes, sablefish, Atka mackerel, sculpins, lumpsuckers, lamprey, skates, and rattails (Tomilin 1967, Kawakami 1980, Rice 1986b). Sperm whales taken in the Gulf of Alaska in the 1960s had fed primarily on fish. Daily food consumption rates for sperm whales ranges from 2 - 4% of their total body weight (Lockyer 1976b, Kawakami 1980). Potential sources of natural mortality in sperm whales include killer whales and papilloma virus (Lambertson *et al.* 1987).

Diving and social behavior. Sperm whales are likely the deepest and longest diving mammals. Typical foraging dives last 40 min and descend to about 400m followed by approximately 8 min of resting at the surface (Gordon 1987; Papastavrou et al. 1989). However, dives of over 2 hr and as deep as 3,000 m have been recorded (Clarke 1976; Watkins et al. 1985). Descent rates recorded from echosounders were approximately 1.7m/sec and nearly vertical (Goold and Jones 1995). There are no data on diurnal differences in dive depths in sperm whales. However, like most diving vertebrates for which there is data (e.g. rorqual whales, fur seals, chinstrap penguins), sperm whales probably make relatively shallow dives at night when organisms from the ocean's deep scattering layers move toward the ocean's surface.

The groups of closely related females and their offspring develop dialects specific to the group (Weilgart and Whitehead 1997) and females other than birth mothers will guard young at the surface (Whitehead 1996b) and will nurse young calves (Reeves and Whitehead 1997).

Vocalizations and hearing. Sperm whales produce loud broadband clicks from about 0.1 to 20 kHz (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995). These have source levels estimated at 171 dB re 1 µPa (Levenson 1974). Current evidence suggests that the disproportionately large head of the sperm whale is an adaptation to produce these vocalizations (Norris and Harvey 1972; Cranford 1992; but see Clarke 1979). This suggests that the production of these loud low frequency clicks is extremely important to the survival of individual sperm whales. The function of these vocalizations is relatively well studied (Weilgart and Whitehead 1993, 1997; Goold and Jones 1995). Long series of monotonous regularly spaced clicks are associated with feeding and are thought to be produced for echolocation. Distinctive, short, patterned series of clicks, called codas, are associated with social behavior and intragroup interactions; they are thought to facilitate intra-specific communication, perhaps to maintain social cohesion with the group (Weilgart and Whitehead 1993).

A general description of the anatomy of the ear for cetaceans is provided in the description of the blue whale above. The only data on the hearing range of sperm whales are evoked potentials from a stranded neonate (Carder and Ridgway 1990). These data suggest that neonatal sperm whales respond to sounds from 2.5-60 kHz. Sperm whales have been observed to frequently stop echolocating in the presence of underwater pulses made by echosounders and submarine sonar (Watkins and Schevill 1975; Watkins *et al.* 1985). They also stop vocalizing for brief periods

when codas are being produced by other individuals, perhaps because they can hear better when not vocalizing themselves (Goold and Jones 1995). Sperm whales have moved out of areas after the start of air gun seismic testing (Davis *et al.* 1995). Seismic air guns produce loud, broadband, impulsive noise (source levels are on the order of 250 dB) with shots at every 15 seconds, 240 shots per hour, and 24 hours per day during active tests. Because they spend large amounts of time at depth and use low frequency sound sperm whales are likely to be susceptible to low frequency sound in the ocean (Croll *et al* 1999). Furthermore, because of their apparent role as important predators of mesopelagic squid and fish, changes in their abundance could affect the distribution and abundance of other marine species.

Status and Trends. Sperm whales have been protected from commercial harvest by the IWC since 1981, although the Japanese continued to harvest sperm whales in the North Pacific until 1988 (Reeves and Whitehead 1997). Sperm whales were listed as endangered under the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA. Critical habitat has not been designated for sperm whales.

The best abundance estimate that is currently available for the western North Atlantic sperm whale population is 2,698 (CV=0.67) animals, and the minimum population estimate used for NMFS management purposes is 1,617 (CV=0.67) (Waring *et al. in prep.*). Due to insufficient data, no information is available on population trends at this time for the western North Atlantic sperm whale stock.

Threats. In U.S. waters in the Pacific, sperm whales are known to have been incidentally taken only in drift gillnet operations, which killed or seriously injured an average of 9 sperm whales per year from 1991-1995 (Barlow *et al.* 1997). Interactions between longline fisheries and sperm whales in the Gulf of Alaska have been reported over the past decade (Rice 1989, Hill and DeMaster 1999). Observers aboard Alaskan sablefish and halibut longline vessels have documented sperm whales feeding on fish caught in longlines in the Gulf of Alaska. During 1997, the first entanglement of a sperm whale in Alaska's longline fishery was recorded, although the animal was not seriously injured (Hill and DeMaster 1998). The available evidence does not indicate sperm whales are being killed or seriously injured as a result of these interactions, although the nature and extent of interactions between sperm whales and long-line gear is not yet clear.

Johnson's Seagrass

Species Description. Johnson's seagrass was listed as threatened under the ESA on September 14, 1998 based on the results of fieldwork and a status review initiated in 1990 and is the first marine plant ever listed. Kenworthy (1993, 1997, 1999) discusses the results of the field studies and summarizes an extensive literature review and associated interviews regarding the status of Johnson's seagrass.

The species has only been found growing along approximately 200 km of coastline in southeastern Florida from Sebastian Inlet, Indian River County to northern Key Biscayne. This narrow range and apparent endemism indicates that Johnson's seagrass has the most limited geographic distribution of any seagrass in the world.

Johnson's seagrass occurs in dynamic and disjunct patches throughout its range. Growth appears to be rapid and leaf pairs have short life spans while horizontally spreading from dense apical meristems (Kenworthy 1997). Kenworthy suggested that horizontal spreading rapid growth pattern and a high biomass turnover could explain the dynamic patches observed in distribution studies. New information reviewed in Kenworthy (1999, 1997) confirms *H. johnsonii's* limited geographic distribution in patchy and vertically disjunct areas between Sebastian Inlet and northern Biscayne Bay. Surveys conducted by NMFS and Florida staff in Biscayne Bay, Florida Bay, the Florida Keys, outer Florida Bay, Puerto Rico, and the Virgin Islands provided no verifiable sightings of Johnson's seagrass outside of the range already reported.

Extent of critical habitat. The northern and southern ranges of Johnson's seagrass are defined as Sebastian Inlet and central Biscayne Bay, respectively. These limits to the species' range have been designated as critical habitat for Johnson's seagrass. Within its range, Johnson's seagrass critical habitat designations have been designated for 10 areas: a portion of the Indian River Lagoon, north of the Sebastian Inlet Channel; a portion of the Indian River Lagoon, south of the Sebastian Inlet Channel; a portion of the Indian River Lagoon near the Fort Pierce Inlet; a portion of the Indian River Lagoon, north of the St. Lucie Inlet; a portion of Hobe Sound; a site on the south side of Jupiter Inlet; a site in central Lake Worth Lagoon; a site in Lake Worth Lagoon, Boynton Beach; a site in Lake Wyman, Boca Raton; and a portion of Biscayne Bay. There is no designated critical habitat within the action area.

Life History

Reproductive strategy

The species is perennial and may spread even during winter months under favorable conditions (Virnstein *et al.* 1997). 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). Searches throughout the range of Johnson's seagrass have produced the same results, suggesting that the species does not reproduce sexually or that the male flowers are difficult to observer 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, suggesting that inlet conditions are qualitatively better for flowering than conditions further inshore (Kenworthy pers. comm. 1998). It is possible that male flowers, if they exist, occur near inlets as well. Maintenance of good water quality around inlets may be essential for promoting flowering in the Johnson's seagrass population.

Niche

The essential features of habitat appear to be adequate water quality, salinity, water clarity and stable sediments free from physical disturbance. Important habitat characteristics include shallow intertidal as well as deeper subtidal zones (2-5 m). Water transparency appears to be critical for Johnson's seagrass, limiting its distribution at depth to areas of suitable optical water quality (Kenworthy 1997). In areas in which long-term poor water and sediment quality have existed until recently, such as Lake Worth Lagoon, *H. johnsonii* appears to occur in relatively higher abundance perhaps due to the previous inability of the larger species to thrive. These

studies support unconfirmed previous observations that suspended solids and tannin, which reduce light penetration and water clarity, may be important factors limiting seagrass distribution. Good water clarity is essential for *Halophila johnsonii* growth in deeper waters.

Johnson's seagrass occurs over varied depths, environmental conditions, salinities, and water quality. In tidal channels *H. johnsonii* is found in coarse sand substrates, although it has been found growing on sandy shoals, in soft mud near canals and rivers where salinity many fluctuate widely (Virnstein *et al.* 1997). Virnstein has called Johnson's seagrass a "perennial opportunistic species." Within his study areas in the Indian River Lagoon, *H. johnsonii* was found by itself, with other seagrass species, in the intertidal, and (more commonly) at the deep edge of some transects in water depths of up to 180 cm. *H. johnsonii* was found shallowly rooted on sandy shoals, in soft mud, near the mouths of canals, rivers and in shallow and deep water (Virnstein *et al.* 1997). Additionally, recent studies have documented large patches of Johnson's seagrass on flood deltas just inside Sebastian Inlet, as well as far from the influence of inlets (reported at the workshop discussed in Kenworthy, 1997). These sites encompass a wide variety of salinities, water quality, and substrates.

Competitors:
Halophila johnsonii appears to be outcompeted in ideal seagrass habitats where environmental conditions permit the larger species to thrive (Virnstein *et al.* 1997, Kenworthy 1997).

Population Dynamics
Population stability
A factor leading to the listing of *H. johnsonii* is its rareness within its extremely restricted geographic range. Johnson's seagrass is characterized by small size (it is the smallest of all of the seagrasses found within its range, averaging about 3 cm in height), fragile rhizome structure and associated high turnover rate, and is apparently reliant on vegetative means to reproduce, grow and migrate across the sea bottom. These factors make Johnson's seagrass extremely vulnerable to human or environmental impacts by reducing its capacity to repopulate an area once removed. The species and its habitat are impacted by human-related activities throughout the length its range, including bridge construction and dredging, and the species' threatened status produces new and unique challenges for the management of shallow submerged lands. Vessel traffic resulting in propeller and anchor damage, maintenance dredging, dock and marine construction, water pollution, and land use practices could require special management within critical habitat.

Population (genetic) variability:
The Boca Raton and Boynton Beach sites proposed for critical habitat designation have populations that are distinguished by a higher index of genetic variation than any of the central and northern populations examined to date (Kenworthy, 1999). These two sites represent a genetically semi-isolated group that could be the reservoir of a large part of the overall genetic variation found in the species. Information is still lacking on the geographic extent of this genetic variability.

Status and Distribution. Kenworthy (1997, 1999) summarized the newest information on Johnson's seagrass biology, distribution, and abundance and confirmed the limited range and

rareness of this species within its range. Additionally, the apparent restriction of propagation through vegetative means suggests that colonization between broadly disjunct areas is likely difficult, suggesting that the species is vulnerable to becoming endangered if it is removed from large areas within its range by natural or anthropogenic means. Human impacts to Johnson's seagrass and its habitat include: (1) Vessel traffic and the resulting propeller dredging and anchor mooring; (2) dredging; (3) dock and marina construction and shading from these structures; (4) water pollution; and (5) land use practices including shoreline development, agriculture, and aquaculture.

Activities associated with recreational boat traffic account for the majority of human use associated with the proposed critical habitat areas. The destruction of the benthic community due to boating activities, propeller dredging, anchor mooring, and dock and marina construction was observed at all sites during a study by NMFS from 1990 to 1992. These activities severely disrupt the benthic habitat, breaching root systems, severing rhizomes, and significantly reducing the viability of the seagrass community. Propeller dredging and anchor mooring 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. Trampling of seagrass beds, a secondary effect of recreational boating, also disturbs seagrass habitat. Populations of Johnson's seagrass inhabiting shallow water and water close to inlets, where vessel traffic is concentrated, will be most affected.

The constant sedimentation patterns in and around inlets require frequent maintenance dredging, which could either directly remove essential seagrass habitat or indirectly affect it by redistributing sediments, burying plants and destabilizing the bottom structure. 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 plant, fragmentation of habitat, and shading. Docking facilities that, upon meeting certain provisions, are exempt from state permitting also contribute to loss of Johnson's seagrass through construction impacts and shading. Fixed add-ons to exempt docks (such as finger piers, floating docks, or boat lifts) have recently been documented as an additional source of seagrass loss due to shading (Smith and Mezich, 1999).

Decreased water transparency caused by suspended sediments, water color, and chlorophylls could have significant detrimental effects on the distribution and abundance of the deeper water populations of Johnson's seagrass. A distribution survey in Hobe and Jupiter Sounds indicates that the abundance of this seagrass diminishes in the more turbid interior portion of the lagoon where reduced light limits photosynthesis.

Other areas of concern include seagrass beds located in proximity to rivers and canal mouths where low salinity, highly colored water is discharged. Freshwater discharge into areas adjacent to seagrass beds may provoke physiological stress upon the plants by reducing the salinity levels. Additionally, colored waters released into these areas reduce the amount of sunlight available for photosynthesis by rapidly attenuating shorter wavelengths of Photosynthetically Active Radiation.

Continuing and increasing degradation of water quality due to increased land use and water management threatens the welfare of seagrass communities. Nutrient overenrichment caused by inorganic and organic nitrogen and phosphorous loading via urban and agricultural land run-off stimulates increased algal growth that may smother Johnson's seagrass, shade rooted vegetation, and diminish the oxygen content of the water. Low oxygen conditions have a demonstrated negative impact on seagrasses and associated communities.

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 authorization by the COE for beach nourishment, dredging, and related activities including construction of docks and marinas; bridge construction projects funded by the Federal Highway Administration; actions by the U.S. Environmental Protection Agency and the COE to manage freshwater discharges into waterways; regulation of vessel traffic by the U.S. Coast Guard; management of national refuges and protected species by the U.S. Fish and Wildlife Service; management of vessel traffic (and other activities) by the U.S. Navy; authorization of state coastal zone management plans by NOAA's National Ocean Service, and management of commercial fishing and protected species by NMFS.

Rangewide trend:
Lamentably, there is currently insufficient information to clearly determine trends in the Johnson's seagrass population, which was described in 1980 and has only been extensively studied during the 1990s. Generally, seagrasses within the range of Johnson's seagrass have declined in some areas and increased in others. Where multiyear mapping studies have been conducted within the Indian River Lagoon, recent increases in Johnson's seagrass have been noted but may be attributed in part to the recent increase in search effort and increased familiarity with this species (Virnstein *et al.* 1997). The authors conclude that from 1994 through 1997, no strong seasonal distribution or increases or decreases in abundance or range can be discerned.

Protected Species Surveys within the project area.
Surveys specifically targeting protected species were conducted in the project vicinity for Johnson's seagrass. There is an Environmental Impact Statement (EIS) being prepared concurrently to satisfy NEPA regulations, which will have additional information covering all potentially impacted species. This assessment, literature reviews and consultations with NMFS serve as the basis for this biological assessment and the determination of which listed and protected species under NMFS' jurisdiction are found in the project area.

Sea Turtles
Palm Beach County is within the normal nesting range of three species of sea turtles: the loggerhead (*Caretta caretta*), the green turtle (*Chelonia mydas*), and the leatherback (*Dermochelys coriacea*). The green sea turtle and leatherback sea turtle are both listed under the U. S. Endangered Species Act, 1973 and Chapter 370, F.S. The loggerhead turtle is listed as a threatened species (Burney and Margolis, 1999). A summary of sea turtle nesting in Palm Beach County can be found in Tables 1, 2 and 3 in the species description section of this assessment. The waters offshore of Palm Beach County are also habitat used for foraging and shelter for the

three species listed above and possibly the hawksbill turtle (*Eretmochelys imbricata*), and the Kemp's ridley turtle (*Lepidochelys kempii*) (USACE, 2000). Table lists the number of sea turtle nests recorded by Palm Beach County for the beach placement area south of the south jetty (http://www.co.palm-beach.fl.us/erm/permitting/sea-turtles/nesting.htm).

Table 4. Sea Turtle Nesting Data for Beach Placement Area South of the South Jetty.

Year	Loggerhead	Green	Leatherback
2006	155	9	10
2007	99	9	8
2008	161	5	8
2009	136	3	15
2010	289	4	6
Mean	168	6	9.4

Johnson's Seagrass

Johnson's seagrass occurs within the project area, specifically in the areas south of the turning basin and north of the project around Peanut Island. Abundance and density values vary and the species is generally associated with *H. decipiens*. From a 2011 survey, Johnson's seagrass was present in 16 of 28 transects surveyed, with abundance and density estimated using the Braun-Blanquet abundance scale (Table 1).

Table 5. Braun-Blanquet Abundance Scale Values

0	Species absent from quadrat
0.1	Species represented by a solitary short shoot, <5% cover
0.5	Species represented by a few (< 5%) short shoots, <5% cover
1.0	Species represented by many (> 5%) short shoots, <5% cover
2.0	Species represented by many (> 5%) short shoots, 5% - 25% cover
3.0	Species represented by many (> 5%) short shoots, 25%- 50% cover
4.0	Species represented by many (> 5%) short shoots, 50%- 75% cover
5.0	Species represented by many (> 5%) short shoots 75%-100% cover

Abundance values for *H. johnsonii* ranged from 0.1 to 1.38 among transects. The average abundance for *H. johnsonii* was 0.6 (< 5% cover). *H. johnsonii* had the lowest abundance values of all species over all transects. Density for *H. johnsonii* was the highest of all species in the study area, with an average value of 0.17. The range of density values for *H. johnsonii* was 0 to 0.57.

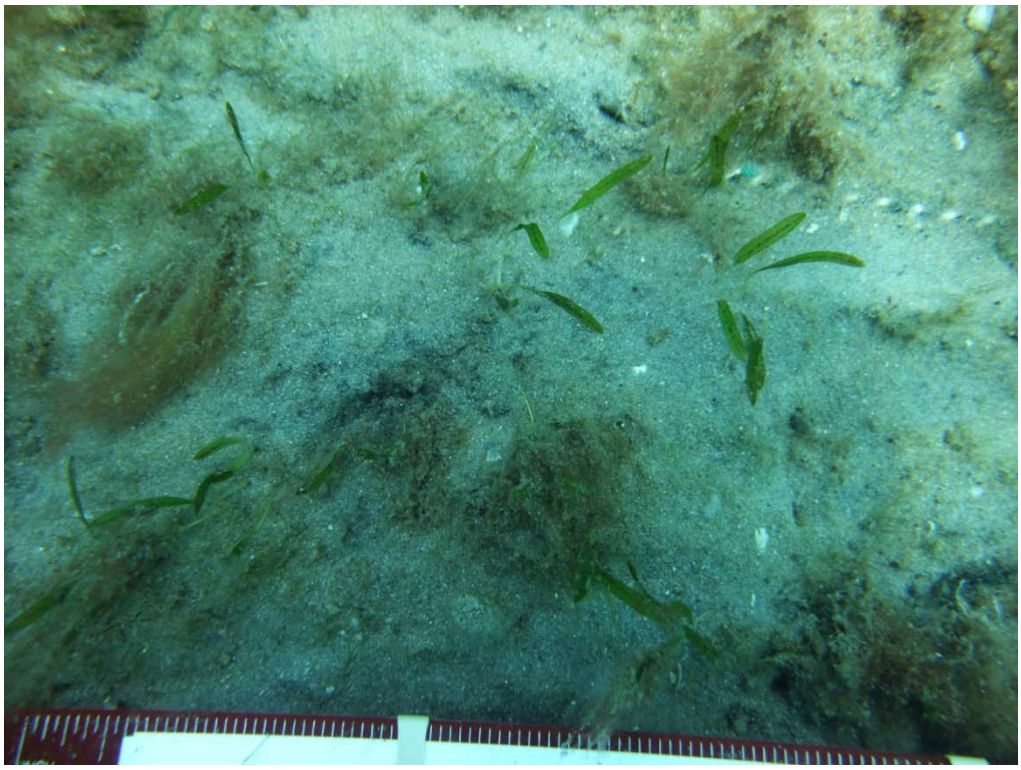


Figure 4. *Halophila johnsonii* (Braun Blanquet score 1 (<5% cover).

Smalltooth sawfish

This species inhabits softbottom estuarine habitats in depths generally less than 30 feet. Its former range in U.S. waters extended from Texas through Maryland. Currently, few are observed outside peninsular Florida. At least one recorded observation has occurred within the vicinity of Palm Beach County (NMFS, 2000). Populations likely decreased due to a low intrinsic rate of natural increase, the long interval to time of reproduction, and human impacts, most notably overfishing, incidental take in nets (due in part to its body size and unusual morphology), and habitat loss (development of shoreline and nearshore habitats).

Humpback and Sperm Whales

These species are found offshore of the project area in deepwater beyond the third reef line. Sperm whales may be found year round near the project area, while humpbacks are found seasonally during their migration to and from breeding grounds in the Caribbean.

Protective Measures Taken in the Project Area as Part of the Proposed Action

Consideration of Plans and Methods to Minimize/Avoid Environmental Impacts. Conservation measures were a major focus during the plan formulation phase for the proposed project. Avoiding and minimizing some potential impact areas significantly decreased the risk of indirect effects on managed and protected species, and a great deal of consideration was given to the utilization of rock removal methods to decrease the likelihood of incidental take, injury, and behavioral modification of protected species. While efforts to reduce impacts to habitats were fruitful, it was determined that if rock removal was needed, options not involving blasting were

possibly more detrimental to populations and individuals of protected species. One alternative option was the use of a punchbarge/piledriver to break rock. However, it was determined that the punchbarge, which would work for 12-hour periods, strikes the rock approximately once every 60-seconds. This constant pounding would serve to disrupt animal behavior in the area. Using the punchbarge would also extend the length of the project, thus increasing any potential impacts to all fish and wildlife resources in the area. The Corps believes that blasting is actually the least environmentally damaging method for removing the rock from within the project. Each blast will last no longer than five (5) seconds in duration, and may even be as short as 2 seconds each. Additionally, the blasts are confined in the rock substrate. Boreholes are drilled into the rock below, the blasting charge is set, and then the chain of explosives is detonated. Because the blasts are confined within the rock structure, the distance of the blast effects are reduced as compared to an unconfined blast (see discussion below).

Development of Protective Measures. The proposed project includes measures to conserve sperm and humpback whale, sea turtles and smalltooth sawfish. Foremost among the measures are protective actions to ensure that sea turtles and smalltooth sawfish are not killed and whales are not harassed due to blasting activities, if in fact such methods are required as a part of the overall dredging operation. Development of the measures involved consideration of past practices and operations, anecdotal observations, and the most current scientific data. The discussion below summarizes the development of the conservation measures, which, although developed for marine mammals, will also be utilized to protect such species as sea turtles and smalltooth sawfish.

Blasting

To achieve the deepening of the Lake Worth Iinlet pretreatment of the rock areas may be required. Blasting is anticipated to be required for some or all of the deepening and extension of the channel, where standard construction methods are unsuccessful. Current geotechnical investigations have shown the majority of rock to be inside the harbor in the turning basin, not in the entrance channel. The work may be completed in the following manner:

1. Contour dredging with either bucket, hydraulic or excavator dredges to remove material that can be dredged conventionally and determine what areas require blasting.

2. Pre-treating (blasting) the remaining above grade rock, drilling and blasting the "Site Specific" areas where rock could not be conventionally removed by the dredges.

3. Excavating with bucket, hydraulic or excavator dredges to remove the pre-treated rock areas to grade.

All drilling and blasting will be conducted in strict accordance with local, state and federal safety procedures. Marine Wildlife Protection, Protection of Existing Structures, and Blasting Programs coordinated with federal and state agencies.

Based upon industry standards and USACE, Safety & Health Regulations, the blasting program may consist of the following:

The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock. The blasting would consist of up to 3 blasts per day, preparing for removal of approximately 1500 cubic yards per blast.

The following safety conditions are standard in conducting underwater blasting:

- Drill patterns are restricted to a minimum of 8 ft separation from a loaded hole.
- Hours of blasting are restricted from 2 hours after sunrise to 1 hour before sunset to allow for adequate observation of the project area for protected species.
- Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
- Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
- The blast design will consider matching the energy in the "work effort" of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.

Because of the potential duration of the blasting and the project area as habitat for listed and threatened species, a number of issues will need to be addressed. One of the key issues is the extent of a safety radius for the protection of marine wildlife. This is the distance from the blast site which any protected species must be in order to commence blasting operations. Ideally the safety radius is large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed

There are a number of methods that can be used to calculate a safety radius. Little published data exists for actual measurements of sub aqueous blasts confined to a rock layer and their impacts to marine mammals or turtles. There is some information on the impacts to fish from similar blasts. Both literature searches and actual observations from similar blasting events will be used as a guide in establishing a safety radius that affords the best protection from lethal harm to marine wildlife. The following will be considered in establishing the radius for blasting inshore of the outer reef:

The U.S. Navy Dive Manual and the FFWCC Endangered Species Watch Manual the safety formula for an uncontrolled blast suspended in the water column, which is as follows:

R = 260 (cube root w)
R = Safety radius
W = Weight of explosives

This formula is a conservative for the blasting being done within Port Everglades, as the blast will be confined within the rock and not suspended in the water column. This formula and plan are consistent with the plans for Miami Harbor Phase II and Miami Harbor GRR that the Corps consulted with NMFS on (I/SER/2002/00178 – September 23, 2002 and F/SER/2002/01094 – February 23, 2003, respectively). In both cases, NMFS found concurred with the Corps' determination that the proposed confined blasting at Miami Harbor "may affect, but is not likely

to adversely affect sea turtles". The Lake Worth Inlet blasting plan will be designed to be consistent with the Miami Harbor projects.

If blasting is required outside the turning basin and into the entrance channel, the Corps proposes to use aerial and passive acoustic surveys to determine if there are sperm or humpback whales within a 1-nautical mile (nm) radius of the project area. In the Biological Opinion for the shock trial of the USS Winston Churchill (DDG-81) (NMFS, 2000b), NMFS required the Navy to establish a zone of 3 nm for acoustic monitoring and 2 nm for aerial monitoring for three 10,000 lb open water unconfined explosions. Blasting for the channel extension will utilize confined blasts drilled into the substrate, and as a result the Corps believes that any acoustic or pressure effects to the project area will be substantially less than those evaluated by NMFS in setting the safety zones for the Churchill tests.

Conservation Measures

It is crucial to balance the demands of the blasting operations with the overall safety of the species. A radius that is excessively large will result in significant delays that prolong the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. Because of these factors, the goal is to establish the smallest radius possible without compromising animal safety and provide adequate observer coverage for whatever radius is agreed upon.

Aerial reconnaissance, where feasible and possible, is critical to support the safety radius selected in addition to boat-based and land support reconnaissance. Additionally, an observer will be placed on the drill barge for the best view of the actual blast zone and to be in direct contact with the blaster in charge.

Prior to implementing a blasting program a Test Blast Program will be completed. The purpose of the Test Blast Program is to demonstrate and/or confirm the following:

- Drill Boat Capabilities and Production Rates
- Ideal Drill Pattern for Typical Boreholes
- Acceptable Rock Breakage for Excavation
- Tolerable Vibration Level Emitted
- Directional Vibration
- Calibration of the Environment

The Test Blast Program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. Each Test Blast is designed to establish limits of vibration and airblast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the Test Blast Program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a

completely engineered procedure for Blasting Plan. During the testing the following data will be used to develop a regression analysis:

- Distance
- Pounds Per Delay
- Peak Particle Velocities (TVL)
- Frequencies (TVL)
- Peak Vector Sum
- Air Blast, Overpressure

Effects of the Action on Protected Species.

As previously stated, the Corps believes that the loggerhead turtle, green turtle, smalltooth sawfish and Johnson's seagrass have the potential to be effected by the proposed dredging project. The project may have the following adverse impacts on listed/protected species are:

- direct effect of blasting in the turning basin.
- direct effect of dredging activities
- indirect effects

Direct Effects

Blasting

Sea turtles

Specific information regarding the likely direct impact of explosives on sea turtles is not available. Studies regarding the impacts of relatively minuscule explosives on humans noted that minor injuries such as small bruises or perforations of the intestinal tract occasionally occur well beyond ranges in which human lung damage could occur (Christian and Gaspin, 1974). Christian and Gaspin (1974) note that these minor injuries could become serious if left unattended. Sea turtles with untreated internal injuries would have increased vulnerability to predators and disease. In the Environmental Impact Statement prepared by the Navy to consider the effects of explosives used in shipshock tests, nervous system damage was cited as a possible impact to sea turtles caused by blasting. Damage of the nervous system could kill sea turtles through disorientation and subsequent drowning. The Navy=s review of previous studies suggested that rigid masses such as bone (or carapace and plastron) could protect tissues beneath them; however, there are no observations available to determine whether the turtles= shells would indeed afford such protection.

Studies conducted by Klima *et al*., (1988) evaluated blasts of only approximately 42 lbs on sea turtles (4 ridleys, 4 loggerheads) placed in surface cages at varying distances from the explosion. Christian and Gaspin=s (1974) estimates of safety zones for swimmers found that, beyond a cavitation area, waves reflected off a surface have reduced pressure pulses; therefore, an animal at shallow depths would be exposed to a reduced impulse. This finding, which considered only very small explosive weights, implies that the turtles in the Klima *et al*. (1988) study would be under reduced effects of the shock wave. Despite this possible lowered level of impact, 5 of 8

turtles were rendered unconscious at distances of 229 to 915 m from the detonation site. Unconscious sea turtles that are not detected, removed and rehabilitated likely have low survival rates.

Blasting will affect nearby finfish and invertebrates and cause short-term changes to the physical characteristics of the benthos. Fish and invertebrates killed or injured by the blasting may provide a short-term enhancement of foraging opportunities for green and loggerhead sea turtles. Through new recruitment and local migrations, finfish and benthic invertebrates are expected eventually to repopulate the affected area. Any modifications of the local area=s environment, as far as sea turtle habitat, are not expected to be significant in the long term.

Smalltooth Sawfish
Blasting rock underwater produces a pressure wave in water that can produce fish mortality. Different types of fish have different mortality thresholds. This depends on whether the fish dwell near the surface, on the bottom, or in between.

The magnitude of the pressure wave generated in greatly affected by the stemming of the blastholes, distance between holes, and the delay time of the holes.

Normally, mortality occurs in the range of 150-psi overpressure for fish. In practice this is a 75-foot to 100-foot radius around the blasting area.

Dredging

Sea Turtles
The effects of hopper dredging on sea turtles on the Atlantic coast were analyzed by NMFS in the 1997 biological opinion entitled "The continued hopper dredging of channels and borrow areas in the southeastern United States". If it is determined that a hopper dredge will be used, the Terms and Conditions of this opinion will be applied to the project. If a cutterhead or clamshell dredge is used, based on a finding in the November 25, 1991 biological opinion between NMFS and the Corps that states:

> "Pipeline dredges are relatively stationary and only influence small areas at any given time. For a turtle to be taken with a pipeline dredge, it would have to approach the cutterhead and be caught in the suction. This type of behavior would appear unlikely, but may be possible. Presently, NMFS has determined that pipeline dredges are unlikely to adversely affect sea turtles".

Based on this determination, the Corps finds that use of a cutterhead dredge may effect, but is not likely to adversely affect sea turtles. If a clamshell dredge is used, there is no suction to capture a sea turtle and the turtle would have to be caught between the two halved of the clamshell. While this is not impossible, it is improbable. The Corps has also determined that use of a clamshell dredge may effect, but is not likely to adversely affect sea turtles.

Smalltooth sawfish
The smalltooth sawfish may be affected by dredging nearshore areas in channels that are currently suitable habitats (areas of sand and/or mud bottoms less than 30 feet in depth) and by blasting if there is an animal present in the blast zone at time of detonations, a stunned or damaged animal may be captured by the clamshell dredge if it could not move out of the way.

Johnson's Seagrass
Dredging will result in the removal of approximately 4 acres of seagrass beds where *H. johnsonii* is the sole constituent or associate of other seagrass species in the areas surrounding the turning basin. This impact will include the direct removal of *H. johnsonii*. Changes in bottom depth through deepening and widening efforts within the Port is expected to make resulting habitats unsuitable for re-colonization of *H. johnsonii*.

Indirect Effects

Sea Turtles
Since beaches of Palm Beach County provide important nesting areas for three sea turtle species, the project area comprises important resources for turtles. Removal of sections of hardbottom and seagrass habitats will eliminate potential foraging habitat for juvenile sea turtles. The reduction in such habitat may slightly decrease the carrying capacity of the region for turtles. Also, since these habitats are also utilized as refugia for hatchling turtles, an increase in predation may be anticipated. Finally, dredge activities and associated disturbances (noise, lights, etc.) may interrupt the movement of turtles swimming toward or away from nesting beaches. In fact, the highest potential impact to sea turtles may be the use of explosives to remove areas of rock within the turning basin or entrance channel. It is extremely likely that both the pressure and noise associated with blasting will physically damage sensory mechanisms and other physiological functions of individual sea turtles.

Johnson's seagrass
Areas of Johnson's seagrass adjacent to construction activities may be temporarily affected by increased turbidity and lower water clarity during construction.

Effect Determination
The Corps has determined that the proposed expansion of Lake Worth Inlet may adversely affect Johnson's seagrass within the action area and requests initiation of formal consultation with NMFS. The proposed project may affect, but not likely to adversely affect; the green turtle, loggerhead turtle, Kemp's ridley turtle, Hawksbill turtle, leatherback turtle, humpback whale, sperm whale, and smalltooth sawfish.

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Planning Division
Environmental Branch

Mr. Larry Williams, Field Supervisor
South Florida Field Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

JUN 2 6 2012

Dear Mr. Williams:

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment for the Lake Worth Inlet widening and deepening, addressing the concerns of the Florida manatee (*Trichecus manatus*) which is under the purview of the U.S. Fish and Wildlife Service (FWS). Based on the enclosed Biological Assessment, the U.S. Army Corps of Engineers has determined that the proposed action may affect, not likely to adversely affect, the Florida manatee. The Corps also has determined that the proposed project will not adversely affect designated critical habitat for the Florida manatee. The Corps requests that the FWS concur with the determination regarding this species.

The USACE has determined that consultation of nesting sea turtles is covered under the Statewide Programmatic Biological Opinion (SPBO) and will not be discussed in the enclosed Biological Assessment. This letter also constitutes the notification required under the SPBO for placement of material on or near the shoreline as described on the enclosed form.

If you have any questions or need further information, please contact Mr. Pat Griffin at 904-232-2286, email Patrick.M.Griffin@usace.army.mil

Sincerely,

Kenneth R Quigley

Eric P. Summa
Chief, Environmental Branch

Enclosure

PROJECT INFORMATION SHEET
Programmatic Biological Opinion (PBO)
Beach Placement and Shore Protection
Coast of Florida
U.S. Fish and Wildlife Service (FWS)

Prepared by: Pat Griffin

Date: Jun 26, 2012

Project Name: Lake Worth Inlet Widening and Deepening

Project Number: 131356 Application #:

Sponsor / Applicant: Port of Palm Beach

Quantity, Length: total dredge quantites estimated at 1.4 million yards, 250 thousand will be beach quality and go on the beach already covered under the palm beach O&M project.

County(ies) Palm Beach Location, R-Monuments: R76-R79

Latitude: ° ' " Longitude: - ° ' "

Borrow or Dredge Site(s): Lake worth entrance channel and turning basin

Beach Placement from Navigation Dredging: ☐ O&M ☒ Deepen, Widen, or Expand

Beach Nourishment / Shore Protection Project: ☐ Initial Nourishment ☐ Renourishment

Nature of Activity: ☒ Beach Placement ☒ Beach Placement Below Mean Low Water

☐ Dune Placement / Planting ☒ Nearshore Placement (all material remains below mean low water)

☐ Sand Bypassing ☐ Sand Back-passing ☐ Sand Transfer ☐ Groin Repair/Replace

☐ Jetty Repair/Replace ☐ *Other (list in comment box)

Area with Sea Turtle Window: ☒ SE FL (Broward through Brevard Counties) ☐ Sarasota Co (Manasota Key)

☐ Gulf Co (St Joe Peninsula St Pk, St. Joe Peninsula, Cape San Blas) ☐ Franklin Co (St. George Is)

*Piping Plover Critical Habitat (below) ☒ *Other Piping Plover Habitat ☐ *30-day Coordination with FWS Still Pending

1.

2.

Beach Mouse Habitat (use drop-down box below): ☐ Other Beach Mouse Habitat (list in comment box)

☒ *Important Manatee Area ☐ *Beach Jacquemontia Habitat (including pipeline/access, storage/staging areas)

☐ *Roseate Tern Nesting Colony, May-June (Pelican Shoal, Vaca Rock, Truman Annex, Marathon Gov Center)

Responsible for Post Construction Monitoring and Corrective Measures:

Sponsor (condition of DEP or Corps Permit issued to Sponsor)

Comment (1) Piping plover other habitat. Within 1 mile of inlet with beach placement

Comment (2)

* These items may be outside the scope of the PBO and/or require additional coordination/consultation with FWS.

Biological Assessment to
U.S. Fish and Wildlife Service for
Lake Worth Inlet Widening and Deepening
Palm Beach County, Florida

Description of the Project Area – Palm Beach Harbor is on the Atlantic coast of Florida, approximately 53 miles south of Fort Pierce Harbor, and 71 miles north of Miami Harbor. The harbor entrance (also known as Lake Worth Inlet) is an artificial cut through the barrier beach and limestone formation connecting Lake Worth, a coastal lagoon, with the Atlantic Ocean. Communities bordering Palm Beach Harbor are Palm Beach Shores on the barrier beach to the north, Riviera Beach on the west shore of Lake Worth, and the town of Palm Beach to the south. West Palm Beach is located immediately south of Riviera Beach and is the largest community in the area. Lake Worth Inlet is a federally maintained inlet and deepwater port located on the Atlantic Ocean in Palm Beach County, Florida.

Lake Worth is an estuary that exhibits characteristics typical of estuarine systems in southeast Florida. Much of the beach and dune ecosystem in this vicinity has been altered by development. Structures such as seawalls and bulkheads have reduced a significant amount of the vegetation that would naturally occur here (Applied Technology and Management Inc. 1995).

The existing channel sediments in the Inlet are predominantly sand and shell and are subject to considerable shifting by wave and tidal action. Limestone rock outcrops are found on either side of the Federal channel at the interface between the Inlet channel and the Intracoastal Waterway (IWW). Littoral drift in the area is predominantly north to south. The mean tidal range is 2.8 feet and the spring tidal range is 3.3 feet. Shoaling continues to be a recurring problem in Palm Beach Harbor.

A sand transfer plant is located on the north jetty of the inlet. The sand transfer plant takes the sand that accumulates on the north jetty, slurries the material with sea water, and passes it under the inlet and to the beach south of the south jetty. Sand continues to accumulate at a rapid rate in this area. The areas to be dredged are located within the Federal project limits.

Action Area

The project proposes to widen and deepen Lake Worth Inlet navigation channel (Figure 1). The authorized project depths are as follows: entrance channel to a depth of 37 feet (from STA 30+00 to STA 47+00); from the inner channel to a depth of 33 feet; from the turning basin to a depth of 33 feet; and to a depth of 25 feet in the extended turning basin located north of the existing project basin. The existing settling basin and the extended settling basin are maintained at 35 feet and are located adjacent to the entrance channel and north jetty.

Deepening will occur within the entrance channel from the current 37 feet to 47 feet,

with depths within the turning basin increasing from 33 feet to 43 feet deep. Widening is needed in certain areas of the project for safe navigation of larger vessels. The entrance channel requires a flare to the south as prevailing currents cause navigation hazards entering the channel as currently configured. The flare starts at the south jetty and extends approximately 2500 feet to the southeast. Within the entrance channel, the northern channel wall would be widened by 60 feet from the north jetty to the beginning of the turn to the southwest. At the turn, the northern side of the channel would be widened 150 feet to ensure a 400 foot channel width throughout. The area at the southern edge of Peanut Island would be deepened to 43 feet. Finally, the southern edge of the turning basin would be widened 150 feet to the south.

Based on geotechnical boring data from the entrance channel and turning basin, sand and rock of varying hardness are expected to be encountered during widening and deepening. Sand, soft rock and rock fragments will be removed via traditional dredging methods. Where hard rock is encountered, the Corps anticipates that contractors could utilize other methods, including confined blasting or large cutterhead dredge equipment to pre-treat the rock prior to removal. Dredged material would be deposited at up to four locations. All beach quality sand material shall be placed on the existing beach disposal template just south of the inlet (figure 2). Sandy material not considered beach quality under the existing permit will be placed in the authorized nearshore placement site south of the inlet. Other rock/coarse materials would likely be placed in a previously dredged depression within Lake Worth as part of construction to create seagrass habitat as compensatory mitigation for seagrass impacts. Dredged rock and other materials that cannot be beneficially utilized for mitigation may be transported to the Ocean Dredged Materials Disposal Site (ODMDS) or placed in a permitted, upland disposal site on Peanut Island.

Figure 1: Current project and proposed changes in yellow

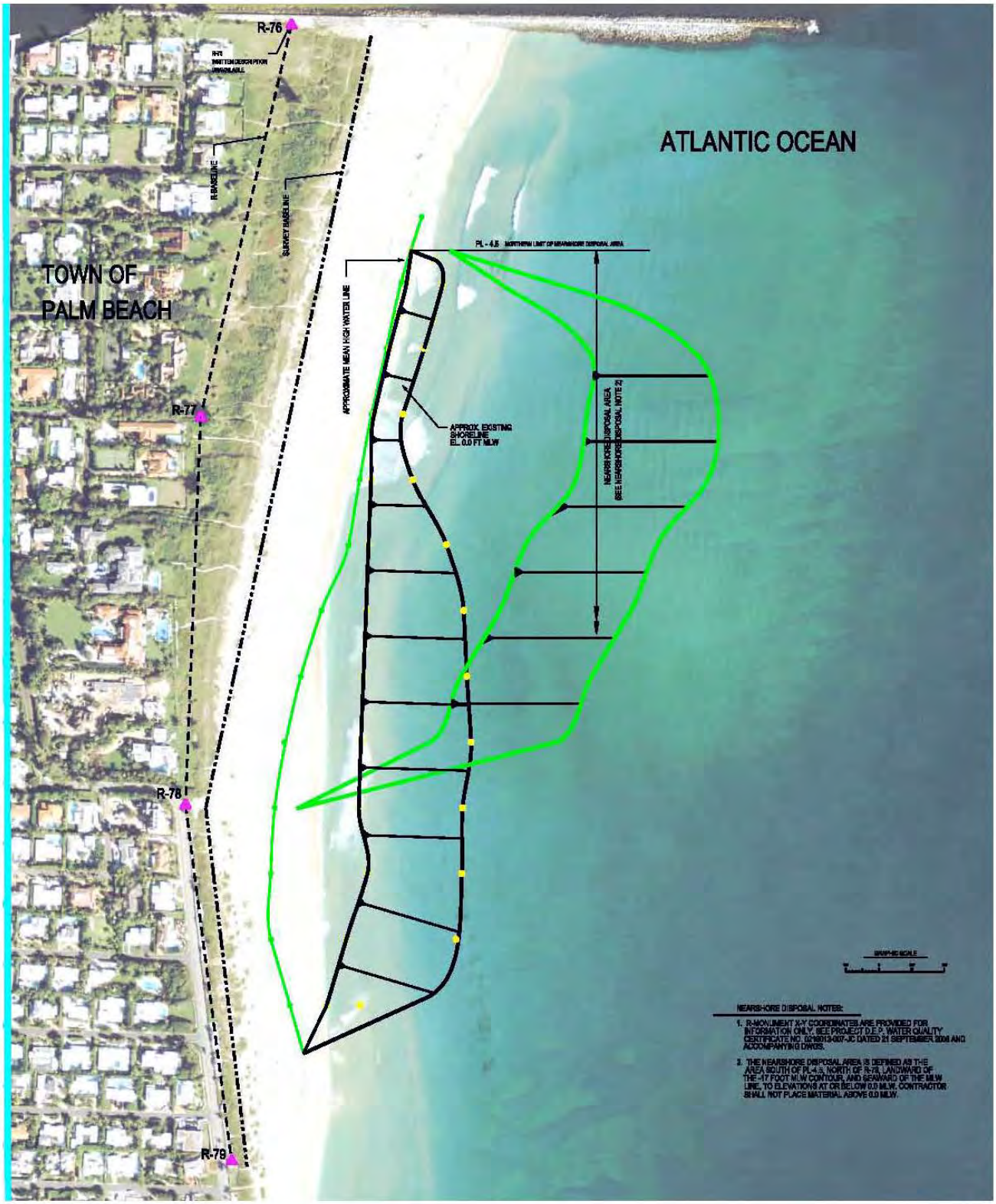

Figure 2. Beach placement site south of inlet

Protected Species Included in this Assessment

Of the listed and protected species under U.S. Fish and Wildlife Service (FWS) jurisdiction occurring in the action area, the Corps believes that the Florida manatee (*Trichecus manatus*) occurs with the project area. The USACE has determined that consultation of nesting sea turtles is covered under the Statewide Programmatic Biological Opinion (SPBO) and will not be discussed in this Biological Assessment.

The Federal government has recognized the threats to the continued existence of the Florida manatee, a subspecies of the West Indian manatee, for more than 30 years. The West Indian manatee was first listed as an endangered species in 1967 under the Endangered Species Preservation Act of 1966 (16 U.S.C. 668aa(c)) (32 FR 48:4001). The Endangered Species Conservation Act of 1969 (16 U.S.C. 668aa(c)) continued to recognize the West Indian manatee as an endangered species (35 FR 16047), and the West Indian manatee was also among the original species listed as endangered pursuant to the Endangered Species Act of 1973. Critical habitat was designated for the manatee in 1976, and includes the project area (50 CFR 17.95). The justification for listing as endangered included impacts to the population from harvesting for flesh, oil, and skins as well as for sport, loss of coastal feeding grounds from siltation, and the volume of injuries and deaths resulting from collisions with the keels and propellers of powerboats. Manatees are also protected under the provisions of the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq*.) and have been protected by Florida law since 1892. Florida provided further protection in 1978 by passing the Florida Marine Sanctuary Act designating the state as a manatee sanctuary and providing signage and speed zones in Florida's waterways.

