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LIST OF ACRONYMS

BMPs - Best Management Practices
CBRA - Coastal Barrier Resource Act
CCCL - Coastal Construction Control Line
CEQ - Council on Environmental Quality
CFR - Code of Federal Regulations
CZMA - Coastal Zone Management Act
CZMP - Coastal Zone Management Plan
dBA - decibels, “A-weighted”
EA - Environmental Assessment
EFH – essential fish habitat
EIS - Environmental Impact Statement
EO - Executive Order
EO 11988 - Floodplain
EO 11990 - Wetlands
EO 12898 - Environmental Justice
EO 13045 - Protection of Children
ESA - Endangered Species Act
FEMA - Federal Emergency Management Agency
FIRM - Flood Insurance Rate Map
FL DEP - Florida Department of Environmental Protection
FONSI - Finding of No Significant Impact
FWCC - Florida Fish and Wildlife Conservation Commission
MLW - mean low water
MWL – mean water level
NAAQS - National Ambient Air Quality Standards
NEPA - National Environmental Policy Act
NMFS – National Marine Fisheries Service
NOAA - National Oceanic and Atmospheric Administration’s National Marine Fisheries
NTU - nephelometric turbidity unit
NWI - National Wetland Inventory
PA - Public Assistance
PAHs – polycyclic aromatic hydrocarbons
PW - Project Worksheet
Section 10 Permit – Rivers and Harbors Act Work in Navigable Waters Permit
Section 404 Permit - Clean Water Act Dredge and Fill Permit
SHPO - State Historic Preservation Officer
SSE - south-southeast
USACE - U.S. Army Corps of Engineers
USEPA - U.S. Environmental Protection Agency
USFWS - U.S. Fish and Wildlife Service

1.0 INTRODUCTION

1.1 Background

Hurricane Frances formed in the Southern Atlantic on August 25, 2004; it strengthened to a Category 4 hurricane on August 31, 2004 and made its initial landfall on south Hutchinson Island on September 5, 2004 as a Category 2 hurricane. After landfall, Frances turned northeast back into the Gulf of Mexico. Hurricane Frances then moved northwestward through the Gulf of Mexico and made a final landfall near the Florida Big Bend region on September 6, 2004. In anticipation of landfall, President George W. Bush issued a major disaster declaration (FEMA-1545-DR-FL) in conformance with the Robert T. Stafford Disaster Relief and Emergency, as amended by *Public Law 106-390*, the Disaster Mitigation Act of 2000 on September 4, 2004. As a result, the entire State of Florida was declared eligible for Public Assistance (PA) Categories A and B work, and 52 counties were declared eligible for PA categories C-G work, including St. Lucie County.

The City of Fort Pierce has applied to the Federal Emergency Management Agency (FEMA) for assistance with repairs to their City Marina and installation of a Storm Protection System within the Indian River Lagoon for hazard mitigation. The Fort Pierce City Marina is a public marina located on the downtown waterfront in the City of Fort Pierce, Florida. It is located on the western shore of the Indian River Lagoon in St. Lucie County, at latitude 27.4508°, longitude -80.3218°. The project location is shown in **Appendix A - Exhibits 1 and 2**.

As a result of Hurricane Frances, the City of Fort Pierce's marina was severely damaged. The outer harbor area was completely destroyed; docks near the entrance to the inner harbor were severely damaged. Docks at the outer harbor were destroyed when the hurricane caused failure of the concrete pilings anchoring the floating docks. Boats were sunk or destroyed in both the outer and inner harbors. In all, 150 public marina slips were lost and 69 boats were sunk or destroyed.

It is unclear which force(s) caused the most damage. Because the storm stalled and hurricane force winds lasted for 32 hours, water levels were high and currents within the vicinity were reported to be as high as 10-12 knots. The outer piles of the docks were bent by the forces, and the inner piles broke off approximately six feet from the river bottom. The loss of the 69 vessels and damage to an additional 27 boats from this storm event totaled approximately \$26 million; the loss of the marina was an additional \$15.5 million. Damage to the docks was caused by both the storm surge and by the boats breaking free from their moorings and being flung up against the docks. In addition, \$15 million of public infrastructure was lost when the City's waterfront was destroyed. The loss of the outer marina has resulted in an annual loss of \$8.5 million and \$1.5 million per year in gross revenues to St. Lucie County and the City of Fort Pierce, respectively.

Photographs on the cover of this report can be referenced in order to see the damage caused by Hurricane Frances. The top left image was taken prior to Hurricane Frances. It shows both the inner and outer harbors. The bottom photo shows the same area a short time after Hurricane Frances. Clean up has started but much of the debris, including destroyed boats

and docks, is still evident. The top right photo shows the Fort Pierce City Marina after clean-up was completed and as it exists today.

1.2 Project Authority

This Final Environmental Assessment (EA) is prepared in accordance with Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended. In accordance with the NEPA, the President's Council on Environmental Quality (CEQ) has developed regulations for implementing the NEPA. These federal regulations, set forth in Title 40, Code of Federal Regulations (CFR) Parts 1500-1508, require an evaluation of alternatives and a discussion of the potential environmental impacts of a proposed Federal action, as part of the EA process. The FEMA regulations, which establish FEMA's process for implementing the NEPA, are set forth in 44 CFR Subpart 10.

The purpose of this EA is to analyze the potential environmental impacts of the proposed project and alternatives, including no action, and to determine whether to prepare an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI). In accordance with above referenced regulations and FEMA's own regulations for NEPA compliance found at 44 CFR Part 10, FEMA is required during decision making to fully evaluate and consider the environmental consequences of major federal actions it funds or undertakes.

2.0 PURPOSE AND NEED

The Fort Pierce City Marina is an important regional resource, as well as an economic factor for the City of Fort Pierce and St. Lucie County. The marina plays a significant role in boating on Florida's Atlantic coast because it is the only publicly owned marina with direct ocean access between Port Canaveral and Fort Lauderdale, each 150 miles away in either direction. (**Appendix A, Exhibit 3** is a map indicating the locations of the public marinas located on Florida's coasts.) As such, the Fort Pierce City Marina specializes in providing a vital service in overnight dockage for transients and tourists. Transient dockage is becoming safety-critical in Florida. The closest marina along the mainland is to the north, the Harbor Town Marina, which is a privately owned marina. The Harbor Town Marina is located approximately three miles north, just inside Fort Pierce Inlet and directly astride the Atlantic Intracoastal Waterway. There are no similar public or private mainland marina facilities within reasonable distance to the south.

In addition to providing vital transient docking services, the Fort Pierce City Marina provides economic benefits to the City because of the sale of fuel, docking fees, and profits derived from tourist services such as restaurants, shopping, vessel provisioning, hotels, and local repair facilities. Charter boats also utilize the marina, and the marina has hosted approximately 12 fishing tournaments a year, as well as numerous boat shows and boat club events.

The City waterfront is used by the local community as public green space for regular gatherings such as Friday Fest and the Farmer's Market. The waterfront parks, marina, river walk, and amphitheater are host to many annual art and music festivals. It is very important to the City officials that the natural and scenic views of the waterfront be maintained and that any project considered enhances the lagoon and fisheries the City depends on for recreation and livelihoods.

The purpose of the action presented in the proposed project is to rebuild the Fort Pierce City Marina harbor areas to pre-disaster conditions and install a Storm Protection System that will provide protection for both the inner and outer harbors, and the City's waterfront, from a 100-year storm event. The need for the project is to restore an important regional boating resource, restore the lost income to the City of Fort Pierce that has occurred as a result of the lost outer harbor, and provide hazard mitigation to protect the harbor areas, public parks, and waterfront walkways that face the marina from future storm events.

The City of Fort Pierce is situated in a precarious location on the Florida peninsula. Since 1871, 51 storms have come within 60 miles of the City's waterfront. This represents an approximate average of one tropical storm every six years.

3.0 ALTERNATIVES ANALYSIS

3.1 Alternatives Considered and Dismissed

3.1.1 *Repair to Pre-Disaster Conditions*

The *Repair to Pre-Disaster Conditions Alternative* would restore the marina to its approximate pre-disaster conditions.

Prior to September 24, 2004, the Fort Pierce City Marina consisted of both an inner harbor and two outer harbor facilities. The inner harbor has been repaired and consists of an off channel basin with eight fixed docks. Fueling and sewage pump-out facilities are located at the entrance to the inner harbor. The outer harbor consisted of two docking facilities; one southern 3-dock system and another dock system north of the basin opening to the open waters of the Indian River Lagoon. The outer harbor contained a total of 47,519-square feet of floating docks that housed approximately 130 slips. The two docking facilities contained two wave attenuators / breakwaters and finger piers with 12-inch diameter timber mooring and bumper piles. A seawall was located along the shoreline and two small observation decks were waterside of the seawall.