Species and Suitable Habitat Descriptions

Florida Manatee *(Trichecus manatus)*

All manatees belong to the order Sirenia. The living sirenians consist of one species of dugong and three species of manatee. A fifth species, the Steller's sea cow, was hunted to extinction by 1768. All living sirenians are found in warm tropical and subtropical waters. The West Indian manatee was once abundant throughout the tropical and subtropical western North and South Atlantic and Caribbean waters. The Florida manatee occurs throughout the southeastern United States. However, the only year-round populations of manatees occur throughout the coastal and inland waterways of peninsular Florida and Georgia (Hartman, 1974). During the summer months, manatees may range as far north along the East Coast of the U.S. as Rhode Island, west to Texas, and, rarely, east to the Bahamas (FWS, 1996, Lefebvre et al., 1989). There are reports of occasional manatee sightings from Louisiana, southeastern Texas, and the Rio Grande River mouth (Gunter, 1941, Lowery,1974).

Preferred Habitats

Manatees occur in fresh, brackish, and salt water and move freely between environments of salinity extremes. They inhabit rivers, bays, canals, estuaries, and coastal areas that provide seagrasses and macroalgae. Freshwater sources, either natural or human-influenced/created, are especially important for manatees that spend

time in estuarine and brackish waters (FWS, 1996). Because they prefer water above 70 ºF (21 ºC), they depend on areas with access to natural springs or water effluents warmed by human activities, particularly in areas outside their native range.

Manatees often seek out quiet areas in canals, lagoons or rivers. These areas provide habitat not only for feeding, but also for resting, cavorting, mating, and calving. Manatees may be found in any waterway over 3.3 ft. (1 m) deep and connected to the coast. Deeper inshore channels and nearshore zones are often used as migratory routes (Kinnaird, 1983). Although there are reports of manatees in locations as far offshore as the Dry Tortugas Islands, approximately 50 mi. (81 km) west of Key West, Florida, manatees rarely venture into deep ocean waters.

Habits

Manatees use secluded canals, creeks, embayments, and lagoons for resting, cavorting, mating, calving and nurturing their young; and open waterways and channels as travel corridors. Within marine, estuarine, and freshwater habitats they are found in turbid and clear water in depths of at least 3 ft. In coastal areas, they tend to travel in water up to 20 ft deep. Manatees occupy different habitats during various times of the year, with a focus on warm-water sites during winter.

Florida manatees are herbivores that feed opportunistically on a wide variety of submerged, floating and emergent vegetation. Shallow grass beds with ready access to deep channels are the preferred feeding areas in coastal and riverine habitats. A complete review of manatee biology is included in the manatee section of the South Florida Multi-species Recovery Plan (FWS, 1999).

In general, manatees feed primarily on freshwater plants, submerged sea grasses, and plants along shorelines.

Migration Patterns

The overall geographic distribution of manatees within Florida has changed since the 1950s and 60s (Lefebvre et al., 1989), and prominent shifts in seasonal distribution are also evident. Specifically, the introduction of power plants and paper mills in Texas, Louisiana, southern Georgia, and northern Florida has given manatees the opportunity to expand their winter range to areas not previously frequented (Hartman, 1979). Florida manatees move into warmer waters when the water temperature drops below about 68 ºF (20 ºC). Before warm effluents from power plants became available in the early 1950s, the winter range of the manatee in Florida was most likely limited on its northern bounds by the Sebastian River on the east coast and Charlotte Harbor on the west coast (Moore, 1951). Since that time, manatees altered their normal migration patterns, and appreciable numbers of manatees began aggregating at new sites. As new power plants became operational, more and more manatees began taking advantage of the sites even though it required traveling great distances. Among the most important of the warm-water discharges are the Florida Power and Light Company's power plants at Cape Canaveral, Fort Lauderdale, Port Everglades, Riviera Beach, and Fort Myers, and the Tampa Electric Company's Apollo Beach power plant in Tampa Bay. During cold

weather, more than 200 manatees have been reported at some power plants. These anthropogenically heated aquatic habitats have allowed manatees to remain north of their historic wintering grounds. Although seemingly conducive for survival, warm-water industrial discharges alone cannot furnish suitable habitats for manatees, as they may not be associated with forage that is typically found near natural warm-water refugia of natural springs.

Population Trends

Determining exact population estimates or trends is difficult for this species. The best indicator of population trends is derived from mortality data and aerial surveys (Ackerman et al., 1992, Ackerman et al., 1995, Lefebvre et al., 1995). Increases in the number of recovered dead manatees have been interpreted as evidence of increasing mortality rates (Ackerman et al., 1992, Ackerman et al., 1995). Because manatees have low reproductive rates, these increases in mortality may lead to a decline in the population (O'Shea et al., 1992 and Beeler and O'Shea, 1988). Aerial surveys, which represent the minimum number of manatees in Florida waters (not the total population size), have been conducted for more than 20 years, and may indicate population growth. However, because survey methods were inconsistent, conclusions are tentative. O'Shea (1988) found no firm evidence of a decrease or increase between the 1970s and 1980s, even though aerial survey counts increased. Over the last decade, aerial counts have varied from 1,267 (in 1991) to 3,807 (in 2012) (FMRI, 2012). The mean number observed during all counts (January, February, and/or March of all years since 1991 except 2008) is 2,332 (std dev = 672).

Boat traffic and development are the main causes for decline in the population. Other causes of injury or death include ingestion of debris, entanglement in fishing gear, cold stress, red tide, and entrapment or crushing in water control structures and navigational locks (USFWS, 2001). Even though manatees are vulnerable in their current environment, recent surveys have shown increases in three of the four population stocks. A 5-year review prepared by USFWS concluded that the manatee no longer fits the ESA definition of endangered and made a recommendation to reclassify it as threatened (USFWS, 2007).

Mortality

Human activities have likely affected manatees by eliminating or modifying suitable habitat; causing alteration of, or limiting access to historic migratory routes; and killing or injuring individuals through incidental or negligent activities. To understand manatee mortality trends in Florida, Ackerman et al. (1995) evaluated the number of recovered carcasses between 1974 and 1992 and categorized the causes of death. The number of manatees killed in collisions with watercraft increased each year by 9.3%. The number of manatees killed in collisions with watercraft each year correlated with the total number of pleasure and commercial watercraft registered in Florida (Ackerman et al., 1995). Other deaths or injuries were incurred due to flood-control structures and navigational locks, entanglement in fishing line, entrapment in culverts, and poaching, which together accounted for 162 known mortalities between 1974 and 1993 (FMRI, 2002a).

Table 1: Manatee deaths in Florida (statewide) from 1974 through 2011(source: FMRI)

Year	Water-craft	Flood Gate / Canal Lock	Other Human	Perinatal	Cold Stress	Natural	Undetermined	Unrecovered	Total
1974	3	0	2	0	0	0	2	0	7
1975	6	1	1	7	0	1	10	3	29
1976	10	4	0	14	0	2	22	10	62
1977	13	6	5	9	0	1	64	16	114
1978	21	9	1	10	0	3	34	6	84
1979	24	8	9	9	0	4	18	5	77
1980	16	8	2	13	0	5	15	4	63
1981	24	2	4	13	0	9	62	2	116
1982	20	3	1	14	0	41	29	6	114
1983	15	7	5	18	0	6	28	2	81
1984	34	3	1	25	0	24	40	1	128
1985	33	3	3	23	0	19	32	6	119
1986	33	3	1	27	12	1	39	6	122
1987	39	5	2	30	6	10	22	0	114
1988	43	7	4	30	9	15	23	2	133
1989	50	3	5	38	14	18	39	1	168
1990	47	3	4	44	46	21	40	1	206

1991	53	9	6	53	1	13	39	0	174
1992	38	5	6	48	0	20	45	1	163
1993	35	5	6	39	2	22	34	2	145
1994	49	16	5	46	4	33	37	3	193
1995	42	8	5	56	0	35	53	2	201
1996	60	10	0	61	17	101	154	12	415
1997	54	8	8	61	4	42	61	4	242
1998	66	9	6	53	9	12	72	4	231
1999	82	15	8	53	5	37	69	0	269
2000	78	8	8	58	14	37	62	8	273
2001	81	1	7	61	32	33	108	2	325
2002	95	5	9	53	17	59	65	2	305
2003	73	3	7	71	47	102	67	10	380
2004	69	3	4	72	50	24	51	3	276
2005	79	6	8	89	31	89	90	4	396
2006	92	3	6	70	22	81	116	27	417
2007	73	2	5	59	18	82	66	12	317
2008	90	3	6	101	25	33	72	7	337
2009	97	5	7	114	56	37	103	10	429
2010	83	1	5	97	282	23	208	67	756
2011	87	2	3	77	113	41	116	14	453

Of interest is the increase in the number of perinatal deaths. The frequency of perinatal deaths (stillborn and newborn calves) has been consistently high over the past several

years. The cause of the increase in perinatal deaths is uncertain, but may result from a combination of factors that includes pollution, disease, or environmental change (Marine Mammal Commission, 1992). It may also result from the increase in collisions between manatees and watercraft because some newborn calves may die when their mothers are killed or seriously injured by boat collisions, when they become separated from their mothers while dodging boat traffic, or when stress from vessel noise or traffic induces premature births (Marine Mammal Commission, 1992).

The greatest present threat to manatees is the high rate of manatee mortalities caused by watercraft collisions. Between 1974 and 1997, there were 3,270 known manatee mortalities in Florida. Of these, 749 were watercraft-related. Since 1974, an average of 31 manatees have died from watercraft-related injuries each year. Between 1983 and 1993, manatee mortalities resulting from collisions with watercraft reached record levels (DEP, 1994). Between 1986 and 1992, watercraft collisions accounted for 37.3% of all manatee deaths where the cause of death could be determined (Ackerman *et al.,* 1995).

The significance of manatee mortalities related to watercraft appears to be the result of dramatic increases in vessel traffic (O'Shea *et al*., 1985). Ackerman *et al.* (1995) showed a strong correlation between the increase in recorded manatee mortality and increasing boat registrations. In 1960, there were approximately 100,000 registered boats in Florida; by 1990, there were more than 700,000 registered vessels in Florida (Marine Mammal Commission, 1992, Wright *et al.*, 1995). Approximately 97 percent of these boats are registered for recreational use. The most abundant number of registered boats is in the 16-foot to 26-foot size class. Watercraft-related mortalities were most significant in the southwest and northeast regions of Florida; deaths from watercraft increased from 11 to 25 percent in southwestern Florida. In all of the counties that had high watercraft-related manatee deaths, high numbers of watercraft were combined with high seasonal abundance of manatees (Ackerman *et al.*, 1995).

Approximately twice as many manatees died from impacts suffered during collisions with watercraft than from propeller cuts; this has been a consistent trend over the last several years. Medium or large-sized boats cause most lethal propeller wounds, while impact injuries are caused by fast, small to medium-sized boats (Wright *et al.*, 1992). The Florida Marine Research Institute (FMRI) conducts carcass recovery and necropsy activities throughout the state to attempt to assess the cause of death for each carcass recovered.

Designated Critical Habitat for Species Included in this Assessment

Florida Manatee *(Trichecus manatus)*

Critical habitat is defined under the ESA as specific areas within and/or outside a geographical area that are occupied by a species at the time of listing, that contain physical or biological features essential to the conservation of the species and therefore require special management considerations or protection for the benefit of the species. Critical habitat was designated for the manatee in 1976 (50 Code of Federal Regulations [CFR] Part 17.95(a)). It encompasses the all of Lake Worth and includes the action area. Although no specific primary constituent elements (PCEs) were

included in the initial critical habitat designation, requirements of the habitat to sustain essential life history functions of manatees can be derived from current literature (USFWS, 2007) which likely include the following:

1. shallow, secluded water areas for resting, mating, and calving (i.e., canals, creeks, lagoons);
2. submerged, emergent, and floating vegetation for foraging;
3. freshwater source for drinking (natural or artificial sources); and
4. unobstructed transiting corridors to warm-water refugia due to manatees' sensitivity to low water temperatures.

Several of these elements are present within Lake Worth and the project area. Resting, mating, and calving are less likely to occur within the deeper federal navigation channel outside of the channel and turning basin than secluded shallower waters located further North and South of the project area. They are more likely to use the shallow edges of the navigation channel as a travel corridor to a freshwater drinking source. There are currently no obstructions within the federal navigation channel, allowing unobstructed transit for the manatees to warm water refuges near the Florida Power and Light Riviera plant.

<u>Project Area Specific Information for Species Included in this Assessment</u>
Florida Manatee *(Trichecus manatus)*

Local Distribution and Status
Manatees are found in marine, brackish and freshwater habitats, including throughout Palm Beach County (PBC), Florida. They can be found along the beaches as well throughout the lagoons and the various natural and man-made waterways of the County (Figure 1). In PBC where the water is relatively clear and shallow, aerial surveys of marine species combined with observations of environmental changes and anthropogenic activities can be particularly effective for evaluating resources and identifying potential or existing threats (PBC 2011). Aerial surveys are flown monthly throughout the year as part of the Palm Beach County Manatee Protection Plan.

In a 2010-11 aerial surveys by Florida Power and Light (FPL), manatees were sighted in Lake Worth on both surveys, with the highest count (554) occurring on 16 December. Calves represented 5.2% of the sightings. The mean count per survey was 449 manatees. Survey conditions were generally excellent in the vicinity of FPL warm water outfall, although visibility elsewhere in Lake Worth was sometimes only good. In 2009, the plant was placed in long-term reserve shutdown, as plans to modernize the plant were promulgated. During the plant shut-down a massive water heater was installed by FPL to ensure that warm water was provided for manatees. The heater discharged warm water when ambient water temperatures dropped to less than 61 degrees F; the location of that discharge was the same as in past years when the plant operated, namely in the so-called "manatee embayment" at the old Units 1 and 2 discharge site. This situation re-occurred in winter 2010-2011, as the power plant will soon be

modernized to a more energy-efficient plant, called the Riviera Beach Energy Center (RBEC).

Most manatees observed were located near, but not inside the manatee embayment at the warm water outfall. Individuals were scattered around Lake Worth, especially lining the western shore to the south of the plant. Most manatees at PRV bottom rested, although some fed in the nearby grass beds. A few animals occupied deep-water slips in the Port of Palm Beach. Sea grass distribution and density continue to appear to be sparse around Peanut Island, located just north of the outfall.

Local Mortality

Manatees are subjected to a variety of threats, both natural and human-related. In Florida, there has been a clear increase in the number of manatee deaths over the last quarter-century. Palm Beach County ranks 10th among the 13 key counties, accounting for approximately 3.7 percent of the total State mortality from all causes between 1974 and 2003. The largest single cause (39%) of documented mortality in the County results from collisions with watercraft. Palm Beach County ranks 6th among the 13 key counties in the number of documented watercraft-related mortalities. Manatees are most likely to be struck by boats in areas where there is an overlap between high levels of manatee abundance and boat traffic. Watercraft-related mortalities were highest in the north Lake Worth Lagoon, Jupiter Sound, and the section of Intracoastal Waterway between Delray Beach and Boca Raton. Not surprisingly, 55 percent of all watercraft-related mortalities occurred during January and February, a period of peak manatee abundance. Although watercraft-related mortality has increased within the County since the posting of regulatory speed zones in 1991, the percent of watercraft-related mortality compared to total mortality has remained relatively stable.

Table 2: Manatee deaths in Palm Beach County from 1976 through Oct 31, 2011 (source: FMRI)

Year	Water-craft	Human, Other	Perinatal	Cold stress	Natural	Undetermined	Unrecovered	Total
1976	1	0	0	0	0	0	0	1
1977	4	0	0	0	0	1	2	7
1978	1	0	1	1	0	0	0	3
1979	1	0	1	0	0	1	0	3
1980	0	0	0	0	0	0	0	0
1981	1	0	0	0	0	2	0	3
1982	0	0	1	0	0	1	0	2
1983	2	0	0	0	0	1	0	3
1984	2	0	0	0	1	2	0	5
1985	3	0	0	0	0	0	0	3
1986	1	0	0	2	0	0	3	6
1987	1	0	1	0	1	0	0	3

1988	2	0	1	0	1	0	0	4
1989	0	0	1	0	0	0	0	1
1990	3	0	0	0	1	2	0	6
1991	1	1	0	0	1	3	0	6
1992	0	0	1	0	2	0	0	3
1993	3	1	0	0	1	0	0	5
1994	2	0	1	0	0	0	0	3
1995	2	0	0	0	3	1	0	6
1996	3	0	0	0	2	2	0	7
1997	1	2	1	0	2	0	0	6
1998	2	0	1	0	1	1	0	5
1999	2	2	1	0	1	1	0	7
2000	3	0	2	2	1	1	0	9
2001	3	0	0	0	1	2	0	8
2002	6	0	3	1	1	2	0	13
2003	5	0	2	2	0	3	0	12
2004	3	1	0	2	1	2	0	9
2005	6	0	1	1	0	0	0	8
2006	0	0	1	1	1	4	0	7
2007	0	0	0	2	1	1	0	4
2008	6	0	0	2	0	0	0	8
2009	4	1	1	3	1	6	0	16
2010	2	0	2	6	1	6	1	18
2011	3	0	0	5	0	3	0	11
Totals	79	8	31	30	25	48	6	227

Direct Effects

As previously stated, during winter months a large population of manatees uses the warm water refuge at the FP&L Riviera Power Plant and shallow areas throughout Lake Worth.

The highest potential to directly affect endangered manatees may be the use of explosives to remove areas of rock within the Entrance Channel and Southport Access Channel. Both the pressure and noise associated with blasting can injure marine mammals. Noise and pressure effects to manatees have not been well documented, however, it is assumed that manatees will be impacted similar to dolphins, where documentation is available.

The other highest potential to directly affect manatees would be the use of clamshell dredges. While no documentation is available to substantiate the higher potential

impacts, the Corps has agreed to no night time clamshell dredging to further reduce the chance to impact manatees.

Protective Measures Taken in the Project Area as Part of the Proposed Action

Consideration of Plans and Methods to Minimize/Avoid Environmental Impacts. Conservation measures were a major focus during the plan formulation phase for the proposed project. Avoiding and minimizing some potential impact areas significantly decreased the risk of indirect effects on managed and protected species, and a great deal of consideration was given to the utilization of rock removal methods to decrease the likelihood of incidental take, injury, and behavioral modification of protected species. It was determined that rock removal options not involving blasting were possibly more detrimental to populations and individuals of protected species. One alternative option was the use of a punchbarge/piledriver to break rock. However, it was determined that the punchbarge, which would work for 12-hour periods, strikes the rock approximately once every 60-seconds. This constant pounding would serve to disrupt animal behavior in the area, and result in adverse effects on the mission. Using the punchbarge would also extend the length of the project, thus increasing any potential impacts to all fish and wildlife resources in the area. The Corps believes that if rock exists that needs to be pre-treated prior to excavation, blasting is actually the least environmentally impactful method for removing the rock. Each blast will last no longer than five (5) seconds in duration, and may even be as short as 2 seconds each. Additionally, the blasts are confined in the rock/ substrate. Boreholes are drilled into the rock below, the blasting charge is set, and then the chain of explosives is detonated. Because the blasts are confined within the rock structure, the distance of the blast effects is reduced as compared to an unconfined blast (see discussion below).

Development of Protective Measures. The proposed project includes measures to conserve and protect Florida manatees. Foremost among the measures are protective actions to ensure that manatees are not killed if in fact such methods are required as a part of the overall dredging operation. Development of the measures involved consideration of past practices and operations, anecdotal observations, and the most current scientific data. The discussion below summarizes the development of the conservation measures.

Standard Manatee Conditions:

The Corps will incorporate the standard manatee protection construction conditions into our plans and specifications for this project. These standard conditions are:

1. The contractor instructs all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel are responsible for observing water-related activities for the presence of manatee(s), and shall implement appropriate precautions to ensure protection of the manatee(s).

2. All construction personnel are advised that there are civil and criminal penalties for

harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act. The permittee and/or contractor may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

3. Prior to commencement of construction, the prime contractor involved in the construction activities shall construct and display at least two temporary signs (placard) concerning manatees. For all vessels, a temporary sign (at least 8 1/2" x 11") reading "Manatee Habitat/Idle Speed In Construction Area" will be placed in a prominent location visible to employees operating the vessels. A second temporary sign (at least 8 1/2" x 11") reading "Warning, Manatee Habitat: Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment. Any collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol at 1-800-DIAL-FMP" will be located prominently adjacent to the displayed issued construction permit. Temporary notices are to be removed by the permittee upon completion of construction.

4. All vessels associated with the project operate at "idle speed/no wake" at all times while in the construction area and while in waters where the draft of the vessel provides less than a four foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

5. If manatees are seen within 100 yards of the active daily construction/dredging operation, all appropriate precautions shall be implemented to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee. Operation of any equipment closer than 50 feet to a manatee shall necessitate immediate shutdown of that equipment.

6. Any collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol (1-800-DIALFMP) and to the Florida Department of Protection, Office of Protected Species Management at (904)922-4330.

7. The contractor maintains a log detailing sightings, collisions, or injuries to manatees should they occur during the contract period. A report summarizing incidents and sightings shall be submitted to the Florida Department of Protection, Office of Protected Species Management, Mail Station 245, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399 and to the U.S. Fish and Wildlife Service, 3100 University Boulevard, Jacksonville, FL 32216. This report must be submitted annually or following the completion of the project if the contract period is less than a year.

Confined Blasting

To achieve the widening and deepening of Lake Worth Inlet from the existing depth of -35 feet to project depth of -43 feet, pretreatment of some of the rock areas may be required. The use of confined underwater blasting as a pre-treatment technique is

anticipated to be required for some of the deepening and widening of the authorized Federal project, where standard construction methods are unsuccessful due to the hardness of the rock. The following analysis of potential blasting needs for the current project performed by the USACE Engineering Division staff is based on evaluations of core boring logs.

Methods

The focus of the proposed blasting work at Lake Worth is to pre-treat bedrock prior to removal by a dredge utilizing confined blasting, meaning the shots would be "confined" in the rock. In confined blasting, each charge is placed in a hole drilled in the rock approximately 5-10 feet deep below the desired depth (see Figure 4) depending on how much rock needs to be broken and the intended project depth. The hole is then capped with an inert material, such as crushed rock (Figure 5; each bag as shown contains approximate volume of material used per discharge). This process is referred to as "stemming the hole." The blasting charge is set and then the chain of explosives within the rock is detonated.

For the Port of Miami Phase II expansion in 2005, which used blasting as a pre-treatment technique, the stemming material was angular crushed rock. The optimum size of stemming material is material that has an average diameter of approximately 0.05 times the diameter of the blast hole. Material must be angular to perform properly (Konya 2003). For the USACE project, project-specific specification will be prepared by the geotechnical branch of the District. In the Miami Harbor Phase II project, the following requirements were in the specifications regarding stemming material:

> "*Stemming.* All blast holes shall be stemmed. The Blaster or Blasting Specialist shall determine the thickness of stemming using blasting industry conventional stemming calculation. The minimum stemming shall be 2 feet thick. Stemming shall be placed in the blast hole in a zone encompassed by competent rock. Measures shall be taken to prevent bridging of explosive materials and stemming within the hole. Stemming shall be clean, angular to subangular, hard stone chips without fines having an approximate diameter of 1/2-inch to 3/8-inch. A barrier shall be placed between the stemming and explosive product, if necessary, to prevent the stemming from settling into the explosive product. Anything contradicting the effectiveness of stemming shall not extend through the stemming."

It is expected that the specifications for any construction utilizing blasting at Lake Worth would have similar stemming requirements as those that were used for the Miami Harbor Phase II project. The length of stemming material will vary based on the length of the hole drilled, however minimum lengths will be included in the project specific specifications. Studies have shown that stemmed blasts have up to a 60-90% decrease in the strength of the pressure wave released, compared to open water blasts of the same charge weight (Nedwell and Thandavamoorthy, 1992; Hempen *et al*. 2005;

Hempen *et al*. 2007). However, unlike open-water, i.e., unconfined blasts (Figure 6), very little peer-reviewed research exists on the effects that confined blasting can have on marine animals near the blast (Keevin *et al*. 1999). The visual evidence from a typical confined blast is shown in Figure 7.

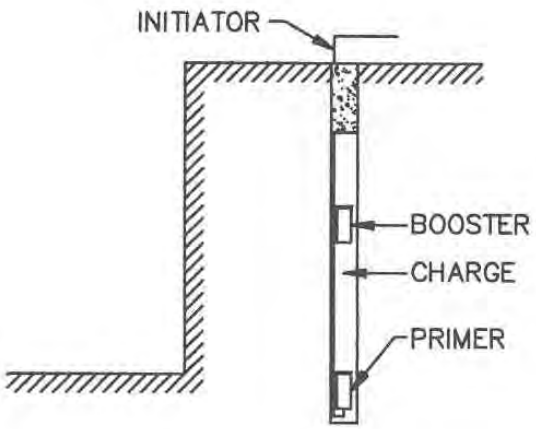

Figure 4 Typical Stemmed Hole for Loading Charges

Figure 5 Stemming Material

Figure 6 <u>Unconfined</u> Blast of <u>Seven</u> Pounds of Explosives

Figure 7 <u>Confined</u> Blast of <u>3,000</u> Pounds of Explosives

To estimate the maximum poundage of explosives that may be utilized for this project, USACE has reviewed previous blasting projects, one at San Juan Harbor, Puerto Rico in 1994 and one at Miami Harbor in 2005. The San Juan Harbor project's heaviest delay was 375 lbs per delay and in Miami it was 376 lbs per delay. Based on discussions with USACE's geotechnical engineers, it is expected that the maximum weight of delays for Lake Worth will be larger since the rock is much harder than what is seen at the Port of Miami. It is unknown at this time what the maximum delay weight will be for Lake Worth. This will be determined during the test blast program.

Minimization of Confined Blasting Impacts to Manatees

Blast specifications. Although the rock at Lake Worth is believed to be softer than Miami or San Juan Harbors, as noted above, USACE biologists, working with senior geologists, concluded that the assumptions set forth concerning minimization of the effects of blasting are applicable and accurate for the Lake Worth project. To that effect, based upon industry standards and USACE Safety & Health Regulations, the blasting program may consist of the following:

1) The weight of explosives to be used in each blast will be limited to the lowest poundage of explosives that can adequately break the rock.
2) Drill patterns are restricted to a minimum of 8-foot separation from a loaded hole.
3) Hours of blasting are restricted from two hours after sunrise to one hour before sunset to allow for adequate observation of the project area for protected species.
4) Selection of explosive products and their practical application method must address vibration and air blast (overpressure) control for protection of existing structures and marine wildlife.
5) Loaded blast holes will be individually delayed to reduce the maximum pounds per delay at point detonation, which in turn will reduce the mortality radius.
6) The blast design will consider matching the energy in the "work effort" of the borehole to the rock mass or target for minimizing excess energy vented into the water column or hydraulic shock.
7) Delay timing adjustments to a minimum of 8 ms between delay detonations to stagger the blast pressures and prevent cumulative addition of pressures in the water.

Safety radii. Furthermore, the confined blasting program will incorporate the use of three safety radii (Figure 8) typically utilized for projects involving unconfined blasts. This conservative use of an *unconfined* blast in development of the safety radii for a *confined* blast will increase the protections afforded marine species in the area. These three zones are referred to as the "Danger zone" – which is the inner most zone, located closest to the blast; the "Safety zone" – which is the middle zone and the "Watch zone"

the outer most zone.

The danger zone radius will be calculated to determine the maximum distance from the blast at which mortality to protected marine species is likely to occur. The danger zone was determined by the amount of explosives used within each delay (which can contain multiple boreholes). These calculations are based on impacts to terrestrial animals in water when exposed to a detonation suspended in the water column (unconfined blast) as researched by the U.S. Navy in the 1970s (Yelverton *et al*. 1973; Richmond *et al.* 1973) as well as observations of sea turtle injury and mortality associated with unconfined blasts for the cutting of oil rig structures in the Gulf of Mexico (Young 1991; Young and O'Keefe 1994). The reduction of impact by confining the shots would more than compensate for the presumed higher sensitivity of marine species. USACE believes that the danger zone radius, coupled with a strong protected species observation and protection plan is a conservative, but prudent, approach to the protection of marine wildlife species. Based on a review by NMFS-OPR for the Miami Harbor phase II project, NMFS and FWS found these protective measures sufficient to protect marine mammals under their respective jurisdictions (NMFS 2005; FWS 2002).

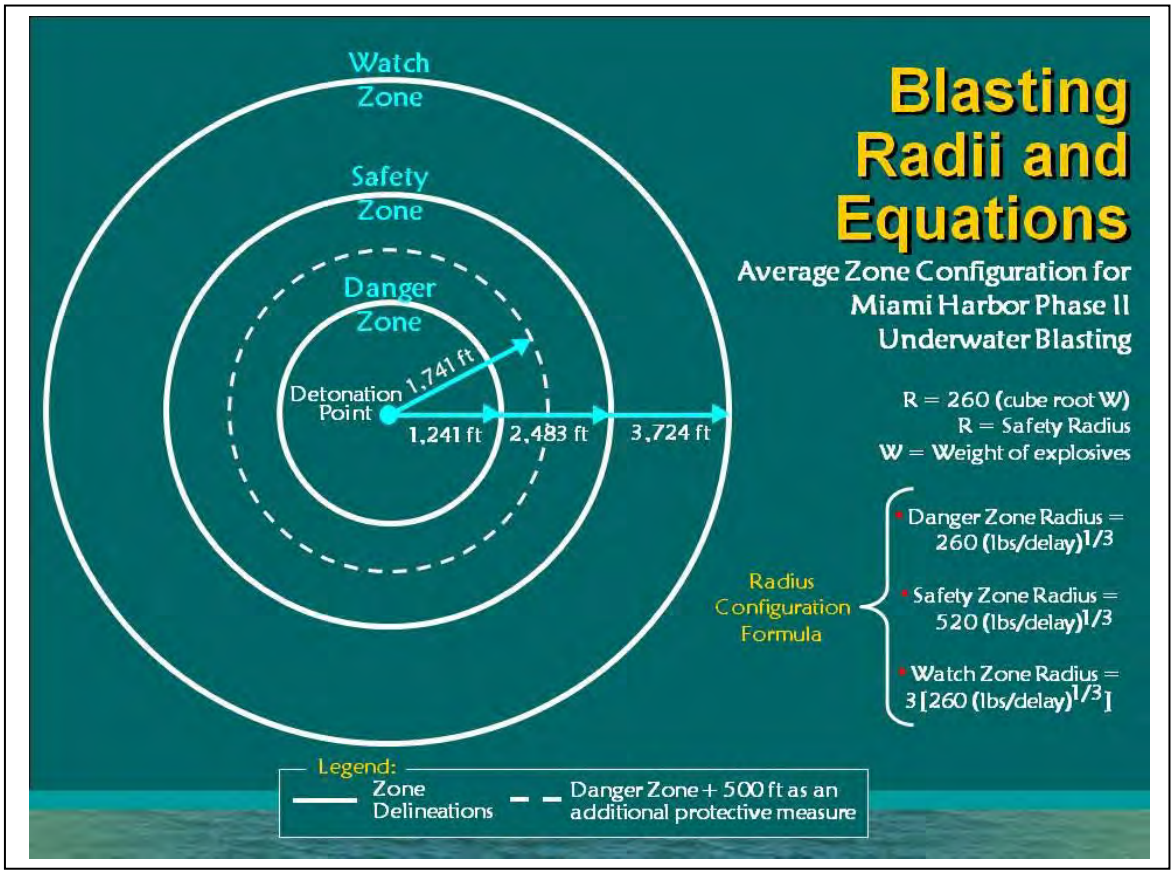

Figure 8 Blast Zone Radii and Equations

These zone calculations will be included as part of the specifications package that the contractors will bid on before the project is awarded. Ideally the safety radius should be large enough to offer a wide buffer of protection for marine animals while still remaining small enough that the area can be intensely surveyed.

Radii specifications are as follows:

1) Danger Zone (NMFS refers to this as the Caution Zone): The radius in feet from the detonation beyond which no expected mortality or injury from an open water explosion is likely to occur (NMFS 2005). The danger zone (ft) = 260 [79.25 m] X the cube root of weight of explosives in lbs per delay (equivalent weight of TNT).

2) The Safety Zone is the approximate distance in feet beyond which injury (Level A harassment as defined in the MMPA) is unlikely to occur from an open water explosion (NMFS 2005). The safety zone (ft) = 520 [158.50 m] X cube root of weight of explosives in lbs per delay (equivalent weight of TNT).

3) The Watch Zone is three times the radius of the Danger Zone to ensure that animals entering to traveling close to the Exclusion Zone are spotted and appropriate actions can be implemented before or as they enter any impact areas (i.e., a delay in blasting activities).

4) Exclusion Zone extends to 500 feet outside the Danger Zone radius. Detonation will not occur if a marine mammal or reptile may be within that zone (based on observational data).

Because of the potential duration of the blasting and the proximity of the inshore blasting to a seasonal manatee high use area (Lake Worth FPL discharge canal), a number of issues will need to be addressed. Due to the likelihood of a large number of manatees in the area during the winter months, USACE has agreed as part of the ESA consultation with USFWS not to blast between November 15 and March 15 of each year. Other dredging and construction activities may take place inside the Port during this period of time, but blasting will not be utilized during this period.

It is crucial to balance the demands of the blasting operations with the overall safety of protected species in the project area. A radius that is excessively large will result in significant delays that prolong the blasting, construction, traffic and overall disturbance to the area. A radius that is too small puts the animals at too great of a risk should one go undetected by the observers and move into the blast area. Because of these factors, the goal is to establish the smallest radius possible without compromising animal safety and provide adequate observer coverage for whatever radius is agreed upon.

Monitoring/watch plan. A watch plan will be formulated based on the required monitoring radii and optimal observation locations. The watch plan will be consistent

with the program that was utilized successfully at Miami Harbor in 2005 and will consist of at least five observers including at least one (1) aerial observer, two (2) boat-based observers, and two (2) observers stationed on the drill barge (Figures 9,10,11,12). The 6th observer will be placed in the most optimal observation location (boat, barge or aircraft) on a day-by-day basis depending on the location of the blast and the placement of dredging equipment. This process will insure complete coverage of the three zones as well as any critical areas. The watch will begin at least one-hour prior to each blast and continue for one-half hour after each blast (Jordan *et al*. 2007).

Specific flight and observing plans will be coordinated with the FAA and Palm Beach County Aviation Department to determine if aerial overflights are authorized throughout the entire project. If any conflicts develop that would prevent overflights of specific areas of the project that have been determined to require blasting, alternative monitoring methodologies will be investigated and coordinated with the resource agencies with jurisdiction for those issues.

Figure 9 Typical observer helicopter

Figure 10 View of typical altitude of aerial observer operations

Figure 11 Typical vessel for boat-based observer

Figure 12 Observer on Drill Barge

Vibration and Pressure Monitoring

Vibration. In an urban environment such as the Port, which is surrounded by commercial properties, utilities, and residential communities, protection of structures must be considered. Once the areas of the project requiring blasting have been identified, critical structures within the blast zones would be determined. Where vibration damage may occur, energy ratios and peak particle velocities shall be limited in accordance with state or county requirements, whichever is more stringent. Furthermore, vibration-monitoring devices will be installed to ensure that established vibration limits are not exceeded. If the energy ratio or peak particle velocity limits are exceeded, blasting will be stopped until the probable cause has been determined and corrective measures taken. Critical monitoring locations may include structures such as bulkheads, hazardous materials storage areas, and buried utilities.

Ground-borne vibration can be generated by a number of sources, including road and railways, construction activities such as piling, blasting and tunneling. Vibration can be defined as regularly repeated movement of a physical object about a fixed point. The parameter normally used to assess the ground vibration is the peak particle velocity (PPV) expressed in millimeters per second (mm/s). In order to completely define ground vibration, the amplitude and frequency of the motion are measured in the three orthogonal directions generally in terms of velocity which is considered to be the best descriptor for assessing human comfort and the potential damage response of structures. The vibration velocity signals are summed (in real time) and the maximum

amplitude of this vector sum is defined as the Peak Vector Sum (PVS). Vibration can cause varying degrees of damage in buildings and affect vibration-sensitive machinery or equipment. Its effect on people may be to cause disturbance or annoyance or, at higher levels, to affect a person's ability to work.

USACE reviewed data from the two most recent blasting projects completed by the district: the deepening of San Juan Harbor in 2000 and of Miami Harbor in 2005. Both used confined underwater blasting. Both projects had significant structural resources located near the blast that were of concern (the San Juan site included the National Park Service's Castillo San Felipe del Morro**,** a 400+ year old fortress overlooking the harbor and 30 additional historic sites within boundaries of the National Monument). In Miami, the harbor is bounded on the north by the port facilities and on the south by Fisher Island, a residential island. In both cases, a network of monitoring locations was established by the blasting contractor to capture vibration associated with the detonation of each blast. Additionally, at El Morro, the contractor installed monitoring devices on each crack in the stucco that covers the structure's interior walls, and a photo was taken after installation to serve as a pre-construction baseline. During construction, the crack was monitored throughout the blasting project to ensure that crack's width or length had not increased (Figure 13).

At Miami the maximum PVS allowed for the project was 1.0 mm/s. The average maximum PVS for the Miami Harbor deepening in 2005 was 0.3828mm/s with a range of 0.0819mm/s - 1.08mm/s during the 40 blast detonations. During both projects, no adverse impacts were reported to any of the surrounding structures by either the vibration monitoring contractor, or the building's owners/trustees.

Air Pressure. The USACE Safety and Health Requirements Manual (EM 385-1-1 3, September 1996) limits of "air blast pressure exerted on structures resulting from blasting shall not exceed 133 dB (0.013 psi)" and industry standard vibration limitations would be incorporated into the design process. A conservative regression analysis of similar projects may be used to develop the design and then continually updated with calibration of the environment. The contractor will also be required to abide by state and local blasting requirements in addition to the USACE Safety Manual previously referenced in this paragraph.

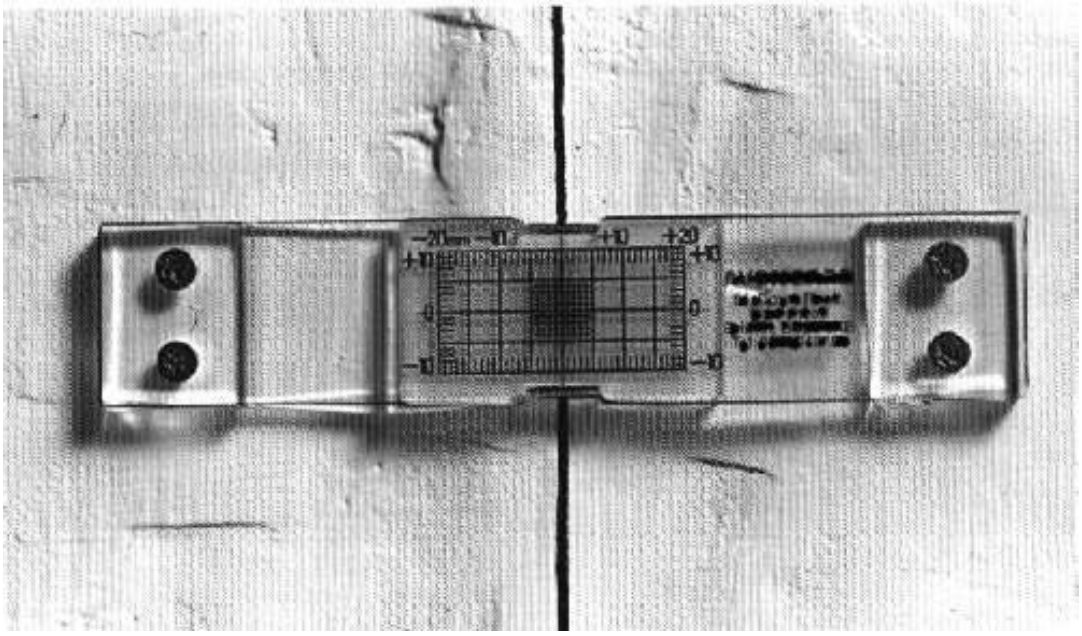

Figure 1 Typical Crack Monitor Device

Duration of Confined Blasting During Construction

The duration of the blasting (pre-treatment) is dependent upon a number of factors including hardness of rock, how close the drill holes are placed, and the type of equipment that will be used to remove the pretreated rock. For comparison, the harbor deepening project at Miami Harbor in 2005-2006 estimated between 200-250 days of blasting with one-shot per day (a blast-day) to pre-treat the rock associated with that project. However the contractor completed the project in 38 days with 40 blasts. The upcoming expansion at Miami Harbor scheduled to begin in summer/fall of 2012 currently estimates 600 blast-days for the entire project footprint. However, the actual number of blast days may be reduced by the contractors, based on the previously mentioned factors. This estimate of how many days of blasting would be needed to complete the work will be estimated with detailed geotechnical analysis during the preconstruction, engineering and design (PE&D) phase of the project.

Adaptive Improvement of Blasting Specifications and Methods

Test Blast Program. Prior to implementing a construction blasting program a test blast program will be completed. The test blast program will have all the same protection measures in place for protected species monitoring and protection as blasting for construction purposes. The purpose of the test blast program is to demonstrate and/or confirm the following:

- Drill Boat Capabilities and Production Rates
- Ideal Drill Pattern for Typical Boreholes
- Acceptable Rock Breakage for Excavation
- Tolerable Vibration Level Emitted
- Directional Vibration
- Calibration of the Environment

The test blast program begins with a single range of individually delayed holes and progresses up to the maximum production blast intended for use. The test blast program will take place in the project area and will count toward the pre-treatment of material, since the blasts of the test blast program will be cracking rock. Each test blast is designed to establish limits of vibration and air blast overpressure, with acceptable rock breakage for excavation. The final test event simulates the maximum explosive detonation as to size, overlying water depth, charge configuration, charge separation, initiation methods, and loading conditions anticipated for the typical production blast.

The results of the test blast program will be formatted in a regression analysis with other pertinent information and conclusions reached. This will be the basis for developing a completely engineered procedure for construction blasting plan. During the testing the following data will be used to develop a regression analysis:

- Distance
- Pounds Per Delay
- Peak Particle Velocities (TVL)
- Frequencies (TVL)
- Peak Vector Sum
- Air Blast, Overpressure

In order to provide dependable verification of presence of manatees within the blast zone, a detection system was designed which included the following three provisions:

- Provision 7: A trained observer will be stationed on the sighting tower or catwalk of the dynamite drill barge.

- Provision 8: An observer in a boat will make a systematic survey of the danger zone prior to blasting.

- Provision 9: An electronic color enhanced fathometer will be utilized to monitor underwater manatee movement.

Additionally, special conditions will be placed into the specifications for the project to

protect manatees in the area.

1. A marine mammal watch will be conducted by no less than 2 qualified observers from a small watercraft, at least ½ hour before and after the time of each detonation, in a circular area at least three times the radius of the above described danger zone (this is called the watch zone).
2. Any marine mammal(s) in the danger zone or the watch zone shall not be forced to move out of those zones by human intervention. Detonation shall not occur until the animals(s) move(s) out of the danger zone on its own volition.
3. No blasting will occur during the “manatee season”.
4. In the event a marine mammal or marine turtle is injured or killed during blasting, the Contractor shall immediately notify the Contracting Officer as well as the following agencies:
    a. Florida Marine Patrol "Marine Mammal Stranding Hotline" 1-800-342-5367
    b. FWS – Vero Beach Office
    c. National Marine Fisheries Service – Protected Resources Division, St. Petersburg

Take Analysis

Due to the restrictions and special conditions placed in our construction specifications the Corps does not anticipate any take of the endangered Florida manatee.

Determination

The Corps has determined that the proposed widening and deepening Lake Worth Inlet is likely to affect, but not likely to adversely affect listed species within the action area. The Corps believes that the restrictions placed on the blasting previously discussed in this assessment will diminish the effect of the project on protected species within the action area. The Corps has also determined that the project will not adversely modify critical habitat for the Florida manatee.

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ATTACHMENT 7: ESSENTIAL FISH HABITAT (AFFECTED ENVIRONMENT)

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) require regional fishery management councils and federal agencies to promote protection, conservation, and enhancement of essential fish habitat (EFH). The EFH provisions of the Magnuson-Stevens Act support one of the Nation's overall marine resource management goals - maintaining sustainable fisheries. Achieving this goal requires maintenance of the quality and quantity of habitats necessary for fishery resources.

The Magnuson-Stevens Act defines EFH as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Rules promulgated by NMFS in 2002 further clarify EFH with the following definitions: **waters** - aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; **substrate** - sediment, hardbottom, structures underlying the waters, and associated biological communities; **necessary** - the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and **spawning, breeding, feeding, or growth to maturity** - stages representing a species' full life cycle. EFH may be a subset of all areas occupied by a species. Acknowledging that the amount of information available for EFH determinations will vary for the different life stages of each species, the rule directs the fishery management councils and the National Marine Fisheries Service (NMFS) to use the best information available, to take a risk averse approach to designations, and to be increasingly specific and narrow in the delineations of EFH as more refined information becomes available.

The rules also provide for fishery management councils and NMFS to consider more limited designations for each species. Habitat Areas of Particular Concern (HAPCs) are subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially important ecologically, or located in an environmentally stressed area. In general, HAPCs include habitats important for the migration, spawning, and rearing of fish or shellfish. Actions with potential adverse impacts to HAPCs are more carefully scrutinized and subject to more stringent conservation recommendations.

The South Atlantic Fishery Management Council (SAFMC) designates mangrove; seagrass; hardbottom, coral, and coral reefs; intertidal flats; coastal inlets; and other bottom habitats within the Lake Worth Inlet project area as EFH (SAFMC 1998). In addition the Mid-Atlantic Fishery Management Council designates coastal inlets as EFH for bluefish and the NMFS designates coastal inlets as EFH for a variety of sharks.