Under *the Repair to Pre-Disaster Alternative*, no hazard mitigation in the form of a Storm Protection System would be constructed. The outer harbor would be repaired to pre-disaster conditions. Only the wave attenuators would be in place to protect the outer harbor against waves and storm surge events.

This alternative was dismissed from consideration because it would permit the City Marina to remain vulnerable to hurricane force winds and storm surges. This vulnerability jeopardizes both the revenue generated for the City and the vital services that the City of Fort Pierce provides to the boating public.

3.1.2 *Fort Pierce City Marina and Storm Protection System Conceptual Design*

The *Fort Pierce City Marina and Storm Protection System Conceptual Design* was the original Fort Pierce City Marina and Storm Protection System Conceptual Design. Under this alternative, the City of Fort Pierce was proposing to restore the marina to its approximate pre-disaster conditions. The outer harbor would have been constructed in the same configuration as that which existed prior to the storm, to provide for approximately 130 boat slips.

Under this alternative, Fort Pierce was proposing to develop a Storm Protection System that would provide 100-year storm wave protection for the marina. This would have been accomplished by providing island breakwaters and floating wave attenuators. The floating wave attenuators would make up the outer docks of the marina and function both as berthing facilities and as dissipators of storm wave and current energies. In this alternative, an island breakwater system would have been

constructed which consisted of three low-crested islands. The outer marina would also have had floating wave attenuators installed.

The *Fort Pierce City Marina and Storm Protection System Conceptual Design* was extensively studied using computer modeling. Based on that modeling, it was determined that this design did not provide the level of protection necessary for a 100-year storm event. This design was therefore dismissed from further study.

3.1.3 Fort Pierce City Marina and Alternative Storm Protection System Conceptual Design

This alternative was the second *Fort Pierce City Marina and Alternate Storm Protection System Conceptual Design*. Under this alternative, the southern docks of the outer harbor would not have been constructed in exactly the same configuration as that which existed prior to the storm. Under this alternative, the northern docks of the outer harbor would have re-configured to provide seven additional slips.

Under this alternative, Fort Pierce was proposing to develop a Storm Protection System for the marina by constructing supplemental wave protection in the form of island breakwaters, installing a panel breakwater east of an existing shoal area, and installing a floating wave attenuator north of the marina. In addition, the new configuration of the north dock in the outer harbor was straightened and was not at the angle that occurred with the pre-disaster configuration. The proposed island breakwater system would have consisted of two low-crested islands which would have been larger and more robust than those considered in the original conceptual design. The islands would have been larger and designed to take the full wave loading during a 100-year storm. A panel breakwater would have been installed east of an existing shoal area in order to provide protection from storm waves coming from the east. The breakwater would have been in a zigzag configuration to lower current velocities. This design would have provided additional protection because the more robust breakwater islands would have been less susceptible to failure.

The *Fort Pierce City Marina and Alternate Storm Protection System Conceptual Design* was extensively studied using computer modeling. Based on that modeling, it was believed that this preliminary design would provide the level of protection necessary for a 100-year storm event. A physical model was developed using this design and the physical model was studied in a large wave pool. The physical model study determined that this design caused unacceptable scour and reflected wave energy within the Indian River Lagoon; it was therefore dismissed from further study. Using the physical model within the wave pool, this design was altered until a design was developed that provided for the necessary hazard mitigation protection while resulting in minimal scour and reflected wave energy. The design developed using the physical model is the *Proposed Alternative*.

3.1.4 Vertical Wall with Riprap

This alternative considered rebuilding the marina with a stronger wave protection system consisting of a vertical wall. The original marina was protected by substantial wave attenuation devices constructed on the outside portions of the L-dock in the northern facility and the A-dock on the southern facility. This design allowed for an upgrade to this system.

The design for this alternative included vertical walls faced with riprap at the structure toe for breakwater protection for the marina. The vertical walls were evaluated to determine if this alternative could provide effective protection from the large waves that can be generated over the long open water fetch to the southeast of the site, as well as the high magnitude tidal currents resulting from the nearby Fort Pierce Inlet and the waterbody constriction at the causeway.