Within southeast Florida, including the Lake Worth Inlet project area, nearshore bottom, live/hardbottom, seagrass, and coastal inlets are HAPCs (SAFMC 1998). Managed species that commonly inhabit the study area include pink shrimp (*Farfantepenaeus duorarum*); spiny lobster (*Panulirus argus*); and members of the 73-species snapper-grouper complex, including blue stripe grunts (*Haemulon sciurus*), yellowtail snapper (*Ocyurus chysurus*), and red grouper (*Epinephelus morio*). These species use inshore habitats as juveniles and sub-adults, and they use hardbottom and reef communities offshore as adults. Other species of the snapper-grouper complex commonly seen offshore in the study area include gray triggerfish (*Balistes capriscus*) and hogfish (*Lachnolaimus maximus*). Coastal migratory pelagic species also commonly utilize the offshore area adjacent to the study area, including cero mackerel (*Scomberomorus regalis*) and Spanish mackerel (*S. maculatus*).

Table 1: Federally Managed Species of Fish that May Occur within the Project Area.

Species	Life Stage	Substrate Preference[1]	
		Unconsolidated Sediment	Seagrass
Brown shrimp *Farfantepenaeus aztecus*	A, J, L	A, J, L	J, L
Pink shrimp *Farfantepenaeus duorarum*	A, J	A, J	J
White Shrimp *Litopenaeus setiferus*	A, J	A, J	J, L
Spiny Lobster *Panulirus argus*	A, J	A, J	A, J
Black seabass *Centropristis striata*	A, J	A, J	
Gag *Mycteroperca microlepis*	A, J	A, J	
Cobia *Rachycentron canadum*	J	J	
Mutton snapper *Lutjanus analis*	A, J	J	J
Gray snapper *Lutjanus griseus*	A, J, L	A, J, L	A, J, L
Lane snapper *Lutjanus synagris*	A, J	A, J	J
Yellowtail snapper *Lutjanus chrysurus*	A, J	J	J
White grunt *Haemulon plumieri*	A, J	A, J	A, J
Sheepshead *Archosargus probatocephalus*	A, J, L	A, J	J, L
Red drum *Sciaenops ocellatus*	A, J, L	A, J, L	J, L
Hogfish *Lachnolaimus maximus*	A, J	J	J
Spanish mackerel *Scomberomorus maculatus*	A, J	A, J	
Black drum *Pogonias cromis*	A, J	A, J	A, J
Southern flounder *Paralichthys lethostigma*	A, J	A, J	J

[1] Substrate preference, unconsolidated sediment and seagrass habitats occur in or near the project area. A=adult; J=juvenile; L=larvae

Table 2: Prey Species that May Occur within the Project Area.

Species	Life Stage	Substrate Preference[2]	
		Unconsolidated Sediment	Seagrass
Thinstripe hermit crab *Clibanarius vittatus*	A, J	A, J	
Horse conch *Pleuroploca gigantea*	A, J	A, J	A, J
Bay anchovy *Anchoa mitchilli*	A, J, L	A, J, L	L
Sheepshead minnow *Cyprinodon variegatus*	A, J, L	A, J, L	
Atlantic menhaden *Brevoortia tyrannus*	A, J, L	A	J, L
Bay scallop *Argopecten irradians*	A, J, L	A, J	A, J, L
Atlantic rangia *Rangia cuneata*	A, J, L	A, J, L	
Quahog *Mercenaria mercenaria*	A, J	A, J	
Grass shrimp *Palaemonetes pugio*	A, J		A, J
Striped mullet *Mugil cephalus*	A, J	A, J	A, J
Spot *Leiostomus xanthurus*	A, J	A	J
Atlantic croaker *Micropogonias undulates*	A, J	A, J	
Silversides *Menidia menidia*	A, J, L	A, J, L	A, J, L
American eel *Anguilla rostrata*	A, J, L	J, L	A, J, L

[1] Substrate preference, unconsolidated sediment and seagrass habitats occur in or near the project area. A=adult; J=juvenile; L=larvae

[2] Substrate preference, unconsolidated sediment and seagrass habitats occur in or near the project area. A=adult; J=juvenile; L=larvae

SEAGRASS

Review of literature, related information, and views of recognized experts on the habitat or species that may be affected

Community Composition of Seagrass in the Lake Worth Inlet Area

The seagrass community in the Lake Worth Inlet area has included *Halophila decipiens, H. johnsonii,* and *Halodule wrightii*. The seagrass habitats are spatially and temporally dynamic, but persistently present in areas around the turning basin. Seagrass communities were dominated by sparse cover of *H. johnsonii* in single species and mixed beds in shallow to mid-water depth (0-4m), while *H. decipiens* predominated in water depth greater than 4m. *Halodule wrightii* was also found in shallow water, primarily less than 2m. Frequency of occurrence, cover abundance scores, and density were relatively low for all seagrass beds documented. Frequency of occurrence across an entire transect was highest for *H. johnsonii* along Transect 18, with a value of 0.36 out of a possible 1.0. Cover abundance scores for all species, *H. johsonii*, *H. decipiens* and *Halodule wrightii* were less than 26% cover (maximum of 2.33; Table 4) across all transects; which means that seagrasses covered less than 26% of the bottom where they were found. The highest density score, which is the sum of cover abundance scores for a species, divided by the total number of quadrats within a transect, was 0.72.

Regardless of species composition or developmental stage, seagrass patches and entire beds can move, the rate of which may vary on scales of weeks to decades (SAFMC 2009). The expansion and contraction of seagrass beds, also referred to as "pulsating patches" may be a long-term survival strategy of *H. johnsonii* (Virnstein et al. 2009) and other seagrass species. For impact assessment purposes, it is important to consider the broader seagrass habitat and not just the currently vegetated portions. Seagrass habitats include not only continuous vegetated beds, but also patchy environments with unvegetated areas between the patches as part of the habitat (SAFMC 2009). Available data show that patchy habitats provide ecological functions similar to continuous meadows (Murphey and Fonseca 1995). The absence of seagrass in a particular location during an isolated survey event does not necessarily mean that the location is not viable seagrass habitat and could be considered as potential habitat if the environmental conditions are suitable. It could merely mean that the present conditions are unfavorable for growth at that moment in time, and the duration of this condition could vary from months to years (SAFMC 2009).

Virnstein et al. (2006) observed seagrass coverage expansion within a year and concluded that seagrass responds rapidly to changing environmental conditions. Because seagrass coverage and density in the Lake Worth Inlet area is dynamic, this may also indicate high resilience to changing environmental conditions. However, the consequences of human development and other anthropogenic pressures in a coastal basin and the loss of natural hydrologic buffers, can compromise an estuary's resilience to rapidly recover from natural pressures, e.g., hurricanes and seasonal salinity fluctuations (Steward et al. 2006).

Halophila decipiens

H. decipiens had the highest abundance score for all seagrasses within the 2011 study area, but the lowest density. This species is highly fecund and cosmopolitan, occupying niches that larger-sized perennial species cannot utilize (Hammerstrom and Kenworthy 2003). The short life history of *H. decipiens* and the apparent existence of a buried, but moveable seed bank means that spatial organization of this community is dictated by first large-scale dispersal of plant propagules (hundreds of

meters) and then, within a growing season, by physical perturbation, bioturbation, and clonal organization of the seagrass operating over very small distances (Fonseca et al. 2008). This species can contribute to a more clumped distribution early in the growing season with subsequent vegetative extension. Fonseca et al. (2008) point out that large-scale disturbance events, such as hurricanes, act to redistribute *H. decipiens* propagules, whereupon clonal organization of the plants in their spring to fall existence likely dictates the pattern of seafloor occupation. Furthermore, bioturbation plays an important role in either burying seeds or bringing seeds to the sediment surface where they can germinate. They further note that this species appears to have the facility for resiliency of natural disturbances (e.g., hurricanes) of its community that appear to be able to move the seed bank hundreds, if not thousands of meters, leading to tremendous seasonal changes in the spatial distribution of the plants. The small seed size and the burial of unvegetated substrate by sediments, coupled with movement along with sediment is a plausible mechanism to explain the inter-annual patterns of seagrass distribution (*sensu* Josselyn et al. 1986). Thus, the definition of "seagrass habitat" for the *Halophila* genera can be highly misleading if presently vacant spaces among patches are not properly considered as requisite space for persistence of the community (*sensu* Fonseca et al. 1998).

Although *H. decipiens* is small and present only through a few months of the year, the species provides significant sediment stabilization (Fonseca 1989). Despite a smaller size and a relatively low rate of production, *H. decipiens* makes an important contribution to primary production in an ecosystem (Iverson and Bittaker 1986). It is important to note that *H. decipiens* communities are a mosaic of seasonally ephemeral seagrass patches that provide the valuable ecological functions recognized for the larger seagrasses (Hammerstrom et al. 2006), therefore the patchy abundance of *Halophila* is a function of the genus dynamics and should be recognized as the ambient condition. Rapid growth, high turnover rates, and labile tissues make *Halophila* spp. a good source of nutrition for several marine herbivores and detritivores (Kenworthy et al. 1989).

Halodule wrightii

Halodule wrightii had the lowest frequency of occurance and abundance of the three seagrasses, but the second highest density. *Halodule wrightii* is a highly productive seagrass under a variety of light, nutrient, and salinity conditions and because of this it is known to have ubiquitous distribution and an opportunistic strategy as a colonizing species (Dunton 1996). This species can persist under diminishing environmental conditions by reclamation of nutrients and stored reserves from senescing shoots and rhizomes (Onuf 1996). Rhizome growth and branch rate for *H. wrightii* is high compared to climax seagrass species (e.g., *Thalassia testudinum*) which allows it to rapidly occupy the space they colonize, however they have a high shoot mortality and low life expectancy which implies they may not occupy the space for long (Gallegos et al. 1994).

Heidelbaugh (1999) conducted a study within a 372 square meter (0.09 acres) study area that examined benthic fauna associated with seagrass and unvegetated bottoms and collected 117 species and 690 macrofaunal organisms from *H. wrightii* beds. The most abundant infaunal organisms belonged to the phylum Nematoda while the most abundant epifaunal species were amphipods and tanaids. The majority of macrofaunal organisms consisted of decapod crustaceans (*Callinectes sapidus*), fishes (*Eucinostomus* sp.), and some gastropods (especially *Bursatella leachii*). An additional study compared nekton densities among *H. engelmannii*, *H. wrightii*, and nonvegetated habitats and, similar to the results of the Heidelbaugh (1999) study, found higher densities in the seagrass habitats (King and Sheridan 2006). These studies and others (Sheridan and Livingston 1983; Stoner 1983; Lewis 1984) conclude that on a per plant biomass basis, *Halodule* provides as much fish and infaunal habitat value as other species with higher above-ground biomass, such as *Thalassia testuninum*.

Halophila johnsonii

Under the Endangered Species Act, the Jacksonville District will separately consult with NMFS on potential effects to threatened *H. johnsonii* from the proposed action, however it is important to note that Johnson's seagrass, like other seagrass species, is also designated as EFH.

Halophila johnsonii was the most frequently occurring seagrass in the 2011 survey, but like all seagrasses, density and abundance was sparse. The expansion and contraction of *H. johnsonii*, also referred to as "pulsating patches" may be a long-term survival strategy (Virnstein et al. 2009). The persistent presence of high density elevated patches of *H. johnsonii* on flood tidal deltas near inlets suggests that it is capable of sediment stabilization (NMFS 2007). Given the similarities between the morphology of other *Halophila* spp. and *H. johnsonii,* it is reasonable to assume that *H. johnsonii* has the same capabilities as these other species to provide important ecological functions and services to the coastal ecosystem of southeastern Florida (NMFS 2007).

Ecological Functions of Seagrass and Seagrass as EFH

The SAFMC designated seagrass as EFH for species managed under the snapper-grouper, spiny lobster, and coastal migratory pelagics Fishery Management Plans. See Table 1 for a list of species associated with these seagrass habitat and documented in the project area. Other studies from Florida have reported that young gray snapper are frequently collected by shrimp trawlers in seagrass beds at night (Serafy et al. 2007). Other species managed under the snapper-grouper fishery management plan that show an affinity with seagrass habitat include juvenile dog snapper (*L. jocu*), goliath grouper (*Epinephelus itajara*), bluestripe grunt, spiny lobster, and pink shrimp. Additionally, species managed under the highly migratory species fishery management plan, such as tiger (*Galeocerdo cuvier*) and Atlantic sharpnose (*Rhizoprionodon terraenovae*) sharks have an affinity for seagrass habitats.

Many ecological functions are associated with seagrass, including nutrient recycling, detrital production and export, sediment stabilization, and provision of food and habitat for many life stages of numerous marine species. The most well-known function of seagrass is the role as habitat for numerous fishes and invertebrates. Some species spend their entire lives within seagrass beds and others utilize them only during certain stages of their life cycle (usually the postlarval and juvenile stages). Seagrass beds are one of the primary nursery habitats for coastal marine fauna because of their abundance of prey items as well as the protection they provide from predators. Like many of the larger species, *Halophila* species provide organic matter, habitat structure, and food for benthic feeding organisms (Valentine and Heck 1999). In addition, *Halophila* based ecosystems are important food for herbivorous reptiles (Ross 1985).

Seagrass habitats perform numerous important functions in coastal ecosystems that aid in successful spawning, feeding, and growth of several seasonal and resident fishery species, thus serving as EFH. SAFMC (2009) provides a review of several studies have concluded that, although juvenile fish and shellfish can use other types of habitat, many estuarine species rely on seagrass for either part of their life history or some aspect of their nutrition, and that the loss or reduction of this habitat will produce concomitant declines in juvenile fish settlement. Seagrass habitat type is essential to many species of commercial, recreational and ecologically important shellfish and finfish (SAFMC 2009). *Halophila* based ecosystems, like the habitats within the Lake Worth Inlet project area, are particularity important habitats for penaeid shrimp (Ross 1985). Scientific evidence also indicates other species have a strong reliance on seagrass habitats as well including, blue crabs and spiny lobster (SAFMC 2009).

One of the more important functions of seagrass as EFH is the nursery role. Seagrass habitats serve as nurseries for juvenile fish and their food sources. Seagrass habitats also affect ecological processes which enable fish to grow and mature to different ontogenetic stages, eventually reaching adult forms and emigrating to other habitats (Orth et al. 1984; Koenig and Coleman 1998; Beck et al. 2001). Several studies indicate that juvenile fishes are the most abundant age group in seagrass beds, especially in more temperate waters (SAFMC 2009). In particular, juvenile yellowtail snapper and French grunt are highly associated with seagrass beds (Cocheret de la Moriniere et al. 2002). Seagrass functions as a nursery is critical for many estuarine dependent fishery species in the South Atlantic region such as gag groupers (*Mycteroperca microlepis*), flounders (family Pleuronectidae), red drum (*Sciaenops ocellatus*), weakfish (*Cynoscion regalis*), and striped mullet (*Mugil cephalus*) (Thayer et al. 1984).

The same ecological characteristics of seagrass beds that make the habitat favorable for juveniles should also benefit larval fish and invertebrates. There have been a few studies dealing with larval fish settlement and use of seagrass habitats. Parish (1989) documented that seagrass provides habitat for settling postlarvae and developing juvenile reef fishes. Seagrass beds are important for the brooding of eggs (for example, silverstripe halfbeak, *Hyporhamphus unifasciatus*) and for fishes with demersal eggs (e.g., rough silverside, *Membras martinica*). Larvae of spring-summer spawners such as anchovies (*Anchoa* spp.), gobies, (*Gobiosoma* spp.), pipefish (*Syngnathus fuscus*), weakfish, southern kingfish (*Menticirrhus americanus*), red drum, silver perch (*Bairdiella chrysoura*), rough silverside, feather blenny (*Hypsoblennius hentzi*), and halfbeaks are present and use seagrass beds (SAFMC 2009).

A large proportion of the seasonal residents of seagrass habitats in the South Atlantic region spawn offshore on continental shelves and reefs, enter the estuaries in late winter and early spring and take up residency until fall or until they reach a certain ontogenetic stage when they move to other habitats or offshore to renew this cycle.

In addition, seagrass habitats pass on unique biological, physical and chemical characteristics to water bodies which both directly and indirectly contribute to the necessary attributes of EFH (Zieman 1982; Thayer et al. 1984). Seagrass habitats play an important role as EFH by influencing the environment they grow in as well as adjacent environments. Essentially, seagrass habitat affects flow, velocity, and turbulence, thereby creating an environment favorable to settlement of fish and fish food. Organic and inorganic particles settle into the seagrass beds providing nutrients and food, enriching the environment and enhancing secondary production. In turn, the substrate is stabilized, nutrients are temporarily conserved within the meadows and water quality is improved by the presence of seagrass. These ecological services enhance the environmental conditions favoring high rates of primary and secondary production in support of healthy and abundant fish communities (SAFMC 2009).

SOFTBOTTOM HABITATS AS EFH

Softbottom habitat is the area with unconsolidated sediment that lacks vascular plants (i.e., no seagrass is present, but marcoalgae may be present). Within the interior portions of Lake Worth Inlet, the unconsolidated sediment is usually sand, silty sand with sandy material occurring more commonly in shallow waters and near the inlet and silty sediments occurring in deepwater waters of the turning basin. Although soft bottom habitat lacks visible structural features, many microscopic plants occur at the sediment surface and burrowing animals commonly occur below the surface (Peterson and Peterson 1979, Alongi 1990); the dominant taxa of macroinfauna are usually polychaetes, crustaceans, mollusks, and echinoderms. One of the more interesting features of soft bottom communities is that the species

within this habitat can significantly structure the habitat thorough processes, such as bioturbation, enhancing water flow through sediments, and tube building, that affect community as a whole. Similarly, soft bottom habitat provides important ecological services to coastal ecosystems (Peterson and Lubchenco 1997). For example, soft bottom areas serve as a storage reservoir of chemicals and microbes. Intense biogeochemical processing and recycling establish a filter to trap and reprocess watershed-derived natural and human-induced nutrients and toxic substances.

One of the more important services provided by soft bottom habitat is foraging habitat for fishery species and their prey. For example, adult white grunts, which are a federally managed fishery species as well as an important food source for species managed within the snapper-grouper complex, are generalized carnivores that feed mainly on benthic invertebrates (Bowman et al. 2000; Potts and Manooch 2001). The high forage value of soft bottom habitat results from the high concentrations of organic matter transported to and produced on soft bottom and the numerically abundant, diverse invertebrate fauna associated with this habitat. While the forage value of soft bottom habitat can vary greatly with position in the landscape, proximity to physical disturbance (such as dredging and wave scour) and chemical disturbances (such as stormwater runoff and low concentrations of dissolved oxygen) can be overriding factors (Pearson and Rosenberg 1978; Diaz and Rosenberg 1995).

Soft bottom habitat also can provide refuge to smaller organisms, such as juvenile fish, because predators are unable to maneuver effectively in shallow waters. Consequently, juvenile fish typically first recruit to the shallowest portions of an estuary or lagoon. Flounder, rays (e.g., *Urobatis jamaicensis* or *Dasyatis americana*), and small cryptic species, such as pink shrimp and blue crabs, can bury in the sediment, camouflaging themselves from predators. Smaller predators in shallow water and larger predators in deeper water also bury themselves in soft bottom habitats relying upon ambush tactics for feeding (Walsh et al. 1999). Consequently, many fish, crabs, and shrimp in subtidal, soft bottom habitats forage nocturnally (Summerson and Peterson 1984).

The SAFMC designated soft bottoms as EFH for species managed under the snapper-grouper, shrimp, and spiny lobster fishery management plans. Federally managed species documented in the Lake Worth Inlet expansion area and associated with soft bottom habitat include white grunt, pink shrimp, and spiny lobster. Additionally, species managed by NMFS under the highly migratory species fishery management plan, such as Atlantic sharpnose, bonnethead (*Sphyrna tiburo*), and finetooth (*Carcharhinus isodon*) sharks have an affinity for soft bottom habitats. See table 1 for a list of species associated with soft bottom habitat and documented in or near the project area.

LAKE WORTH INLET AS EFH

Tidal inlets are HAPCs because of the unique role they play as migratory corridors connecting ocean and estuarine waters that serve as spawning and nursery areas for shrimp, red drum, mackerels, and other species (Hettler and Chester 1990; Lindeman et al. 2000; Faunce and Serafy 2007).

Movement of larval and juvenile fish and shrimp through inlets can vary greatly between inlets and over time with some species migrating nocturnally, within portions of the tidal stream, phases of the lunar cycle or interaction of these factors (Forward et al. 1999). The major point being that migration through inlets rarely is a passive process and, instead, reflect behaviors of the migrants. While modeling studies conducted for this project and summarized in this Draft EIS conclude that changes in the physical characteristics of Lake Worth Inlet Inlet as a result of dredging will be minor, these studies do not

examine the response of fish and other organisms to those changes, and such examinations would be difficult to do. Most larval and juvenile fish that utilize the inlet to access their inshore nurseries respond to a variety of environmental factors once they reach the inlet (Boehlert and Mundy 1988). Dredging of inlets, including their ebb and flood tide shoals, may result in unanticipated changes to the cues used by migrants to the estuary. Species that orient to cues associated with the sea bottom may be affected by a deepened channel. Channel dredging also may change flow of long-shore currents. These currents not only affect the transport of sediments along the beach but also influence the recruitment of early life history stages of fish and invertebrates into the estuary. In short, complex modeling and empirical studies would be needed to examine how fish would respond to the modified inlet.

The SAFMC designated coastal inlets as EFH for species managed under the snapper-grouper and shrimp fishery management plans. Additionally, the Mid-Atlantic Fishery Management Council designated coastal inlets as EFH for the bluefish (*Pomatomus saltatrix*) fishery management plan.

HARDBOTTOM HABITATS AS EFH

Channel Wall, Channel Shelf and Nearshore

Expansion zones B-1 and B-2 included the excavated rock walls of Lake Worth Inlet and short shelf sections extending away from the existing Federal Channel. Hardbottom habitat within these areas tended to be vertically oriented; however, the shelf portion of B-1 did support a measurable percentage of consolidated substrate. Throughout zones B-1 and B-2, the predominant space occupiers were of suspension and filter-feeding species from Hydrozoa and Porifera. At least 3 species of thecate hydroid (unidentified) and 8 species of sponge (*Siphonodictyon* sp., *Agelas* sp., *Niphates* sp., *Amphimedon* sp., *Cliona* sp., *Monanchora* sp., *Ircinia* spp., and *Spirastrella* sp.) typically comprised the benthic assemblage.

Eastern portions of C represented a westward continuation of the same sponge and hydroid communities found on the northern face of the Inlet. *Siphonodictyon* sp., *Agelas* sp., *Niphates* sp., *Amphimedon* sp., *Cliona* sp., *Monanchora* sp., *Ircinia* spp., *Spirastrella* sp., and several species of thecate hydroid were found to dominate the southerly-facing wall and slope regions with diminishing coverage on the shelf and flats to the north. Diver and towed-video surveys also suggested a gradual decrease in hardbottom coverage moving westward through Zone C, with an increasing percentage of sand and shell hash.

Hardbottom in expansion Zone D consisted of intermittent rock outcroppings along the ~20-ft contour of the channel slope. A variety of hydroids, sponges (*Amphimedon* sp., *Niphates* sp., *Ircinia* sp., boring, etc.), and fish (including bandtail pufferfish, sergeant major, juvenile porkfish, and juvenile cocoa damselfish) were observed

Continuous hardbottom, sand with scattered hardbottom and hardbottom ledge habitat included a number of benthic organisms unique to hardbottom habitat which were not found in seagrass habitats. Hardbottom benthic organisms were documented to the lowest taxonomic level and are listed in Table 5. Fish populations associated with hardbottom habitat were also documented (Table 6).

Table 3: List of benthic invertebrates and macroalgae documented along transects.

Common Name	Species Name
Sponge	
Black ball sponge	*Ircinia strobilina*
Orange boring sponge	*Cliona delitrix*
Lumpy overgrowing sponge	*Holopsamma helwegi*
Hard Corals	
Lesser starlet coral	*Siderastrea siderea*
Greater starlet coral	*Siderastrea radians*
Hydroids	
Feather bush hydroids	*Dentitheca dendritica*
Macroalgae	
Geen feather algae	*Caulerpa sertularoides*
Y branched algae	*Dictyota* sp.
Oval Blade algae*	*Caulerpa prolifera*

*Documented in seagrass habitat and hardbottom habitat.

Table 4: Fish species documented within project area.

Fish Common Name	Fish Species
Porkfish	*Anisotremus virgincus*
Gray Angelfish	*Pomacanthus arcuatus*
Stoplight Parrotfish	*Sparisoma viride*
Tomtates	*Haemulon aurolineatum*
Grunts (j)	*Haemulon* (spp.)
Blue tang	*Acanthurus coeruleus*
Bluehead wrasse (j,a)	*Thalassoma bifasciatum*

The relative abundance of benthic organisms to each other and the percent cover of hardbottom benthic organisms along transects is described in Table 7 (DCA 2011). Benthic organisms were identified to the lowest taxonomic level and categorized by functional group for analysis. Values are percent cover averages over the entire transect, so lower values represent less hardbottom habitat along the entire transect. Hard corals were noted along transects, whether or not they fell within $1m^2$ quadrats. A total of five hard corals were documented along all transects surveyed and included *Siderastrea siderea* and *S. radians*. Noteably, no soft corals were documented during this survey.

Table 5: Percent cover of hardbottom constituents including hydroids, sponge, hard coral, macroalgae, tunicates and bare space along each transect where hardbottom was documented. Transect totals add to 100% only if the entire transect consisted of hardbottom.

Transect	Hydroid	Sponge	Hard Coral	Macroalgae	Tunicate	Bare	Total
T14	0	2.3	0	0.5	0.01	2.3	5.11
T15	3.3	3.3	0	0	0	6.6	13.2
T16	4.6	2	0	1.2	0.23	12.8	20.83
T17	0.8	0.8	0	0	0	1.6	3.2
T20	9.4	3.8	0	0	0.38	24.0	37.58
T21	0	6.6	0	0	0	10	16.6
T22	1.6	2	0	0	0	4.4	8
T25	17.0	1.4	0.05	0	0.05	34.1	52.6
T26	16.8	0.66	0.06	1.33	0	33.4	52.25
T27	15.7	3.9	0.04	0	0	71.5	91.14
T28	18.7	0.83	0	0	0	76.3	95.83

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APPENDIX E

LAKE WORTH INLET

Palm Beach Harbor

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

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JAN 23 2008

To Participants and Attendees:

Thank you for your attendance and participation in the Public Scoping Meeting held on January 9, 2008, to explore expansion alternatives for Lake Worth Inlet – Palm Beach Harbor, Palm Beach County, Florida. As discussed during the scoping meeting, the "scoping process" is used to determine the breadth of issues that should be considered during preparation of the Draft Environmental Impact Statement (DEIS), as required by the National Environmental Policy Act and associated regulations (40 CFR 1501.7).

The January 9th scoping meeting produced a broad range of views and issues with noteworthy potential for analysis under the DEIS evaluation process. The information obtained from the public meeting has been incorporated into the administrative record, in the form of a recorded transcript and written submittals. You may obtain a copy of the recorded meeting (i.e., transcript or written submittals), after February 1, 2008 from website: http://planning.saj.usace.army.mil/envdocs/envdocsb.htm#Palm-Beach-County under Palm Beach County, Lake Worth Inlet (Palm Beach Harbor), Florida. Please note this website will not contain information that is already publicly available or copyrighted. If you have any additional information that you would like to see incorporated into the DEIS and the information is relevant to the proposal, please submit to the Chief, Planning Division, at the above letterhead address within 15-days from the date of this letter.

Please be advised that your name and mailing information have been made part of the project's mailing list. Unless you indicate otherwise, this list will be used to inform when the DEIS is available for public review and comment in addition to providing notice for the public meeting to be scheduled on the DEIS.

I would like to thank you for taking the time to attend the scoping meeting and providing input into this process.

Sincerely,

for

Marie G. Burns
Acting Chief, Planning Division

Summary of Public Comments
Lake Worth Inlet (Palm Beach Harbor) Scoping Meeting
January 9, 2007

(Please note that this summary reflects points raised by speakers during the scoping meeting, as recorded on flip charts during the meeting itself. It may not include all points made by speakers. Further, these notes are not a complete record of comments; a transcription of the meeting is available for those wishing to review a verbatim account. Minor edits have been made for clarity when needed or requested by speakers after the meeting conclusion.)

Susan Markin, Town of Palm Beach resident

- Concerned about Port expansion
- House is near Port on Lake Worth
- Safety issues self-imposed due to bringing in large ships
- Area surrounded by small communities
    - Not Miami or Ft Lauderdale
    - Residents expect small Port with small vessels
- Recreational uses important and are economic generators
- Be cautious about Port expansion and impacts on communities
- Manatee impacts are a concern
- Aesthetic impacts are a concern
- Increased surge potential during storm a concern
- Impacts to sand retention in Palm Beach a concern

Peter Elwell, Town of Palm Beach, Town Manager

- Concerned about size and number of ships
    - Study should clearly identify the existing and proposed ship number and sizes and address the impact of larger and increased vessels
- Concerned about impacts to Peanut Island and recreational vessels (especially in Areas C, E and F) (note: Area F added by speaker after meeting)
- Concerned about water quality impacts due to vessels, especially larger vessels
- Change in coastal dynamics are a concern and technical information to address concerns should be included in the study. Concerns include:
    - Tides and tidal surge
    - Flooding
    - Beach erosion

- Blasting – If it becomes a possibility it will need to be studied and the USACE should notify the public immediately and provide expert information to the public
- Beach Erosion/Inlet Management – Want assurances based on extensive study that conditions will not deteriorate
- 100% of beach compatible sand should be placed on the beach

David Rosow, Town of Palm Beach resident

- North Lake Way resident in Palm Beach
- Naval B. G.
- Opposed to Port expansion
- Enjoy watching Port activities
- Should use tugs to guide in ships if needed; don't expand
- Connecticut has spent a lot of money on Port expansion with little result
- Most of Port traffic goes to islands where large ships are not used
- Will not get ships from China
- Plan is over-reaching
- Doesn't want large ships near his moored yacht
- Concerned about impacts to the north end of the island
- Impacts to people environment (recreation) will out-weigh benefits

Royall Victor III – Town of Palm Beach resident

- Shares many of same concerns as prior speakers
- Who wants expended Port? This area is recreational, doesn't understand who wants expansion.
- Is it true that USACE is CEO of Project?
    - Will information be gathered from all parties including federal, state, and local levels?
    - Who is in charge?

John Turner – represents the Teeter Agency

- His client wants expansion, as do most Port users
- Port capacity is connected to regional economy
- Real and immediate problems with existing shipping, not to mention expansion of shipping industry
- This project is about restoration of existing business, not just expansion
- Lost business = increased in consumer goods cost
- Teeter Agency family business impacted by channel constraints
- Hopes USACE takes methodological approach as win/win for business and environmental concerns

Rich Vogel – Vecenergy

- Asphalt and diesel business
- Maintenance and safety concerns with channel
- Favors dredging
- Have to bring in more small vessels instead of less large vessels due to channel constraints
- Problems with doing business caused by channel constraints
- There is a lot of interest in this Port internationally (including in South America)
- Safe, environmental project favorable

Dick Bresee

- This will be another disaster – don't need study to determine this
- More water and energy in intracoastal and more beach erosion will occur if project constructed
- Principals of gravity – more material will move down grade
- Singer Island – increase beach grade, more sand will move off beach, residence time of sand on beach will be longer
- This will make beach problems worse – sand will not reach Town of Palm Beach
- Sand carried by current dependent on velocity – will get more erosion
- West Palm Beach and Palm Beach having problems with retaining walls
    - Increased volumes of water could negatively impact retaining walls
- Bigger ships – more energy to move ships, more prop wash, more material fluidized
- Instead of expanding channel should dredge continuously – this will resolve shoaling and lessen severity of events
- Compare Port income to beach income
    - Will Palm Beach be an industrial county or good place to live and for tourists?

Dr. Kuvin

- Resident of Palm Beach on north end
- Will be impacted by expansion
- Not navigational safety issue – rather consumer issue
- 40 years ago, USACE here
    - Blasting plus dredging impacted surrounding communities
    - History of inlet and dredging should be addressed by study
    - Residents awarded damages
- Significant environmental damages mentioned in scoping letter
    - Need to be sure that impacts to human species addressed
- 2005 El Paso Gas Seafarer Project
    - Was defeated due to small size of Port

    - Other areas more receptive
    - Commerce responded to local interests
- Area still recovering from hurricane damage
    - Residents should not allow another disaster (this project)
- Noise and air pollution
- Vibrations
- Red mite pollution
- Bilge pollution
- Increased flooding threats, particularly in IWW
- Increase in beach erosion
    - Global warming, hurricanes also
- Project will allow bigger and better and larger ships @ 600-900 feet, which can't turn in turning basin
- Increase in homeland security concerns including increase in terrorism threat and more homeland security vessels in channel
- No Action Alternative
    - Residents urge this alternative
    - Will save tax payer dollars
- USACE under pressure – news article quote
    - Need to discipline dysfunctional agency
    - Spend money where reward will out-do risk
- USACE has done good
    - Maintained inlet and placed sand on beach
    - But not done out of charity
    - Is risk worth commercial reward?

Terry Gibson

- Represents recreational fishing interest and Surfrider member
- Doesn't understand what most aggressive option would be
- Alt A – Are these jetty expansions?
- Value of fishing, reefs, diving
- Proceed with lots of stakeholder involvement
- Seagrass locations important to value of habitat
    - Those closest to inlet support more juvenile reef fishes especially snappers
    - Proximity to reefs – shorter migration which equates to greater survival of fish
- Seagrass assessments in D, F and G understated in presentation
    - Has seen Johnson's seagrass in 30 feet of water
    - Robust communities in project area
    - Need to look at area larger than 150 feet to assess turbidity impacts
- Don't undermine excellent habitat restoration efforts in vicinity

- Snook spawning in inlet
    - Need to avoid impacts to this activity
    - No activity (such as dredging) should occur during spawning
- Turbidity concerns
- Do not consider recreational boating in safety analysis – this is a safe inlet
- Sand should not be placed in inlet
- Inlet deepening could impact beaches
- Manatees could be impacted
- Sediment quality and impacts should be assessed
    - Impact to fish communities
- Keep process transparent
- Will help with information

Lynne Purvis – County resident

- Everglades Earth First representative
- Need for project has not been addressed
    - Before study conducted determine if needed – wants cargo statistics
    - Is project most cost effective approach?
    - Is there better way to get needs met locally?
    - Cost sharing not clear
- Supports all other speakers for No Action Alternatives
- Holistic approach needed
    - Oil needed to ship in foreign goods
    - Global warming, pollution and war should be addressed
- More creative alternatives should be considered
    - Spend money effectively
- Everglades
    - Restoration has been languishing
    - Why allow more impact?
- Will business owners participate in mitigation?
- Use less technical term in environmental presentations

Sam Oser

- Before anything done, there will be a study
- His vision – County is going to grow
    - Will have scientific community
    - But also people who need work
- Hopes for win/win situation
- Ports to south are loaded, this Port ideal for expansion
- Growth, progress will happen whether we like it or not
- Meet needs of all people

- Lori Baer best thing to happen to Port
- Quality of life important, but brilliant engineers will study

Dr. Lilja – Town of Palm Beach resident

- Reasons for change
    - 300 ft vessels running aground – valid concern
    - 900 ft vessels in future – concern
- OK to improve channel for existing vessels
    - Dredge before shoaling
- Gulf Stream
    - Not pushing to north
    - Nearshore current flows to south
- Studies on sand differ
    - Get true evaluation of grain size

William Djubin

- In collaboration with Reef Rescue are starting water quality monitoring
- Confused by presentation
    - Is project for existing navigation or to enlarge channel?
    - Are we trying to increase imports or exports?
    - Economic generators in Florida -1 Energy 2 Agriculture and 3 Tourism
    - If expansion is to increase business, has more concerns

Gerald Ward

- Not appropriate to formalize pro or con positions for scoping
- Requests copies of meeting documents and hard copies of DEIS and FEIS (cited rules and regulations)
- Are comments due in next 11 days?
- Study schedule too long, finish by first quarter 2009
    - Same money – citation requires response to this suggestion
- How many pages will EIS be?
    - Should be less than 150 pages to avoid confusing public
- Alternatives
    - 8 alternatives or combinations
    - Need to add "Similar Action Alternatives"
        - Reduce existing depths – do not serve bulk cargo
        - This will open up more berth space
- Between two major Ports – Canaveral and Everglades
- Increase Island trade and containers
- Small ferry and cruise vessels
- Port is niche Port – small Port

- CRA Report almost complete, needs to be incorporated into study
- State comprehensive Plan requires that Port accommodate public needs
    - Use cruise terminal for public
- A1 and A2 don't make sense
- E doesn't make sense – contrary to USACE manuals
- G most economic potential – will use FPL bulkheading
- Ecological impacts minimal
    - It is only because of Port that resources are what they are now today
- Tides and surge
    - 1960's deepening almost doubled tidal range
- Economics should drive study

George Williamson – Cemex (formerly Rinker)

- Construction materials company with two facilities in Palm Beach (cement and aggregate)
- Aggregate business at Port struggling due to channel constraints
- Deeper is better – volumes reduce customer costs
- Supports efforts to deepen
    - 40' good
    - Can substantially increase input
    - Ensure supply to users

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PUBLIC MEETING
4 LAKE WORTH INLET FEASIBILITY STUDY

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8 Wednesday, January 9, 2008
Port of Palm Beach
9 One East 11th Street, Suite 400
Riviera Beach, Florida 33404
10 3:00 - 5:31 p.m.

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1 DAIS:

2 Richard McMillen
Marie Burns
3 Kenneth Dugger
Donald Dies
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Lori Baer, Port Director
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P R O C E E D I N G S

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RICHARD McMILLEN: I want to welcome everybody to the first public meeting of the Lake Worth Inlet Feasibility Study. This is one of our first meetings in a series of meetings. And let me dispel some of the fears that some of you may have right now.

You will not be seeing any construction going on or expansion of the Port or channel widening or dredging in the Port facility for at least four to five years. You won't see it tomorrow, you won't see it next year.

This is the first public meeting related to the Port -- not Port facility, but the channel widening of the federal navigation channel, okay?

The reason for our study is because we have some navigational safety issues surrounding our federal channel out there. The

vessels are getting longer, they're getting wider. Currently we're having a problem getting those vessels in and out of this inlet right now, particularly the oil vessels, the fuel vessels for the power plant. We have some

other cargo that's running into problems.

Our navigation channel is posing some restrictions. It's authorized for 33 feet. It's currently shoaled up to 29 feet. Harbor pilots are restricting the channel to 29 feet and less. And we've continued to experience these types of problems for the last several years, and that's what we're down here for as part of the federal study. And it is a federal study, folks.

The Port Director, Lori Baer, has brought this concern to our table. We have known about it for a while and we've finally been able to get Congress to give us some money and authority to move forward with this study. And that's where we're at right now, starting off with the first public meeting here, okay?

As I mentioned, the reason for looking at this is to address a navigational safety issue getting vessels in and out of the existing

21 projects, okay? In the process of doing so,

22 we'll be looking at deepening, we'll be looking

23 at widening and realigning some of the channel

24 to make it easier and safer for most vessels to

25 get in and out.

The reason for the public meeting is this is part of what we call our NEPA scoping process. NEPA process. NEPA stands for National Environmental Policies Act. It is an act passed by Congress that requires us to go through an exhaustive environmental investigation on any of our federal projects to ensure -- to minimize impact to environments. Okay?

The purpose of the meeting is to solicit your comments. I'd like to say the good, the bad, the ugly, the indifferent, the for, the against, and we'd like all that, but to be more specific as to what your concerns are as we go through this process, okay?

As I mentioned, I once again strongly emphasize that this is a federal process. This isn't a Port process, this isn't a Palm Beach County process, this is the federal process and, as I mentioned, it's very lengthy, trying

and full of tribulations as we get to our ultimate goal; and that is, addressing those navigational issues.

As we get ready to move forward here, before we move forward I'd like to state that

as part of the federal process, as part of these federal projects we have non-federal sponsors. The federal government doesn't pony up one hundred percent of the bucks for these federal projects. We have to have sponsors that initiated or wanted or expressed a need for a federal project. And our sponsor in this case is Lori Baer, the Executive Port Director for the Port of Palm Beach.

And Lori, if you have any comments, now is your time.

MS. BAER: Good afternoon. Welcome to the Port. It's a privilege for me to be able to welcome you here. And we're pleased that this federal study is now underway.

You know, the safe navigation into the Port is critically important. It's a huge responsibility and we're sincerely interested in this study and hearing your input today and throughout the process.

The Port of Palm Beach, as you all know, is a huge economic engine. Many lives and livelihoods depend on it. Many of our tenants are here today, and you'll hear from them as well. Again, we are pleased that this federal

study is now underway, and I thank you all for coming today to be a part of it.

Let me introduce our Port Commissioner, George Mastics, who is here and known to many of you. And I also thank Steve Martino, who is here from Senator Martinez's office. And thank you for being here and thanks to the senator for all his help as well.

Again, welcome to the Port. We look forward to your input.

MR. McMILLEN: Thank you, Lori.

Let me take a moment and introduce the Corps' project delivery team as well as members of the Port's project delivery team, as we are working cooperatively together to reach some solution to address navigational needs out there.

The lady dressed in purple up here, not the lady in red, is our chief of our planning division currently; and that's Marie Burns.

To her right is our navigational technical lead, he's our senior tech, he's been with the Corps as long as I have, if not longer, I'm sure; and that's Dick Powell, upon whom we rely upon heavily for all of our navigational

experience.

The person to his right is a gentleman by the name of Don Dies. He's with the Port's project delivery team. He will be one of the environmental leads investigating environmental resources within the area and within those designs that we came up with.

We also have in the back at the table back here a lady by the name of Samantha Brucker. She's my study manager for this project.

We have -- down here in the front row we have Amy Kimball Murley, with the Four Gates Company. She is working as a consultant for the Port.

Also working as a consultant for the Port is Nancy Case O'Bourke. And I promised I was going to get her company's name right; and that is Dalton, Almsted and Fugelbee (phonetic}. All right. I got it right. Okay.

And back there in the back, I'll just

bring her to attention, from our South Atlantic division office in Atlanta is Angie Primo. She's down here to partake in this public meeting as well.

Have I forgotten anybody?

Oh, right there in the front and center, one of the more critical people, also our environmental lead from the Corps, he will be instrumental working with Don Dies with the Port environmental lead, and that's Ken Dugger. He will be giving a presentation later along with Don Dies.

Okay. Reviewing the agenda, what we're going to talk about today -- break this into two phases: The first is to provide you with some information, information on the federal study process, as I have reiterated several times already. We're going to brief you on what the NEPA process is, the National Environmental Policy Act process, as that's a process we have to go through to develop the federal project. We're going to talk about those study areas of improvement that you saw in your letters or that graphic that showed some of the areas that we're looking at.

I want you to understand, folks, that we're taking a very broad brush stroke as trying to address what these navigational safety issues are out there. We do not know as yet what it is we're going to be doing. But

the last thing we want to do, since it's nothing short of a miracle to go through this federal process, we want to make sure we cover all the bases up front and then start whittling it down to something that's workable. So that's the reason you see the broad brush stroke; all of those alternatives listed on that graphic that you saw.

I will be talking to those alternatives after Ken Dugger does his NEPA process presentation. Then we'll have a presentation from Don Dies on the ecological scoping, some of the resources in those particular areas that we are concerned about, and what he has found to date.

And then what we'll do is I'll close out the first part of our meeting and take a break and we'll set up for Q and A, comments and answers, and we'll do the best we can to answer your questions.

Remember, this is not a debate. We're here to get your comments back. If we do not have an answer to your question, it's not because we can't give it to you, it's because we don't have the information yet. This is a

four to five-year process, remember, and this is the first meeting of a series of meetings to be held on this. I'm trying to solicit your comments so we can begin addressing your concerns as we go through the evaluation of the alternatives and coming to a solution here.

All right. After having said all that, let me tell you about the federal study process, which is nothing short of a miracle that we ever get through it. Those of us who have been in the federal government can attest to that. Even those consultants who work for us can attest to that as well.

The federal process starts with somebody, some entity, some taxing district saying we want a federal project. We have a need. We have an issue down here. That entity -- in this case it's the Port -- goes to the congressman and says we need some help. The congressman turns around and passes a

resolution. Truly, it takes an act of Congress for us to do anything. Congress authorizes us to begin a study.

Authorization is one thing. We need money to go with it. And that's where the

appropriations come in, all right? Appropriations is the money.

We received funds in 2005 to begin a recon study. We took a broad brush stroke of the inlet of the federal navigation project out there and we found that yes, there are some serious concerns that we had to look at. A recon study was approved by our higher authority in 2005. We ran into funding issues in 2006. Therefore, we did not start the feasibility study in '06, we didn't start it in '07. Actually, let me rephrase it. We started it in July of '07 is when we kicked off the feasibility study. And thanks to the Port, they advanced their funds.

The feasibility study's costs are fifty/fifty and we're looking at about a $2 million type study here. So the Port has ponied up roughly three, four hundred thousand dollars for us to initiate and get moving

21 forward. We're waiting for the federal dollars

22 to come down in this next appropriations bill

23 is where we stand right now.

24 Now, what happens during the feasibility

25 process, feasibility process we begin taking

data, collecting data, environmental data. We go out to take sand samples, core borings, all that physical data we need in order to begin the engineering.

We're going to be looking at the sand out there, we're going to be trying to identify where the top of the rock is out there, we're going to be looking at, as Don Dies will say in his presentation -- I don't want to steal his thunder -- we'll be looking at a number of environmental resource studies to be conducted. We'll be looking along the shoreline across the coastal processes to try to address the shoaling issues within the channel, so we have to take surveys of the beaches as well as the channel itself, looking at historical information.

We're going to be pulling all of this together, trying to identify what information we have, what do we need now. And that's what

we're going to be doing over the first part of this year; is basically collecting a lot of data because we can't do any engineering without the data.

One of the other things we're going to be

doing is running harbor simulation. Ship simulation. Pardon me. Harbor simulation as well, which is running the benefits, finding out what benefits are to deepening, widening to improve navigation.

We're going to be running ship -- taking various sized ships in and out of that Port in a modeling type effort to find out where the currents are, the physical forces on those ships out there currently. What happens if we do this to the inlets, navigation channel, what kind of impacts do these improvements have on that ship? So we're going to be designing it properly. We're going to be running those type of modeling efforts throughout the course of the next two years.

As we go through the engineering, the alternatives that you have seen in that little piece of paper that came out in the scoping meeting that you saw -- and we'll talk to those

here in a minute -- we're going to be looking at every one of those alternatives, not only from an economics perspective and environmental perspective but the engineering perspective and also from a funding perspective, okay?

As to when we go through our feasibility process, the federal government, the federal process, we have to look at national economic development benefits. What's the best -- what's the most bang for the buck? That's the federal government process. What can we get the most bang for the buck? We're going to be looking at all those alternatives individually, combining a few to find out what is going to work the best and get the most bang for the buck as we go through that process.

Now, as we go through that feasibility process there's going to be public meetings along the way, okay? As we go through that, we'll probably have the meetings down here or at some venue. And we're going to be doing the same thing as what we're doing today. We're going to be asking for your concerns, posting information out on a website for you to go look at and comment on, and we'll talk to those type

ideas here in a moment.

As we get through the feasibility process, at the end of that feasibility we have a document that's been approved, it's been coordinated, most everybody has approved it and

likes it, likes the design.

What happens then is it goes up through our review chain up to headquarters for approval and it goes through several independent technical type reviews both inside the Corps as well as outside the Corps.

Once it passes those internal reviews, it goes up to the Assistant Secretary of the Army's office for approval and then basically over to Congress for them to authorize.

Remember, I mentioned authority. Congress -- we do not act on a whim. Congress has to direct us to. Right now all they have done, all the authority they have given us is just the authority to conduct a study. They have not given us approval to construct anything. That approval comes after we have prepared a document, made a recommendation, it's gone through the entire review and approval process and the NEPA process, which

Ken Dugger will explain here in a moment, goes to Congress, then Congress authorizes it.

Congress authorizes federal projects every two years generally speaking, okay? The last authorization Congress made was year 2000,

except for recently. They made an authorization, they passed an authorization bill here a couple months ago, 2007. So it's been seven years since Congress passed an authorization bill authorizing a project, authorizing either a study or authorizing to go to construction. The next window of opportunity for us to get this project or these improvements authorized is 2010. That's the date that we're looking for to complete the study, get it reviewed and approved and get Congress to authorize it.

Once Congress authorizes it, they still have to give us the money to go build it. It comes in the form of an appropriations bill, as I mentioned before. The earliest we're going to probably get appropriation funds and move forward with construction, earliest -- like I said, it will be a miracle if we get there -- but we're shooting at a target on the wall

that's 2012, okay? So that's the federal process as we go through that on just this study. I can get into the whole intricacies of it, but I'm sure that will invite all kinds of questions and confuse you to no end.

Let me back up a moment and clear up a couple things. The study information -- as we go through the study process we're going to be setting up a website with the study information out there on the web for the people that go look at, for the public to go view and take a look at, okay? On the back here you'll see some web sites for you to look at.

Now, we, the Corps, have not officially got our website for this particular project up and established yet. The Port does have a website that we're putting stuff on currently for people to go view, and I believe your website -- yes, it is Port of Palm Beach. So you can go take a look at that.

Also as we go through this public meeting process, we have a court reporter down here that's taking everybody word-for-word. You're on record. Legal and the whole bit.

At the same time as when we get to the Q

and A we're going to be writing your comments on a flip chart and posting them on the wall over there. So before you go, you leave today, make sure you check the flip chart out to see if we captured your concerns correctly because

as we go through this process we want to make sure that we've addressed those concerns. In order to address those concerns we want to make sure we've captured those concerns accurately, okay?

Let's see. Basis for the decision for federal project. What makes a project, what approves a project, how is a federal project justified? Comes down to simple benefit versus cost. The benefits are going to be the cargo that runs in and out of the Port. Also the safety issues; the benefits of a cargo coming in and out safely versus the cost. Those alternatives that you saw, those areas we're concerned about and wanting to look into, what's the cost of expanding into those areas singly or in multiple options there to consider. We start comparing those costs versus the benefits we have, and that's where we get to the most bang for the buck; which is

21 going to give us the best benefits to cost

22 ratio?

23 I think I have covered pretty much the

24 federal process. I'm sure I have confused most

25 of you. It confuses me, and I have been at

this for 18 years, and they continue to change the rules on me from time to time. But without further ado on that part, let me have somebody come up here who's going to confuse you even further with our NEPA process, okay?

Ken, do you want to come up and lead us through the NEPA process?

MR. DUGGER: Yes. I am going to talk a little bit about the scoping process and what is the purpose of the scoping meeting and where it is in the sequence of events.

The purpose of the scoping is to determine the scope of the Environmental Impact Statement. That is, the issues that are to be evaluated in detail or not to be evaluated in detail, alternatives to be evaluated, any studies needed, the various procedures to accomplish the Environmental Impact Statement and other matters relating to the scoping process I won't get into. They're technical

matters.

The Environmental Impact Statement process can be divided into basically six phases. The process formally kicks off with a Notice of Intent that's published in the Federal Register

and also a mailing. This particular Notice of Intent to prepare this draft Environmental Impact Statement was published in the Federal Register on 13 December and was mailed out on 6 December. And in the next step, which is where we are today, is the scoping process, and we're holding a public scoping meeting.

To follow this meeting we would begin preparing a draft Environmental Impact Statement that will accompany the feasibility study, and when it is ready for public release it will be announced in the Federal Register and by mailing and there will be a public meeting on that draft Environmental Impact Statement and feasibility study.

Following that would be the final Environmental Impact Statement and feasibility study. And a record of decision would have to be made by a higher authority before any action is taken on the selected plan, whatever that

21 happens to be.

22 The purpose of the study and the thing

23 that's being evaluated in the Environmental

24 Impact Statement will be the needs and

25 opportunities associated with Port improvements

to accommodate first, future commercial fleet, to more effectively transition the existing fleet, and we will be looking at various alternatives: Widening and deepening, various disposal options, and other alternatives that may become apparent through the process.

We will analyze these alternatives from an engineering perspective. For example, coastal processes, constructability and other issues, economics. That is, what are the economic benefits and what are the economic costs of these proposed alternatives and the environmental impacts of the various alternatives that are being evaluated?

You probably can't see this very well. There's a lot of detail in it. What this shows is the existing channel, and these are some of the limits of the study area. Now, of course, these limits do not mean that's the limits of dredging. That's just the limits of areas that

will be studied and considered.

Some of the issues that will undoubtedly be evaluated in detail will deal with protected species, such as manatees and Johnson's sea grass, any wetlands or other water resources,

such as other types of sea grasses, hard ground, including perhaps coral species, any mangrove or marsh that might be impacted, water quality impacts, turbidity and nutrients, esthetics, recreation, cultural and historic resources and impacts to those, socioeconomic impacts. And we will also look at ways to mitigate those unavoidable impacts and any other issues that we may identify through the scoping and Environmental Impact Statement process.

Alternatives under the National Environmental Policy Act, we have to consider the no action alternative. We will also look at deepening various depths and widening at various locations, and to various extents disposal options of the dredged material. For example, Peanut Island might be a temporary facility for handling dredge material. Might later be off-loaded to somewhere else; ocean

disposal site. There is a designated ocean disposal site for Palm Beach harbor that will probably have to be expanded to accommodate the quantity of material that might come out of the suggested project.

Beach placement. If we have good sand material suitable for beach placement, then we would look at beach placement options and for artificial reef. If we have suitable rock, suitable size and composition, it might be placed on an existing artificial reef or create a new artificial reef.

Other alternatives and measures that might be identified through the scoping process or through the environmental impact process could also come into play.

Studies. There are existing studies: Sea grass survey, natural resources survey and others referenced in the report and in the website, which was referred to earlier. And also we're looking at needed studies. That's also one of the purposes of scoping. Do we need to conduct additional studies?

Mr. Don Dies will speak in more detail about existing and ongoing and proposed

21 studies.

22 This website is on the back of your

23 agenda. You don't have to write it down right

24 now. We're posting information as it becomes

25 available on this website, and there are other

web sites on the back of your agenda.

Procedures. I'll reiterate this real quick. The six steps, Notice of Intent, prepare the Environmental Impact Statement, the scoping meeting, which is where we are here today, the draft Environmental Impact Statement is prepared, then we publish a Notice of Availability and hold a public meeting on the draft Environmental Impact Statement, prepare the final Environmental Impact Statement, do a Notice of Availability of the final Environmental Impact Statement, and prepare a record of decision.

Various agencies will be involved in this process, the Corps of Engineers being the lead federal agency for the Environmental Impact Statement. Other federal agencies would be the Environmental Protection Agency, Fish and Wildlife Service, National Marine Fishery Service.

The Port of Palm Beach is the non-federal cost sharing sponsor. Palm Beach County would be involved, the Florida Department of Environmental Protection and other state agencies and any other roles or agencies that

we identify in the scoping process.

As I mentioned earlier, the U.S. Fish and Wildlife Service, a Fish and Wildlife Coordination Act report would have to be prepared by or for the Fish and Wildlife Service concerning this project and any recommended plans.

The Endangered Species Act would involve the Fish and Wildlife Service as well. The National Marine Fisheries Service would also have some Endangered Species Act listed species involved, and they would be involved with the coordination as well. Also the National Marine Fisheries Service, we will provide to them an Essential Fish Habitat Assessment for their review and comments.

The Environmental Protection Agency is responsible for publishing the notice in the Federal Register of the Environmental Impact Statement, and they also have a responsibility

to review the adequacy of the Environmental Impact Statement. And there may be other roles or agencies identified.

As I mentioned earlier, the Department of Environmental Protection would issue the water

quality certification. They would also be involved in the coastal zone consistency concurrence. The state clearinghouse, which is the clearinghouse for state and regional agencies, would be involved in the coastal zone consistency concurrence as well, and there could be state-owned lands involved. The state historic preservation officer would be involved with respect to any impacts to cultural resources, historic resources.

The Fish and Wildlife Conservation Commission would comment on impacts to fish and wildlife resources. And there could be other state agencies involved as well.

We also involve elected officials, such as the representatives in Congress, the representatives in the Florida legislature, the Town of Palm Beach, Riviera Beach, Palm Beach County, West Palm Beach, Palm Beach Shores and also adjacent property owners, Florida

Power & Light, condo homeowners and various groups, environmental industry or development groups and any other interested or affected parties.

We are developing a mailing list for this

action. If you want to be included in the mailing list, you can submit your name and address. In fact, on your registration card you were given that opportunity. Or you could submit the name of some other interested party or stakeholder to be included on the mailing list.

Oral comments. As Rick mentioned earlier, we will be taking oral comments here and they will be transcribed or you may submit your comments in writing and they will become part of the record. There was a comment sheet provided at the registration table if you would like to use that or any other form that you feel appropriate. And also the mailing address was on one of the sheets that you received when you came through the door. The comment -- and the comments card. The comments sheet.

MR. McMILLEN: Thanks, Ken.

Okay. I might add to what Ken had to say

with regards to the draft EIS or the final EIS.

In the past when we prepared these federal feasibility studies there were two separate segregated type documents. We have the feasibility study and then we have the EIS

running separately, and then they'd come together as one document. Now our policy and procedures are to integrate them so it's only one document. So when you grab the document to read, you will see everything comes together as one. You're not having to jump to Environmental Impact Statement to look at things.

What I mean by that is the feasibility studies, they are at least two to three inches thick and there's always a yellow or a green document in there that was an EIS, and the white part or the feasibility study would refer to the yellow part. Now it's all one document so you can read it as you go along. It should be easier to understand, easier to comprehend.

Another part of the agenda today is for me to describe to you the areas that we're looking to evaluate for consideration and address navigational safety issues, the channel

widening and the deepening areas. Let's start on the outside and work our way in.

We come up with these alternatives from the Port, from our own engineers, from the harbor pilots. We relied heavily on the pilots

since they're the ones that have to navigate the ships in and out. What we found out from the harbor pilots is that area A1, where the ships approach the inlet, they come in from the south because the Gulfstream currents, they use the Gulfstream currents to push them into alignment with the channel. They kind of glide in. Then as soon as they hit the channel, the throat of the channel, they have to goose it and race into, through the throat to the channel. So we're looking at doing this taper on the outside. That's generally deep water. What we see there is just a realignment on paper of what the federal channel is. We'll be investigating those areas. We don't anticipate any serious construction needs, if any at all, in those particular areas.

As we get inside the throat there, we're looking at widening. The ships that are coming in for future vessels are going to be wider.

21 Also, if we can widen those areas, it provides

22 us a better safety issue for the pilots to

23 navigate those ships in there.

24 As we get into the area around C, you can

25 see in the pink where the existing federal

navigation channel takes a dogleg. It not only takes a dogleg, it gets shallower in that area and narrower. It makes it difficult for the pilots coming in. So we're looking at evaluating area C to give those ships an easier approach into the turning basin as it comes through the inlet.

Area D right there, we're looking at area D because the pilots and some of the traffic coming in there, it gives them a better alignment into those berths directly behind Peanut Island in there and it gives them a safer opportunity to approach those berths.

In area E, it's been brought to our attention that we're looking at possibly expanding the turning basin; basically, doing a little widening of the turning basin in there to give the ships an opportunity to turn better and approach the berths as well.

Area G is the same reason. As the ships

21 get longer, they get bigger. Right now we're

22 currently having some problems in our turning

23 basin as the ships get longer and bigger and

24 turning around. So you see, we're looking at

25 those areas from purely a navigational and

safety issue because it only takes one incident of a ship running aground in this area -- you can only envision what a tanker bringing crude oil or fuel oil for the power plant would do, and it creates -- we've got a big mess.

Those are our concerns that we're trying -- one of our major concerns. We have to improve the navigational safety of those ships coming in and out of this inlet.

So with that -- that's a very short synopsis of those areas and why we're looking into those areas. With that, I'm going to turn it over to Don Dies, who's going to explain to you some of the resource issues we're looking at in those areas and what we have to address.

Thanks.

MR. DIES: This effort represents the first stages of understanding the resources from available information and beginning to plan the future field efforts that need to be

21 done. The purpose of our study is to -- within

22 the potential project expansion area -- is to

23 collect the existing community information and

24 create a GIS database and also a literature

25 database and then to plan and conduct resource

surveys to assist in compliance and environmental laws and regulations. We're just now beginning to plan those field surveys.

The location of the project area is within Palm Beach County and North Lake Worth Lagoon, Port of Palm Beach, Lake Worth Inlet and the surrounding communities.

This is the existing federal harbor project. You have already seen that. And the potential expansion zones. Our study will actually go beyond that. 150-foot buffer area around each of the zones also. We will be looking at in-water resources, not going on land, so they'll truncate in the water.

We have already approached federal agencies; Corps of Engineers, National Fishery Service, U.S. Fish and Wildlife Service, state agencies, FDEP, South Florida Water Management District, local agencies. Palm Beach County DERM has been very helpful. And private

21 companies, such as FP&L and NGOs and

22 not-for-profits. Wildlife Trust has given us

23 data also.

24 First starting within the wideners area,

25 A1 and A2 in the offshore environment, I'm

going to go through some of the information we have collected in our GIS database.

This is 2003 Laser Airborne Department sounding data. What this does, this is provided by FDEP. It provides depth and the ability to simulate contours and relief in the offshore environment. And this combined with, just off the press, it is the reef mapping done by Nova Southeastern for the Southeastern Florida Coral Reef Initiative. This is reef mapping, and these different features, this is all sand here, this is the offshore reef, the natural offshore reef, this is an artificial reef signature right here, these are the rock piles. This is former material that was taken out of the channel during the original dredging of the channel, deposited here, boulders in this area, and it is an artificial reef type of environment. There's a little signature up here. I think it's just an artifact. This

data was field verified to some extent, but not too well in this area, so I think that's just an artifact.

If we combine these two layers together into depth contours and also the self-created

data, you can see most of the depths in the reef environment are deeper. They're in the order of 50 feet or greater, 55 feet or greater. And the rock pile is also deeper. In the area of 55 feet. Some of the sand areas are shallow. Thirty-five feet in the southern widener.

Now, moving into the inlet throat proper, these are our survey areas and potential expansion. They're mainly shelf areas, and also the inlet walls themselves. There haven't been any real studies done in this area. We do have the 2003 Laser Airborne Department sounding data that does penetrate. It was intended to be an offshore study, but it did penetrate into the inlet, and it provides us a depth contouring where you can see the inlet walls themselves in the shelf area behind it and the riprap of the inlet. Same on the south side.

Just initial surveys have shown this is a definite rock area here that was cut. These are cut through rock area also, north and south.

Into Area C, this area is mostly a hard

bottom area between the marker 8 and the range finder here.

We do have several survey studies that have been done in the past. This is a 2001 sea grass mapping done by Palm Beach County DERM. It does have field verification associated with it. And you can see some sea grass areas coming into this southern area around Peanut Island.

We also have a 1992 statewide sea grass survey done by Florida Marine Research Institute. This was less field verification, mostly done by aerial imagery interpretation. You can see a continuous sea grass area coming into the soft bottom area behind the range finder.

We also have a 1990 Palm Beach County Submerged Natural Resource study. This wasn't done by NGIS, and so what we've had to do here is kind of stretch the information to fit the

GRRIS format. But you can still see features on here. You can see the hard bottom area over here, and you can see this shows up as a hard bottom feature here, and that same sea grass area just continues a sea grass area coming in

right there.

Area D behind marker 12 here, south of Peanut Island, again our survey area will be truncated at land's edge and be concerned with water resources.

We do have the 2001 sea grass data from Palm Beach County DERM, and it shows a continuous sea grass bed in that area and some discontinuous sea grass. That will be mainly be the halophilous species.

1992 shows discontinuous sea grass area beds in that area, and the same is true of the 1990 submerged bottom studies.

In this area is Johnson's's sea grass and Halodule shoal grass.

Area E is actually the northern extension of the Intracoastal waterway, and this is the 2001 sea grass data and also the 1992 combined because there wasn't really anything that really entered the study area at all with

21 those. And then the same is true really with

22 the 1990 submerged aquatic resource data.

23 Area F is south of the Port channel and

24 south of the basin area. The 2001 data, I'd

25 like to point out here, this is actually the

FP&L heated water discharge point right here. They moved it out into Lake Worth Lagoon several years ago and you can see copious and discontinuous sea grass beds in this area.

This is the 1992 Florida Marine Resources Institute data. Discontinuous sea grass beds throughout this area.

And the 1990 data. This pretty much indicates to me a cover of -- summertime cover of halophila decipiens, paddle grass.

This is Area G along with its buffer area. You'll see a signature right here of an algal mat. This is 2007 aerial imagery, by the way, from wintertime 2007. You can see 2001 sea grass imagery sort of follows that.

This is sand down in this area. Follows that pattern with continuous and discontinuous sea grass beds.

The 1992 statewide FMRI data is pretty much discontinuous sea grass beds throughout

that area, and the same is true of the 1990 submerged aquatic resources.

More detailed information about sea grasses just from the literature itself, Lake Worth Lagoon sea grass species dominant are

shoal grass, halophlia wrightii, paddle grass, halophlia decipiens and Johnson's sea grass, which is a listed threatened species. Infrequent species are turtle grass, manatee grass and star grass, another halophlia species. These are found mainly in the northern part of the lagoon north of Blue Heron Boulevard.

Lake Worth Lagoon sea grass coverage, these are the 1941 interpretation of aerial imagery available at that time. You can see a very low point in the lagoon sea grasses in 1975 because of poor management of the lagoon waters, allowing surface water runoff and sewage treatment plant outfalls into the lagoon area.

A clean-up of that and a resurgence of sea grasses in the 1990s back up to about 50 percent of the level. The difference between the 2001 and 1990 is not really

21 significant, the differences between there.

22 This could be mapping error. So about two

23 thousand acres, about 50 percent of what was

24 estimated to be in the 1940s.

25 Most of your sea grasses -- this indicates

most of your sea grasses are in the northern part of the lagoon, and most of your sea grasses are found in six feet of water or less.

This is the 2001 Palm Beach County sea grass mapping effort within the lagoon area, just to give you an overview of that.

Sea grass surveys were conducted in 1975, 1990 and 2001. Since 2000 Palm Beach County has been conducting annual monitoring of nine transects located throughout the lagoon. There's been little change in those surveys except after 2005, and that was really due to the strong 2004/2005 hurricane season with two significant hurricanes in 2004, Jean and Francis, and then also Katrina and Wilma adding a lot of water to the area in 2005.

Moving now to manatee aerial data, this is 2007 surveys done in February; two different dates in February. You can see here between 150 and 300 manatee, and mostly in the area of

the FP&L discharge along the shoreline, and then manatees also in that area around that area in the sea grass beds, resting and feeding. And this really uses that 2007 aerial which was done in February of 2007 to show you

the manatees near the discharge point and then up in some of the algal, macro-algal beds and sea grass beds along the shoreline.

Our basic conclusions are that background information indicates that there are habitat concerns within all potential expanse areas. There's some inconsistencies in the background data. This could be due to the year-to-year changes, major storms, things like that.

We'll begin our actual field certification and validation of resources in 2008 beginning soon in this year. Our surveys will be towing video within the ship channel and the deeper expanse areas at the berths and the ship channel, then in A1 and A2 with some diver spot checking of that data. And then within the shallower areas within sea grass growing season, April to September, we'll be doing surveys in B1 through G and those areas of potential sea grass throats.

Thanks.

MR. McMILLEN: Okay. That concludes our technical presentation at this time. I'd like to take a moment before we take a break and move into the question and answers to recognize

Counselwoman Lynn Hubbard, who is here.

At this time we're going to take a short break and we're going to set up a panel, the folks up here. And the Port has been very gracious to set up some food and beverages for you during this break. What we're going to do is take about a 15-minute break, no more, because we don't want to be here any longer than you guys have to, and then we're going to come back and conduct a question and answer session.

Correct me if I'm wrong, Marie. If they want to go on record to express a concern or ask a question or whatever, please fill in a card so we can get your name and address so we've got a record of that, please. You can do that during the break. So let's take about 15 minutes. Time now is 4:00. How about 4:15? And we'll start it back up then. Thanks, folks.

(Thereupon, a short recess was taken.)

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MS. BURNS: We have to get started on the comments and we do have a short number. I just wanted to reiterate again the Corps of

Engineers is dedicated to making this as transparent a process as possible, so as we go along and we are posting information, et cetera, if you feel that it's not happening, I would very much appreciate it if you would let myself or any of the staff know that. And what can we do to make it more transparent? So again, we're dedicated to doing that, so please, please let us know if you have any suggestions for us.

Okay. I'm just going to go through these and call folks. There's a podium. That way we can make sure we hear everything you have to say. And I was just going to call Miss Markin first.

SPEAKER: Well, I didn't really want to be first, but that's okay.

MS. BURNS: Oh, okay.

SPEAKER: Susan Markin. I live in Palm Beach at 1450 North Lake Way, which is directly

21 across from this Port, and I can tell you I

22 bought the house because I love the Port, I

23 love watching the activity of the Port, and I

24 love this particular environment right here.

25 I'm just very concerned about the expanse of

the Port. And I will also say I'm on Town Council in Palm Beach but I'm speaking as a resident and as a concerned neighbor, as I mentioned earlier the proximity of my house to the Port.

I can tell you that from the plans that you have shown here as far as your potential expanse that the microscope or telescope that I currently have to watch the activity I won't need as much because the boughs of the boat should be coming much closer to my dock.

My concern is this: As much as I can appreciate the economic viability that you speak of relative to the Port and the potential economic growth that you'd like to see at the Port as well as your navigational safety concerns that you're expressing, I would suggest to you that maybe your safety issues are self-imposed by bringing in larger ships than what the Port can physically handle, which

is why you're looking to expand it. And I would suggest also that the image that comes to mind is that you're trying to fit a square peg in a round hole. Or even worse than that, an elephant into a bread box.

The size and the growth of the Port is a concern not only with all the other issues that you bought up as far as species and the recreation areas as well as the other environmental issues, not to mention all the other things that you're going to study, engineering, shipping, doing ship simulations, economics and environmental, but the bigger picture that I'm here to speak of today just on the first glance at this is this area is surrounded by small communities.

You look at Palm Beach Shores, you look at the Island of Palm Beach and Riviera Beach. This is not Miami, it's not a Miami Beach, it's not a Ft. Lauderdale, and I have a very grave concern, and I think it's shared by other residents and other municipalities, that you're trying to enlarge a port in an area where people look at this as a small environment. And the Port certainly has been here and we

have agreed to certain things that have taken place in the Port in the past with the idea that it was within a feasible entity for the surrounding areas.

When I look out my window what I see are

people in kayaks, individuals in kayaks. As of late, you have individuals on surf boards with the long paddles. You have smaller sailboats that are mooring in the lagoon, an area according to your map that will go away. You have small boats going around recreationally. This area is for the residents of this area, the tourists of this area, which is also a very good economic business for this community and for this area, so I'm very concerned that you're trying to do something here that is not befitting of the municipalities in this area or for the surrounding neighborhood and for the surrounding neighbors. And as much as I like the Port and the activity of the Port, I think we should be cautious about the growth capacities that you are looking for and what it is going to do to the other economically viable industries we have, such as tourism and premier community on both sides of the inlet coming

over here.

The other thing in terms of -- you wanted specific issues in light of your comments that you want to be transparent, so I'm kind of hitting you with some very transparent

concerns. I do have some concerns about the protected species; the manatees. I have concerns about the esthetics and the recreation areas that I mentioned before.

One other area that has been brought up, and I would hope that someone's going to study it in a much more technical way than I'm capable of looking at it, but what does this do for increased surge potential during storms by widening and deepening this particular area?

And last but not least, and probably foremost, is what does this do to sand retention south of the inlet, which we're already suffering from in the Town of Palm Beach all the way down to the next inlet down?

So those are my concerns and I hope that you take the time to address all of them.

Thank you.

MS. BURNS: Thank you.

Okay. Mr. Elwell?

SPEAKER: Good afternoon. My name is Peter Elwell. I'm the town manager in Palm Beach. And I'm going to cover a couple of the same things that Counselwoman Markin did and a few others on behalf of her colleagues and

herself on the full Town Council and Mayor McDonald for the Town of Palm Beach.

We're concerned about the size and number of ships that would be coming in after the widening and deepening activities occur and would like to make sure that the study is very clear as to what the goal is in that regard, what this work would be intended to accomplish in terms of creating a greater volume of shipping activity and what size vessels would be intended to be accommodated so that the impact of more shipping traffic and larger vessels can be accurately identified.

One of the concerns in that regard is safety; both the safety of the recreational vessels, since there's so much recreational activity going on with small boats in this area, safety for them; safety also for the Peanut Island area, the park that's been developed by Palm Beach County and the activity

that goes on in that area.

We noticed in some of the diagrams during the presentation that particularly in Area C and E it would be creating the opportunity for shipping activity to come much closer to those

recreational areas. I'm sure Palm Beach County would have something to say. But that's a concern the town would like to see addressed.

And the water quality issue, particularly if the size of vessels, the increased size of vessels that would be able to come in, might also mean a different type of vessel coming in and calling at the Port.

Then we'd like very specific information in the study what type of vessels will be attempted to be accommodated and what additional risk those type of vessels might pose for water quality and other safety concerns.

Counselwoman Markin did mention about the flow in the inlet, and that's something that we do recognize is beyond all of our expertise in coming here to represent the town today, but we have a very great concern, and we know you'll have experts addressing that issue.

We really need to be satisfied that the change in the dynamics of how the twice-a-day tidal activity will occur as well as storm surge when severe weather arrives.

We know from experience from past decades

after previous improvements at the inlet that there were some changes that have caused erosion on the shoreline in the inlet and on the lake side and also concerns about the potential it may have exacerbated the storm surge and flooding from the lake side during storm events, and we'd like to see technical information presented in this study that would address those concerns.

We were happy to see that in the notice that came out there's an intent not to do blasting and an expectation that blasting may not be necessary in order to achieve deepening and widening. We would be especially concerned if blasting is going to be required so we ask simply as you go through the study if at some point blasting becomes a possibility or something that's going to be entertained as a method of proceeding with this project, that that would be not only studied in detail but

21 those of us who have signed on as being

22 interested parties be immediately notified that

23 that has become a consideration. Right now the

24 way the public notice was presented, that was

25 sort of a reducing the fears and doesn't look

like blasting is going to be necessary so we just ask if it becomes part of the study, you let us know right away so that we can then engage more specifically on that issue and see what expertise you're bringing into the study in order to address the impacts blasting might have.

Finally, because of the possibility of the widening and deepening exacerbating the erosion problems that already exist, there are numerous activities going on around the inlet right now, some of which we have been very directly involved between the council and the county and the Port in addressing other areas of inlet management so we know that there's an effort to make sure that we don't do anything in all of this to create further down-drift erosion, but we would ask that you in the study specifically address that and make sure assurances can be made that none of this activity is going to

21 further the historical erosion that has

22 occurred south of the inlet as a result of the

23 inlet existing and that whatever beach quality

24 sand may come from the work that's to be done

25 in this project, one hundred percent of that

beach quality sand needs to go onto the beaches south of the inlet. We can't afford any additional loss. We had years of that material going out to sea.

We have now, between the federal government and local entities, worked out a nice arrangement where the inlet is dredged, the material is going on the island to the south, so we're addressing together that historical erosion. We want to make sure nothing out of this project would create any new erosion or loss of beach quality sand, so we ask that under any circumstances beach quality sand that's identified through the surveying that you're going to be handled, that every grain of that beach quality sand go in on the beach in the Town of Palm Beach.

Thank you.

MS. BURNS: Mr. Russo? I'm going to apologize now if I mess up your names.

SPEAKER: It's David Rosso. I happen to live next to Susan Markin on North Lake Way. I'm a resident of Palm Beach and I have lived on the water and been on the water most of my life. I have owned all sizes and shapes of

boats. I was in the Navy, ran a couple of large vessels there. I have a very close friend who's heavily engaged in the shipping industry, and I can tell you that I'm very much opposed to any growing of the Port of Palm Beach.

As I watch it every day, and I enjoy watching it, it's fun to see the ships come in, it's great when I see the pilots go out, coming in, I know something's going to happen when I see tugs moving around, I have an idea something's going to happen, and I watch that and that's a lot of fun, and I understand some of the navigational issues that pilots might have, but I have also seen them during inclement weather using tugs to get ships in, and it seems to me if you need a tug to help guide a ship into the Port, use one.

I hail from Connecticut and we have two very deep water ports; Bridgeport, Connecticut

and New London, Connecticut. The state of Connecticut has spent untold millions of dollars to make those ports friendly for shipping. I think in New London Connecticut the state spent over $35 million to get the New

London docks rehabilitated and to get that port in action. For the last five or ten years all they do is get a couple ships in who bring in lumber and they store the lumber on the docks. They employ one and a half people. So it's not a great return on the investment.

Here, 99 percent of vessels I believe go to the islands. So to assume that a 600 or 900-foot vessel is going to go to the islands is ludicrous because they can't handle them. Most of the vessels that I see coming in here are much less than 300 feet. They're very small container ships, bulk carriers. And to think that we're going to get 600-foot vessels in here when everybody is going bigger, according to my friends, is silly. We're not going to get ships from China, we're not going to get oil tankers from the Middle East coming in here. I don't think any of us want that. So I think you're trying to look at this the

21 wrong way.

22 If you have navigational issues and you

23 said, somebody said, the depth is 29 feet and

24 it's authorized to be 33 feet, make it 33 feet.

25 That's all. If you need more help getting a

ship in here, use a tug. That's what they are here for. And they are used quite frequently. I appreciate the pilots having their concerns, but the pilots were -- I believe most of them are former tug captains. They know what it's like to have a tug. So I think the whole plan is overreaching.

Like Susan, I think if you have one of these large ships in here, I'm going to see his bough against my boat, and that's not going to be a lot of fun.

I don't know what's going to happen to storm surge. I know -- I have friends who live on the north end of the island who are very concerned about what's going to happen to their properties if you dredge any closer to their property. They have seawall issues already. We don't need any additional seawall issues. So I think you should look at this as a re-dredging of the inlet project and basically

forget the rest. It's not needed. You're
going to impact the environment here of people
more than you're going to improve it for
shipping and commerce.

There are a lot of people that use this

water for recreation. That's why they came here. They're the driving force in Florida. They should be taken care of.

Thank you.

MS. BURNS: Thank you for your comments.

Mr. Royal Victor?

SPEAKER: Yes. Good afternoon. My name is Royal Victor and I'm a resident of Palm Beach. I share much of what the speakers before me have said, and I have two questions. I will confess that they're rhetorical.

Question Number One: Who wants this expanded Port capability? We're essentially a residential -- this area of Florida consists essentially of residential communities and I don't know, we taxpayers and people who make their homes here, I honestly don't know who wants this expanded facility.

Secondly -- and this is not a rhetorical question so much as seeking guidance -- is it

21 true that the Corps of Engineers is the

22 overarching CEO of this project? In other

23 words, will you be gathering information from a

24 whole host of different interested parties and

25 then assemble that information and make a

determination as to the relative merits of the arguments or, indeed, will the process permit all of us concerned citizens to talk at the federal level, which is you, presumably at the state level, which is Tallahassee, at the county level, at presumably the port level, Port Authority level and others? In other words, who's in charge? Who does one go directly to to either express concerns or make a particular plea on behalf of certain interested parties?

MS. BURNS: Thank you for your comments.

Part of what you're doing today is giving the information to us as we go through the federal process, but we certainly do consider the Port one of our partners. They're also the non-fed sponsor. But your comments today will help us flesh out some of the issues that we need to look at from a federal standpoint.

Mr. John Turner.

SPEAKER: Hello. My name is John Turner. I'm an attorney in West Palm Beach. I represent -- I'm here on behalf of Teeter's Agency and Steve Doring (phonetic), a Port tenant and user.

In answer to the gentleman's question who just spoke, my client wants this, and I don't think I would be speaking out of turn to say that everyone who does business here at the Port probably wants this.

The connection between the Port's -- this Port's capacity and the overall economic viability and fluidity of this region is immediate and direct, and I hope that that's observed.

I have used this analogy before and I'll use it again. If every year Mother Nature decided to chew up and overgrow ten to twenty feet off of the end of every runway at the West Palm Beach airport, within a couple years probably everyone within Palm Beach County, probably residents in adjoining counties, would be up in arms about how that would be allowed to continue even though perhaps the residents in the adjoining areas

21 might not mind that large planes could no

22 longer begin to take off or land at that

23 airport. And the same is true for this Port.

24 As Mother Nature essentially tries to do

25 what she's doing at this inlet, there are very

real and immediate effects being felt by my client and every other Port user. And that's before you even consider the direction that the shipping industry has taken with expanding the size of ships.

One significant comment that I want to emphasize is that although the phrase "Port expanse" has been thrown about a lot, for those who have actually done business at this Port for a long time this is just as much about Port restoration or inlet restoration as anything else. Again, Mother Nature is trying to fill something in and probably always will try to fill in this inlet, and my client is losing business because it cannot accept ships and the cargo that those ships bring on them regardless of tug boats and frequently because pilots will refuse to accept business.

Now, it would be shortsighted to react to that and say well, one business losing

business, so what? I respectfully suggest the answer is that we are losing business and it's the cost of our consumer goods that's going up, it's the cost of our steel, our rice, our watermelons, our cars that is being impacted

here.

Anybody who remembers the supply and transportation bottlenecks caused by hurricanes Francis and Jean remember the immediate impact that that type of bottleneck will have on commerce. And that's exactly what's happening, although it's subtle and it's perhaps easy to overlook because to the public in general it's not immediately felt. Well, I'm here to tell you on behalf of Teeter's Agency, which is a family business that makes its living from moving cargo on and off ships and moving that cargo further inland to support construction, commodities, every other type of business that you can imagine, that that bottleneck is having a significant effect. And although the Corps may be looking at this as an expanse project, it is just as much about restoration. That's not to say that Teeter's does not echo many of the environmental concerns.

My client hopes that the Corps will take a methodic approach, find ways to create win/win solutions. We're encouraged to see beach restoration and artificial reef outcomes of this. There's no reason why business and

environmental concerns have to be mutually exclusive; however, environmental concerns should not be a pretext behind which local interests, immediate interests and private interests use to essentially try to prevent this area from growing economically.

Thank you.

MS. BURNS: Thank you for your comment.

I'm looking for the name. Mr. Vogel? For Synergy Resources.

SPEAKER: How are you? My name is Rich Vogel. I work for Synergy Services. We just recently built an asphalt plant in West Palm Beach and most recently opened up a diesel plant in West Palm Beach and we are for the dredging. We don't see it as an expanse as much as a maintenance and safety operation.

I have worked at a lot of ports in my previous life in the petroleum industry. I have worked in several of them. I like the

setup that's in this port. It's very small and nice and contrite. It's not as crazy as all the other ports that I have already worked in. But I do see a good viability and a good possibility of a good, solid, sound business in

this port that does get held back a little bit because of the dredging issues.

Some of the vessels cannot come in because they're too large, so it means we have to come with more frequent vessels, more than we would if it was one big one versus two or three smaller one. A larger vessel with better dredging will sometimes minimize the number of ship trips that come in versus create more, but it gives you better flexibility for the type of vessels that do come in. It also influences some of the costs that's put into what it costs to get in.

There were several times we were trying to bring in asphalt and we couldn't bring it in. We actually had a vessel on its way and it was deemed it couldn't make it, too close, and the pilot said no, you can't bring it in. So that had to get turned and sent someplace else. So it is a problem with doing business with the

dredging that's ongoing.

Also the safety is a very important cog in the shipping business. Everything needs to be safe. There can't be incidents, there can't be accidents. If dredging minimizes or takes that

away, then we're all for it because we want to move things safely.

Recently I was down in Brazil with the Governors Commission, I was down there with Lori, and there's a lot of interest in this port because they see how congested Port Everglades is, Miami is, they see the possibility of something being done here, but there are restraints because of the dredging and those issues. So we are for the safe, environmental, ecological dredging if it can be done. I mean, we think it works. So we're one of the people who are for the dredging operation.

Again, this is a long process. You have a lot of people. I've been involved in Port Everglades' dredging program down there, their massive port plan, and there's a long way to go here. But you have the ability to work together in a finite area to make this work.

So we are for the dredging and we are for the environmental impacts and economic impacts that they could provide.

MS. BURNS: Thank you for your comment.

Mr. Dick Breezy, Breezer?

SPEAKER: Hi, folks. I'm Dick Bresse and I live down south of here in West Palm Beach.

MS. BURNS: Could you get a little closer to the mic, Dick?

SPEAKER: Better?

When I read the story in the paper about this, the first thing that came to my mind is another disaster. And it will be a disaster. And you don't need a two million dollar study to figure that out.

What's proposed? Widen the inlet, deepen the inlet, and enlarge the settlement basin. Will effect will it have? It will allow more water and more energy to enter the Intracoastal and it will steepen the grade, which will cause erosion.

We should look at a few things that we learned in Engineering 101. First, the effect of gravity increases as the grade increases. You have so much gravity here, you increase a

grade, you have more gravity. More effective gravity. And that will give anything on the surface a bigger propensity to slide down that surface. You have a hole this deep; here's land, here's the bottom of the hole. You drop

that -- this is your grade -- you drop that hole five feet, you increase the grade, you're going to get more stuff rolling down that grade.

How will this affect Singer Island? It will reduce the grade along the beach more than it is now, which will give added energy to moving the sand down, and so you will have more sand being moved down off the beach on Singer Island than you have today.

Now, today you may have some sand move south and stop. If you get southeast waves, that will push it back up, and so the residents' time on the beach will be longer. If it goes all the way into the pits, it is going to be gone.

They're already talking about a $30 million breakwater on Singer Island. This would exacerbate their problems.

In Palm Beach island any material that

21 presently moves over shoals will never make it.

22 It will drop down into the deep hole.

23 Secondly, we should look at the formula

24 that the amount of current, the amount of

25 material that a current can carry, varies

directly as its velocity squared. If you double the velocity of the current, it can carry four times as much material. If you cut the current in half, it can carry one-fourth as much. So if you have an increase in current and material that can be fluidized, enough energy to fluidize it, you're going to get erosion. Period. End of story. It is going to happen. And if you have a loaded-up current that drops in velocity, you're going to get it dumping part of its load and you're going to get erosion. Again, period. End of story. That's the way it works.

West Palm Beach is having problems with their retaining walls, and the gentleman said that we're having some problems in Palm Beach with them. Now, as this water, extra water, moves in, it is going to be neck down and it will accelerate. And if you have enough energy there and material that can be fluidized, which

it appears there is because they are having problems, you're going to have more problems with your retaining walls than you're having today. It's gonna happen.

Then the third thing is that you have

increased mass that takes more energy to move it. So if you have bigger ships, you're going to have a bigger wake, you're going to have more energy from prop wash, and when that hits the shore, it's going to fluidize the material there and the grade is going to be steeper. So you fluidize it, gravity is going to do the rest. It is going to carry it down into the bottom.

I think an alternative to this is to have continuous dredging. When I was walking the beach there were two areas that were doing it, and I can't remember, but Dr. Kuvin has at least one of the areas. I can't remember it. But if you had continuous dredging, it would take care of this three-foot fluctuation in sand on the bottom in most cases. And if you have a good, clean bottom there, if you have an event with a bunch of sand moving in, it's not going to be as bad.

Like I said, if this project is done, it's going to be a disaster.

Now, we're talking about the income the Port can generate. We should compare that to the income that the beaches generate and see

how much money the beaches generate compared to what the Port does. The politicians are going to have to make up their mind whether Palm Beach County is going to be an industrial county or if it's going to be a good place to live and a good place to welcome tourists. But if this goes through, it's going to be a disaster.

Thank you.

MS. BURNS: Thank you for your comment.

Dr. Kuvin.

SPEAKER: Thank you, Miss Burns.

My name is Sanford Kuvin, and my wife and I are 44-year residents of the Town of Palm Beach, and our property is located at the northeast extremity of the town, directly in the shadow of the inlet. We live at 149 East Inlet Drive.

Our substantial interest, just like the other 8,000 residents of the Town of Palm

Beach, will be absolutely and directly affected if the Army Corps adopts this project of inlet expanse.

Miss Burns, you stated in your letter of December 6, 2007 that the Army Corps is

gathering information to define issues and concerns associated with the expansion. Mr. McMillan has indicated that this is a navigational safety issue. It's a commercial issue, it's not a navigational safety issue.

And please let me help you define our concerns both personally as a family and speaking for many residents of the Town of Palm Beach. We've lived here for over four decades and we believe that this expanse should absolutely not take place for the following reasons: Over four decades ago -- you indicated that transparency is one of the hallmarks of your current inquiry, and four decades ago the Army Corps was here at that time, only at that time they blasted, they dredged, and yet we have heard nothing about that historical aspect as it impacted on the Town of Palm Beach and the surrounding communities, where damages were afforded and

where inquiries were made. Transparency indicates the past, the present and the future in terms of how it impacts on the residents, and that has not been accomplished in your meeting today nor has been the history of the

inlet, which is absolutely germane to why we're here today.

As you know -- I won't go into the details, but it was built in 1928 and '29, it was deepened, then a few other times in the interim deepened. In 1958 the sand transfer plant was created not out of charity to Palm Beach but because of the harmful effects that the inlet -- even the federal government agreed through the Federal Harbors and Rivers Act -- and mitigated creating that sand transfer plant. But we're not here to discuss the plant, we're here to discuss the impact of further expanse, which has been ongoing since 1928 and 1929 through the '50s.

And by the way, there's documentation about the impact on residents who are still here who were awarded damages at that time.

Miss Burns, you cited significant environmental issues in your letter that went

21 out on December 6th and that were related to

22 what Mr. Dies explained today; a number of

23 endangered species, sea mammals, migratory

24 birds, water quality, but nothing in your

25 letter mentioned the impact of the expanse on

the human species. Everything was relegated to other species, and yet we're here today because of the impact on us; the human species.

In 2005 a paradigm at that time occurred -- which you may be acquainted with, maybe not -- namely, that a company called El Paso Gas initiated the Seafarer Project, which was near to installing a two-foot pressurized gas pipeline coursing through the Lake Worth Inlet. Fortunately, proactive debate took place by a handful of citizens, just like you're hearing comments today, about that particular issue of a gas pipeline being put in the inlet going to Florida Power and Light. That was defeated and they moved elsewhere. Why? Because the port was too small. Florida Power and Light realized that other areas, including Port Everglades in Miami, were more receptive to this natural increase in the necessity for pressurized gas coming to our

region. And that was a paradigm of how commerce failed to local interests, and I would urge you that this is a similar paradigm.

We're still recovering from four hurricanes in Florida, as you know, and they

all paled in comparison to the Asian tsunami, but it caused huge environmental damage to our reef system along the property and coastal damage. The residents of this community should not -- and it's the residents, not the commercial interests, but the residents -- should not allow yet another disaster from this expanse, which will surely bring it, as Mr. Breese just articulated.

There are serious objections coming from a hit list within the airport expanse which include noise pollution, air pollution, the outcome of increased shipping vibrations, garbage in bilge dumping pollution, and even -- you may not be aware of it, but the red mite pollution, which was mentioned in the December 29th issue of the Palm Beach Daily News, a mite coming into our shores which is infesting all of the palm trees. It's obvious that with deepened and widened channels, as you

have heard today, so obvious, there will be an increase to the threat of flooding, particularly in the Lake Worth Intracoastal waterway, which began over four decades ago.

The increased velocity of water, as you

have heard before, will be rushing through the inlet and will cause even greater Intracoastal and beach erosion.

We're consumed in the sand wars today with erosion not only in Palm Beach, not only in Florida, the world over. Beach erosion has entered into a warfare state because of events we know about like global warming, rising tides, putting more concrete on our shores, hurricanes and other things we don't know about; but nevertheless, it's here and it's not going away.