Vertical breakwater systems can be effective in protecting the area they enclose from large wave conditions. There are, however, some significant disadvantages with the application of vertical breakwaters in the Fort Pierce Marina physical environment. The first disadvantage results from the placement of a generally continuous walled enclosure in a high current environment. Tidal flows are significantly displaced and current magnitudes outside of the enclosure would be increased. The vertical breakwater system was determined to have serious potential for scour damage to adjacent seagrass beds which exist in the project vicinity. The higher tidal current environment would also exacerbate the difficult maneuvering challenges that boaters face when approaching and berthing at the marina.

Vertical breakwater structures are brute force wave protection alternatives. They must resist the entire force on an incident wave and reflect it back in the opposite direction. The reflection process would have resulted in wave heights at the wall that are twice as high as the incoming waves. As a result, the vertical breakwaters must be higher in profile than other wave protection alternatives and must be massive to resist the high level of wave forces. The reflected waves can also be the source of damage to adjacent facilities and marine resource areas.

Finally, vertical breakwaters create an effective barrier to the movement of both water and marine species through the marina area. They can also impact the ability of the marina to flush, with the result being a chronic buildup of contaminants within the basin. Enclosing the marina facilities within a solid breakwater structure would block the movement or travel of marine species, such as manatees, through the project area.

An analysis of this alternative revealed that it would result in direct impacts that would include 0.86 acre of seagrass beds impacts, have an overall 7.66-acre project footprint, and result in the placement of 136,972 cubic yards of fill in the Indian River Lagoon. Approximately 76,118 cubic yards (2.21 acres) of the riprap associated with the project would serve as artificial reef Essential Fish Habitat and would offset some, but not all, of the functional loss of the seagrass beds. The submerged limestone rock

would provide a substrate for vegetation, corals, and other organisms to colonize; as well as provide habitat and foraging areas for many estuarine fish and invertebrate species.

This alternative was dismissed from further consideration because of technical difficulties and environmental impacts. These impacts would have included the potential for scouring of adjacent seagrass beds, increased tidal currents which would create safety issues for boaters trying to moor their vessels, and the reflected waves which would have caused damage to the docking facility. Additionally, the enclosure of the marina would have created a water quality problem due to inadequate flushing and the wall would have impeded the migration of manatees through the project area.

3.2 No Action Alternative

The *No-Action Alternative* consists of not replacing the outer harbor at the Fort Pierce City Marina, and not constructing the Storm Protection System. Currently, the inner harbor of the marina has been repaired under Project Worksheet (PW) 438. These repairs restored the inner harbor to their pre-disaster condition. When the Storm Protection System was proposed as hazard mitigation after the inner harbor was restored, PW 438 was re-written to include the proposed project. The *No-Action Alternative* therefore consists of allowing for the repairs and restoration of the inner harbor which have already occurred, but not replacing the outer harbor's approximately 130 slips nor installing the proposed hazard mitigation.

This alternative has the same failings as the *Repair to Predisaster Conditions* discussed in Section 3.1.1. Although that alternative was dismissed from consideration because it would allow for the City Marina to remain vulnerable to hurricane force winds and storm surges, thereby jeopardizing revenue and services, the *No Action Alternative* will be considered for compliance with NEPA.

Further discussions related to this alternative will refer to it as the *No-Action Alternative*.

3.3 Proposed Alternative

The City of Fort Pierce is proposing to repair the outer harbor to its public City Marina, as well as provide hazard mitigation. The marina is located in the downtown waterfront in the City of Fort Pierce, Florida. It is located on the western shore of the Indian River Lagoon in St. Lucie County. The inner harbor is located at latitude 27.4508°, longitude -80.3218°.

The proposed project consists of repairing the City Marina's outer harbor to its approximate pre-disaster conditions and installing hazard mitigation consisting of a Storm Protection System. The Storm Protection System will provide protection from waves coming from a south-southeasterly direction during a 100-year storm event; it will protect the Fort Pierce City Marina's outer and inner harbors, as well as publicly owned waterfront properties.

The City of Fort Pierce has already completed repairs to the City Marina's inner harbor and service facilities and is proposing to now reconstruct the outer harbor. Fort Pierce is

proposing to reconstruct the outer harbor of the marina by maintenance dredging the area to the U.S. Army Corps of Engineers (USACE) and the Florida Department of Environmental Protection (FL DEP) permitted elevation of -8.0 feet mean water level (MWL). In the outer harbor, the City will install two dock complexes consisting of northern and southern dock units. The southern dock previously contained 98 slips and covered 34,038 square feet. The new southern dock will also contain 98 slips within the same area. The northern dock in the outer harbor previously contained 32 slips in an area of 12,481 square feet. The proposed new northern dock will contain 39 slips in an area of 13,310 square feet, for an increase of seven slips. The outer harbor entrance will be moved from the south side to the northern portion of the harbor to improve public access and navigation safety.