It's been indicated that there will be bigger and better and larger and deeper draft ships coming through this inlet. I have heard figures going anywhere between six and nine hundred feet with sparse room to even turn in the basin.

In addition, on an average day -- we live right at the inlet, we have lived there for

21 over four decades -- you know, what with

22 increasing threats to our homeland, we see on

23 any given day Homeland Security boats,

24 helicopters, the Sheriff's boats, Palm Beach

25 police boats, West Palm Beach police boats,

Customs boats, the Coast Guard, and please accept on faith that all of them have appeared on any given day. It's a traffic jam unto itself. It's hard to imagine what an increased traffic that you're proposing if this were to go through with the deepened port widening will bring, and particularly, particularly with the ongoing threat of terrorism that we are faced with today as a nation. That aspect is not going to go away, it is going to only increase, and we don't want to be a participant to its increase within the confines of this, what used to be a sleepy area which was always a charming area but unfortunately is becoming a slick area.

You stated in your letter that one of the alternatives to be considered is no action. The vast majority of residents who live in this area and who will be impacted by this expanse urge you to carry back the message to

21 Jacksonville and to Washington to do just that;

22 take no action. And in doing so, you'll save

23 the taxpayers millions upon millions of tax-

24 payer dollars.

25 The Corps prides itself on cost

efficiency, and if I ever heard a story in the making for cost efficiency, this is it. The Corps has come under enormous pressure, as you well know, in recent times. It was mentioned in an editorial in the New York Times in November, it's had congressional impact studies on it. This is no secret. And it's no secret because of the Corp, to quote a phrase from the New York Times, which sought reforms to impose discipline on a notoriously dysfunctional agency. Those are the quotes of the New York Times. Diane Feinstein and other senators have voiced this concern about Corps action.

And does the Corps do wonderful things? Absolutely. You have now in your hands, I believe, 22 billion in the Water Resources Act, and I believe some of this money will come from that, but I think all of you will agree that it must be spent with a conscience and where the good -- where the reward will outdo the risk.

The real question -- and let me also add parenthetically we have seen some wonderful things happen with the Corps in our region. They have kept our inlet at 234 feet, they have given us free sand on the shores of Palm Beach,

which that's multiple millions of dollars at about $10 to $13 a cubic yard, and they have benefited the Town of Palm Beach in many, many ways. However, that was done to expedite the commercial interest of the Port of Palm Beach, it wasn't done out of charity to the Town of Palm Beach. We were the beneficiaries of that, quote, free sand and we look forward to more of it coming because it was the Corps and the federal government that caused our problems in the first place, going back historically.

The real question the Corps has to answer is, is the risk of this extremely controversial and environmentally dangerous project with untold unpredictable associated hazards worth the commercial reward? I think not. The vast majority of the residents of this area think not. And I hope the Corps will take no action as its alternative.

Thank you very much.

MS. BURNS: Thank you. Thank you for your comments.

Terry Gibson Gibraltar.

SPEAKER: It's not explicitly clear to me. I understand there's options from zero, do

nothing, to very aggressive options, and from the presentation it wasn't clear to me what the most aggressive option is regarding what you would do from the inlet mouth seaward. Are these jetty extensions or the edges of dredging? Can you answer that question?

MR. McMILLEN: It's already deep water out there. If anything, it would be just a line on a piece of paper. That's all it is.

SPEAKER: Okay. I'm Terry Gibson. I'm the projects editor for Sportsman's Magazine. I grew up here. My family's been here a hundred years. I know these waters and the natural resources here intimately. And I certainly appreciate the Port is an economic engine, but you're not the only economic engine. The engine that I represent, salt water recreational fishing in Florida, is worth about $15 billion a year. Salt and fresh, it's massive in this area. The value of coral reefs

in Palm Beach County are worth hundreds of millions of dollars. The diving and surfing communities are also massive economic engines in this area. Whatever is contemplated here, I encourage the Port to proceed thoroughly and

cautiously and slowly with lots of stake-holders' involvement.

One concern I have inside the lagoon is on the sea grasses. Before contemplating dredging some of those up, we have to realize not all sea grass beds are created equal. The location of these sea grass beds is very important.

Grant Gilmore has oodles of data from the Indian River Lagoon and I think probably from the Lake Worth Lagoon showing sea grass beds close to the inlets are more valuable for fish; furthermore, they're more valuable for reefs. Our reefs are in a lot of problem. Over-population is one of the gravest concerns. So whatever is contemplated, you need to consider the value of those reefs or the sea grass beds near the inlet where the Gulfstream's coming right to the beach and bringing from the Keys and Caribbean -- things are settling out there, and they have a very short ontogenetic highway

with manmade reefs right in the lagoon, shallow reefs right outside the inlet, and lines of reef on out to that.

There's a number of studies, Mumby (phonetic), et al, a few others, that show the

shorter the fish has to migrate throughout its life history in a different kind of habitat as a baby, as a teenager, as an adult, the greater the survival is. Of course, that's confounded by fishing pressure, but that's another story.

Judging from your assessment -- and I understand this is very preliminary -- of the sea grass resources in the area, they seemed a little understated. I spent a lot of time with an underwater videocamera in this area filming for various TV shows, and the sea grass beds to the south of D and around F and G seem -- I was there in November -- they are very robust. Yeah, there's some sand patches in between them, but they also occur at depths I have never seen. I have seen Johnson's's in almost 30 feet of water, which is highly unusual, and it has to do with the incredible quality of water thanks to the Gulfstream. So I hope you all will take a look at sea grasses.

You said something about 150 feet of where you might dig. Dredging, especially if there's carbonated muds in the area, dredging this might cause turbidity issues, could kill those sea grasses or create a light starvation

condition that can create -- that could kill those sea grasses if persistent turbidity occurs there, or imposed starvation.

Also in the sea grass the Corps along with the Port, some of the best work I have seen you guys do, I always -- you know, my story is, as a Florida sportsman, is mostly pathos and loss, but the Lake Worth Lagoon is one of the places we have shown we have the power to make things a whole lot better. So I encourage you all not to undermine your earlier partnering and work.

These habitat restoration areas are full of fish and wonderful recreational opportunities. The north Lake Worth Inlet or Palm Beach Inlet, as it's often called, is also supplying irrigation sites for snook in the state. I think it's the third largest spawning site. Whatever goes on there should not go on during snook spawning season. This is a fish vital to the economy and to recreational

21 opportunities and it's a very sensitive

22 species, very carefully managed species, and we

23 don't need to use world class dredging going on

24 in the summer months.

25 I'm very concerned also -- and I was glad

to hear that you're going to do core borings and analyzes -- I'm very concerned about turbidity from dredging impacting sounding resources inside the lagoon, outside the lagoon and sea grasses, but turbidity booms, things like those, should be strongly contemplated if this goes on.

Safety is a word that has come up a lot. I hope you aren't considering the recreational boating community in your safety part of the cost benefit analysis. This is the safest inlet I'd say probably north of Port Canaveral and south of Cape Canaveral, maybe Ft. Pierce. But compared to Jupiter and Boynton, this inlet is a cakewalk.

I was fishing offshore in a 13-foot Whaler, in somebody's, as a kid. I never had a problem coming in and out of the inlet. So please don't try to give up safety for recreational boating in that analysis. That

21 would be somewhat dishonest.

22 I'm going to speak as a surfer. On either

23 side of the inlet right about where the B2 sign

24 is and right about where the B1 sign is are two

25 of the best surf breaks in the east coast. B2

is called Pump House, the other one can be referred to as Reef Road. The last time you drenched the inlet after Francis, a lot of that sediment was put in the Reef Road area and it badly degraded the quality of the surf spot. There are thousands of kids and adult kids like me that enjoy that resource, and it generates millions of local economy. People drive from Jacksonville to score these spots. Whatever you do, I think you have noticed how much trouble the surfing foundation can give you all. It can give you a lot of trouble if anything happens to the surf spots.

I have seen a number of cases now to the down-drift beach impacts. I can cite a number of cases. One, the inlets just up drift, Long Beach, Ft. Pierce Inlet, where you all have deepened the inlets and the, quote, need for refurbishment becomes one, two, three, four times more frequent. I think Ft. Pierce has

been done four or five times since the inlet was deepened. I think that has something to do with the venturi effect, if I understand the book correctly. Very concerned.

Palm Beach is about out of sand. Dredging

has had horrible recreational impacts. They're about out of sand. They might have 20 years left offshore. Please don't make our beaches disappear. Please, please don't do that.

I'm glad you noticed the manatees.

And finally, I uncovered a paper the other day from the Caribbean where a massive dredging project in the Caribbean caused an epidemic of ciguatera. I suggest that you check these sediments not just for what they are in terms of define them geologically, but for contaminants. There's a lot of bad stuff coming in and out on these ships and on other things, and I really don't want to get paralyzed from the snapper I take home.

That's about it.

There are a number of other things, but just on the transparency issue, I have done battle with you guys in a hundred contexts, and this is going to go down transparently because

the media is going to be all over it and throughout the whole process.

With that having been said, I know these resources incredibly well, and if you want help finding things or researching things, diving

things, I'll be more than happy to help.

Thank you.

MS. BURNS: Thank you for your comments.

Just let me tell you the order of things. Miss Purvis will be next, Dr. Lilja would be next, Mr. Djubin and then Mr. Ward. So if you could, as people get finished, if you could just come on up.

SPEAKER: Good evening. My name is Lynn Purvis, P-u-r-v-i-s. I'm a life-long resident of Palm Beach County. I currently live in Lake Worth but now we're battling to restore the Lake Worth Lagoon so it kind of irks me to be here about them wanting to do further dredging projects upstream.

I'm also representing Everglades Earth First, which is a chapter of the National Environmental Protection Group who -- some things that you're taking on involves things going on in the Everglades where the Army Corps

21 as in the rest of the country has made it their

22 job to totally disrupt ecosystems and wetlands

23 and our waters, so I have a little bit of

24 hesitancy when it comes to Army Corps projects.

25 Something that doesn't seem to have been

addressed in the process I have seen is the convincing of the need for this project. I don't know if that happens somewhere else, but before I want to see a lot of money and effort and expertise get put into studying if this is feasible and environmentally acceptable, I would like to find out if it's necessary.

What is the expected cargo increases that we're going to see coming through here? What exactly is that cargo? I don't know if the Port picks out those kind of statistics that we can see, but I would like to see that and be convinced of the need to bring in bigger ships and more cargo. Specifically, is that the most cost effective way of meeting our needs?

You know, he talks about watermelons, cars, et cetera being brought in here. Well, to me it would seem a much more wholesome and environmentally acceptable and cost acceptable way to be growing those things here and using

local industry better. So if we're going to be putting in a lot of money being able to ship in foreign things, I would like to know where the ships are coming to, I would like to see is there a better way to get those needs met

locally?

In terms of the cost, as I said, having bigger ships helps bring down the cost of those goods, A: I say that's not the only method; but B: Is that including the cost of this project in all of its aspects or is the Port just taking that as a federal subsidy to their business? Because the cost sharing thing that was mentioned earlier hasn't been broken down. Maybe it hasn't been created yet.

And I really appreciate all the comments that other people have brought up, especially those that are really focused on some of the technical aspects. And I would like to support everything that's been said of the people that have been opposing the project and supporting the no action alternative, and I would like to bring up some more holistic concerns.

I know for those of you up on the panel it's nobody's job description to look at some

21 of these larger issues, but I think that's been

22 one of the main problems with the way that this

23 agency and some of the supporting agencies do

24 business.

25 So in terms of again going back to what is

this cargo that we're bringing in and where are these ships coming from, to me it sounds like a whole lot of oil use because we're shipping in things from afar, and we all know that the larger implications of so much increased petroleum use is war, pollution, and now we're looking at global warming from carbon emissions. I know these are buzz words and people throw them around, but it's real, and I think that those types of things have to be included when we're doing these cost benefit analyzes and when we're creating alternatives.

As you say, you have to look at several different alternatives to the project. I think that those alternatives need to get a little more creative in terms of what is the ultimate goal that we're trying to meet here and are there other ways? Is (sic) there better places to be putting this money to serve those needs?

Not to go back to my other problems, but

we have watched the Everglades get totally torn apart in the name of development, in the name of economy, and people finally caught on to how much damage it was actually doing to our land and our peoples and our communities, and there

is a lot of outcry against that, and it would be a request to have that restored.

Now, that request has been met with technical agreements to do so; the Everglades Restoration Project. But everyone agrees that project has been languishing out there, never come into play, without ever coming to fruition. So I'm really hesitant to allow yet another project where there's been so little accountability to the residents and the other people who benefit from these vibrant ecosystems.

So I would like to get back to more specific things that you guys might feel more comfortable addressing. Is (sic) there any plans to have the people who are benefiting from this project, those being the business owners at the Port, to participate in any kind of mitigation fund or mitigation project and again, looking into more creative alternatives

21 to meeting our needs? So I appreciate you

22 listening.

23 I do have one very specific comment for

24 Mr. Dies, who gave the presentation about the

25 data collection. I would say maybe -- we're

doing public presentations. You used a lot of technical terms. I know I didn't understand, and I've been trying to follow these things for a long time. So I know you get pressed into a very short time period to get through a lot of material, but I would just maybe try to watch out for trying to explain things in terms that people can understand. But I appreciate it.

Thank you.

MS. BURNS: Dr. Lilja, before you come up, Mr. Sam Osher (phonetic).

SPEAKER: I hope you won't mind. I have got another meeting after this and this is my second meeting today.

UNIDENTIFIED VOICE: What's your name?

SPEAKER: Let me think about that.

Thank you very much. I'm Sam Osher. I'm not an engineer. And I've been listening to some very brilliant people here this afternoon and also people talking about the quality of

life, and I'm all for that. I would think before anything is done, there's going to be a study, everything is going to be taken into account, and if the studies don't work out too well, well, okay, it's not going to work out.

However, I want to throat something else into the pot.

You talked about the quality of life and all of that, but from what I see in my vision Palm Beach County is going to grow like you have never seen it before. Businesswise, I think it's going to be one of the most noticed scientific counties in the entire country. It's coming. It's already started. Can't be stopped.

What we need here also -- and I appreciate people talking about the quality of life, and I'd like to see that going on for at least another 30 years personally, but at any rate, there are people out there who need work. Business is coming here, and I hope that things can be worked out so that everybody is pleased. And I'm sure with the brilliance that we have even sitting here, people who we listened to today because their questions and their

thoughts are very good, it will be worked out.

The ports south of us are loaded. They can't do much more. This is the ideal place.

And as I was talking to somebody else, from the standpoint of security and naval ships

coming in, they're smaller ships, they'll come in. It's extremely important to have this port be used for that. But I want to emphasize, and I'm very much involved in that, I represent a number of clubs, people, and we reach out to perhaps fifty thousand or more voters, and I think that's important. How I got to that point I don't know, but boy, I'll tell you it's important.

So my point is this: I represent a lot of people who still have to work or are looking for work and I would remind the folks here that there are a lot of people here for 40, 50, 60 years, families before, and their work is coming, and whether we like it or not, there's going to be progress upon progress. Sometimes that's not good, but it's gonna happen. It is happening right now. So I want to just throat that into the pot with everything else. We're gonna have to rely on you folks to come up with

the answers. I will be here, as you will, and hope for the needs of all of our people.

And by the way, I do want to commend the people that work here at the Port. Lori has been the best thing that's happened to this

Port in about the 10 or 12 years that I've been here.

And I want to thank you for the five dollars you just gave me to say that.

But the point I want to make out is there are two sides: The quality of life, which is extremely important; and then the brilliance of engineers, who can equate everything. May not be able to please everybody, but hopefully you can please most people. It's gonna take a long time, a lot of money, but whether we like it or not, it's going to happen, and you better know it's going to happen. But it could happen in a good way; a way that works out for, hopefully, for everybody. And I expect to be around another 30 years to make sure it happens.

Thank you very much. I've got to get out of here.

MS. BURNS: Thank you folks for letting Mr. Osher go since he had to leave.

Dr. Lilja.

SPEAKER: My name is L-i-l-j-a. I live in Palm Beach. I shall not try to improve on the eloquence of previous speakers that are against this particular project. I will just state the

facts the way I see it.

There are two reasons presented for the change: One reason is that present 300-foot vessels are having difficulties running aground, which is a valid reason. The other reason is to open the Port for up to 900 feet mastodons, which will affect the commercial status of this area and at the same time, of course, will hurt the life that we like here today.

I am all for improving the channel for the present size of vessels, and it can be done in different ways. One is to dredge it a little bit deeper than the 32 feet, as we have done before. Just watch out for your pipe that goes from the sand transfer plant.

And the other one is in addition to that, dredge it a little more frequently. Don't wait until it shoals. It's not that difficult. It's elementary.

I will finish with two technical observations. It was said here in the very beginning in the presentation that the Gulfstream is affecting the approach of vessels into the Port. They're being pushed northward

by the Gulfstream. I beg to differ. As a boater, we all should know that the Gulfstream is out there, but closer to Port we have a southward bound stream, and I would suggest that the Army Corps look into that one and take that into consideration in their philosophy.

The last thing I have is that we have seen many, many investigations of the sand or the silt that we have here that we're dredging. They differ very much, and always in the benign direction. I would urge you to make sure that you really have a true evaluation of the grain size that we're talking about.

Thank you.

MS. BURNS: Thank you for your comments.

Mr. Djubin.

SPEAKER: My name is William Djubin. It's D-j-u-b-i-n. I'm a most recent founder of an environmental organization local here out of Jupiter. Our specifics right now is a coral

reef initiative, and we will begin water
quality monitoring independently later this
month. That will be in collaboration with Reef
Rescue of Palm Beach, and most likely the water
quality monitoring reports will be translated

by Southeast Florida Coral Reef Initiative. That's what we're looking to have here.

I'm not really too sure why I'm here, but I did begin to become confused first in the presentation and then also the speakers' questions.

The presentation seemed as though this was to improve existing navigation in the Port, whereas several people had indicated that we're looking to actually reach out to larger ships and more ships. So I'd like to have that cleared up; as to whether this is for current navigation or whether it is to actually enlarge.

And to add on to previous questions, who is it that -- they're coming here, or is it that we're actually looking to export more?

Living in Florida for 30 plus years I have watched our state go from number one in tourism to now close to number one possibly in energy

and agricultural, and our main source of income for the state now is energy and agriculture, and what it appears to be is tourism is number three. I appreciated tourism. I disappreciated (sic) tourism as much as I did

appreciate tourism. But I believe that the pollution and the effects of agriculture and energy are taking a stronghold on our state, and in our legislature this must be addressed.

If the expansion of this port is to export agriculture and energy abroad, we need to know that. We need to know those facts. If this is truly just because the ships that need to go from the Port of Palm Beach to the Bahamas and existing islands, that those boats are getting larger and it's becoming unnavigable for them to come in and out of port, we need to know that as well. I'm just a little bit confused as far as whether this is fixing an existing problem or if this is actually trying to enlarge the port to take on more work and more transportation. And those are my questions.

Thank you.

MS. BURNS: Thank you for your comments.

Mr. Ward, and then Mr. Williamson will

wind us up.

SPEAKER: I'm Gerald Ward. 31 West 20th St. here in Riviera Beach.

This is a NEPA scoping meeting so we're really not into formalizing for or against

positions, but I have to compliment you, Miss Burns, because the last scoping meeting I went to up in Martin and St. Lucie County for a marine minerals management service offshore meeting was a disaster, and it's pleasant to see that you have the reporting accommodated versus what happened up there.

I would request a copy of any summaries, transcripts or documents as a result of this meeting. Plus, pursuant to 40CFR1502.19 subC I'd like to get hard copies of the draft Environmental Impact Statements and the final. I understand you're limiting the written comments to the 20th. If that's not correct -- that's only 11 days away.

The draft schedule says you are proposing to drag this out until the first quarter of 2010. That's two years hence. My experience in economic and NEPA actions is that that's way too long to do it, and pursuant to

21 40CFR1502.8(c) I request you advance it to no

22 later than the first quarter of 2009. It cuts

23 costs. It will probably not -- if you take an

24 extra year, you probably won't know that much

25 more about this area. And I think it's

important. So you have to, I believe, by that regulation have to look at my request.

How many pages are you proposing for this EIS? I hope it's 150 or less. When you get too big, you overwhelm the public in responding, and we need to have the greatest response on this.

The sixth area, which is my last major topic, is scoping alternatives. The alternatives are the heart of an economic statement, an Environmental Impact Statement. It is really an evaluation process of which many questions were thrown out today that people really want an evaluation. You list in the public notice of the scoping meeting only eight areas, all waterside and all increases in the project. Then you list a combination of those eight projects, again all increases, plus the no action. You have indicated numerous physical models, ship models, studies, economic

21 studies, and you have complained about the

22 maintenance of the existing channel because its

23 depth is now six or so feet. Underneath the

24 project, the depth's at 29 feet, apparently.

25 Therefore, you need another alternative to the

study; what I think is known as a similar action alternative.

Number One, reduce the project navigation depth. Look at not serving bulk cargo. That seems to be the predominant safety issue that you've gotten into. What would it also do? It would free up existing lip faces. And I think that's in accord with what's happened at the Port. Your economist has got to look at how the cargo traffic has gone up in the Port. And they're not big vessels.

You are between two major deports or ports; Port Canaveral, which has significant military assistance for maintenance, Port Everglades with much less wave climate that does not have a significant maintenance problem. Both have little tributary runoff with no currents except the tidal currents in and out from the straits of Florida or the Atlantic Ocean to the inland waters. They deal

in deep channels for different types of vessels. The container shipping that has developed in this port could use more wharfage and cargo container area. That type of transportation and similar island trade, which

is small bulk, plus small ferry or cruise vessels have great future at the Port of Palm Beach.

The Port advertises itself as a niche port, and I think you need to go into how they have promoted themselves. It is a small port. Go to the Port of Shanghai and compare it.

The project, eight projects -- and by the way, interestingly, last night we completed the steering committee for a surety of the CRA, Community Redevelopment Agency of the City of Riviera Beach. That project, report, will be out on the 30th of this month and I hope you at least incorporate it by reference.

But one of the things is that the State Comprehensive Plan, Chapter 186 Florida Statutes, requires the 14 deport of ports to start to accommodate the locals in changing their types of uses. So we expect to see the port -- and several suggestions are already

21 being bantered about of how even this building

22 can become more of a common facility for the

23 public of this area.

24 The project -- I like the man inquiring

25 about A1 and A2, Mr. Gibson. I am not quite

sure that's a viable project.

Project I doesn't make any sense except to spend money. It has a bogus name. North Turning Basin Widener. Look at the Corps manuals, Mr. McMillan. That doesn't compute.

Project G probably has the most economic potential. Moving the Port's waterfront faces south along the existing Florida Power & Light Company wharfage or bulkheads could quickly convert more usable area. Ecology impacts are really minimal, and you have to recite in your investigations that less than a century ago it is only because of the Port of Palm Beach and the Florida Legislature that created two ports. Both have port powerage (sic), or they did have when they were created, that has reduced the marine resources within the Lake Worth system of the magnitude that they are today.

Lastly, I guess of a technical nature, water levels, tides, storms and the resulting

21 surge, the modeling does need to focus on that.

22 I personally have looked at the tides for the

23 federal government prior and after the mid '60s

24 deepening of the inlet. We basically almost

25 doubled the inlet tide range with that project.

NEPA mandates a host of upland-based considerations. I haven't heard a lot of discussion about that, but it includes economics. This should be an economic driven study, not ecology. We need -- didn't see that man here today, or woman, but they are the driving forces to evaluate what's good for Riviera Beach or the Port or Palm Beach County.

MS. BURNS: Thank you for your comments.

Last but not least, Mr. Williamson.

SPEAKER: I'll bet everybody is happy to see me. I'm last.

My name is George Williamson and I work for Rinker Materials, but now we're called Cemex. We were purchased by Cemex back in July. And what that really means is that we have gone from a company of 13,000 employees that did about 5 billion in business per year to a company that does about 25 billion in sales a year and has about 50,000 employees.

We're a construction materials company. The products that we bring in from literally around the world are used in construction; building roads, schools, houses, bridges. We have two facilities here at Palm Beach. One of

them is a cement facility, the other one is aggregate. I'm here to speak on the aggregate side of things.

And in fairness, we are any port's worst nightmare. We are high volume, low dollar material. Everything we do comes in in volume. Big volumes.

We've had our facility here for a while and frankly we have struggled to make it financially viable because of the 28, 29-foot water depth. It is difficult for us to handle business that way economically and we have found ourselves searching for materials as far away as Guiana to bring in in small barges in order to bring the material into the port. Clearly, the deeper it is for us, the better it is. That reduces our costs by bringing it in volume and thereby reduces the cost to our customer, the ultimate user who is building the roads and schools and bridges in the community.

21 I would just like to say that we

22 wholeheartedly support the Port's effort to

23 deepen this facility. Clearly, 35 feet is just

24 a start for us. We'd love to see it go to 40.

25 Our other big terminals throughout the country

are at least 38, 39, 40 feet. We do have some that are a bit shallow because when that happens, when this Port is deepened, we can substantially increase our through port, which means more dollars for the Port and the community, increase our jobs and, most importantly I think, supply a constant -- have a constant supply of quality materials for our customers and the end users.

We also applaud the Corps's efforts to get this far in the survey. Thank you very much.

MS. BURNS: Thank you for your comments.

Okay. Some of you may have some thoughts after this meeting. Again, the comments period for scoping -- and remember, please remember this is not the last time you will have an opportunity to comment -- but for purposes of scoping, which is how we will focus some of our efforts on what we're going to look at, that comment period closes the 20th. So we'll

appreciate getting those comments.

First of all, I wanted to thank all of you for staying and helping us try and frame how we will be looking at this project. Again, the next part of the process is we will be taking

all of your comments again. We've had a very diligent writer. I have heard her scratching over there. But your comments are important and we wanted to make sure that you can see that your comments were captured.

UNIDENTIFIED VOICE: Can I say something?

MS. BURNS: Sure. Please.

UNIDENTIFIED VOICE: I did my best to get your comments. Please look at them. I know I missed a couple things because speakers were going fast. If you see mistakes, I'll be over there. Let me know and I'll correct it.

Thanks.

MS. BURNS: So please, it's some of the neatest writing I have ever seen, at least from here, so please take a look at it. If you have anything we need to add, this will be the first thing that we probably will take a look at and try and post on the site.

Again, you have those sites to look at.

The next step for us will be taking the information that you have given us today, framing again the study that we'll be doing to try and do the studies and the different things that we need to do to answer some of the

questions you have raised and some of the questions all of us have about the project. Again, we're trying to make this as transparent as possible, so if you have any suggestions, please let us know.

Did you have any comment you wanted to make in finishing?

All right. Thank you very much for coming. Grab an apple on the way out. Thanks.

(Thereupon at 5:31 p.m., the meeting was concluded.)

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C E R T I F I C A T E

THE STATE OF FLORIDA
COUNTY OF PALM BEACH.

I, Elaine V. Williams, Registered Professional Reporter, do hereby certify that I transcribed the notes of Lake Worth Inlet Feasibility Study public meeting to the best of my ability.

Dated this 6th day of February 2008.

_____
Elaine V. Williams, RPR

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23

24

25

GENERAL THE MURPHY CONSTRUCTION CO. CONTRACTORS

OFFICE ADDRESS:
1615 CLARE AVENUE
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FLORIDA 33401

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P.O. BOX 3768
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FLORIDA 33402

DEPARTMENT OF THE ARMY
Jacksonville District Corp of Engineers
P.O. Box 4970
Jacksonville, FL 32232

January 9, 2008

Attn: Marie G. Burns, Acting Chief, Planning Division

Re: Lake Worth Inlet/Palm Beach Harbor Feasibility Study NEPA Documents

Dear Sir:

I am writing you as directed from 6th of December 2007 notice. As an adjacent property owner, located North of The Port of Palm Beach, I object to your Plan (Figure 1, [specifically Area E] – Expansion Alternatives Proposed for Lake Worth Inlet (Palm Beach Harbor) as presented. I am concerned that our upland interests and waterfront improvements which date back to the early 1940's are being proposed for impairment by this process.

In conclusion, I ask that 'Area E' be removed from the Environmental Impact Statement for the Expansion of Lake Worth Inlet (Palm Beach Harbor), FL Draft Environmental Impact Statement (EIS). Further, I wish to be copied on any government or private party correspondence or documents related to the above during this entire EIS process

Sincerely,
THE MURPHY CONSTRUCTION CO..

By: _____
Martin E. Murphy
Vice President

cc: ● Rick MacMillian, Jacksonville District, Project Manager
Lori Baer, Executive Director, Port of Palm Beach

Florida Fish and Wildlife Conservation Commission

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Executive Director

Victor J. Heller
Assistant Executive Director

Karen Ventimiglia
Deputy Chief of Staff

Office of Policy and Stakeholder Coordination
Mary Ann Poole
Director

(850) 410-5272
(850) 922-5679 FAX

Managing fish and wildlife resources for their long-term well being and the benefit of people.

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MyFWC.com

January 10, 2008

Ms. Lauren Milligan
Florida Department of Environmental Protection
Florida State Clearinghouse
3900 Commonwealth Boulevard, MS-47
Tallahassee, FL 32399-3000

Re: Palm Beach County, SAI #FL200712103896C, Notice of Intent to prepare a Draft Environmental Impact Statement for expansion of Lake Worth Inlet (Palm Beach Harbor) including widening and deepening of the existing channels and turning basin

Dear Ms. Milligan:

The Florida Fish and Wildlife Conservation Commission's (FWC) Aquatic Habitat Conservation and Restoration Section has coordinated a preliminary agency review of the potential wildlife and wildlife habitat issues associated with the expansion of Lake Worth Inlet (Palm Beach Harbor), Florida. This letter outlines the anticipated concerns and comments related to the feasibility study and proposed Draft Environmental Impact Statement.

Background

The U.S. Army Corps of Engineers (USACE) is performing a feasibility study for the expansion of Lake Worth Inlet (Palm Beach Harbor). The expansion alternatives being reviewed include no action, creation of channel flares, channel deepening and widening, and turning basin expansion. Options for the disposal of dredged material include Peanut Island, disposal in the Palm Beach Harbor Ocean Dredged Material Disposal Site, beach placement, disposal of suitable rock at existing artificial reef sites, and any other viable disposal options that may become available. The USACE intends to prepare a Draft Environmental Impact Statement for this project. The Port of Palm Beach District is the cooperating agency and non-federal sponsor for this project and will provide information and assistance on the resource assessment and mitigation measures and alternatives.

Wildlife

Marine Turtles: The coastal beaches both north and south of Lake Worth Inlet provide nesting habitat for the loggerhead (*Caretta caretta* - threatened), leatherback (*Dermochelys coriacea* - endangered), and the green sea turtle (*Chelonia mydas* - endangered). Construction activities associated with sand placement on these beaches during the marine turtle nesting season (March 1 through October 31) could adversely affect nesting turtles, incubating nests, and emergent hatchlings. The compatibility of sand placed on the nesting beach may also adversely affect the ability of nesting females to construct viable nests and the incubation environment necessary for successful development and escape of marine turtle hatchlings.

Nearshore hardbottom communities and artificial reefs provide foraging, resting and juvenile developmental habitat that could be adversely affected by the expansion of channels associated with this project. Blasting to remove limestone during deepening or widening of channels could be lethal to marine turtles and manatees if it occurs relatively close to individual animals.

Manatees: The Florida Power & Light Riviera Beach power plant located immediately south of the port provides an important winter warm-water refuge for the Florida manatee (*Trichechus manatus latirostris* - endangered). During winter cold fronts, over 400 manatees have been documented using this warm-water refuge. The desired turning basin expansion would encompass the area adjoining this warm-water habitat. Construction activities may directly affect manatees using this site if work is conducted during the cold season (November 15 through March 31), or indirectly by creating a deterrence to the use of this important habitat.

Secondary adverse affects could include altering the nature of the warm-water refuge. Substantially deepening the bathymetry adjacent to the warm-water refuge could result in reduction of warm-water habitat due to an increase of the mixing between the cooler water from the expanded turning basin with the thermal outfall of the power plant. Expansion of the turning basin is also expected to affect seagrass resources that provide forage for manatees. Increased shipping traffic may also increase the risk to manatees due to its proximity to the warm-water refuge and to the travel corridors used to access foraging areas located north of the port.

Habitat

Corals and Hardbottom: Hard corals may be found within the inlet channel and the area marked as "south channel flare" and "north channel flare" on the map provided by the USACE labeled "Study Areas for Potential Improvements (Widening and Deepening)." In addition, the nearshore areas that may be affected by this project fall within the range of staghorn coral (*Acropora cervicornis*), which was recently listed federally as a threatened species. Other hardbottom resources occur on the walls of the existing channel and potentially in the nearshore channel expansion areas. The primary benthic resources expected to be found within the prospective expansion areas include live bottom (soft corals and sponges), solution holes, limestone ledges, and their associated communities.

Potential adverse effects to these benthic resources could result due to dredging, blasting, and sediment disposal. Expansion of the offshore disposal area may also affect hardbottom resources, which will need to be considered if this option is explored.

Seagrass: Six species of seagrass have been documented in Lake Worth Lagoon and all could be affected by the dredging necessary to expand the inlet channel and turning basin. Seagrass species found in Lake Worth Lagoon include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*) and the threatened species Johnson's seagrass (*Halophila johnsonii*). Seagrasses provide important ecological functions to estuarine and marine coastal systems. A wide range

of organisms are directly or indirectly dependent upon seagrasses for food and habitat (Zieman and Zieman1989), including several federally and state-listed endangered species such as green sea turtle and Florida manatee.

Seagrasses, coral, and hardbottom also provide essential fisheries habitat by creating a physically stable refuge and nursery ground for numerous commercially and recreationally viable fish and invertebrates (Zieman 1982, Phillips and Meñez 1988, Fonseca et al. 1988).

Artificial Reefs

Any dredged material that would be considered for disposal at an artificial reef site will need to meet appropriate criteria for artificial reef construction depending upon the proposed deployment location and material types. No silt, sand, clay (of any type), or rock boulders less than 150 pounds each will be allowed to be deployed in the artificial reef site. Ideally, the minimum acceptable weight of each individual piece of rock proposed for artificial reef deployment should weigh at least 500 pounds. Close coordination with the FWC Artificial Reef Program (Attn: Jon Dodrill, FWC-Division of Marine Fisheries Management) and Palm Beach County Artificial Reef Coordinator (Dr. Janet Phipps) will be required if artificial reefing is considered as a disposal option.

Peanut Island

Peanut Island contains a large habitat enhancement project that includes a 7.1-acre maritime hammock, 3 acres of mangroves, 1.5 acres of tidal channels and ponds, 3 acres of shallow-water lagoons and 1.3 acres of shallow-water reef. All of these habitat features provide habitat for a variety of wildlife including shorebirds, fish, crustaceans, and mollusks. Placing spoil on the island and widening the channel in segments C, D and E could adversely affect these habitats.

Resource Surveys

We recommend that multiple resource surveys be conducted as well as a review of historical data in order to evaluate the potential affects of this project on the wildlife and marine habitats that are present within the scope of the project. The draft Environmental Impact Statement should include the results of seagrass surveys within the project boundary areas of Lake Worth Lagoon and the inlet, as well as the results of surveys of hardbottom and coral surveys within the inlet channel and the inlet flares, with special attention paid to the finding of any staghorn coral. We offer our expertise and assistance in developing the protocols for the resource surveys due to their importance in the determination process of the feasibility of the options suggested in this scoping effort.

Summary

Expansion of the Lake Worth inlet channel and turning basin has the potential to adversely affect numerous wildlife and habitat resources of the state of Florida. Many difficult environmental hurdles would need to be overcome for the full extent of this project to come to fruition. We recommend that the USACE and the Port of Palm Beach give great consideration to the natural resources that would be affected

during a project of this nature when assessing the information and determining the feasibility of the expansion options.

We appreciate the opportunity to provide input during the scoping process for the Navigation Feasibility Study for the expansion of the existing channels and turning basin of Lake Worth Inlet (Palm Beach Harbor). Please continue to notify Ron Mezich of all future meetings, information exchanges, and requests for comments regarding this potential project. Should you require additional assistance regarding our comments, please contact him at (850) 922-4330 or at ron.mezich@myfwc.com.

Sincerely,

Mary Ann Poole

Mary Ann Poole, Director
Office of Policy and Stakeholder Coordination

map/rrm
Lake Worth Inlet 1182
ENV 1-3-2
cc: K. Cairns, USFWS, Vero Beach
J. Valade, USFWS, Jacksonville
J. Karasia, NMFS, Miami
P. Davis, PBC-DERM, West Palm Beach

Literature Cited

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. National Oceanic and Atmospheric Administration, Coastal Ocean Program Decision Analysis Series No. 12, NOAA Coastal Ocean Office, Silver Spring, MD. pp. 1-222.

Phillips, R.C., and E.G. Menez. 1988. Seagrassses. Smithsonian Institution Press. Smithsonian Contributions to the Marine Sciences. Number 34, pp. 1-104.

Zieman, J.C. 1982. The ecology of the seagrasses of south Florida: A Community Profile. U.S.Fish and Wildlife Service., Office of Biological Services, Washington, D.C. FWS/OBS-82/25, 158pp. (Human Impacts p.84-90).

Zieman, J.C., and R.T. Zieman. 1989. The ecology of the seagrass meadows of the west coast of Florida: a community profile. U.S. Fish and Wildlife Service, Biological Report 85 (7.25). Washington, D.C.

Florida
Department of Environmental Protection

"More Protection, Less Process"

Project Information	
Project:	FL200712103896C
Comments Due:	01/11/2008
Letter Due:	01/21/2008
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - SCOPING NOTICE - DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR EXPANSION OF LAKE WORTH INLET (PALM BEACH HARBOR) - PALM BEACH COUNTY, FLORIDA.
Keywords:	ACOE - SCOPING - EXPAND LAKE WORTH INLET/PALM BEACH HARBOR - PALM BEACH CO.
CFDA #:	12.107

Agency Comments:

TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL

The proposed study is not in conflict or inconsistent with the Strategic Regional Policy Plan. It furthers Regional Goal 7.1 that calls for a balanced and integrated transportation system.

PALM BEACH -

COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

The FWC has provided a number of comments regarding the potential direct and secondary impacts of: 1) beach sand placement activities during the marine turtle nesting season (March 1 through October 31) on sea turtle nesting, nests and emergent hatchlings; 2) turning basin expansion and subsequent alteration of the warm-water refuge utilized by manatees at the Florida Power & Light Riviera Beach power plant south of the port; 3) dredging, blasting and sediment disposal activities within the turning basin, inlet channel and channel flares on seagrass, corals and hardbottom resources; and 4) Peanut Island dredged material placement on wildlife habitat. FWC staff advises that dredged material considered for disposal at artificial reef sites must meet appropriate criteria for artificial reef construction. Staff also recommends that project managers conduct multiple resource surveys and review historical data to evaluate the potential effects of the project on wildlife and marine habitats. Please refer to the enclosed FWC letter for additional detailed comments and recommendations.

STATE - FLORIDA DEPARTMENT OF STATE

No Comments Received

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The DEP Bureau of Beaches and Coastal Systems notes that a Joint Coastal Permit (JCP) will be required for the proposed project and offers comments on the potential effects of the project on: the existing sand transfer plant at the inlet, Peanut Island and other proposed upland disposal sites, seagrass beds around Peanut Island, the FP&L plant warm-water manatee refuge and current inlet hydraulics. Continued coordination with the DEP Bureau of Beaches and Coastal Systems and FWC to facilitate resolution of project design, sediment management, protected species monitoring and resource impact minimization and mitigation issues is strongly advised. Please contact Ms. Roxane Dow at (850) 922-7852 for further information and assistance.

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

1-12-08

Ms C.L. Brooks
Planning Division
Dept of the Army
P.O Box 4970
Jacksonville, Fl. 32232-0019

Re: Port Channel, Palm Beach County Widening

I am sending our comments regarding the above subject.

Our option is to take no action on the widening!

This widening if implemented, will be the demise of the Manatee. Grass Beds will be impacted along with the reefs. Peanut Island has just been restored, and certainly will be impacted.

We don't need larger vessels here, just because a cargo client is losing business!

Sincerely

Stella Rossi
Coalition for Wilderness Islands
Founded 1982

625 Whispering Pines Rd
Boynton Bch Fl. 33435

PURPOSE: SCOPING MEETING - Environmental Impact Statement for Palm Beach Harbor, Feasibility Study of Navigation Improvements
DATE: 9 January 2008
LOCATION: Riviera Beach, FLORIDA (Port of Palm Beach)

RECEIVED
JAN 22 2008

REID HANSEN
NAME AND TITLE (PLEASE PRINT)

Myself
BUSINESS OR ORGANIZATION YOU REPRESENT

131 DATE PALM DR
MAILING ADDRESS

LAKE PARK, FL 33403
CITY, STATE, ZIP CODE

captainhansen@yahoo.com
EMAIL ADDRESS

Mail Your Comments to:

U.S. Army Corps of Engineers
Attention: PD-EC
P.O. Box 4970
Jacksonville, Florida 32202-4412

YOUR COMMENTS OR NOTES BELOW:

see typed sheet attached

BY JAN 20

PRIVACY ACT STATEMENT

AUTHORITY: 42 USC 4321, 4331-4335
PRINCIPAL PURPOSES: Information on this card is used for organization and conduct of this meeting. It may be added to the mailing list for notification of future meetings on the topic and for addressing correspondence subsequent to the meeting.
ROUTINE USES: This information is a public record and may be disclosed to other Federal or local agencies for governmental purposes as well as to private individuals and organizations under the Freedom of Information Act.
MANDATORY OR VOLUNTARY DISCLOSURE: Completion of this card is voluntary. However, failure to supply the information requested may result in your (or your agency's) omission from further notification regarding participation in the process.

January 18, 2008

When determining whether or not the Port of Palm Beach should be revitalized with widening, deepening, and any expansion in general, there are many considerations that must be taken into account. However, the affect on the greater good, or, the big picture, is most important. It is Lake Worth Inlet itself that has provided the surrounding areas and people with economy, employment, and recreation. People in protest seem to forget this. Ports are highly valued economic hubs for shipping and trade and therefore extremely important to not only local economies, but the state and national economy as well. The opinions of the protesting multi-millionaires on Palm Beach, who are worried about their view and width of their private beaches, have no merit. The greater good for the economy, while taking safety and/or any fragile environmental issues into consideration is of the utmost importance in this matter.

RH

Reid Hansen
Palm Beach Pilots

Florida Department of Environmental Protection

Coral Reef Conservation Program
1277 NE 79th Street Causeway
Miami, Florida 33138

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

RECEIVED
JAN 22 2008

January 18, 2008

Ms. Catherine L. Brooks
U.S. Army Corps of Engineers
Jacksonville District, Planning Division
Environmental Section, P.O. Box 4970
Jacksonville, FL 32207

RE: Notice of Intent to Prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), FL

Dear Ms. Brooks:

The Florida Department of Environmental Protection (FDEP) Coral Reef Conservation Program (CRCP) has reviewed the above-referenced Notice of Intent and the information presented by the U.S. Army Corps of Engineers (USACE) and its contractors at the public and agency scoping meeting held at the Port of Palm Beach on 9 January 2008. The FDEP-CRCP recognizes the importance addressing navigational safety issues and maintaining infrastructure necessary to support the economy of the State of Florida, when conducted in accordance with management practices that are appropriate for the exceptional natural resources in the proposed project area. Our environmental concerns, comments and recommendations are provided below to support the development of a comprehensive Feasibility Study and Draft Environmental Impact Statement by USACE for the proposed Lake Worth Inlet project.

Project Need/Justification

The FDEP-CRCP understands the navigational safety issues associated with shoaling which has reduced the authorized depth of the Lake Worth Inlet channel from 33' to 29', and that a project to conduct channel depth maintenance may be necessary. However, the need for the proposed Lake Worth Inlet expansion project, including widening and deepening of existing channels and turning basins, has not been demonstrated. Adjacent ports, at Port Everglades and the Port of Miami, are currently planning or preparing (respectively) to undergo major expansion projects, and therefore, an additional expansion project for the Port of Palm Beach may not be necessary or appropriate. The need for these three, or even two of these, ports within the 83-mile distance from the Port of Miami to the Port of Palm Beach to accommodate larger, deeper-draft vessels must be evaluated as a fundamental component of the economic analysis prepared for the feasibility study for this proposed project.

The economic analysis must also address the exceptional natural resources in the proposed project area, including their economic value and the economic losses associated with impacts to these natural resources. For, example, a study by Johns et al. (2001) concluded that the reef resources in Palm Beach County generate $699 million dollars in annual sales and income, and support 6300 jobs in the County. The economic value of reef resources in Miami-Dade and Broward counties is even greater. Due to the presence and economic importance of the extensive nearshore and offshore sensitive coral reef communities, endangered species, seagrasses, and other sensitive marine habitats and animals which lie within the footprint and surrounding area of the proposed project, the FDEP-CRCP strongly encourages consideration of alternative port expansion project locations in the feasibility study, where the potential impacts to valuable natural resources and the multi-decadal timescales required for resource recovery are fewer than in southeast Florida. FDEP-CRCP also notes that the intrinsic value of these natural resources to the citizens and businesses of Palm Beach County is exceptionally high, as demonstrated by local community members who voiced opposition to the proposed project during the public comment period of the recent scoping meeting.

Offshore Hardbottom and Coral Reefs

The proposed Lake Worth Inlet channel and flare expansion would directly impact hardbottom and coral reef communities. As cited above, in addition to supporting a diverse assortment of marine life, hardbottom communities and coral reefs drive an important economic engine in southeast Florida. These reefs support a thriving and economically indispensable tourism industry, as well as recreational and commercial fisheries, and provide shoreline protection. Dredging activities pose significant risks and may cause irreversible harm to hardbottom communities from potential increased turbidity and direct impacts from dredging equipment. Mitigation using artificial reefs can never fully replace a natural reef community. Further, the cost and challenges of providing mitigation at scales which attempt to compensate for the loss of ecological services following project construction may be greater than the economic benefits derived from project construction.