The City of Fort Pierce proposes to mitigate against future storm events by including a Storm Protection System that consists of one large (10.51 acres) Storm Protection Island located southeast of the outer harbor; a series of 11 smaller Free Form Breakwater Habitat Islands (totaling 3.52 acres) located east of the outer harbor; and Tombolo Point, a 0.64-acre peninsula constructed off of the bulkhead south of the outer harbor (see **Appendix A, Exhibit 4** for plan views of proposed project)

The Storm Protection Island and Tombolo Point will be constructed using sand filled Geotubes which will form the outer boundary of the structure. Once the geotubes are filled, the internal area will be filled with sand. The large Storm Protection Island will be anchored by T-shaped riprap revetments (t-groins). Additionally, rock-filled marine mattress units will be used to armor the Geotubes on the large Storm Protection Island. A veneer of sand will be provided to complete the Storm Protection Island and Tombolo Point. Native vegetative plantings will be added to enhance shoreline stabilization. The large Storm Protection Island will include various construction materials placed at different elevations, and vegetative plantings matched to the materials and elevation; the Storm Protection Island will provide a diversity of habitat. (See **Appendix A, Exhibit 5** for a plan view of the habitats provided by the large Storm Protection Island and **Exhibit 6** for a plan view of the habitats provided by Tombolo Point.)

Sand for the Storm Protection System and Tombolo Point will be obtained both from the harbor dredging project (discussed above) and from Stewart Mining Industries. The sand obtained from the harbor dredging will be used as a veneer on the top of the Storm Protection Island and Tombolo Point in order to match native sands in the project area. Sand obtained from Stewart Mining Industries will meet FL DEP permitting requirements related to the matching of native sands in the project area.

The 11 Free Form Breakwater Habitat Islands will be constructed east and northeast of the outer harbor. These Free Form Breakwater Habitat Islands will be constructed with Geotube cores. In contrast to the Storm Protection Island, the Free Form Islands do not include any sand fill and the Geotube cores will be covered with natural limestone rock to provide a breakwater armor layer of protection. The Free Form Breakwater Habitat Islands will be planted with mangroves to stabilize the islands and provide habitat (See **Appendix A, Exhibits 7a** and **7b** for plan views of habitats provided by these structures.)

The Storm Protection System will provide hazard mitigation against future storm events, as well as enhance the Indian River Lagoon by creating habitats including oyster beds, lime-rock artificial reefs, mangrove fringes, and coastal dune. Mangroves and coastal dune vegetation will be planted to stabilize the islands and provide habitat. Oyster shells and lime rock will be used at lower elevations to promote the establishment of oyster beds, hardbottom communities, and other essential fish habitats. The Storm Protection System will also lower current velocities within the outer harbor. The lowering of current velocities within the outer harbor area is anticipated to result in the creation of an estimated 5.2 acres of seagrass recruitment areas.

The Storm Protection System will also provide hazard mitigation for privately and publicly owned river front property. The river front property in the vicinity of the City Marina includes the Indian River Memorial Park/Community Center, Gazebo Park, a boat ramp and nature center, an amphitheater, promenade for waterfront viewing, and two City-owned restaurants.

The engineering design of the Storm Protection System has been independently reviewed by two separate entities. Moffat & Nichol provided a review on behalf of FEMA; they verified the project's technical feasibility, performance standards, model input, and probable longevity. In addition, the U.S. Army Engineer Research Development Center, Coastal and Hydraulics Laboratory reviewed the design on behalf of the USACE. The Coastal and Hydraulics Laboratory reviewed the design for technical feasibility, model appropriateness, and probability that the design would perform as anticipated. On-going coordination with these reviews has occurred and details identified during the reviews have been incorporated into the current project design. A copy of the Moffat & Nichol engineering report may be obtained from Richard Czapinski of Tetra Tech or Cheryl Nash of AECOM upon request (see Section 10.0 for contact information).

Further discussions related to this alternative will refer to it as the *Proposed Alternative*.

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

4.1 Summary of Impacts and Mitigation

This section addresses specific information related to environmental resources, sensitive issues, locations of interest, and impacts that may occur as a result of the project. Also included is a discussion of the avoidance, minimization, and mitigation measures that are proposed. The following Summary Table is included to provide an overall understanding of the impacts and proposed mitigation.

AFFECTED ENVIRONMENT and CONSEQUENCES				
Impact Summary				
Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Water Resources/Water Quality</i>	4.2	Water Quality: Continuation of existing conditions, including high turbidity due to currents.	Water Quality: Short term, negative impacts due to increased turbidity during construction. Long term, minimal negative impacts due to boat propeller wash and oil/gasoline leaks. Long term, positive impacts due to permanent improvements in turbidity due to the lowering of current velocities, resulting in decreases in sediment scour and transport. Reduced shoaling and the resulting reduced need for maintenance dredging will also result in improved turbidity.	Water Quality: The City of Fort Pierce will control turbidity during construction to reduce water quality impacts. For near shore work and work within the Indian River Lagoon, the contractor will be required to use both mixing zones and fixed turbidity barriers. Ft. Pierce has obtained a FL DEP permit (Permit No. 56-0129156-011) which allows a mixing zone methodology and allows for increased turbidity within a distance of 150 meters in the up and down current directions of the construction operations. FL DEP has

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Water Resources/Water Quality (continued)</i>	4.2	<p>Floodplains: None</p> <p>Wetlands: None</p>	<p>Floodplains: Long term, minimal impacts due to the placement of 14.66 acres of fill for the Storm Protection System. Long term, positive impacts to public property through protection during future events due to the Storm Protection System.</p> <p>Wetlands: None</p>	<p>approved a turbidity monitoring program that will be implemented to prevent water quality impacts from reaching unacceptable limits</p> <p>Chromated-copper-arsenate treated pilings will be wrapped to prevent leaching into the water column.</p> <p>Floodplains: None</p> <p>Wetlands: None</p>

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Coastal Resources</i>	4.3	None	None	None
<i>Biological Resources</i>	4.4	<p>Terrestrial Environment: None</p> <p>Aquatic Environment: None</p>	<p>Terrestrial Environment: None</p> <p>Aquatic Environment: Short term, negative impacts during construction due to increased turbidity. Loss of 0.43 acre of seagrass, 5.92 acres to unvegetated sandy bottom that <i>may</i> be suitable seagrass habitat, and 8.31 acres of unvegetated sandy bottom due to placement of Storm Protection System.</p> <p>Long term, positive impacts due to the creation 21.76 acres of a diversity of habitats and 5.2 acres of seagrass recruitment areas.</p>	<p>Terrestrial Environment: None</p> <p>Aquatic Environment: Sediment control discussed in Section 3.2.1 (Surface Water) will minimize impacts to the aquatic environment.</p>

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Biological Resources</i> (continued)	4.4	EFH: None	EFH: Long term, negative impact due to loss of 0.43 acres of seagrass beds, 5.92 acres to unvegetated sandy bottom that <i>may</i> be suitable seagrass habitat, and 8.31 acres of barren sand with open water habitat. No temporary impacts to seagrass during construction. Long term, positive impact due to the creation of 1.23 acres of oyster beds; 6.27 acres of artificial reef; 1.54 acres mangrove fringes; 5.2 acres of seagrass bed recruitment areas.	EFH: The City of Fort Pierce will ensure that work will be conducted from shallow-draft barges that provide at least one foot clearance from the submerged bottom. The City will restore an estuarine bottom at a seagrass bed adjacent to the North Causeway Island Park and Boat Ramps; provide channel markings; provide seagrass restoration efforts at the North Causeway Island Park and Boat Ramps; and donate 56 acres of City-owned submerged lands to the State of Florida. Per USACE and NMFS, detailed mitigation and monitoring plans, assurances for long-term protection of the mitigation areas, mitigation contingency plans, sediment and turbidity containment, island maintenance, and post-construction island performance analysis will be incorporated into the project.

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Biological Resources</i> (continued)	4.4	T&E Species: None	T & E Species: Project may affect, but is not likely to adversely affect sea turtles, manatees, and smalltooth sawfish. Permanent impacts to 0.06 acre of Johnson's seagrass beds and 0.37 acres of mixed Shoal/Manatee/Johnson's seagrass beds, which are likely to adversely affect but not likely to jeopardize the continued existence of this species.	T & E Species: Sea turtle, smalltooth sawfish, and manatee construction conditions instituted by FWCC, FL DEP, USFWS, and NMFS will be required to be incorporated into the project, including compliance with <i>NMFS-COE Key Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's Seagrass</i> . Mitigation for Johnson seagrass impacts is discussed under EFH.
<i>Socioeconomic Issues</i>	4.5	Economics: Continued negative impact due to loss of \$1.5 million/annually of direct revenue to the City of Fort Pierce, \$8.5 million/annually to St. Lucie County, loss to businesses associated with the marina that benefit from the boating public.	Economics: Significant positive impacts due to restoration of significant revenue for the City of Fort Pierce created by dockage fees, gasoline and ship's store revenues, and rental fees. Positive impacts to commercial facilities that benefit from the boating public/industry. Protection against costs associated with damages to the marina, vessels, and city-owned riverfront properties due to	Economics: None