Nearshore Hardbottom and Seagrass Communities

The ecological relationship between seagrasses and coral reefs is inseparable and irreplaceable. Impacts to either community carry severe repercussions to both, including loss of critical habitat, fisheries stock, and primary productivity. Hardbottom and seagrass communities provide important habitat to numerous adult and juvenile fishes and foraging and resting grounds for sea turtles. Of particular note, the Lake Worth Inlet is known to be one of the largest of the few remaining snook spawning sites on the Atlantic Coast. Burial or dredging of nearshore hardbottom and seagrass communities will result in loss of habitat, biodiversity, foraging grounds, and natural shoreline stabilization and protection. Mitigation for hardbottom and seagrass communities cannot avoid or replace the associated organismal and biodiversity losses.

The proposed channel and turning basin expansion and anticipated increase in subsequent beach nourishment (due to increased post-project construction erosion) will directly and permanently impact these important nearshore habitats through direct habitat destruction (i.e. removal by dredging), and burial of the hardbottom by smothering the associated algal, sponge, coral and worm reef communities from sand placement and offshore sand migration after placement.

Nearshore and Offshore Softbottom/ Sandy Habitat

It is also important to note that sandy and softbottom seafloors, bays and lagoons provide an important, unique, but often overlooked habitat for numerous meiofauna –organisms that live and move among the grains of sand – as well as other marine fauna which bury themselves (e.g. flat fishes, stingrays), live in burrows in the sand (e.g. burrowing anemones, molluscs), or forage for food in softbottoms (numerous fishes, invertebrates and marine mammals). Blasting and dredging activities and offshore migration of sand placed on the beach can displace and/or destroy many of these fauna, and should be avoided or minimized. Destruction of this habitat may cause significant ecological repercussions.

Study Design

At the scoping meeting, USACE representatives stated that funding has been received, and the firm PBS&J has been contracted, by USACE to comprehensively survey the aquatic resources which will be impacted by the proposed project. However, the sampling design presented by Don Deis of PBS&J is inadequate to address the (1) extent and nature of potential project impacts, (2) options for minimization of impacts, and (3) the amount and appropriate mitigation required to compensate for resources destroyed by the construction of the proposed project, should it be approved. Of particular concern, we note that the surveys of the potential project impact areas A1 and A2, as well as the channel floor (project area B), and channel walls (project areas B1 & B2) are limited to towed video sampling. This methodology by itself is insufficient to address questions which must be answered by the survey. Diver surveys, both inside and adjacent to the proposed impact areas, incorporating an appropriate suite of sampling methodologies and replication must be performed to provide the ecological data necessary to fully evaluate the proposed environmental impacts associated with this project. FDEP-CRCP would be pleased to work with USACE and PBS&J to develop a comprehensive survey protocol, and would appreciate the opportunity to review and recommend specific modifications to the survey protocol in advance of the actual survey period.

For example, FDEP-CRCP encourages USACE and PBS&J to incorporate an active and directed *Acropora* spp. (Elkhorn and Staghorn coral) search into its survey protocol. We define an active search as surveying an area while specifically seeking to locate and enumerate target species. In light of the recent designation of these two coral species as Threatened under the U.S. Endangered Species Act, and the documented evidence that reefs throughout southeast Florida historically and currently provide suitable habitat for these threatened species, it would be a

gross oversight to exclude an active search for these species in the study design and report. Other factors, such as the classification of stony coral, octocorals and barrel sponge size classes also need to be considered.

The total potential area of impact is not clear. The total areas should include identification and percent cover of marine resources (in hectares and acres) defined as "live cover" (i.e. scleractinians, hydrocorals, octocorals, sponges, turf algae and macroalgae) including the natural areas of sand and uncolonized hardbottom which normally occur on reefs in southeast Florida. These areas need to be surveyed and mapped in detail to determine the extent of marine resources they include, and the total area of potential impact should include and evaluation of these areas. The study should also provide information on the impact to the nearshore and offshore softbottom or sandy habitat. Finally, the total anticipated area of both direct impacts and indirect impacts from the expansion of the Port of Palm Beach must be clearly defined.

Beach Erosion

FDEP-CRCP has concerns regarding the beach erosion and associated consequences that may result from construction of this project, including but not limited to:

- Impacts to nearshore and hardbottom resources.
- Sediment and turbidity associated with project construction methods (e.g. an inadequate buffer zone of 150ft has been proposed for this project).
- No accounting for potential impacts beyond the buffer zone.
- Subsequent need to re-nourish affected beaches which will exacerbate impacts to nearshore and hardbottom resources.
- Lack of suitable beach nourishment sand sources compatible in both grain size and composition.

In addition to the concerns addressed above, recreational activities including swimming, snorkeling, diving, and fishing may also be adversely affected by the proposed Lake Worth Inlet expansion project, and anticipated subsequent increased frequency of beach nourishment projects, due to increased turbidity and loss of habitat and biodiversity. Increased environmental pollution, road traffic, development, and infrastructure necessary to support increased maritime activity and port commerce must be considered and will impact the surrounding residential communities, as well as the greater south Florida area. Construction of this project may result in substantial, irreplaceable, and potentially unnecessary losses to the State of Florida.

The FDEP Coral Reef Conservation Program recommends that alternative ports in the State of Florida be thoroughly investigated for their potential to accommodate deeper draft vessels and increased maritime activity, in lieu of the ports in southeast Florida (e.g. Port of Palm Beach and Port Everglades). The extent of potential marine resource and associated environmental impacts from newly proposed channel deepening and widening (if needed) at alternative Ports should be compared to the proposed resource impacts anticipated to result from port expansion projects in

southeast Florida. The FDEP-CRCP requests full consideration of all potential methods and alternatives which address the stated No Action alternative for this project. As further information about this project is made available by USACE, we anticipate providing additional comments and recommendations.

Please copy me on any further activities and communications regarding this proposed project at Chantal.Collier@dep.state.fl.us.

Sincerely,

Chantal Collier
Coral Reef Program Manager
Office of Coastal and Aquatic Managed Areas
Florida Department of Environmental Protection

cc via e-mail:
Stephanie Bailenson, FDEP-CAMA
Dan Bates, Palm Beach County ERM
Marie Burns, USACE
Paul Davis, Palm Beach County ERM
Lisa Gregg, FWC
Jocelyn Karazsia, NOAA-NMFS
Vladimir Kosmynin, FDEP-BBCS
Audra Livergood, NOAA-NMFS
Stephen MacLeod, FDEP-BBCS
Ellen McCarron, FDEP-CAMA
Erin McDevitt, FWC
Janet Phipps, Palm Beach County ERM
Joanna Walczak, FDEP-CRCP

Literature Cited:
Johns GM, Leeworthy VR, Bell FW, Bonn MA (2001) Socioeconomic Study of Reefs in Southeast Florida. Final Report. Hazen and Sawyer Environmental Engineers & Scientists

Powell

Department of Environmental Resources Management
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www.co.palm-beach.fl.us/erm

Palm Beach County Board of County Commissioners

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County Administrator
Robert Weisman

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January 22, 2008

Ms. Marie Burns, Acting Chief
Planning Division (PD-EC)
US Army Corps of Engineers
PO Box 4970
Jacksonville, Florida 32202-4412

SUBJECT: PALM BEACH HARBOR EIS/FEASIBILITY STUDY

Dear Ms. Burns:

The Department of Environmental Resources Management (ERM) has conducted a preliminary review of the issues associated with the proposed expansion of Palm Beach Harbor and Lake Worth Inlet. While the Port has been working closely with Palm Beach County to improve the management of the inlet and Peanut Island, the proposed project will have major environmental impacts that need to be addressed in the Feasibility Study and Environmental Impact Statement. Palm Beach County has agreed to support this study to get a better understanding of project alternatives and their impacts.

PROPOSED WORK

The study will evaluate options for widening and deepening the Lake Worth Inlet and expanding Palm Beach Harbor to improve navigation safety, improve port efficiency and to accommodate larger ships. Potential expansion alternatives include no action, channel deepening, channel widening, addition of channel flares offshore, and expansion of the turning basin to the north and south as outlined on the enclosed map.

HABITAT ISSUES

- One of the primary concerns is that dredging will destroy valuable seagrass, hardbottom and softbottom resources. Depending on the extent of dredging proposed, the potential exists for negative impacts to offshore reefs and the artificial reefs within the channel flare footprint (Study Areas A1 and A2), hardbottom communities on the inlet channel walls (Study Area B), hardbottom and seagrass communities east of Peanut Island (Study Area C), and seagrass communities (Study Areas D, F and G). Additionally, substantial amounts of shallow, productive softbottom supporting a diverse invertebrate community may be eliminated in all study areas.
- Surveys of these habitats that have been performed by ERM are not sufficient to address potential impacts from the proposed work. Detailed resource surveys will need to be conducted to adequately characterize each study area.
- While some of the resources that will be affected have been created by man (artificial reefs, channel walls, hardbottom rubble), these communities have been established for decades. They have been colonized by hard corals, soft corals, and sponges, support recreationally and commercially species (including lobsters), and provide important environmental functions that need to be recognized in the study.
- The seagrass beds within the project limits are some of the most diverse in the county with at least 5 species documented to occur. These beds have additional

significance given the proximity to the manatee aggregation site at the Florida Power and Light (FPL) warm-water discharge.

- Mitigation for seagrass impacts at the scale being considered will have a poor chance of success in Lake Worth Lagoon. The most likely method to mitigate for any seagrass impacts would be to fill large portions of the Lake Worth Lagoon to raise the bottom to the photic zone. The only location near the inlet where mitigation at this scale could be constructed is located about 1 ½ miles south of the inlet. It is unlikely a sufficiently large mitigation project could be constructed here since it is expected to have additional significant impacts to nearby seagrasses, benthic invertebrates, navigation, and flushing of the lagoon. Further, based upon their limited distribution in the lagoon and their light and nutrient requirements, it is highly unlikely that manatee grass (*Syringodium filiforme*) or turtle grass (*Thalassia testudinum*) would grow at this location. For these reasons, every effort should be made to significantly reduce or eliminate seagrass impacts.
- The proposed dredging is in direct conflict with the Lake Worth Lagoon Management Plan which lists seagrass preservation as one of its priority objectives, and the Coastal Management Element (CME) of the Palm Beach County Comprehensive Land Use Plan, which has a goal of preserving and protecting coastal resources.
- Impacts to water quality and the potential for increased flushing in the Lake Worth Lagoon need to be evaluated. While it is likely that increased oceanic water in the lagoon will provide benefits from improved clarity, there will be changes in lagoon salinity that may affect a number of other species that need to be evaluated. It is recommended that predicted changes in salinity in the lagoon be evaluated using an existing model (Zarillo, 2003). Additionally, the potential for increased flushing of nutrient rich lagoon waters onto offshore reefs needs to be considered.

LISTED SPECIES ISSUES

- Manatees are the listed species most affected by this project which is located where the majority of manatees are found in the county. The FPL discharge provides an important warm-water refuge for hundreds of manatees in the winter. Alterations to the basin near the discharge are likely to affect manatees and will be one of the most challenging impacts to offset.
- Sea turtles utilize a number of habitats in the project area including the beaches, reefs, seagrass beds, and inlet jetties. Recent studies conducted by ERM have documented juvenile green turtles utilizing seagrass beds 1 ½ miles north of Palm Beach Inlet and they may be using the beds south of the inlet. Juvenile green and hawksbill turtles utilize nearshore reefs near the inlet. Juvenile green turtles have also been killed during maintenance dredging of the inlet indicating that they may be foraging on algae found on the rocks (similar to those observed in the Trident submarine basin in Port Canaveral and Brazos Santiago Pass in Texas). Four species of sea turtles (loggerhead, green, leatherback, and hawksbill) utilize the nesting beaches adjacent to the inlet and five species (loggerhead, green, leatherback, hawksbill, and Kemp's ridley) occur in the ocean near the inlet.
- Lighting at the Port is currently impacting sea turtles. High mast lighting that has been added during recent Port renovations that increased illumination in the coastal area, has been implicated in sea turtle hatchling disorientation incidents on Palm

Beach Shores, and probably contributes to many other disorientations in the area. Increased cargo traffic will likely mean increased coastal lighting impacts in the cargo handling area. Port lighting should be evaluated during the EIS process to determine methods for achieving sufficient illumination for port operations while minimizing the amount of light trespass off the property.

- Johnson's seagrass (*Halophila johnsonii*) is one of the most commonly occurring seagrasses in Lake Worth Lagoon. Impacts from dredging and sedimentation, as well as alterations to salinity and water clarity will impact this threatened species.
- Whales, including humpback and right whale, have infrequently been observed in the inlet and in adjacent waters.
- The Lake Worth Inlet is one of the most important areas for several species of the Atlantic population of snook (*Centropomus* spp), a species of special concern. Thousands of snook utilize the inlet and nearby structure during summer spawning aggregations and return to this location every year.
- Construction will have to be timed to minimize impacts in the winter to manatees and during the summer to nesting sea turtles and spawning snook. Another consideration in determining timing of construction is that offshore currents tend to be stronger in summer which would increase flushing, dilution and transportation of a turbidity plume.
- The public notice stated that blasting may not be necessary for this project. However, based upon our understanding of the geology, previous dredging at this inlet, and recent dredging in the Port of Miami, we expect that there will strong economic incentive to use blasting. Any consideration for blasting must take into account the impacts to listed species and fishes.

INLET AND BEACH MANAGEMENT ISSUES

- The Lake Worth Inlet is already the primary cause of erosion of downdrift beaches. Any widening and deepening of the inlet and the nearshore will alter the wave climate and littoral sand transport which could increase the loss of sand to the downdrift beaches. Any impacts will require an increase in the amount of sand bypassing and beach nourishment (which can have negative impacts) to compensate. The costs to mitigate for downdrift beach impacts must be clearly and fully defined.
- All beach compatible sand must be placed on the beach. There may be options for disposing of non-beach compatible material in existing dredge holes in Lake Worth Lagoon. Use of the offshore spoil disposal area should be only as a last resort since there are important deep reef habitats downstream from the disposal area. Geotechnical work should be performed as part of this study to adequately characterize the sediments and determine the quantities that will be available for disposal at the different sites.

PORT OPERATIONS

- Expansion of the inlet and turning basin to accommodate larger ships will have secondary impacts that should be addressed in the EIS.
- Concerns have been raised recently about potential damage associated with the existing anchorage area and a study has been initiated to evaluate options for

revising the anchorage area. This issue should be addressed in the EIS since the ships that would be using the anchorage are usually associated with the Port.

- ERM currently uses the lot west of Study Area G as the artificial reef construction staging area. In the event the Port acquires this site for expansion. ERM would like to receive assurances that there will be provisions for such a staging area in future Port plans.

RECREATION ISSUES

- NEPA requires that impacts to recreation be evaluated. The inlet vicinity is heavily used by boaters, fisherman, snorkelers, divers, surfers, and the general public.
- Safety issues will need to be evaluated since larger ships operating close to a popular park (Peanut Island), amidst large numbers of recreational and commercial small craft, and near popular dive sites is likely to increase the chance of accidents.
- Dredging of the channel flare (Study Area A) will affect wave generation that may alter local surf conditions. Given the quality and popularity of the Reef Road and Pump House surf breaks, it is recommended that potential changes to the surf be evaluated.
- Erosion of the southeast corner of Peanut Island has necessitated increasing amounts of armoring to protect recreational amenities. Dredging the channel deeper and closer to the island will allow for increased wave and current energy to alter the shoreline and threaten additional amenities. Those impacts and costs should be evaluated.

BENEFIT/COST

- A key determinant of feasibility is the benefit/cost ratio of each alternative. It is requested that, in addition to construction costs, the true costs to all the resources be included in the analysis. This would include costs for mitigation, monitoring, increased beach and inlet management, and loss of recreation resources.

In summary, a thorough study is necessary to adequately evaluate alternatives. Given the extent of potential impacts, it does not appear that it is possible to construct all components of the project without significant environmental effect. The challenge will be to develop a plan that meets some of the Port's goals while minimizing impacts.

Thank you for the opportunity to provide comments. Please call me at 561-233-2400 or Mr. Paul Davis at 561-233-2509 if you have any questions.

Sincerely,

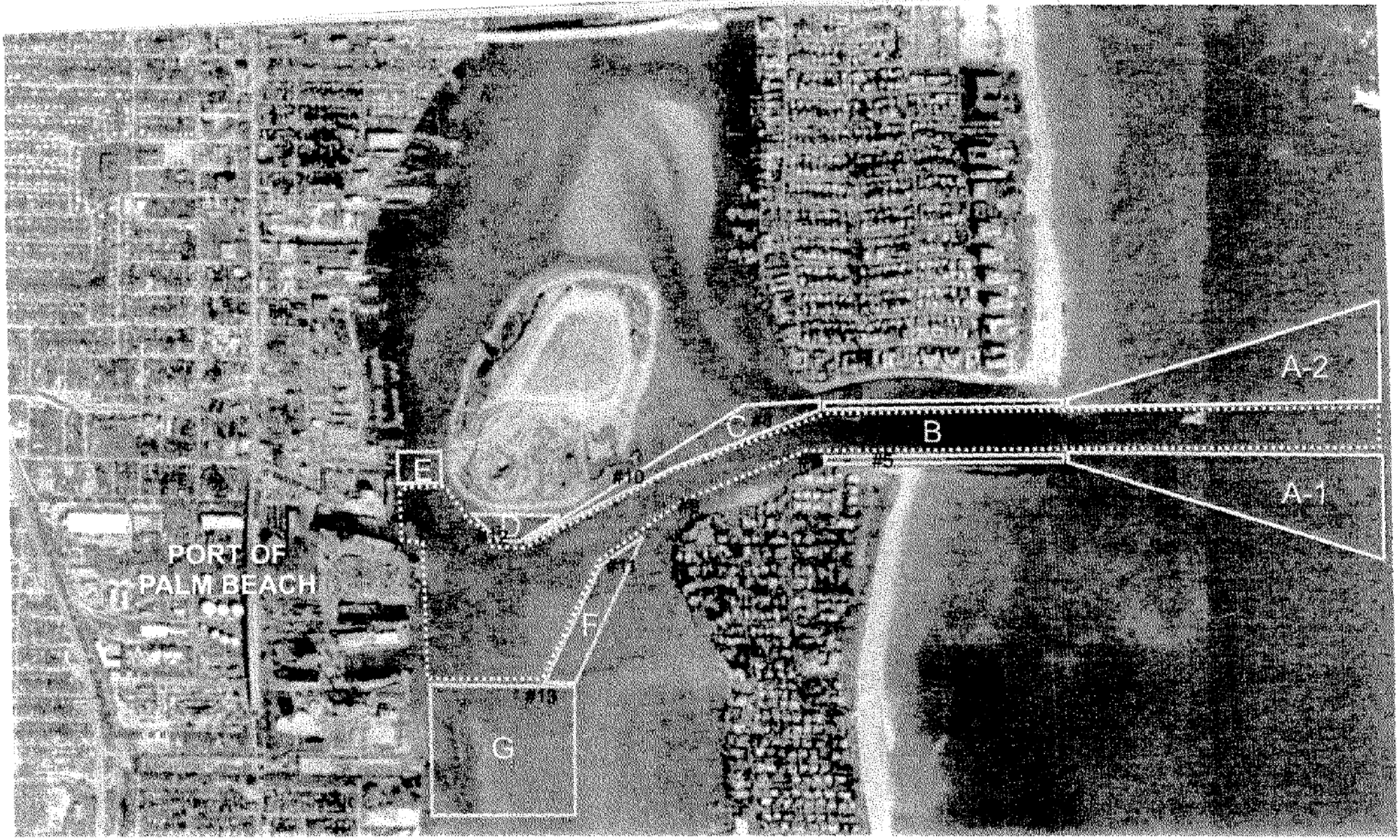
Richard E. Walesky

Richard E. Walesky, Director
Environmental Resources Management

REW:PD:dab

Enclosure

c: (w/ enclosure):
Robert Weisman, County Administrator
Members of the PBC Artificial Reef and Environmental Enhancement Committee
Lori Baer, Director, Port of Palm Beach
Peter Elwell, Town Manager, Town of Palm Beach
Cynthia Lindscoog, Town Administrator, Town of Palm Beach Shores
William Wilkins, City Manager, Riviera Beach
Edward Mitchell, City Administrator, West Palm Beach
Dennis Eshleman, Director, PBC Parks and Recreation
David Roach, Executive Director, FIND



LEGEND

"- - -" Federal Harbor Project Potential Improvement Areas

Note: Improvement areas are general study areas only; extensive analysis is required prior to refinement and selection of any expansion alternative.

A-1 - South Channel Flare
A-2 - North Channel Flare
B - Widener inside jetties
C - Widener
D - Peanut Island Widener
E - North Basin Widener
F - Turning Basin Eastern Widener
G - Turning Basin Southern Expansion
1- Channel Marker Number

Palm Beach Harbor/Lake Worth Inlet
Navigation Feasibility Study
Study Areas for Potential Improvements
Port of Palm Beach District

Source: Google Earth; The Four Gates Company, 2017

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 23, 2008

Ms. Catherine L. Brooks
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 - Scoping Notice Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor) - Palm Beach County, Florida.
SAI # FL200712103896C

Dear Ms. Brooks:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, 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, has coordinated a review of the above public notice.

The Florida Department of Environmental Protection's (DEP) Bureau of Beaches and Coastal Systems notes that a Joint Coastal Permit (JCP) will be required for the proposed project and offers the following comments:

1) Please be advised that there is an existing sand transfer plant at the inlet. In 1996, the pipe was drilled approximately 15 feet under the existing channel. The costs of redrilling the pipe should be included in the total project costs if the proposed entrance channel depth approaches this pipeline depth.

2) The DEP will consider the effects of dredged material disposal and management on Peanut Island and other upland sites. Any potential discharges from the disposal site (i.e., return water) must be reviewed, along with any construction to increase the capacity of the containment dikes. (If no dike construction is necessary, an engineer's certification of containment dike integrity will still be required.) Impacts of disposal operations on water-dependent bird species must be considered, especially if conducted during nesting season.

3) Continuous seagrass beds border the south turning basin, and seagrasses have also been observed around the south end of Peanut Island. Any expansion within the areas labeled C, D, F and G on Figure 1 of the scoping notice will likely require seagrass mitigation.

4) A Florida Power & Light (FP&L) power plant exists south of the port. Expansion to the south would bring larger ships closer to this warm-water manatee refuge, increasing the risk of primary and secondary impacts.

5) Neither the Lake Worth Inlet Management Plan study by Applied Technology and Management, Inc. (April 1995) nor prior studies by the Jacksonville District Corps of Engineers have obtained any recent inlet hydraulics data, so DEP does not have a complete understanding of this inlet's hydraulics. Changes to the federal navigation project through this inlet propose channel deepening and widening that would affect the inlet's hydraulics. Water quality effects, tidal prismatic modification, and changes to interior waters circulation are among the physical environmental reasons to develop an understanding of the inlet's hydraulics. Physical changes to the inlet's hydraulics may also have biological effects.

   The effect of channel deepening and widening on the sand transfer plant's discharge line and pumping performance should also be evaluated. Although the inlet trap northeast of the inlet should entrap most of the sediment, it is too early to ascertain its success or calculate the amount of sediment that will still be entrapped by the inlet channel. At most other inlets in Florida, channel deepening would have a significant impact on natural sand bypassing.

   DEP staff requests the collection of current inlet hydraulics data to utilize in the evaluation of any proposed modifications.

Continued coordination with the DEP Bureau of Beaches and Coastal Systems and Florida Fish and Wildlife Conservation Commission to facilitate resolution of project design, sediment management, protected species monitoring and resource impact minimization and mitigation issues is strongly advised. Please contact Ms. Roxane Dow at (850) 922-7852 for further information and assistance.

The Florida Fish and Wildlife Conservation Commission (FWC) has provided a number of comments regarding the potential direct and secondary impacts of:

1) Beach sand placement activities during the marine turtle nesting season (March 1 through October 31) on sea turtle nesting, nests and emergent hatchlings;
2) Turning basin expansion and subsequent alteration of the warm-water refuge utilized by manatees at the FP&L Riviera Beach power plant south of the port;

3) Dredging, blasting and sediment disposal activities within the turning basin, inlet channel and channel flares on seagrasses, corals and hardbottom resources; and
4) Peanut Island dredged material placement on wildlife habitat.

FWC staff advises that dredged material considered for disposal at artificial reef sites must meet appropriate criteria for artificial reef construction. Staff also recommends that project managers conduct multiple resource surveys and review historical data to evaluate the potential effects of the project on wildlife and marine habitats. Please refer to the enclosed FWC letter for additional detailed comments and recommendations.

Based on the information contained in the scoping notice and the 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 our reviewing agencies must be addressed, however, 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 review of the project's consistency with the FCMP will be conducted 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

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: Roxane Dow, DEP, BBCS
Mary Ann Poole, FWC

Project Information	
Project:	FL200712103896C
Comments Due:	01/11/2008
Letter Due:	01/21/2008
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - SCOPING NOTICE - DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR EXPANSION OF LAKE WORTH INLET (PALM BEACH HARBOR) - PALM BEACH COUNTY, FLORIDA.
Keywords:	ACOE - SCOPING - EXPAND LAKE WORTH INLET/PALM BEACH HARBOR - PALM BEACH CO.
CFDA #:	12.107

Agency Comments:

TREASURE COAST RPC - TREASURE COAST REGIONAL PLANNING COUNCIL

The proposed study is not in conflict or inconsistent with the Strategic Regional Policy Plan. It furthers Regional Goal 7.1 that calls for a balanced and integrated transportation system.

PALM BEACH -

COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

The FWC has provided a number of comments regarding the potential direct and secondary impacts of: 1) beach sand placement activities during the marine turtle nesting season (March 1 through October 31) on sea turtle nesting, nests and emergent hatchlings; 2) turning basin expansion and subsequent alteration of the warm-water refuge utilized by manatees at the Florida Power & Light Riviera Beach power plant south of the port; 3) dredging, blasting and sediment disposal activities within the turning basin, inlet channel and channel flares on seagrass, corals and hardbottom resources; and 4) Peanut Island dredged material placement on wildlife habitat. FWC staff advises that dredged material considered for disposal at artificial reef sites must meet appropriate criteria for artificial reef construction. Staff also recommends that project managers conduct multiple resource surveys and review historical data to evaluate the potential effects of the project on wildlife and marine habitats. Please refer to the enclosed FWC letter for additional detailed comments and recommendations.

STATE - FLORIDA DEPARTMENT OF STATE

No Comments Received

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The DEP Bureau of Beaches and Coastal Systems notes that a Joint Coastal Permit (JCP) will be required for the proposed project and offers comments on the potential effects of the project on: the existing sand transfer plant at the inlet, Peanut Island and other proposed upland disposal sites, seagrass beds around Peanut Island, the FP&L plant warm-water manatee refuge and current inlet hydraulics. Continued coordination with the DEP Bureau of Beaches and Coastal Systems and FWC to facilitate resolution of project design, sediment management, protected species monitoring and resource impact minimization and mitigation issues is strongly advised. Please contact Ms. Roxane Dow at (850) 922-7852 for further information and assistance.

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

Florida Fish and Wildlife Conservation Commission

Commissioners
Rodney Barreto
Chair
Miami

Brian S. Yablonski
Vice-Chair
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Kathy Barco
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Kenneth D. Haddad
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Deputy Chief of Staff

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Mary Ann Poole
Director

(850) 410-5272
(850) 922-5679 FAX

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

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32399-1600
Voice: (850) 488-4676

Hearing/speech impaired:
(800) 955-8771 (T)
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MyFWC.com

January 10, 2008

RECEIVED
JAN 14 2008
CIP / CLGA

Ms. Lauren Milligan
Florida Department of Environmental Protection
Florida State Clearinghouse
3900 Commonwealth Boulevard, MS-47
Tallahassee, FL 32399-3000

Re: Palm Beach County, SAI #FL200712103896C, Notice of Intent to prepare a Draft Environmental Impact Statement for expansion of Lake Worth Inlet (Palm Beach Harbor) including widening and deepening of the existing channels and turning basin

Dear Ms. Milligan:

The Florida Fish and Wildlife Conservation Commission's (FWC) Aquatic Habitat Conservation and Restoration Section has coordinated a preliminary agency review of the potential wildlife and wildlife habitat issues associated with the expansion of Lake Worth Inlet (Palm Beach Harbor), Florida. This letter outlines the anticipated concerns and comments related to the feasibility study and proposed Draft Environmental Impact Statement.

Background

The U.S. Army Corps of Engineers (USACE) is performing a feasibility study for the expansion of Lake Worth Inlet (Palm Beach Harbor). The expansion alternatives being reviewed include no action, creation of channel flares, channel deepening and widening, and turning basin expansion. Options for the disposal of dredged material include Peanut Island, disposal in the Palm Beach Harbor Ocean Dredged Material Disposal Site, beach placement, disposal of suitable rock at existing artificial reef sites, and any other viable disposal options that may become available. The USACE intends to prepare a Draft Environmental Impact Statement for this project. The Port of Palm Beach District is the cooperating agency and non-federal sponsor for this project and will provide information and assistance on the resource assessment and mitigation measures and alternatives.

Wildlife

Marine Turtles: The coastal beaches both north and south of Lake Worth Inlet provide nesting habitat for the loggerhead (*Caretta caretta* - threatened), leatherback (*Dermochelys coriacea* - endangered), and the green sea turtle (*Chelonia mydas* - endangered). Construction activities associated with sand placement on these beaches during the marine turtle nesting season (March 1 through October 31) could adversely affect nesting turtles, incubating nests, and emergent hatchlings. The compatibility of sand placed on the nesting beach may also adversely affect the ability of nesting females to construct viable nests and the incubation environment necessary for successful development and escape of marine turtle hatchlings.

Nearshore hardbottom communities and artificial reefs provide foraging, resting and juvenile developmental habitat that could be adversely affected by the expansion of channels associated with this project. Blasting to remove limestone during deepening or widening of channels could be lethal to marine turtles and manatees if it occurs relatively close to individual animals.

Manatees: The Florida Power & Light Riviera Beach power plant located immediately south of the port provides an important winter warm-water refuge for the Florida manatee (*Trichechus manatus latirostris* - endangered). During winter cold fronts, over 400 manatees have been documented using this warm-water refuge. The desired turning basin expansion would encompass the area adjoining this warm-water habitat. Construction activities may directly affect manatees using this site if work is conducted during the cold season (November 15 through March 31), or indirectly by creating a deterrence to the use of this important habitat.

Secondary adverse affects could include altering the nature of the warm-water refuge. Substantially deepening the bathymetry adjacent to the warm-water refuge could result in reduction of warm-water habitat due to an increase of the mixing between the cooler water from the expanded turning basin with the thermal outfall of the power plant. Expansion of the turning basin is also expected to affect seagrass resources that provide forage for manatees. Increased shipping traffic may also increase the risk to manatees due to its proximity to the warm-water refuge and to the travel corridors used to access foraging areas located north of the port.

Habitat

Corals and Hardbottom: Hard corals may be found within the inlet channel and the area marked as "south channel flare" and "north channel flare" on the map provided by the USACE labeled "Study Areas for Potential Improvements (Widening and Deepening)." In addition, the nearshore areas that may be affected by this project fall within the range of staghorn coral (*Acropora cervicornis*), which was recently listed federally as a threatened species. Other hardbottom resources occur on the walls of the existing channel and potentially in the nearshore channel expansion areas. The primary benthic resources expected to be found within the prospective expansion areas include live bottom (soft corals and sponges), solution holes, limestone ledges, and their associated communities.

Potential adverse effects to these benthic resources could result due to dredging, blasting, and sediment disposal. Expansion of the offshore disposal area may also affect hardbottom resources, which will need to be considered if this option is explored.

Seagrass: Six species of seagrass have been documented in Lake Worth Lagoon and all could be affected by the dredging necessary to expand the inlet channel and turning basin. Seagrass species found in Lake Worth Lagoon include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), shoal grass (*Halodule wrightii*), star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*) and the threatened species Johnson's seagrass (*Halophila johnsonii*). Seagrasses provide important ecological functions to estuarine and marine coastal systems. A wide range

of organisms are directly or indirectly dependent upon seagrasses for food and habitat (Zieman and Zieman1989), including several federally and state-listed endangered species such as green sea turtle and Florida manatee.

Seagrasses, coral, and hardbottom also provide essential fisheries habitat by creating a physically stable refuge and nursery ground for numerous commercially and recreationally viable fish and invertebrates (Zieman 1982, Phillips and Meñez 1988, Fonseca et al. 1988).

Artificial Reefs

Any dredged material that would be considered for disposal at an artificial reef site will need to meet appropriate criteria for artificial reef construction depending upon the proposed deployment location and material types. No silt, sand, clay (of any type), or rock boulders less than 150 pounds each will be allowed to be deployed in the artificial reef site. Ideally, the minimum acceptable weight of each individual piece of rock proposed for artificial reef deployment should weigh at least 500 pounds. Close coordination with the FWC Artificial Reef Program (Attn: Jon Dodrill, FWC-Division of Marine Fisheries Management) and Palm Beach County Artificial Reef Coordinator (Dr. Janet Phipps) will be required if artificial reefing is considered as a disposal option.

Peanut Island

Peanut Island contains a large habitat enhancement project that includes a 7.1-acre maritime hammock, 3 acres of mangroves, 1.5 acres of tidal channels and ponds, 3 acres of shallow-water lagoons and 1.3 acres of shallow-water reef. All of these habitat features provide habitat for a variety of wildlife including shorebirds, fish, crustaceans, and mollusks. Placing spoil on the island and widening the channel in segments C, D and E could adversely affect these habitats.

Resource Surveys

We recommend that multiple resource surveys be conducted as well as a review of historical data in order to evaluate the potential affects of this project on the wildlife and marine habitats that are present within the scope of the project. The draft Environmental Impact Statement should include the results of seagrass surveys within the project boundary areas of Lake Worth Lagoon and the inlet, as well as the results of surveys of hardbottom and coral surveys within the inlet channel and the inlet flares, with special attention paid to the finding of any staghorn coral. We offer our expertise and assistance in developing the protocols for the resource surveys due to their importance in the determination process of the feasibility of the options suggested in this scoping effort.

Summary

Expansion of the Lake Worth inlet channel and turning basin has the potential to adversely affect numerous wildlife and habitat resources of the state of Florida. Many difficult environmental hurdles would need to be overcome for the full extent of this project to come to fruition. We recommend that the USACE and the Port of Palm Beach give great consideration to the natural resources that would be affected

December 6, 2007

Planning Division
Environmental Branch

To Whom It May Concern:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is gathering information to define issues and concerns that may be associated with expansion of Lake Worth Inlet (Palm Beach Harbor), Florida

A Feasibility Study is being undertaken to determine if the authorized project should be modified. During the feasibility study, environmental considerations will be addressed in an Environmental Impact Statement. Alternatives that are being considered include no action, widening and deepening of existing channels and turning basin modifications, or a combination of alternatives (see enclosed Figure).

Significant issues that are anticipated include concern for nearshore and offshore hard bottom communities, fisheries, threatened and endangered species, sea grasses, marine mammals, migratory birds, and water quality. For additional information, see the enclosed Notice of Intent to prepare a Draft Environmental Impact Statement.

Preliminary geotechnical reports indicate that blasting may not be necessary to achieve the proposed inlet expansion. Disposal options being considered include Peanut Island (with possible off-load to another use or location), ocean disposal in the Palm Beach Harbor Ocean Dredged Material Disposal Site (which may require expansion or modification), beach placement (if sufficient beach compatible material), artificial reef (if sufficient suitable rock), and any other disposal or beneficial use options that may become available.

Letters of comment or inquiry should be submitted within 45 days from the date of this letter to the letterhead address, attention of Ms. C. L. Brooks, Planning Division. Your concerns or comments may also be communicated in one of several public and agency scoping meetings that will be conducted on this project. The first public and agency scoping meeting will be held January 9, 2008, at 3:00 p.m., Port of Palm Beach, One East 11th Street, Riviera Beach, Florida, 33404,. Additional information and project updates can be obtained from website: http://www.portofpalmbeach.com/feasibility_study.htm

Sincerely,

Marie G. Burns
Acting Chief, Planning Division

Enclosures

Figure 2. Port of Palm Beach Proposed Expansion Alternatives

BILLING CODE: 3710-AJ

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent to Prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), FL

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

COOPERATING AGENCY: Port of Palm Beach District, Riviera Beach, Florida

ACTION: Notice of intent.

SUMMARY: The Jacksonville District, U.S. Army Corps (Corps) of Engineers intends to prepare a Draft Environmental Impact Statement (EIS) for expansion, including widening and deepening of existing channels and turning basins in Lake Worth Inlet (Palm Beach Harbor). The project is a cooperative effort between the U.S. Army Corps of Engineers (lead Federal agency) and Port of Palm Beach District (non-Federal sponsor and cooperating agency).

ADDRESSES: Ms. Catherine L. Brooks, U.S. Army Corps of Engineers, Jacksonville District, Planning Division, Environmental Section, P.O. Box 4970, Jacksonville, FL 32207.

FOR FURTHER INFORMATION CONTACT: Catherine L. Brooks at (904) 232-2130.

SUPPLEMENTARY INFORMATION: Authority for the proposed study was received under the House Resolution of June 25, 1998. An expedited Reconnaissance Report completed in 2001 by the Corps, concluded based on preliminary findings, there was a

federal interest in pursuing harbor improvements.

Alternatives: The project's expansion alternatives include no action, creation of channel flares, wideners, deepening, turning basin, or a combination of the considered alternatives. Alternatives being considered for disposal of dredged material include Peanut Island (with possible off-load to another use or location), ocean disposal in the Palm Harbor Ocean Dredged Material Disposal Site (which may require expansion or modification), beach placement (if there is sufficient beach compatible material), artificial reef (if there is sufficient suitable rock) and any other disposal or beneficial use options that may become available.

Issues: The EIS will consider impacts on coral reefs and other hardbottom communities, sea grasses, protected species, shore impacts, health and safety, water quality, aesthetics and recreation, fish and wildlife resources, cultural resources, energy conservation, socio-economic resources, navigation, and other impacts identified through scoping, public involvement and interagency coordination.

Scoping: The scoping process will involve Federal, State, County and municipal agencies and other interested persons and organizations. A public and agency scoping meeting will be held on January 9, 2008, at 3:00 p.m. at the Port of Palm Beach, One East 11th Street, Riviera Beach, FL, 33404.

Public Involvement: We invite the participation of affected Federal, State and local agencies, affected Native-American Tribes, and other interested private organizations and individuals. In addition to the agency and public scoping meeting on January 9, 2008, and receipt of written comments at various stages of the Feasibility Study, there will be a public meeting on the Draft Environmental Impact Statement following its preparation. The date,

time, and location will be announced.

Coordination: The proposed action is being coordinated with the U.S. Fish and Wildlife Service (FWS) and NOAA-National Marine Fisheries Service (under Section 7 of the Endangered Species Act) and the Wildlife Coordination Act (FWS only). The proposed action is also being coordinated with the Florida State Historic Preservation Officer, the U.S. Coast Guard, and the U.S. Environmental Protection Agency.

Other Environmental Review and Consultation: The proposed action would involve evaluation for compliance with guidelines pursuant to Section 404(b)(1) of the Clean Water Act, water quality certification (application to the State of Florida) pursuant to Section 401 of the Clean Water Act, certification of state lands, easements, and rights-of-way, determination of Coastal Zone Management Act Consistency, and the use of the Ocean Dredged Material Disposal Site for Palm Beach
Harbor pursuant to the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act).

Agency Role: As the cooperating agency, non-Federal sponsor and leading local expert, the Port of Palm Beach will provide information and assistance on the resources to be impacted, mitigation measures and alternatives. Other agencies having either regulatory authority or special expertise may also be invited to become a cooperating agency in preparation of the EIS.

Draft EIS Preparation: It is estimated that the Draft EIS will be available to the public by November 2008. As the study and EIS develop, additional information will be posted under Palm Beach County on the Jacksonville District's Environmental Documents web page at: *http://planning.saj.usace.army.mil/envdocs/envdocsb.htm*. The status of any

Florida Department of Environmental Protection application submitted for permit of this action will be posted on the internet at:

http://www.dep.state.fl.us/beaches/permitting/permits.htm.

December 6, 2007

DATE

MARIE G. BURNS
ACTING CHIEF, PLANNING DIVISION

USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

One East 11th St., Suite 332, Box 3
Riviera Beach, FL 33404

Phone: (561) 841-4873
Fax: (561) 841-4871

Federal Relay Service (Voice/TTY/ASCII/Spanish) 1-800-877-8339

December 12, 2007

Ms. Catherine L. Brooks
U.S. Army Corps of Engineers
Jacksonville District
Planning Division, Environmental Section
P.O. Box 4970
Jacksonville, FL 32207

Dear Ms. Brooks:

We recently received a package from Marie Burns, Acting Chief, Planning Division, regarding the expansion of Lake Worth Inlet (Palm Beach Harbor), Florida (page 1 enclosed).

Our address on the envelope and Port of Palm Beach Mailing List (November 2007) is incorrect. Please make the following change to our address which appeared on page 12 of the mailing list (copy enclosed):

OLD ADDRESS: US DEPT OF AGRICULTURE
THE MARITIME OFFICE BLDG
4 EAST PROT ROAD SUITE 112
RIVIERA BBEACH FL 33404

NEW ADDRESS: **US DEPT OF AGRICULTURE**
MARITIME OFFICE BLDG
1 EAST 11TH ST., STE 332, BOX 3
RIVIERA BEACH FL 33404

If you have any questions concerning this matter, call me at 561-841-4873. Thank you.

Sincerely,

John Gilmore

John Gilmore
Supervisory PPQ Officer
USDA, APHIS, PPQ

Enclosures:
1. Ltr from Corp dtd 12/06/07
2. Pg 12 of Address List w/correction

Sondra Mack
958 North Lake Way
Palm Beach, FL 33480

December 11, 2007

Ms. C. L. Brooks
Planning Division
Department of the Army
Jacksonville District Corps of Engineers
PO Box 4970
Jacksonville, FL 32232-0019

Dear Ms. Brooks:

I am in receipt of the letter from Acting Chief Marie Burns regarding the expansion of Lake Work Inlet. I think it's a great idea. Whatever we can do to help the inlet and beaches will benefit everyone.

Yours truly,

Sondra Mack

Sondra Mack

SM:jl

Surfrider Foundation
CONSERVATION • ACTIVISM • RESEARCH • EDUCATION
P.O. BOX 6010
SAN CLEMENTE, CA 92674-6010

WEST PALM BEACH
FL 334
05 JAN 2008 PM 1 L

USA 41

General Grosskruger
US Army Corps of Engineers, Jacksonville District
701 San Marco Boulevard
Jacksonville, FL
32207-0019

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32207+6175

RECEIVED
2 Jan 08

Marie Burns
Planning Division
Dept of the Army

December 23, 2007

Re: Expansion of Lake Worth Inlet

Dear Ms. Burns:

I have received your letter dated Dec 6, 2007 about the possible expansion of Lake Worth Inlet.

Our property is located in the 'C' section or Northwest part of Palm Beach Island. Over the years of the inlet dredging we have lost as much as 50 feet of our property and beach. We do not want anymore dredging to go on because we have lost too much property already. Please do NOT dredge in the 'C' area.

We would appreciate it if you would put back the beaches that were on the Northwest portion of Palm Beach Island. They have been taken away by prior dredgings and hurricane conditions.

If you have any questions or comments please let me know.

Sincerely,

Jeffrey P. Prudden

Jeffrey P. Prudden

PURPOSE: SCOPING MEETING - Environmental Impact Statement for Palm Beach Harbor, Feasibility Study of Navigation Improvements
DATE: 9 January 2008
LOCATION: Riviera Beach, FLORIDA (Port of Palm Beach)

Kelly Novic, Staff Biologist
NAME AND TITLE (PLEASE PRINT)

Save the Manatee Club
BUSINESS OR ORGANIZATION YOU REPRESENT

500 N Maitland Ave
MAILING ADDRESS

Maitland, FL 32751
CITY, STATE, ZIP CODE

knovic@savethemanatee.org
EMAIL ADDRESS

Mail Your Comments to:

U.S. Army Corps of Engineers
Attention: PD-EC
P.O. Box 4970
Jacksonville, Florida 32202-4412

YOUR COMMENTS OR NOTES BELOW:

SMC would like to express our concerns over the impacts this project will have on manatees and their food source. Historical, current, and projected manatee use needs to be examined and considered. Please review FWRI manatee sighting and telemetry data. Holly Edwards at FWRI may be able to assist with this data aquisition (727-896-8626).

Please also coordinate with the FWS regarding Mike Runge's findings for the east coast in 2003 and 2007. Runge's study is available through USFWS (Jim Valade is contact: 904-232-2580).

Runge's model predicts a stable to slightly increasing current manatee population that is projected to decline on the East Coast in the next 10 to 15 years. Warm water refuges like FPL Riviera Beach are critical.

SMC will be monitoring the development of this plan and would like to see negative impacts to manatees, their habitats and their food sources avoided.

PRIVACY ACT STATEMENT

AUTHORITY: 42 USC 4321, 4331-4335
PRINCIPAL PURPOSES: Information on this card is used for organization and conduct of this meeting. It may be added to the mailing list for notification of future meetings on the topic and for addressing correspondence subsequent to the meeting.
ROUTINE USES: This information is a public record and may be disclosed to other Federal or local agencies for governmental purposes as well as to private individuals and organizations under the Freedom of Information Act.
MANDATORY OR VOLUNTARY DISCLOSURE: Completion of this card is voluntary. However, failure to supply the information requested may result in your (or your agency's) omission from further notification regarding participation in the process.

DEPARTMENT OF DEFENSE

Department of the Army

Army Science Board Plenary Meeting

AGENCY: Department of the Army, DoD.

ACTION: Notice of open meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act of 1972 (5 U.S.C., Appendix, as amended), the Sunshine in the Government Act of 1976 (U.S.C. 552b, as amended) and 41 Code of the Federal Regulations (CFR 102–3. 140 through 160, the Department of the Army announces the following committee meeting:

Name of Committee: Army Science Board (ASB).

Date(s) of Meeting: January 15 & 16, 2008.

Time(s) of Meeting: 0800–1700, January 15, 2008.

0800–1600, January 16, 2008.

Place of Meeting: University of Maryland University College (UMUC) Inn and Conference Center, Adelphi, MD. 3501 University Boulevard E, Adelphi, MD.

FOR FURTHER INFORMATION CONTACT: For information please contact Ms. Sharon Harvey at *sharon.harvey1@us.army.mil* or (703) 604–7466 or Mr. Wayne Joyner at *wayne.joyner@saalt.army.mil* or (703) 604–7490.

SUPPLEMENTARY INFORMATION: *Proposed Agenda:* The Army Science Board will meet on January 15 & 16, 2008 at the University of Maryland University College (UMUC) Inn and Conference Center. Purpose of the meeting on both days is to allow each study; Generation Force Functional Census, Institutionalized Lifecycle Management of Innovation Organizations, Information Operations, and Persistent CSR to collect data and hold discussions as it relates to each individual study.

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. E7–24151 Filed 12–12–07; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army

Conservation Measures for Transfer of Federal Land at Parks Reserve Forces Training Area, Dublin, CA

AGENCY: Department of the Army, DoD.

ACTION: Notice of requirement.

SUMMARY: Pursuant to the proposed conservation measures found within the U.S. Fish and Wildlife Service Biological Opinion #1106F1752 dated December 18, 2006, acceptance of any portion of the 170.5-acre land exchange property located at Parks Reserve Forces Training Area (PFRTA), Dublin, CA is conditioned on the developer engaging the U.S. Fish and Wildlife Service in Section 7 or Section 10 Endangered Species Act consultation prior to the development of the aforementioned land. This consultation requirement is because of the potential loss of habitat and potential for take of the endangered San Joaquin Kit Fox (*Vulpes macrotis mutica*), the threatened California red-legged frog (*Rana aurora draytonii*), and the threatened California tiger salamander (*Ambystoma californiense*).

ADDRESSES: Public Affairs Office, U.S. Army CTSC, Camp Parks, 790 5th Street, Dublin, CA 94568–5201.

FOR FURTHER INFORMATION CONTACT: Amy Phillips, (925) 875–4298, *amy.phillips@usar.army.mil.*

SUPPLEMENTARY INFORMATION: A Request for Proposal (RFP) regarding the 170.5-acre land exchange property will be available upon request.

Kevin R. Riedler,

Colonel, U.S. Army, Commanding.

[FR Doc. E7–24193 Filed 12–12–07; 8:45 am]

BILLING CODE 3710–08–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent to Prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), FL

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

COOPERATING AGENCY: Port of Palm Beach District, Riviera Beach, Florida.

ACTION: Notice of intent.

SUMMARY: The Jacksonville District, U.S. Army Corps (Corps) of Engineers intends to prepare a Draft Environmental Impact Statement (EIS) for expansion, including widening and deepening of existing channels and turning basins in Lake Worth Inlet (Palm Beach Harbor). The project is a cooperative effort between the U.S. Army Corps of Engineers (lead Federal agency) and Port of Palm Beach District (non-Federal sponsor and cooperating agency).

ADDRESSES: Ms. Catherine L. Brooks, U.S. Army Corps of Engineers, Jacksonville District, Planning Division, Environmental Section, P.O. Box 4970, Jacksonville, FL 32207.

FOR FURTHER INFORMATION CONTACT: Catherine L. Brooks at (904) 232–2130.

SUPPLEMENTARY INFORMATION: Authority for the proposed study was received under the House Resolution of June 25, 1998. An expedited Reconnaissance Report completed in 2001 by the Corps, concluded based on preliminary findings, there was a federal interest in pursuing harbor improvements.

Alternatives: The project's expansion alternatives include no action, creation of channel flares, wideners, deepening, turning basin, or a combination of the considered alternatives. Alternatives being considered for disposal of dredged material include Peanut Island (with possible off-load to another use or location), ocean disposal in the Palm Harbor Ocean Dredged Material Disposal Site (which may require expansion or modification), beach placement (if there is sufficient beach compatible material), artificial reef (if there is sufficient suitable rock) and any other disposal or beneficial use options that may become available.

Issues: The EIS will consider impacts on coral reefs and other hardbottom communities, sea grasses, protected species, shore impacts, health and safety, water quality, aesthetics and recreation, fish and wildlife resources, cultural resources, energy conservation, socio-economic resources, navigation, and other impacts identified through scoping, public involvement and interagency coordination.

Scoping: The scoping process will involve Federal, State, County and municipal agencies and other interested persons and organizations. A public and agency scoping meeting will be held on January 9, 2008, at 3 p.m. at the Port of Palm Beach, One East 11th Street, Riviera Beach, FL 33404.

Public Involvement: We invite the participation of affected Federal, State and local agencies, affected Native-American Tribes, and other interested private organizations and individuals. In addition to the agency and public scoping meeting on January 9, 2008, and receipt of written comments at various stages of the Feasibility Study, there will be a public meeting on the Draft Environmental Impact Statement following its preparation. The date, time, and location will be announced.

Coordination: The proposed action is being coordinated with the U.S. Fish and Wildlife Service (FWS) and NOAA-National Marine Fisheries Service (under Section 7 of the Endangered Species Act) and the Wildlife Coordination Act (FWS only). The proposed action is also being coordinated with the Florida State

Historic Preservation Officer, the U.S. Coast Guard, and the U.S. Environmental Protection Agency.

Other Environmental Review and Consultation: The proposed action would involve evaluation for compliance with guidelines pursuant to Section 404(b)(1) of the Clean Water Act, water quality certification (application to the State of Florida) pursuant to Section 401 of the Clean Water Act, certification of state lands, easements, and rights-of-way, determination of Coastal Zone Management Act Consistency, and the use of the Ocean Dredged Material Disposal Site for Palm Beach Harbor pursuant to the Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act).

Agency Role: As the cooperating agency, non-Federal sponsor and leading local expert, the Port of Palm Beach will provide information and assistance on the resources to be impacted, mitigation measures and alternatives. Other agencies having either regulatory authority or special expertise may also be invited to become a cooperating agency in preparation of the EIS.

Draft EIS Preparation: It is estimated that the Draft EIS will be available to the public by November 2008. As the study and EIS develop, additional information will be posted under Palm Beach County on the Jacksonville District's Environmental Documents web page at: *http://planning.saj.usace.army.mil/envdocs/envdocsb.htm*. The status of any Florida Department of Environmental Protection application submitted for permit of this action will be posted on the internet at: *http://www.dep.state.fl.us/beaches/permitting/permits.htm*.

Dated: December 6, 2007.

Marie G. Burns,

Acting Chief, Planning Division.

[FR Doc. E7–24150 Filed 12–12–07; 8:45 am]

BILLING CODE 3710–AJ–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

U.S. Army Corps of Engineers (Corps) Regulatory Guidance Letter (RGL) 07–02: Exemptions for Construction or Maintenance of Irrigation Ditches and Maintenance of Drainage Ditches under Section 404 of the Clean Water Act (CWA)

AGENCY: U.S. Army Corps of Engineers, Department of Defense.

ACTION: Notice of availability.

SUMMARY: The Corps issued RGL 07–02 to further explain the regulatory exemptions for construction or maintenance of irrigation ditches and maintenance of drainage ditches consistent with Section 404(f) of the CWA (33 U.S.C. 1251 et seq.) and implementing regulations. Specifically, the RGL clarifies when Section 404(f) exempts from permitting requirements discharges of dredged or fill material into waters of the United States associated with the construction and maintenance of irrigation ditches and maintenance of drainage ditches. The RGL also clarifies how certain terms in the regulations at 33 CFR 323.4 are applied in the context of the Sections 404(f) exemptions, including irrigation ditch, drainage ditch, construction, and maintenance. In addition, the guidance provides a framework for determining the applicability of the exemptions and the recapture provision, consistent with the CWA and implementing regulations. This RGL was effective July 4, 2007.

DATES: Comments must be received on or before February 11, 2008.

ADDRESSES: Submit your comments, identified by docket number COE–2007–0038, by one of the following methods:

- *http://www.regulations.gov:* Follow the on-line instructions for submitting comments.
- *E-mail: Kimberly.S.McLaughlin@usace.army.mil.* Include the docket number, COE–2007–0038 in the subject line of the message.
- *Mail:* 441 G Street, NW., Washington, DC 20314.
- *Hand Delivery:* 441 G Street, NW., Washington, DC 20314. Such deliveries are only accepted during normal hours of operation, and special arrangements should be made for deliveries of boxed information.

Instructions: Direct your comments to docket number COE–2007–0038. The Corps's policy is that all comments received will be included in the public docket without change and may be made available online at *www.regulations.gov*, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through *www.regulations.gov* or e-mail. The *www.regulations.gov* Web site is an ''anonymous access'' system, which means the Corps will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to the Corps without going through *www.regulations.gov* your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, the Corps recommends that you include your name and other contact information in the body of your comment and with any disk or CD–ROM you submit. If the Corps cannot read your comment due to technical difficulties and cannot contact you for clarification, the Corps may not be able to consider your comment. Electronic files should avoid the use of special characters, any form of encryption, and be free of any defects or viruses.

Docket: All documents in the docket are listed in the *www.regulations.gov* index. Although listed in the index, some information is not publicly available, e.g., CBI or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, will be publicly available only in hard copy. Publicly available docket materials are available either electronically in *www.regulations.gov* or in hard copy at 441 G Street, NW., Washington, DC 20314. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays.

FOR FURTHER INFORMATION CONTACT: Kim McLaughlin, Regulatory Community of Practice (CECW–CO), U.S. Army Corps of Engineers, Headquarters, 441 G Street, NW., Washington, DC 20314; telephone number: (202) 761–7763; fax number: (202) 761–5096; e-mail address: *Kimberly.S.McLaughlin@usace.army.mil.*

SUPPLEMENTARY INFORMATION:

I. General Information

The Corps is requesting public comment on RGL 07–02, which is available at: *http://www.usace.army.mil/cw/cecwo/reg/rgls/rgl07–02.pdf.*

At the same time, the Corps appreciates that the public has considerable interest in the issues addressed in this guidance. The Corps is particularly interested in hearing from the public regarding their actual experience with implementing the guidance. The Corps is providing a 60-day public comment period, and encourages the public to provide comments informed by actual experience. To assure the public of our commitment to carefully consider their comments, and to address issues that

Mr. Gerald Ward
30 West 20th Street
Riviera Beach, FL 33404

Mr. John Marshall
525 S. Flagler Drive, Apt 10C
West Palm Beach, FL 33401

Mr. K. Dan Shalloway
1201 Belvedere Road
West Palm Beach, FL 33405

Executive Director
Advisory Council on Historic Preservation
The Old Post Office Bldg. Ste 809
1100 Pennsylvania Ave NW
Washington, DC 20004

Chairman
American Littoral Society
PO Box 491228
Miami, FL 33149

Mr. Eric Draper
Audubon of Florida
444 Brickell Avenue, Ste 850
Miami, FL 33131

Ann B. Hodgson, Ph.D.
Audubon Society
410 Ware Blvd.
Tampa, FL 33619

Superintendent
Biscayne National Park
9700 SW 328th Street
Homestead, FL 33033

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West Palm Beach, FL 33411

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Save the Manatee Club
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Maitland, FL 32751

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DEP Southeast District Office
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U.S. Department of the Interior
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Washington, DC 20240

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The Honorable Marco Rubio
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South Atlantic Regional Office
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The Honorable Debbie Schultz
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Pembroke Pines, FL 33026

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7000 North Ocean Drive
Dania Beach, FL 33004

Commanding Officer
US Coast Guard, Marine Safety Office
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The Honorable Marco Rubio
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The Honorable Theodore Deutch
US House of Representatives, Dist 21
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Commissioner Jess Santamaria (PBC Dist 6)	jsantama@pbcgov.org
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Commissioner Paulette Burdick (PBC Dist 2)	pburdick@pbcgov.org
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Tropical Audubon Society	director@tropicalaudubon.org

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

REPLY TO
ATTENTION OF

Planning and Policy Division
Environmental Branch

JUL 20 2012

Robert Bendus, SHPO
Division of Historical Resources
State Historic Preservation Officer
500 South Bronough Street
Tallahassee, Florida 32399-0250

Dear Mr. Bendus:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is evaluating the environmental effects from our proposed project to deepend and widen the entrance channel and the large turning basin at Lake Worth Inlet at Palm Beach Harbor in Palm Beach County, Florida. Enclosures 1 and 2 show the location and footprint of the proposed project. Palm Beach Harbor is a deep-draft harbor and extends from the Atlantic Ocean to the Port of Palm Beach, a distance of 1.7 miles.

Initial consultation with your office (DHR Project file No. 2000-03471), when we were preparing the Environmental Assessment for the Operations and Maintenance of Palm Beach Harbor, indicated the potential for cultural resources to be present in the project area. An underwater cultural resource survey including diver identification was conducted for the Intracoastal Waterway and Palm Beach Harbor in 2001 by Wes Hall. These surveys included the Palm Beach Harbor Inlet. No cultural resources were identified within the Palm Beach Harbor project area as a result of this survey. Your office concurred with the Corps determination of no historic properties (DHR Project file No. 2000-5816). The proposed settling basin expansion area was surveyed for cultural resources in 2003 by Tuttle. No cultural resources were located by this survey. Your office again concurred with the Corps' determination of no historic properties (DHR Project File No. 2004-1138). Enclosure 3 shows our proposed project footprint superimposed on the DHR survey file.

We once again ask for your concurrence with our determination of no historic properties affected by this proposed project. Please provide your comments within 30 day. Your comments and correspondence will be included in the Lake Worth Inlet Integrated Feasibility Study and Environmental Impact Statement. If you have questions or require additional information, contact archeologist David McCullough at 904-232-3685 or by email at david.l.mccullough@usace.army.mil

Sincerely,

Eric P. Summa
Chief, Environmental Branch

Enclosures

FLORIDA DEPARTMENT of STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Palm Beach Regulatory Office
Jacksonville USACE
4400 PGA Boulevard, Suite 500
Palm Beach Gardens, Florida 33410

September 13, 2012

Re: Projects Reviewed by the Florida State Historic Preservation Office
No Historic Properties Likely Affected - **See Attached List**
Date Received –August 14- August 31, 2012

To Whom It May Concern:

This office received and reviewed the above referenced project applications in accordance with Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-665), as amended in 1992; 36 C.F.R., Part 800: Protection of Historic Properties 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.

Our review of the Florida Master Site File indicates that no historic properties are recorded within the project areas. Furthermore, because of the location and/or nature of the project it is unlikely that historic properties will be affected.

If you have any questions concerning our comments, please contact Michael Hart, Historic Sites Specialist, by phone at 850.245.6333, or by electronic mail at Michael.Hart@dos.myflorida.com. Your continued interest in protecting Florida's historic properties is appreciated.

Sincerely,

Robert F. Bendus, Director
Division of Historical Resources
and State Historic Preservation Officer

DHR NO.	***App. No.***	***Project Name***	***County***
2012-03897	SAJ-2000-02301 (IP-MJW)	Palm Beach County/ South Lake Worth Inlet Maintenance Dredging	Palm Beach
2012-04092	SAJ-2012-02152 (LP-JMC)	Holly S. Powell/ Proposed Seawall and Boat Basin	Palm Beach
2012-04093	SAJ-2004-05180 (LP-GGL)	Robert W. Block III/ Dolphin Piles	Palm Beach

McCullough, David L SAJ

From: Hart, Michael R. [Michael.Hart@DOS.MyFlorida.com]
Sent: Friday, November 30, 2012 4:43 PM
To: McCullough, David L SAJ
Subject: RE: Lake Worth Inlet (UNCLASSIFIED)
Attachments: Nofxlist, 09-13-2012, PB.doc

David,

Attached is the list-letter that included the Lake Worth Project.

Michael Hart
Historic Sites Specialist | Bureau of Historic Preservation | Division of Historical Resources | Florida Department of State | 500 South Bronough Street | Tallahassee, Florida 32399 | 850.245.6300| 1.800.847.7278 | www.flheritage.com

-----Original Message-----
From: McCullough, David L SAJ [mailto:David.L.McCullough@usace.army.mil]

Sent: Friday, November 30, 2012 4:37 PM
To: Hart, Michael R.
Subject: RE: Lake Worth Inlet (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

-----Original Message-----
From: Hart, Michael R. [mailto:Michael.Hart@DOS.MyFlorida.com]
Sent: Wednesday, September 12, 2012 11:58 AM
To: McCullough, David L SAJ
Subject: RE: Lake Worth Inlet (UNCLASSIFIED)

David,

I received your voicemail. Yes, I have the project (SAJ-2000-02301). It's in my pile and I should have it done in the next couple of days.

If you need it sooner, let me know.

Thank you,

Michael Hart
Historic Sites Specialist | Bureau of Historic Preservation | Division of Historical Resources | Florida Department of State | 500 South Bronough Street | Tallahassee, Florida 32399 | 850.245.6300| 1.800.847.7278 | www.flheritage.com

Florida is headed in the right direction! View Florida's Jobs Growth Chart: http://www.flgov.com/photoview/jobcreationchart.jpg
The Department of State is leading the commemoration of Florida's 500th anniversary in 2013. For more information, please go to www.fla500.com.
The Department of State is committed to excellence. Please take our Customer Satisfaction Survey:
http://survey.dos.state.fl.us/index.aspx?email=Michael.Hart@DOS.MyFlorida.com

-----Original Message-----
From: McCullough, David L SAJ [mailto:David.L.McCullough@usace.army.mil]

Sent: Tuesday, September 11, 2012 1:57 PM
To: Hart, Michael R.
Subject: Lake Worth Inlet (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Good afternoon Michael. I just left you a voice mail about this. I am not sure if you are my reviewer for this project, but Scott and I thought we would start with you. I am attaching a copy of a letter that I sent in July. I hope you or someone there can hunt it up and have a look at it.

Thanks,

David McCullough
Archeologist
USACE, Jacksonville District
9i04-232-3685

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

Pilot Approval Letter and Associated Correspondence

Gregory G. Turner
William G. Roden, Jr.

William D. Messer
Matthew L. Rigby
Reid Hansen

Palm Beach Harbor Pilots' Association

200 E. 13th Street, Suite B
Riviera Beach, Florida 33404-6946
Office (561) 845-2628 FAX (561) 845-2644
Email: PBPilots@aol.com

April 22nd, 2012

The Palm Beach Harbor Pilots have reviewed and approve Revised Plan 2 of the Army Corps of Engineer's Channel Improvement Plan. We feel the new plan will maximize ship size: length and beam, that can safely enter to the Port of Palm Beach. We also feel Revised Plan 2 will require the least amount of dredging and minimize the ecological impact to the Lake Worth Inlet and turning basin while providing maximum economic benefit.

Sincerely,

Captain Gregory G. Turner, President
Palm Beach Harbor Pilots' Association

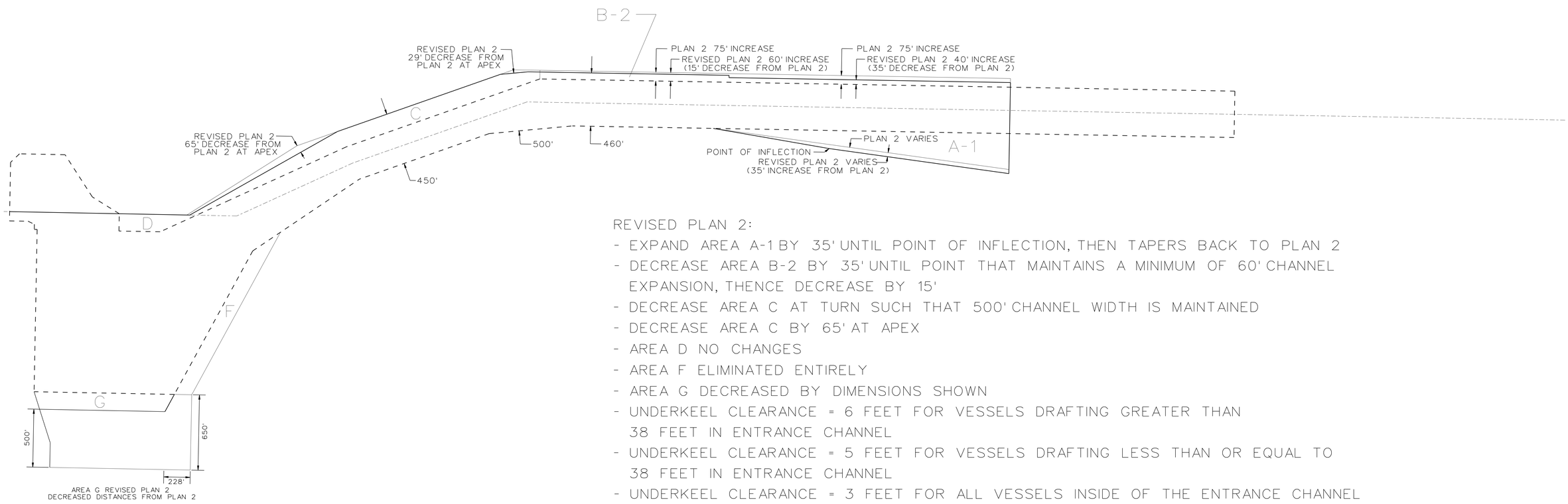
REVISED PLAN 2

LEGEND:

EXISTING PROJECT

PLAN 2 PROJECT EXPANSION

REVISED PLAN 2 PROJECT EXPANSION



REVISED PLAN 2:

- EXPAND AREA A-1 BY 35' UNTIL POINT OF INFLECTION, THEN TAPERS BACK TO PLAN 2
- DECREASE AREA B-2 BY 35' UNTIL POINT THAT MAINTAINS A MINIMUM OF 60' CHANNEL EXPANSION, THENCE DECREASE BY 15'
- DECREASE AREA C AT TURN SUCH THAT 500' CHANNEL WIDTH IS MAINTAINED
- DECREASE AREA C BY 65' AT APEX
- AREA D NO CHANGES
- AREA F ELIMINATED ENTIRELY
- AREA G DECREASED BY DIMENSIONS SHOWN
- UNDERKEEL CLEARANCE = 6 FEET FOR VESSELS DRAFTING GREATER THAN 38 FEET IN ENTRANCE CHANNEL
- UNDERKEEL CLEARANCE = 5 FEET FOR VESSELS DRAFTING LESS THAN OR EQUAL TO 38 FEET IN ENTRANCE CHANNEL
- UNDERKEEL CLEARANCE = 3 FEET FOR ALL VESSELS INSIDE OF THE ENTRANCE CHANNEL
- RANGE MARKERS WILL REMAIN IN PLACE AND BUOYS WILL BE RELOCATED AS NECESSARY BY THE USCG

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

FEB 13 2008

REPLY TO
ATTENTION OF

Planning Division
Plan Formulation Branch

Mr. Martin E. Murphy
The Murphy Construction Company
1615 Clarke Avenue
West Palm Beach, Florida 33401

Dear Mr. Murphy:

Thank you for your response to the December 6, 2007 Notice of Intent to prepare a Draft Environmental Impact Statement for Expansion of Lake Worth Inlet (Palm Beach Harbor), Florida. The Port is no longer considering expansion of their cruise terminal to the north.

Element E of the study was being considered for navigational reasons. The harbor pilots had identified conditions, particularly when a strong east wind occurred with Tropical vessels berthed along the marginal wharf approach that the northern extent of the basin during turning maneuvers was limiting. The alternative does not include expansion of the Port of Palm Beach to the north.

This study area has a low priority with both the pilots and the Port of Palm Beach and based upon further consideration is being removed from the study as an alternative.
I would like to thank you for taking the time to attend the scoping meeting and providing input into this process. If you have any questions, please contact Samantha Brucker at (904) 232-1066.

Sincerely,

Marie G. Burns
Acting Chief, Planning Division

Copy Furnished:

Ms. Kathy Andress, Deputy Port Director, One East 11th Street, Ste. 400, Riviera Beach, Florida 33404

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CECW-PM (10-1-7a)

29 MAR 2001

MEMORANDUM FOR COMMANDER, SOUTH ATLANTIC DIVISION
ATTN: CESAD-CM-P

SUBJECT: Lake Worth Inlet (Palm Beach Harbor), Florida - Section 905(b) Analysis

1. Reference: E-mail Message from Mr.William H. Osborne, CESAD-CM-C, dated 16 March 2001, which forwarded the subject analysis to HQUSACE.

2. The subject analysis and letter of intent, which were provided as an attachment to the referenced message, are approved for proceeding into the feasibility phase of planning. The district should plan to convene an in-progress review meeting early in the feasibility study to ensure that the study is focused and tailored to meet specific objectives. Based on the results of the in-progress review meeting, the project study plan may need to be revised to better define depth of analysis required and/or refine study constraints.

3. Submission of the model feasibility cost sharing agreement is not required, provided no deviations are required.

FOR THE COMMANDER:

James F. Johnson

JAMES F. JOHNSON
Chief, Planning and Policy Division
Directorate of Civil Works

Gregory G. Turner
William G. Roden, Jr.

William D. Messer
Matthew L. Rigby

Palm Beach Harbor Pilots' Association

200 E. 13th Street, Suite B
Riviera Beach, Florida 33404-6946
Office (561) 845-2628 FAX (561) 845-2644
Email: PBPilots@aol.com

June 28, 2005

To: Vessel Operators, Ship's Agents and Port Officials

This letter is to help clarify our parameters as to what size, beam, and draft that vessels may transit the Port of Palm Beach. A synopsis of our guidelines is listed below; however, it is impossible to regulate each scenario. When a vessel is calling on the Port for the first time, the Pilots must be contacted before scheduling vessels that are either 550' LOA or greater, 85' or over in beam, or over 30' in draft. The Pilots should be contacted at least 72 hours prior to arrival for all other vessels calling on the Port for the first time to discuss any tug or docking requirements that may delay the vessel.

The maximum salt-water draft is 33'-00" for the Port of Palm Beach when the channel and turning basin are free from shoaling. During periods when shoaling is present, further restrictions beyond what is stated below might be applied to the draft, length, or beam.

Vessels 600' and over LOA will enter only during daylight hours.
Vessels 600' and over LOA or a beam of 90' or greater may have an additional draft restriction.
Vessels within 3 feet of maximum allowable draft are restricted to high water slack.
Single screw vessels 500' LOA or greater may be restricted to maneuvering during daylight slack water depending upon the draft of the vessel and the current weather conditions.
Single screw vessels must have at least 50' of clearance to adjacent vessels in the slip in order for the tugs to operate safely. All vessels may expect delays whenever this situation occurs.
Deep draft vessels over 600' should be advised that the west end of the South Slip (Slip #3) has a depth of 25' at MLW.

Vessels less than 550' LOA and 85' beam with 50 feet of clearance in the slip can be safely handled using the two local tugs under most weather conditions. When vessels exceed this size or when the weather deteriorates, we have found that it is necessary to order an outside tug and/or restrict the draft to improve the maneuvering of these vessels. Briefly, the reasons for this are; the low horsepower of the local tugs, the strength of the Gulf Stream at the mouth of the inlet, the width of the turn in the inner channel, and wind velocities that exceed 20 knots.

Single screw vessels will require a third tug if they exceed the following parameters:

550' LOA or greater when there are adverse weather conditions
600' LOA or greater with drafts at 30' or greater
Inbound vessels with a LOA of 550' or greater and a draft over 32' or beam over 85' and a draft over 30'
A combination of LOA over 600' and a beam over 85' at any draft with 30' being the maximum

Vessels 500' LOA or greater may need a third tug when backing into a slip in a loaded condition. Twin-screw ships, and single screw vessels fitted with thrusters, may not have all of the restrictions that are listed above depending upon the handling characteristics of the vessel. The Pilots should be contacted regarding such vessels.

Additional recommendations for Oil Tankers and Barges:

It is recommended that vessels carrying oil transit during slack water for safety reasons. Flood tides should be avoided at all times. Certain vessels such as steam tankers may require 3 tugs. The maximum draft for oil is 32'-00" unless limited by the above parameters or shoaling.

It has been and will continue to be the Port's decision on what vessels will have priority and to which berths they will be assigned. We will continue to work with the staff at the Port of Palm Beach in order to fully utilize the Port. Please contact the Port and the Pilots for further information before considering vessels for charter within the parameters specified above. Guidelines for vessels entering the North Slip (located at the new Cruise Terminal) will be determined after all bottom surveys and simulator studies are complete.

Gregory G. Turner
President / Palm Beach Harbor Pilots

APPENDIX F

LAKE WORTH INLET

Palm Beach Harbor

APPENDIX F

DRAFT

LAKE WORTH INLET
PALM BEACH COUNTY, FLORIDA
NAVIGATION STUDY
FEASIBILITY REPORT

REAL ESTATE PLAN

LAKE WORTH INLET
PALM BEACH COUNTY, FLORIDA
NAVIGATION STUDY
FEASIBILITY REPORT

REAL ESTATE PLAN

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EXHIBIT F-3: REAL ESTATE CAPABILITY ASSESSMENT (DRAFT INCLUDED)

12/2012 lhz
Rev 3/2013 lhz

REAL ESTATE PLAN
LAKE WORTH INLET
PALM BEACH COUNTY, FLORIDA
NAVIGATION STUDY
FEASIBILITY REPORT

1. Statement of Purpose.

a. The purpose of this report is to determine the feasibility of improving the existing Federal navigation project at Lake Worth Inlet, Florida.

b. This real estate plan is tentative in nature for planning purposes only and both the final real property acquisition lines and estimates of value are subject to change even after approval of this report.

2. Project Authorization.

The non-Federal sponsor, the Port of Palm Beach, requested a feasibility study to focus on evaluating deepening and widening of the entrance channel and the large turning basin. A 905(b) Analysis was approved for proceeding into the feasibility phase of planning on March 29, 2001. The memorandum can be found in Appendix F. The Port of Palm Beach applied for a state grant to assist in the 50% non-Federal share, the FCSA was then signed in August 2005. Since signing of the FCSA in 2005, the schedule has been linked to the appropriations received.

House Resolution dated June 25, 1998, authorized the Lake Worth Inlet study. The full text of the resolution is as follows:

"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Palm Beach Harbor, Florida, published as House Document 283, 86th Congress, 1st Session, and other pertinent reports, with a view of determining if the authorized project should be modified in any way at this time, with particular reference to widening the existing interior channel through Lake Worth Inlet."

See Exhibit F-1 of this appendix for additional project authorizations.

3. Project Location and Description.

Lake Worth Inlet (LWI), also known as the Palm Beach Inlet, is located in Palm Beach County, Florida, and is approximately 80 miles north of Miami and 135 miles south from Port Canaveral. The LWI provides access to deep draft vessel traffic using terminal facilities located at the Port of Palm Beach. The inlet is the 4th busiest Port in Florida. (See Figure ES-2in the Executive Summary of the main report for existing conditions and location map.)

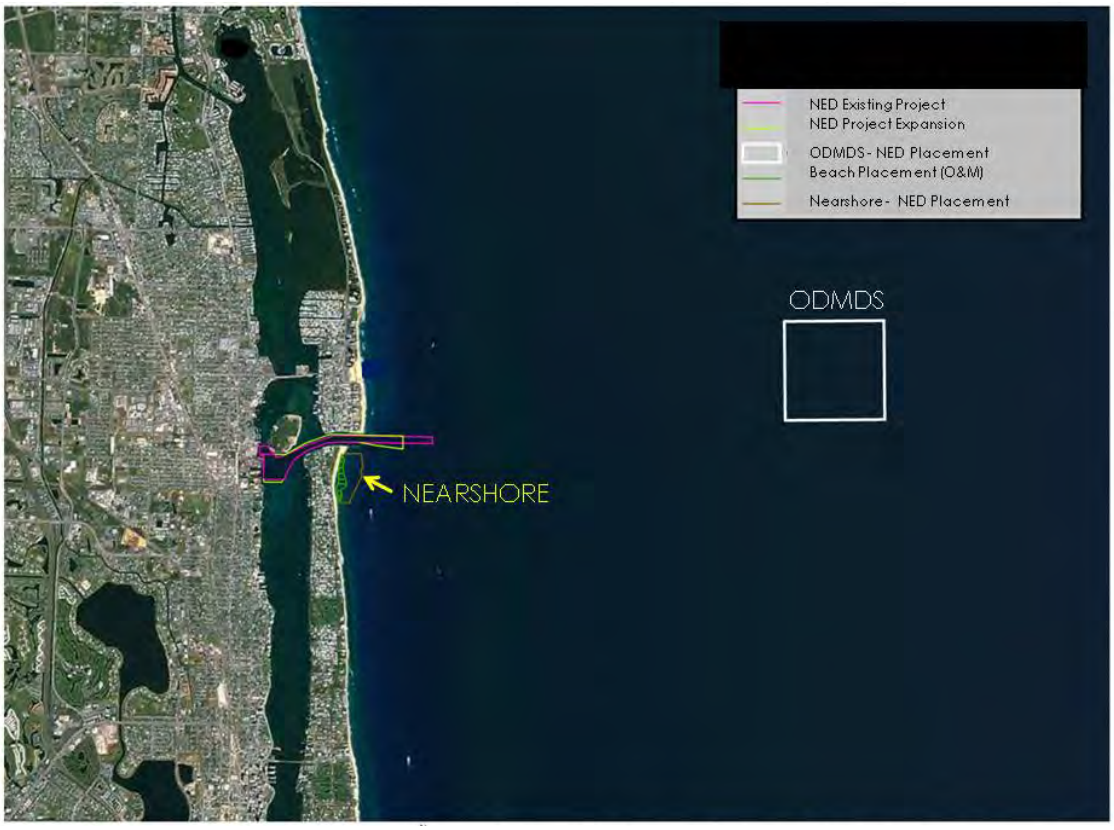
The present authorized channel for the Palm Beach Harbor Navigation Project includes the following: an entrance channel 35 feet deep, 400 feet wide, and 0.8 miles long, merging with an inner channel 33 feet deep, 300 feet wide and 0.3 miles long, then flaring into a turning basin, 1,400 feet north-south along the side next to the berthing area by a minimum of 1,210 feet east-west; maintenance of a local turning basin to the north of the project turning basin of 24 feet; removal of south point; and jetties and shore revetments at the inlet. The entire length of the project is approximately 1.6 miles. Maintenance of the northern turning basin including the area of slip 1 is authorized to 24 feet; however much of this area is constructed to 33 feet by the non-Federal sponsor.

The recommended (NED) plan for the project includes a new channel flare on the south side of the Entrance Channel, a widening of the Entrance Channel by either 40' or 60' to the north, widening of the Inner Harbor Cuts 1 and 2 to provide for a minimum channel width of 450', a 150' expansion of the Southern (Main) Turning Basin to the south, and an expansion of the Southern (Main) Turning Basin on the north side to remove a notch currently encroaching into the basin. (See page 6, Figure F-1, of this appendix for map of NED plan). The channel would be deepened to a project depth of 39 feet Mean Lower Low Water (MLLW) for the Inner Harbor and 41 feet MLLW for the Entrance Channel. These features are necessary to facilitate the safe and efficient navigation of the design vessel. Additional project features include North Jetty stabilization, reconfiguration of the Advance Maintenance Zones, reconfiguration of the Settling Basin, Seagrass Mitigation Area construction, and Hardbottom Mitigation Area construction. **See Engineering Appendix A for additional details.**

The material anticipated to be excavated from the widening and deepening of the project will be placed within the least cost disposal options. These options include the ODMDS, the proposed seagrass mitigation locations, and beach nearshore areas. These areas are located at or adjacent to Lake Worth Inlet, within Sections 34 and 35 Township 42 South, Range 43 East. The nearshore disposal template begins 500 linear feet south of the south jetty, between FDEP coastal reference monuments R-76.5 and R-79 (See Exhibit F-2 of this appendix for FDEP Coastal Monument Reference Map).

Further opportunities for additional beneficial use of dredged material exist in the project vicinity such as the filling of anoxic deepwater holes in the Lake Worth Inlet Lagoon, creation of hardbottom habitat, creation of habitat for submerged aquatic vegetation such as seagrasses, and/or placement of beach quality material in the uplands south of the Inlet or below MHW at Mid-Town Beach (reference Figure 4-2 of the main report for locations). These areas are located as discussed above but also includes upland placement from FDEP Monument R-76.5 extending to R-81. Mid-Town beach fill template is located between R-90.4 and R-101.4.

The current proposed mitigation plan involves placing quarry rock at a potential artificial reef offshore and placing project material for sea grass rehabilitation in a dredged hole site. Other opportunities for mitigation are identified and can be found in the Mitigation Plan, Section 3 of Appendix D.



Recommended Plan (NED Plan) – Figure F-1

4. Real Estate Requirements.

The deepening and widening activities as well as proposed mitigation features are within the navigable waters of the United States and are available to the Federal Government by navigation servitude. The disposal areas identified for the project are near shore and an existing ODMDS. These sites are also within the navigable waters of the United States.

The local sponsor, as well as the State of Florida, has communicated the preference for beach compatible dredged material to be placed on the beach, both landward and seaward of the mean high water line (MHWL). Beach placement in this area is not considered a least cost disposal option and is not a part of the recommended plan.

At the time of this report, the Town of Palm Beach, Florida, approximately 23 temporary construction easements have been acquired as part of the existing Palm Beach Harbor Maintenance Dredging Beach Placement Project. The easements are to expire May of 2015. The easements extend from approximately R-76.5, 2,500 feet to R-79. These parcels have been certified for the Palm Beach Harbor Navigation Project. The easement allows the USACE to nourish, renourish, protect, operate and to perform any other work necessary and incident to the maintenance between MHW and vegetation. The existing easements, as well as the an additional 20 parcels, (R-76 through R-81), are in the process of being extended or acquired for continued disposal placement. All lands seaward of the MHWL is owned by the State of Florida and should be included within the Joint Coastal Permit (JCP). During PED phase if the template within the area described above is filled to capacity then an additional placement area at Mid-Town Beach between R-90.4 through R-101.4 may be used. The material will be placed below the

MHWL and no easements will be required. All construction easements from private owners would be acquired and funded solely by the local sponsor or other local interests. This includes all administrative costs. They will be certified by the local sponsor prior to project construction if necessary.

Staging and work areas will be within the lands below the designated MHWL line or on sponsor provided construction easements.

Federal fee and easement properties located at the south jetty may be used temporarily for construction purposes. No land acquisition is necessary. (See Exhibit F-3).

5. Federally-Owned Land.

USACE controls numerous fee and easement tracts within the project area. (See Exhibit F-3 of this appendix). A pipeline to deposit sand on the beach may require access to (and over) the south jetty and within areas controlled by the USACE.

6. Non-Federally-Owned Land.

The Port of Palm Beach and the Town of Palm Beach have lands within the project area. They own approximately 154 acres.

7. Non-Federal Operation/Maintenance Responsibilities.

a. The Local Sponsor shall provide and maintain, at its own expense, all project features other than those for general navigation, including dredged depths commensurate with those in related general navigation features in berthing areas and local access channels serving the general navigation features.

b. The Local Sponsor shall provide to the Government all lands, easements, and rights-of-way, including dredged material disposal areas, and perform, or assure performance of, all alterations or relocations of facilities and utilities (except relocations or alterations of highway bridges and railroad bridges and approaches thereto), determined by the Government to be necessary for maintenance of the Project.

8. Non-Federal Authority to Participate in the Project.

The local sponsor, Port of Palm Beach, Florida, is a sub-division of the State Division and was established under provisions of Laws of Florida Acts of 1915, Chapter 7081, as amended and supplemented. The Port of Palm Beach entered into a tri-party interlocal agreement in August 2006 with the Town of Palm Beach and Palm Beach County to share local costs of the navigability of the Lake Worth Inlet. This agreement expires September 30, 2016.

9. Navigation Servitude

Lands required for deepening and widening of the project, as well as the mitigation features, are available to the Federal Government via navigation servitude. Coordination with the State of Florida will occur to provide the necessary permission for the submerged lands.

10. Attitude of Owners.

All public landowners impacted by the proposed project have been involved in the planning process and have indicated strong support for the project. Upland beach owners are aware of the project and have previously provided temporary construction easements to the Town of Palm Beach, Florida, for the Palm Beach Harbor Navigation Project.

11. Minerals.

There are no known minerals of value in the project area.

12. Hazardous, Toxic and Radioactive Wastes (HTRW).

A phase I environmental assessment was completed for the proposed dredging and disposal activity areas and did not identify HTRW within the areas. Prior to disposal of the dredged material additional testing will occur and contaminated materials will be coordinated with the appropriate environmental agencies and disposed of in accordance with Federal, State and Local laws.

13. Induced Flooding.

There will be no induced flooding directly associated with this project.

14. Zoning Ordinances

Zoning ordinances are not of issue with this project. Application or enactment of zoning ordinances will not to be used in lieu of acquisition.

15. Relocations Assistance (Public Law 91-646).

There are no persons or businesses that will need to be relocated due to project implementation.

16. Relocations, Alterations, Vacations and Abandonments (Utilities, Structures and Facilities, Cemeteries, and Towns).

There is a pipeline within the harbor right of way. The pipeline provides the Sand Transfer Plant, located north of the north jetty, to move accumulated sand south of the south jetty. This pipeline is located well beneath the bottom lands and will not be affected by this deepening project.

17. Standing Timber and Vegetative Cover.

There is no timber or unusual vegetative cover in the project area. Final mitigation compensation will range between 8.25 to 11.25 acres for seagrass impacts, and a range of 4.9 -9.8 acres is proposed for hardbottom impacts. Final mitigation will be determined during the public review of the document by the USACE and Federal and state agencies.

18. Recreation Resources.

There are no separable recreational lands identified for the project.

19. Cultural Resources.

There are no known cultural resources that have been identified as being affected by the project. Further investigations will be performed prior to any construction activities.

20. Outstanding Rights.

There are no known outstanding rights in the project area.

21. Mitigation.

The widening of the existing turning basin and the entrance channel will result in impacts to seagrass and hardbottom habitat. Final mitigation compensation will range between 8.25 to 11.25 acres for seagrass impacts, and a range of 4.9 -9.8 acres is proposed for hardbottom impacts. Final mitigation will be determined during the public review of the document by the USACE and Federal and state agencies.

A variety of mitigation options and locations have been considered. Specific details of these options can be found in the Mitigation Plan, in Attachment 3 of Appendix D .

All lands considered for mitigation are submerged and are within the navigable waters of the United States and under control of the State of Florida. Coordination with the appropriate resource agencies is ongoing.

22. Acquisition/Administrative Costs.

The estimate of the Federal real estate acquisition/ administrative cost is $15,000. This figure includes project real estate planning, review and monitoring cost. The non-Federal sponsor will receive credit towards its share of real estate administrative project cost incurred for certification. Non-Federal administrative costs are estimated to be $10,000.

23. Summary of Project Real Estate Costs.

The following cost figures are subject to change prior to construction:

a. Lands and Damages		$0
b. Acquisition – Administrative costs		$25,000
Federal*	$15,000	
Non-Federal	$10,000	
c. Public Law 91-646		$0

d. Condemnations		$0
e. Total Estimated Real Estate Cost		$25,000
f.	Contingency (30%)	$ 8,000
g.	Total Real Estate Cost with Contingency	$33,000

* Includes Corps Real Estate planning and monitoring costs

24. Real Estate Acquisition Schedule.

With no formal acquisition processes required for the tentatively selected plan, no schedule is currently proposed.

25. Estates to be Acquired.

There are no estates required for the project.

26. Maps.

See Figures F-1 (page 6) of this appendix for map showing the tentatively selected plan. Exhibit F-2 shows Federal ownership or interests in the area of the project.

27. REAL ESTATE CHART OF ACCOUNTS

01	Lands & Damages	$ 0
01AA	Project Planning	$ 10,000
01B--	Acquisition/Admin	
01B20	By Local Sponsor (LS)	$ 10,000
01B40	Review of Local Sponsor	$ 5,000
01C--	Condemnations	
01C20	By Local Sponsor	$ 0
01C40	Review of Local Sponsor	$ 0
01E--	Appraisals	
01E30	By Local Sponsor	$0
01E50	Review of Local Sponsor	$0
01F--	PL 91-646 Assistance	
01F20	By Local Sponsor	$0
01F40	Review of Local Sponsor	$0
01R--	Real Estate Payments	

01R1	Land Payments		
01R1B	By Local Sponsor	$0	
01R2	PL 91-646 Assistance Payments		
01R2B	By Local Sponsor	$0	
TOTAL REAL ESTATE COST EXCLUDING CONTINGENCY			**$25,000**
	Contingency (30%)		**$ 8,000**
TOTAL REAL ESTATE COST WITH CONTINGENCY			**$33,000**

(Contingency costs were formulated from the cost risk analysis and added to total project costs).

EXHIBIT F-1

Previous authorizations are as follows:

ACT	WORK AUTHORIZED	DOCUMENTS
March 13, 1934 P.W.A. Program	Maintenance of improvements previously constructed by local interests.	H. Doc 185/73/2
December 10, 1935 P.W.A. Program	Deepening channels and turning basin to 20 feet.	Recommended by COE to P.W.A. October 17, 1934
August 30, 1935	Authorized work previously approved by the P.W.A. and restoration of jetties, removal of south point, revetment of banks, widening of channels, and enlargement of turning basin.	H. Doc. 185/73/2 and R&H Comm. Doc. 42/74/1
March 2, 1945	Deepening channels and turning basin to 25 feet.	H. Doc 530/78/2
May 17, 1950	Extending turning basin southward 550 feet.	H. Doc 704/80/2
July 14, 1960	Deepening channels to 35 and 33 and enlarging turning basin.	H. Doc 283/86/1
November 17, 1986	Maintenance of locally expanded turning basin to a depth of 25 feet on north side of existing basin.	Public Law 99-662
July 11, 1992	Authorized Port of Palm Beach to deepen the northern side of existing basin from 25 feet to 33 feet.	Permit Number: 199130682

EXHIBIT F-2

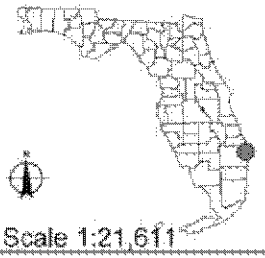
FDEP Coastal Range Monument Reference Map

26°46'39.5815", -80°3'23.6353"

26°46'35.4026", -80°0'58.2643"

26°44'59.5113", -80°3'27.2150"

26°44'55.3335", -80°1'1.8807"



Scale 1:21,611

Aerial Imagery 2010 NAIP

Coastal Range Monuments

Range Monuments

Virtual Monuments

Counties

Aerial Imagery Flight Dates 2010 NAIP

Florida Department of Environmental Protection Disclaimer: This map created in Map Direct on Thu, 21 Mar 2013 22:00:00 UTC is intended for display purposes only. It was created using data from different sources collected at different times, with differ levels of accuracy, and/or covering different periods of time. NAVTEQ road data is provided "AS IS" and without warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement. YOU SHOULD THEREFORE VERIFY ANY INFORMATION OBTAINED FROM THE SITE BEFORE ACTING ON IT.