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Socioeconomic Issues (continued)</i>	4.5	<p>Recreational: Continued negative impact due to loss of boat slips resulting in loss of recreational opportunities; fishing tournaments would continue to be hampered. The waterfront park, river walk, and amphitheater would be vulnerable to future storm events.</p> <p>Environmental Justice: None</p>	<p>future storm events.</p> <p>Recreational: Positive impacts due to the restoration of boat slips and recreational opportunities, and restoration of the City's ability to host fishing tournaments. The waterfront park, river walk, and amphitheater will be protected against future storm events.</p> <p>Environmental Justice None</p>	<p>Recreational: None</p> <p>Environmental Justice: None</p>
<i>Air and Noise Impacts</i>	4.6	<p>Air: None</p> <p>Noise: Minimal</p>	<p>Air: Minimal</p> <p>Noise: Minimal</p>	<p>Air: None</p> <p>Noise: None</p>
<i>Cultural Resources</i>	4.7	None	None	None

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Safety</i>	4.8	<p>Health and Safety: Positive impact due to decrease in incidents of boating accidents resulting from the lowering of boating traffic.</p> <p>Negative impact due to loss of docking facilities to provide safe harbor during storms.</p> <p>Executive Order 13045: None</p> <p>Americans with Disabilities Act: None</p>	<p>Health and Safety: Negative impact due to increase in incidents of boating accidents resulting from increases in boating traffic. Positive impacts, including decrease in boat accidents due to the lowering of current velocities, decrease in drowning potential due to the lower current velocities, and increases in docking facilities to provide safe harbor during storm.</p> <p>Executive Order 13045: Minimal</p> <p>Americans with Disabilities Act: None</p>	<p>Health and Safety: None</p> <p>Executive Order 13045: None</p> <p>American with Disabilities Act: None</p>
<i>Public Services and Utilities</i>	4.9	None	None	None

AFFECTED ENVIRONMENT and CONSEQUENCES
Impact Summary

Affected Environment Issue Areas	Location in Text (Section)	Summary of Impacts Alternatives		
		<i>No-Action</i>	<i>Proposed Alternative</i>	<i>Proposed Mitigation</i>
<i>Cumulative and Secondary Impacts</i>	4.10	<p>Cumulative Impacts: None</p> <p>Secondary Impacts: Loss of business/revenue could lead to business closures, possible reallocation of land use.</p>	<p>Cumulative Impacts Minor increases in water quality impacts to Indian River Lagoon; Minor cumulative impacts to EFH and Johnson's seagrass. Cumulative impacts to Johnson seagrass are not expected to jeopardize its existence.</p> <p>Secondary Impacts: Possible sediment loading to Indian River Lagoon if Storm Protection System fails. Johnson's seagrass impacts due to increased boat traffic and maintenance dredging. Potential for the development of new businesses due to economic revitalization of downtown.</p>	<p>Cumulative Impacts Turbidity curtains and other BMPs will be used during construction to reduce water quality impacts. EFH habitat and seagrass impacts will be mitigated for through the creation of mangroves, oysters, and seagrass recruitment areas.</p> <p>Secondary Impacts: Fort Pierce will conduct inspections for performance and integrity of the Storm Protection System annually and following severe storms. Impacts to Johnson's seagrass will be minimized because the Indian River Lagoon is of sufficient depth that propeller caused turbidity is minimal; no wake zones have been established which result in the minimization of boat propellers stirring up bottom sediments. Future maintenance dredging projects will incorporate BMPs to reduce turbidity.</p>

4.2 Water Resources

4.2.1 *Surface Water and Water Quality*

The proposed project will occur within the Indian River Lagoon. The Indian River Lagoon is a 156-mile long estuary that extends parallel to the Atlantic Ocean through six Florida counties, including St. Lucie County. Water is exchanged between the Atlantic Ocean and the Lagoon via five breaks in the barrier islands. The closest break in the barrier islands in the vicinity of the project area is the Fort Pierce Inlet, which is approximately one mile northeast of the Fort Pierce City Marina. (See **Appendix A - Exhibit 2** U.S.G.S. topographic map for the locations of the City Marina and the Fort Pierce Inlet.) The surface water within the Lagoon is composed of a mixture of saline ocean waters and fresh water discharged from inland sources. Unlike true rivers, water flow is not directed by gravity within the Indian River Lagoon, but by wind and tidal action, which makes the current magnitudes and directions variable.