EXHIBIT F-3

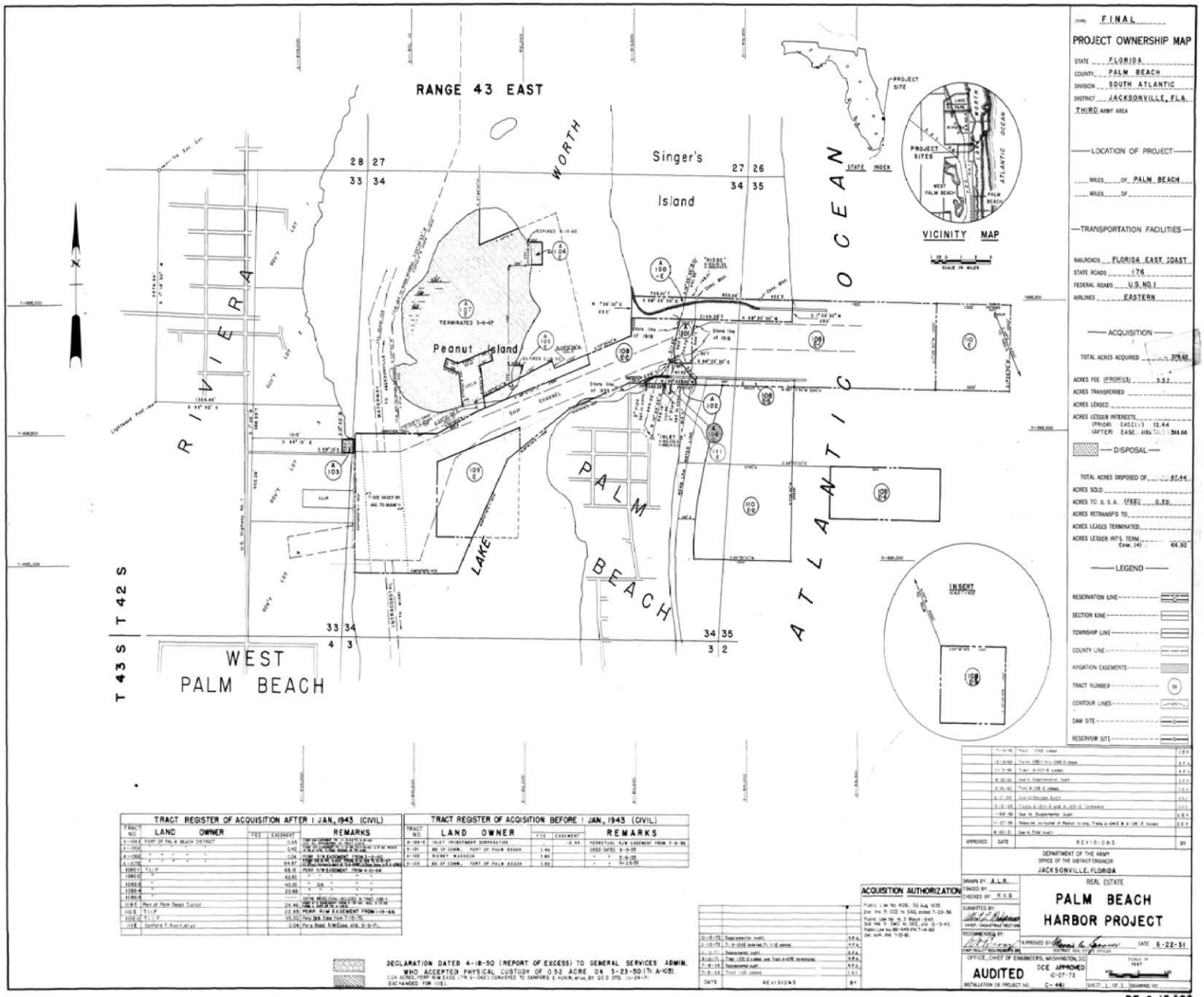

FINAL
PROJECT OWNERSHIP MAP
STATE FLORIDA
COUNTY PALM BEACH
DIVISION SOUTH ATLANTIC
DISTRICT JACKSONVILLE, FLA.
THIRD ARMY AREA
LOCATION OF PROJECT
MILES OF PALM BEACH
MILES OF
TRANSPORTATION FACILITIES
RAILROADS FLORIDA EAST COAST
STATE ROADS 176
FEDERAL ROADS U.S. NO. 1
AIRLINES EASTERN
ACQUISITION
TOTAL ACRES ACQUIRED 376.60
ACRES FEE (PROPER) 3.52
ACRES TRANSFERRED
ACRES LEASED
ACRES LESSER INTERESTS
(PRIOR) EASE. (1) 12.44
(AFTER) EASE. (15) 364.66
DISPOSAL
TOTAL ACRES DISPOSED OF 57.44
ACRES SOLD
ACRES TO G.S.A. (FEE) 0.52
ACRES RETRANSFD TO
ACRES LEASES TERMINATED
ACRES LESSER INT'S. TERM. (Con. (4)) 64.92
LEGEND
RESERVATION LINE
SECTION LINE
TOWNSHIP LINE
COUNTY LINE
AVIGATION EASEMENTS
TRACT NUMBER
CONTOUR LINES
DAM SITE
RESERVOIR SITE
RANGE 43 EAST
T 43 S | T 42 S
RIVIERA
WEST PALM BEACH
NORTH
Singer's Island
Peanut Island
LAKE
PALM BEACH
ATLANTIC OCEAN
PROJECT SITE
STATE INDEX
VICINITY MAP
PROJECT SITES
WEST PALM BEACH
PALM BEACH
ATLANTIC OCEAN
SCALE IN MILES
INSERT
TERMINATED 3-6-47
EXPIRES 1-13-60
SHIP CHANNEL
TRACT REGISTER OF ACQUISITION AFTER 1 JAN., 1943 (CIVIL)
TRACT REGISTER OF ACQISITION BEFORE 1 JAN., 1943 (CIVIL)
DECLARATION DATED 4-18-50 (REPORT OF EXCESS) TO GENERAL SERVICES ADMIN. WHO ACCEPTED PHYSICAL CUSTODY OF 0.52 ACRE ON 5-23-50 (Tr. A-103).
(124 ACRES, PERP. R/W EASE. (Tr. A-106) CONVERED TO SANFORD E. KUHN, et ux, BY QCD (TR. 11-24-7) (EXCHANGED FOR 110E).
ACQUISITION AUTHORIZATION
Public Law No. 408, 70 Aug. 1935
2nd Ind. Pr. OCE to SAD, dated 7-10-36
Public Law No. 14, 2 March 1945
3rd Ind. Pr. SAD to OCE, dtd 10-3-45
Public Law No. 98-645 PR 7-14-60
Det. auth. Ind. 7-12-60
DEPARTMENT OF THE ARMY
OFFICE OF THE DISTRICT ENGINEER
JACKSONVILLE, FLORIDA
REAL ESTATE
PALM BEACH
HARBOR PROJECT
DRAWN BY: A.L.R.
TRACED BY:
CHECKED BY: R.V.B.
SUBMITTED BY:
RECOMMENDED BY:
APPROVED BY
DATE 6-22-51
OFFICE, CHIEF OF ENGINEERS, WASHINGTON, D.C.
DCE APPROVED
6-27-72
AUDITED
INSTALLATION OR PROJECT NO. C-461
SHEET 1 OF 1
DRAWING NO.
RE-C 15,468
REVISIONS
DATE
BY

EXHIBIT F-4

DRAFT

ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITY FOR LAKE WORTH INLET NAVIGATION PROJECT

I. Legal Authority:

a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? **YES**
b. Does the sponsor have the power of eminent domain for this project? **YES**
c. Does the sponsor have "quick-take" authority for this project? **YES**
d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? **NO**
e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? **NO**

II. Human Resource Requirements:

a. Will the sponsor's in-house staff require technical training to become familiar with the real estate requirements of Federal projects including P.L. 91·646, as amended? **NO**
b. If the answer to IIa. is "yes," has a reasonable plan been developed to provide such training? **N/A**
c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? **YES**
d. Is the sponsor's projected in-house staffing level sufficient considering its other work load, if any, and the project schedule? **YES**
e. Can the sponsor obtain contractor support, if required in a timely fashion? **YES**
f. Will the sponsor likely request USACE assistance in acquiring real estate? **NO**

III. Other Project Variables:

a. Will the sponsor's staff be located within reasonable proximity to the project site? **YES**
b. Has the sponsor approved the project/real estate schedule/milestones? **YES**

IV. Overall Assessment:

a. Has the sponsor performed satisfactorily on other USACE projects? **YES**
b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/insufficiently capable. **HIGHLY CAPABLE**

V. Coordination:

a. Has this assessment been coordinated with the sponsor? YES/NO
b. Does the sponsor concur with this assessment? YES/NO

Date:_____

Prepared by:

_____
Lynn H. Zediak
Realty Specialist
REAL ESTATE DIVISION
JACKSONVILLE DISTRICT

Reviewed and approved by:

_____
Audrey C. Ormerod
Chief, Real Estate Division
REAL ESTATE DIVISION
JACKSONVILLE DISTRICT

APPENDIX G

LAKE WORTH INLET

Palm Beach Harbor

Preliminary Assessment Update
Palm Beach Harbor, Florida

National Harbors Program:
Dredged Material Management Plans

January 2013

Preliminary Assessment Update
Palm Beach Harbor, Florida

National Harbors Program:
Dredged Material Management Plans

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8 Conclusions 15
9 Recommendations 16

1 PROJECT NAME AND DESCRIPTION

The existing Federal navigation project, authorized in 1960, Lake Worth Inlet, is on the Atlantic Coast of Florida 47 miles north of Port Everglades and 71 miles north of Miami Harbor. The entrance channel is through an artificial cut across the barrier beach. An inner channel crosses Lake Worth (a narrow coastal lagoon), and connects the entrance channel to a turning basin at the terminal and transfer facilities of the Port of Palm Beach.

The currently authorized project, provides for:

1. An approach channel 35 feet deep over a bottom width of 400 feet and 0.8 mile long;
2. An inner channel that is 33-foot deep, 300 feet wide, and 0.3 mile long;
3. A main turning basin 33-foot deep over a trapezoidal bottom area with a turning diameter 1400 feet;
4. A secondary turning basin 24 feet deep over an irregular shaped bottom area with a turning diameter of 600 feet;
5. Maintenance of jetties at the channel entrance; and
6. Maintenance of the authorized channel.

Construction of the project included 2 feet of required overdepth in a portion of the entrance channel and turning basin due to rock at project depths. That overdepth was not for advance maintenance but rather to enable more efficient and economical maintenance in the future.

The Sponsor is the Port of Palm Beach District, P.O. Box 9935, Riviera Beach, FL 33419, 407-842-4201. The cooperation agreement in effect is a resolution which the Port of Palm Beach District signed on October 21, 1960.

This update will serve the following purpose:

1. To state that the current base plan can accommodate the O&M dredging events for the next 20 year planning horizon.
1. Include the proposed new work widening and deepening project, Lake Worth Inlet Feasibility Study and Integrated EIS, as well as associated operation and maintenance dredging for a 20 year planning horizon.
2. Include historic shoaling from 1994-2019.
3. Provide updated economic analysis
4. Include the additional advance maintenance and expanded settling basin from the Request for Additional Advance Maintenance Package, approved December 2011, as well as the updated recommendation for advance maintenance as proposed in the Lake Worth Inlet Feasibility Study and Integrated EIS.

2 AUTHORITY

House Resolution dated 25 June 1998 authorized the Lake Worth Inlet study:

"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Palm Beach Harbor, Florida, published as House Document 283, 86th Congress, 1st Session, and other pertinent reports, with a view of determining if the authorized project should be modified in any way at this time, with particular reference to widening the existing interior channel through Lake Worth Inlet."

ACT	WORK AUTHORIZED	DOCUMENTS
March 13, 1934 P.W.A. Program	Maintenance of improvements previously constructed by local interests.	H. Doc 185/73/2
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July 11, 1992	Authorized Port of Palm Beach to deepen the northern side of existing basin from 25 feet to 33 feet.	Permit Number: 199130682

3 ECONOMIC ASSESSMENT (2012)

OVERVIEW – COMMODITIES

Lake Worth Inlet connects the Palm Beach Harbor to the Atlantic Ocean. The port is located in Riviera Beach, Palm Beach County, Florida – 80 miles north of Miami and 135 miles (217 km) south of Port Canaveral. The Port of Palm Beach is the fourth busiest container port in Florida and the eighteenth busiest in the continental United States. The port is positioned well for growth due to its access to intermodal capabilities, as well as its acreage available for warehousing. The port has evolved into an export port (one of only 11 in the United States) and is a major nodal point for the shipment of bulk sugar, molasses, cement, utility fuels, water, produce, and breakbulk items. In addition, the Bahamas Celebration cruise ship is based at the port. Located in the heart of south Florida's tourism enclave, the port also serves significant recreational boat traffic.

The Port of Palm Beach, along with its tenants, is an economic engine for the county, state, and nation - contributing $260 million in business revenue and $12 million in state and Federal taxes. Over $7 billion worth of commodities move through the port each year, and approximately 2,400 people are employed directly and indirectly because of the port.

The Port of Palm Beach is a niche port, meaning, a relatively small number of commodities make up a large portion of the total tonnage that transits through the port. For example, cement and concrete,

molasses, sugar, and petroleum products represented roughly 10% of vessel calls in 2007. However, these same four commodity groups accounted for almost 60% of total tonnage that year Figure 3-1. In addition to traditional bulk commodities and general cargo, the Port is also home to an overnight cruise service to the Bahamas, a day-cruise that sails twice daily, and a containership operator that services the Caribbean islands on small container vessels. Throughout the following analysis, 2007 data is used as the baseline as it represents a typical level of historical commodity tonnage and vessel calls prior to the economic recession.

Figure 3-1: Comparison of Tonnage and Vessel Calls by Commodity Type[1]

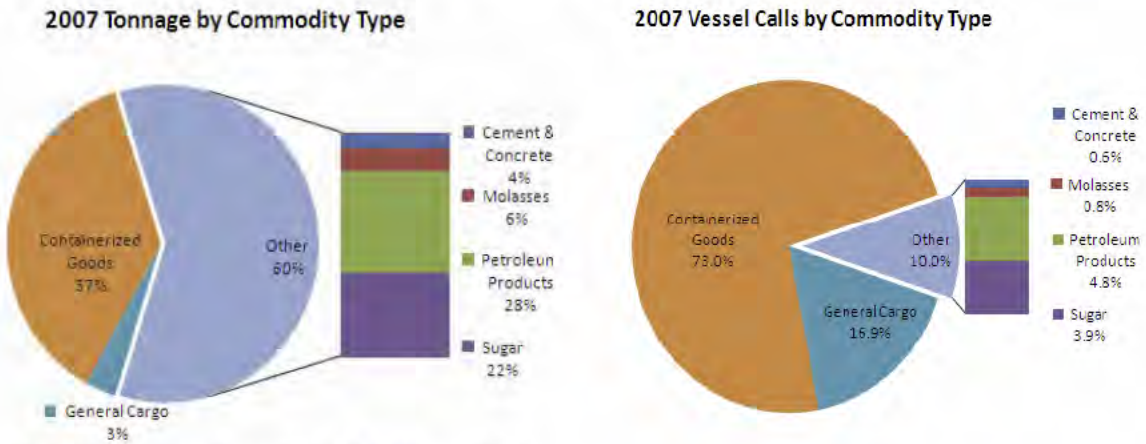


Figure 3-1 depicts the major bulk commodity tonnages for the period 1996 through 2010 that would be associated with the deepest draft vessels calling the port. Total major bulk cargo grew from 1.889 million tons in 1996 to 2.669 million short tons in 2004 for a combined annual growth rate (CAGR) of 4.415 percent. Bulk cargoes declined in 2005-2006 largely related to hurricane and storm disruptions, for example exports of molasses and receipts of fuel oil. Fuel oil has been declining recently due to the closure of the Riviera Beach power generation facility for renovations and modernization. Cement has declined due to the recent housing market price decreases. Not shown on this table is the recent substantial increase in diesel fuel and asphalt tonnage due to a new port tenant who is importing diesel and asphalt.

It is important to note that due to the economic recession, the demand for some commodities has temporarily declined, but that it is reasonable to assume that demand would rebound as the economic conditions of the nation improve.

The future commodity growth for a 50-year planning horizon from the base year of 2017 to 2067 is shown graphically in Figure 3-2.

[1] Source: Waterborne Commerce Statistics Center, GEC, and Port of Palm Beach Pilots' Log.
Notes: Petroleum Products includes: Residual Fuel Oil, Distillate Fuel Oil, Gasoline, Kerosene, and Asphalt.

Figure 3-2: Annual Cargo Tons through the Port of Palm Beach (1996-2009).

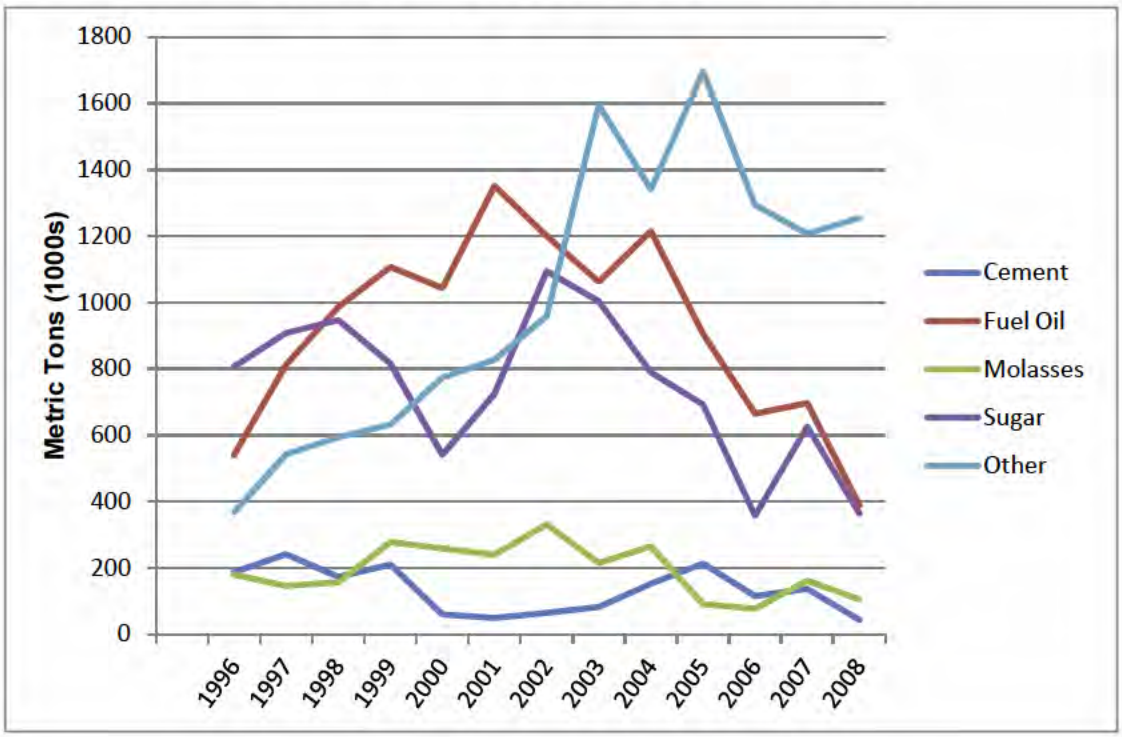
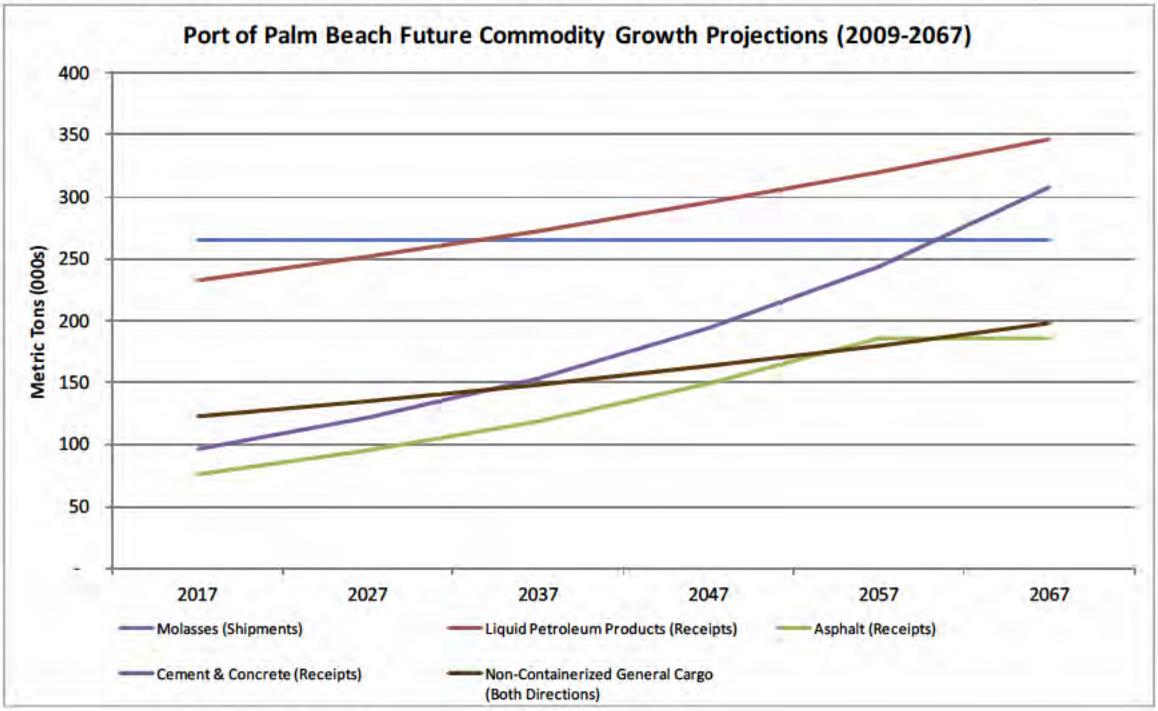


Figure 3-3: Future Commodity Movement Forecasts for Port of Palm Beach.



OVERVIEW - FLEET

Figure shows the total annual inbound and outbound vessel trips at the port between 1996 and 2010. The sharp decline in total vessel trips, which occurred between 1996 and 1999, is primarily due to a reduction in small domestic vessel calls. This is also shown by the increase in annual cargo tons during the same period (Figure 3-2). From 2000 to 2005, annual vessel trips were steady, while cargo tonnage continued to increase from 2000 to 2003, suggesting more cargo was being loaded on the same or larger vessels. Since 2005, both annual cargo tonnage and annual vessel trips have steadily declined. Figure 3-5 shows the number of vessel movements by draft from 2004 to 2010. Note that as the total movements have declined, movements that are 27 feet of draft and above have remained steady from 2006 to 2009 and increased substantially in 2010.

Figure 3-4: Port of Palm Beach Total Annual Vessel Trips

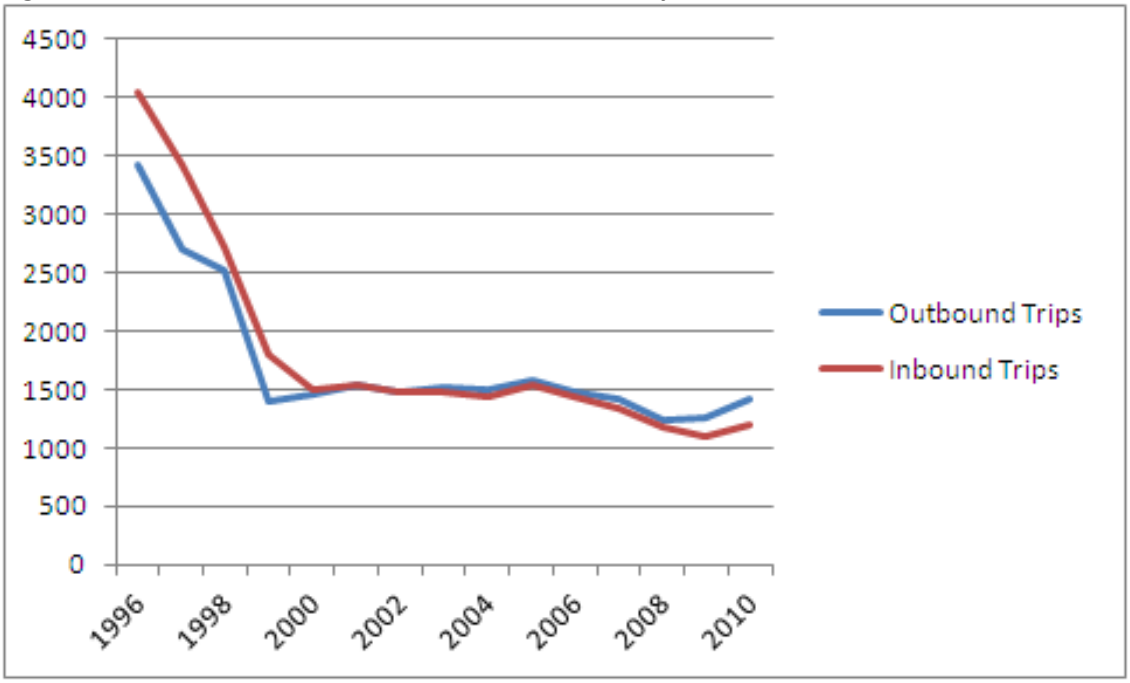
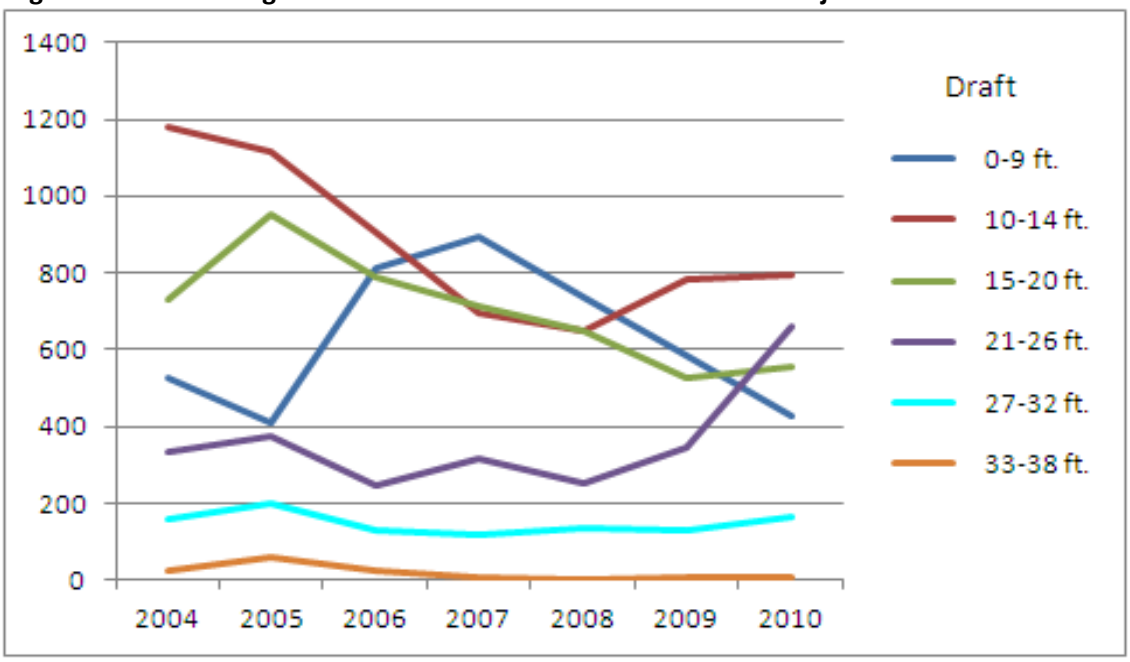


Figure 3-5: Benefiting Vessel Call Forecasts for Future Without-Project



4 MAINTENANCE DREDGING AND ADVANCE MAINTENANCE

Summary of Past PA:
Construction dredging occurred in 1938, 1948, 1951, 1965, and 1987. Initial construction of the navigation project involved the dredging of about 1 million cubic yards of material. Historical records indicate about 3.5 million cubic yards of material have been removed since 1950.

Shoals form in two primary areas of the entrance channel. The outer shoal builds up between mile -0.1 and 0.1 and has encroached to the channel centerline in the past. Surveys in 1993 showed depths of 9 to 10 feet northerly of the channel and due east of the north jetty. The predominantly southerly littoral drift moves material down the beach, around the east end of the north jetty and into the channel. The inner shoal builds up between Mile 0.2 and 0.3 with a depth of 28 to 31 feet usually near the center of the channel. Maintenance has been required 12 times for the 1978-93 period and the quantity of material has increased considerably over the past 10 years.

Maintenance dredging for 1991 through 1995 indicates the removal of 395,000 cubic yards from the project over the past 5 years which averages 79,000 cubic yards for that period. The wide variance in the amount of material dredged from year to year is attributed to the port's close proximity to the Gulfstream, coral rock bottom, and unbuffered susceptibility to storms from the northeast. A survey of the existing Federal project in November 1995 indicated two significant problem areas. Several feet of shoaling located on the south side of the entrance channel at mile 0.0. About 1-foot of shoaling is along the north and eastern sides of the shallower depth turning basin immediately adjacent to Peanut Island.

Update:
Per the "Request for Additional Advance Maintenance Dredging package", December 2011, hereafter in this report known as the **December 2011 report,** the annual shoaling rate during 1994 through 2009 in

144,000 cy. The average annual shoaling rate during 1994 though 2003 is 125,000 cy. The average shoaling rate during 2004 through 2009 is 176,000 cy. The hurricanes in 2004 and 2005 significantly increased the average annual shoaling rate even though the south jetty was sand-tightened in early 2004. Table 4-1 below shows annual shoal quantities for the years 1994 through 2009 (pg. 3, December 11 report)

Table 4-1: Historic Shoaling

No. of Events	Year	Cubic Yards
2	1994	169,700
1	1995	179,330
1	1996	150,110
1	1997	175,500
1	1998	55,100
1	1999	52,100
1	2000	143,600
1	2001	75,300
1	2002	151,900
1	2003	97,900
2	2004	275,500[2]
1	2005	305,500
2	2006	73,000[3]
1	2007	185,000
1	2008	157,800
1	2009	64,000

The December 2011 report gave approval to:

1. Construct an expanded existing settling basin with dimensions 550 feet by 500 feet at a dredging depth of 35’ + 2’ MLLW.
2. Construct and maintain an additional 2 feet (39’+2’ MLLW) of advance maintenance from Sta. 30+00 to Sta. 47+00 in the entrance channel.

Further advance analysis during the Lake Worth Inlet Feasibility Study and Integrated EIS (widening and deepening) determined the following modifications, shown in Figure 4-1 and Table 4-2.

[2] Routine and emergency
[3] Routine and emergency

Figure 4-1: Proposed modifications to Advance Maintenance

Table 4-2: All proposed modifications to Federal project and Advance Maintenance

Location	Required Depth + Overdepth (proposed)	Required Depth + Overdepth (future O&M)	USACE Boundaries (Approximate)
Feasibility Recommended Plan			
Entrance Channel with widened footprint	41 feet + 2 feet	41 feet + 2 feet	see drawings for widened footprint Rge, Stn (47.0 to 60.0)
Inner Channel with widened footprint	39 feet + 2 feet	39 feet + 2 feet	see drawings for widened footprint Rge, Stn (60.0 to 8.0)
Turning Basin (Main), with 150 foot ext to south	39 feet + 2 feet	39 feet + 2 feet	see drawings for widened footprint Rge, PI Stn (-1.4 to 17.2)
Turning Basin (Northern)	unchanged	25 feet + 2 feet	Rge (-500 to 150), PI Stn (10.1 to 19.6)
Slip 3 Deepening (Port of Palm Beach)	39 feet + 2 feet	39 feet + 2 feet	see drawings for widened footprint Rge and Stn
Advance Maintenance			
Settling Basin			
Settling Basin - SB4	35 feet + 2 feet	35 feet + 2 feet	Rge(-60 to -800), Stn(32.0 to 34.0)
Settling Basin - SB1	51 feet + 1 foot	49 feet + 2 feet	Rge(-60 to -800), Stn(34.0 to
Settling Basin - SB2	34 feet + 1 foot	32 feet + 2 feet	Rge(-60 to -800), Stn(37.5 to
Settling Basin - SB3	22 feet + 1 foot	20 feet + 2 feet	Rge(-350 to -800), Stn(38.0 to

Entrance Channel			
Zone A (rectangle)	51 feet + 1 foot	49 feet + 2 feet	Rge(400 to -40), Stn(30.0 to 40.75)
Zone A (trapezoid)	51 feet + 1 foot	49 feet + 2 feet	see drawings for widened footprint Rge, Stn(30.0 to 38.75)
Zone B	47 feet + 1 foot	45 feet + 2 feet	Rge(400 to -40), Stn(40.75 to 47.0)
Zone C	51 feet + 1 foot	49 feet + 2 feet	See drawings for Rge and Stn

These modifications to the advance maintenance plan would have been the proposed plan for the December 2011 report, had the Coastal Modeling System (CMS) been available at that time to model to this level accuracy 10 years ago. The CMS model makes it possible to more accurately predict the sediment transport.

This improved advance maintenance plan is recommended for the existing project, even if this new construction project is never built. The improved maintenance plan would normally be incorporated into existing maintenance and funded by the O&M program. However, the O&M program is not authorized to initially fund and construct areas which contain rock.[4] Therefore, this improved maintenance plan is submitted for approval with this feasibility study and this project will fund initial construction of this recommended advance maintenance plan, with the intent that future maintenance of those areas, after they no longer contain rock, will be funded out of the O&M program.

Future maintenance from project induced shoaling for the entrance channel, including advance maintenance, is projected at a rate of 33,000 cy/yr, and for the settling basin at a rate of 68,000 cy/yr for a total of 101,000 cy/year. That would be added to the current shoaling rate of 101,000 cy/year. With the improvements, however, a significant portion of the volume will be trapped in the settling basin and in the deeper portions of the entrance channel rather than the navigable potion of the channel. Therefore, the total maintenance volume estimate is 202,000 cy/2 yr. This is based on an average basis, depending upon storm activity, where there may be periods when dredging is required annually and others when dredging is not required until 3 years after the previous maintenance event. Based on experience from other construction deepening projects completed by the USACE, it is anticipated that the first maintenance event for the project will not be needed until the third year following initial construction. This is primarily due to the incorporation of required overdepth in the initial construction dredging.

The existing maintenance includes dredging 240,000 cy every year at a cost of $5,200,000 per year, and smaller hopper event every other year.

[4] ER 1130-2-520, dated 29 November 1996, page 8-1, specifically prohibits the dredging of advance maintenance in rock under the O&M program: "Advance maintenance involving removal of rock Is not authorized under the Operation and Maintenance, General appropriation."

The proposed advance maintenance assumes $7 million for initial construction cost and routine dredging of 250,000 cy every 2 years.

The December 2011 report stated that the frequency of dredging would be reduced from up to twice a year to once a year, and that AAEQ savings of $207,433 would be realized. The new recommended advance maintenance plan would propose to reduce the frequency of dredging to once every two years (24 maintenance dredging events over a 50-yr period of analysis) to produce an additional AAEQ savings of $250,588 when compared to the December 2011 report.

5 NEW CONSTRUCTION DREDGING

The Lake Worth Inlet Feasibility Study and Integrated EIS propose a plan which will dredge an initial quantity of approximately 2,000,000 cy in base year 2017. The quantity of material to be dredged, and associated placements sites, are shown in Table 5-1 :

Table 5-1: New construction quantities and placement sites

Item	Quantity (cubic yards)	Placement	Classification
Dredging Volumes			
(Federal)			
Entrance Channel	285,404	nearshore	Sand and Silty Sands
Entrance Channel	145,767	ODMDS	Rock, Interfingering Layers
Inner Harbor	910,129	ODMDS	Rock, Interfingering Layers
Inner Harbor	112,950	Seagrass Mitigation (Turtle Cove)	Sand and Silty Sands
Advance Maintenance	172,700	nearshore	Sand and Silty Sands
Advance Maintenance	12,000	ODMDS	Rock, Interfingering Layers
Settling Basin	258,000	ODMDS	Rock, Interfingering Layers
(Non-Federal)			
Port of Palm Beach Slip 3	71,415	ODMDS	Rock, Interfingering Layers
TOTAL DREDGING QUANTITIES	**1,968,365**		
Hardbottom Mitigation Construction			
Provide and place limestone boulders	25,100	Singer Island Artificial Reef Site	Quarried Limestone
North Jetty Stabilization			
PZC25 Sheetpile	200 LF, pile length = 63.5 feet		
*Rock is defined as: Thinly bedded and moderatelt hard limestone and sandstone			
*Interfingering layers are defined as: layers of sand, silty sand, limestone and sandstone			

6 DREDGED MATERIAL DISPOSAL SITE CAPACITY AND USAGE

Summary of Past PA:

Most of the dredging in Palm Beach Harbor has been in navigable waters of the United States. Historically, four areas were in use for disposal of dredged material as follows:

a. In an {interim} ocean dredged material disposal site (ODMDS);
b. On the beach south of the inlet;
c. On Peanut Island; and
d. Along a near shore area south of the inlet.

Interim ODMDS: Existing records from 1970 to 1984 indicate the dredged material from the channel and turning basin maintenance went into an ODMDS with a depth of 17 feet. The sand transfer plant moved material from north of the inlet to south of the inlet.

Beach: From 1984 to 1996, suitable material from the maintenance of the project went on the beach. The State of Florida and the sponsor want to put as much suitable material as possible on the beach. Roughly 395,000 cy of material went on nearby beaches {permitted template} from 1991-1995. Sediment testing in the past indicates that channel shoal material is suitable for beach disposal. No pollutants or unacceptable amount of fines are in that material to prevent beach placement. As long as the material is suitable, beach disposal is good for over 20 years in order to keep material in the littoral drift. Renourishment of the beach is important also as mitigation for the inlet impacts on the littoral drift material.

Peanut Island: Peanut Island is an artificial island comprising about 5.8 million cubic yards of dredged material. It has two owners, the Florida Inland Navigation District (FIND) and the Port of Palm Beach. FIND owns the northern portion of Peanut Island, while the Port of Palm Beach owns the southern portion of the island.

Beneficial Use: Beneficial uses are dredged material to improve the environment usually involves fill for habitat restoration. A borrow pit with depths of 30 feet and located 2.5 miles west of the project was identified but is currently filled to capacity.

Programmed Maintenance Dredging Summary: The programmed amount of dredged material averages 100,000 cy each year, from 1996 to 2005, and the annual maintenance cost is projected to be $1.7 million.

Assessment of the 1996 PA:

Disposal Options – Will remain the same as PA 1996. Only new difference is new construction and new advance maintenance construction.

The interim ODMDS site has been replaced with a new ODMDS site, located approximately 4.5 miles east of Lake Worth Inlet. The new ODMDS has not been used to date. The permitted beach template and nearshore area still remain active. The FIND site on Peanut Island is unlikely to be of use to the USACE, and it of limited capacity. The Port of Palm Beach owns the southern portion of Peanut Island, but capacity is limited. To be of use, this site would need to be expanded by dike raising, and the cost would likely be cost prohibitive.

Updated List:

a. In the new ocean dredged material disposal sites (ODMDS);
b. On the beach south of the inlet;
c. Along a near shore area south of the inlet;
d. Midtown Beach Placement
e. Beneficial use options

ODMDS: This site is permitted by EPA, but would require testing the first time it goes online with a project. It can currently accept 500,000 cy per event. The 2004 SMMP[5] states the following: "The capacity of the Palm Beach Harbor ODMDS has not been determined. Modeling conducted by the Coastal Engineering Research Center (CERC) was conducted for a single project volume up to 500,000 cubic yards. Therefore, use of the ODMDS will be restricted to 500,000 cubic yards of dredged material per project. Projects in excess of 500,000 cubic yards of dredged material will require additional capacity studies prior to utilization of the ODMDS."

During USACE coordination with EPA throughout this feasibility study (2012), EPA noted that the original purpose of the ODMDS was for maintenance material, and that the current estimated 1.4 million cubic yards which would be dredged and placed in the ODMDS for the NED plan is beyond the intent of the ODMDS design. As a result, per conversations with EPA, for USACE is in the process of conducting a modeling study to look at the distribution of the proposed material (rock and sediments) to determine the resulting footprint on the seafloor and associated mounding, and the results will be known prior to (pre-construction, engineering, and design) PED phase. Should materials exceed the ODMDS footprint, site expansion could be determined necessary. Based on the existing site configuration and conditions at the Palm Beach ODMDS and the amount of proposed dredged material from the tentatively selected plan, it is not likely (low risk) that an ODMDS expansion would be necessary for this site.

In addition, prior to disposal in the ODMDS, the USACE will assess the dredged material to determine if it meets the Ocean Dumping Criteria in 40CFR226, in accordance with the 2009 Palm Beach ODMDS SMMP.

Beach: The State of Florida and the sponsor want to put as much suitable material as possible on the beach. Sediment testing in the past indicates that channel shoal material is suitable for beach disposal. No pollutants or unacceptable amount of fines are in that material to prevent beach placement. Renourishment of the beach is important also as mitigation for the inlet impacts on the littoral drift material.

The placement of beach quality material from R-76 to R-79 (above the MHW line to vegetation) is currently being done for operation and maintenance material and will likely continue to be done in the future; however, placing material above the MHW line for the new feasibility project would incur large real estate costs, which would not make it a least cost placement options. Therefore, this option is not considered to be part of the tentatively selected plan.

Nearshore: The nearshore can accept a lesser percent of fines than the beach and is a valuable way to keep sand in the natural system while abiding by state standards. Near shore quality sand would be placed in the near shore (below the MHW line) between DEP range monuments R-76 to R-79. This is a least cost placement option and also allows beneficial use of the material for recreation and wildlife, which is an incidental benefit. The nearshore can accept all sandy material from the new project, as well as ongoing maintenance material.

Beneficial Use: Several beneficial use areas exist within the lagoon area and capacities greatly vary. However, there is not one particular beneficial site which would be able to accept all of the material for the new construction project. For this reason, beneficial use sites will be considered when capacity,

[5] The SMMP was updated in 2009 with revisions, but this requirement was transferred with the update.

material type, and availability are appropriate. Beneficial use sites are a part of the base plan when they are least cost.

The placement of beach quality material from R-76 to R-79 (above the MHW line to vegetation) is currently being done for operation and maintenance material and will likely continue to be done in the future; however, placing material above the MHW line for a new project would incur large real estate costs, which would not make it a least cost placement options. Therefore, this option is considered beneficial use for the new construction project.

Other opportunities exist in the project vicinity such as the filling of anoxic deepwater holes in Lake Worth Inlet Lagoon, creation of habitat for submerged aquatic vegetation such as seagrasses and/or placement or at the Mid-Town beach placement area. It is not anticipated that these alternative forms of disposal will result in any cost savings to the project; however, if cost increases are considered small or if there is a non-federal interest in paying for any increased cost difference, these alternatives are preferable and could be further developed and incorporated into the project during the pre-construction, engineering, and design phase (PED).

7 ENVIRONMENTAL COMPLIANCE

An Environmental Assessment (EA) on the effects of maintenance dredging the project and disposal of materials is on file with the U.S. Environmental Protection Agency (EPA). An Environmental Impact Statement (EIS) is integrated into the report for the new construction project. In the project area, wildlife includes a wide variety of shore and sea birds, small mammals, reptiles, amphibian and fishes. Threatened-to-endangered species that are often found in the project area are listed below: Mammals (manatee); Birds (Bald eagles, Red-cockaded woodpecker, Eastern brown pelican); Reptiles (American crocodile, Alligator, Green sea turtle, Loggerhead sea turtle).

Manatees frequent the heated water discharge area at the Florida Power and Light Company's Riviera Beach Station located just south of the project. Some of those manatees could pass areas undergoing maintenance dredging. Maintenance dredging contracts for the area include cautionary requirements for manatees.

8 CONCLUSIONS

Preliminary assessment of the Palm Beach Harbor plan for disposal of the shoal material indicates no major problems for the foreseeable dredging cycle. Future dredging cycles for the existing federal project and project induced shoaling may use the areas including the beach, nearshore, ODMDS, and beneficial use sites, when appropriate and when cost increment is paid for by a non-federal sponsor. Almost all the material from the entrance channel is suitable for beach placement. Future placement of most material is likely to continue going on the beach as the State and sponsor strongly support that method. The beach disposal area has not had a capacity problem in th past and is not likely to have one in the next 20 years or more. The ODMDS and nearshore have sufficient capacity for the new construction dredging.

The economic viability of Palm Beach Harbor is not in question at the present time. Continued maintenance is essential to the movement of cargo through terminals in the harbor. Port related industries have a significant investment in terminals and infrastructure to handle the tonnage volume.

Environmental compliance does not appear to be in question. Water Quality Certification (WQC) is current with periodic environmental assessments.

9 RECOMMENDATIONS

Continued maintenance of this project is warranted on the basis of project usage and indicators of economic productivity, sufficient potential disposal capacity, and maintenance activities in compliance with current applicable laws and regulations for the next 20 years. Therefore, no additional dredged material management plan is necessary beyond this assessment.