The project location is within a portion of the Indian River Lagoon exposed to a long fetch, or wave generation area, from the south-southeast (SSE). Maximum tidal flows through the project area are in a north-northwest direction and peak at 4 knots. Spring ebb flows range from 0.11 knots to 0.83 knots and travel in a SSE direction. Currents during storm conditions result in ebb flow conditions that can reportedly exceed 10 knots during a storm. Wave actions within the project vicinity range from 0.5-foot to 1.0-foot during normal conditions, with harbor waves reaching a maximum of 3.0 feet in height from a SSE direction. During extreme weather conditions generated by a 100-year storm, waves can reach 6.6 feet in height from a SSE direction.

Currents within the project vicinity are responsible for high turbidity and shoal migration. The currents transport sediments and sand into the deeper areas of the marina. Additionally, the shoals currently located southeast of the marina are constantly changing in form and elevation due to short term and seasonal changes in tidal currents.

Water depths within the project vicinity vary. Depths within the marina and the southeast access channel are -8.1 feet MLW. The new northeast channel has a permitted depth of -9.6 feet MLW (-10.0 feet NGVD). The water depths immediately south and southeast of the City Marina are shallower and average 2.5 feet MLW. The natural water depth in the vicinity of the marina results in turbidity issues due to the shallowness and the currents' ability to pick up bottom sediments. The water depths in the wave generated areas of the Indian River Lagoon average -5.0 feet MLW.

There are four water quality monitoring stations within the Indian River Lagoon in the project vicinity, but none of them have had water samples analyzed in the last five years. Information is available on water quality within the Indian River Lagoon based on 2005 analytical results.¹ In 2005, the Indian River Lagoon's water quality was impaired and did not meet water quality standards for its class. Impairment was caused by the significant amount of agriculture in the watershed. The main pollutants causing non-attainment of designated use in the Indian River Lagoon include low dissolved oxygen levels, the presence of coliform bacteria, excess nutrients (from fertilizer runoff), mercury, iron, and lead.

Water within the marina has been classified as Class III Marine Waters with designated uses of recreation and the propagation and maintenance of well-balanced fish and wildlife populations. Water quality sampling was conducted for the purposes of this project. Water quality sampling revealed that dissolved oxygen, specific conductivity, pH, nutrients, hardness, metals, oil and grease, and polycyclic aromatic hydrocarbons (PAHs) were generally within limits acceptable for Class III Marine Waters. Copper was identified as slightly elevated above water quality standards for Class III Marine Waters. One sample exceeded the PAH limits.

No-Action Alternative

The *No Action Alternative* would not impact surface water quality beyond what is currently occurring due to the presence of the inner harbor and adjacent freshwater inputs. No additional water quality impacts would occur due to boating activities or construction activities. No changes would occur to the existing current's velocities, which would continue to cause high turbidity.

The Proposed Alternative

The *Proposed Alternative* will have impacts on surface water quality, both negative and positive. Short-term negative impacts will occur due to construction, long term negative impacts will occur due to increased boat traffic. Long term positive impacts will occur due to the reduction in current velocities. Below is a complete discussion of these impacts.

Construction Impacts

Construction activities in the project area will result in temporary, short term impacts to water quality. Construction will require the installation of piers and the Storm Protection System, both of which will result in temporary increases in turbidity due to sediment bottom disturbances. These turbidity impacts are expected to be short term and will be minimized by the use of turbidity control.

The City of Fort Pierce has completed a turbidity modeling study which identifies the degree of turbidity and the distribution of turbidity plumes within the Indian River Lagoon during construction. The model considered both the transient flow

¹ *Integrated Water Quality Assessment for Florida: 2006 305(b) Report and 303(d) List Update*, May 2, 2006 from http://www.dep.state.fl.us/WATER/tmdl/docs/2006_Integrated_Report.pdf

conditions during a typical tidal cycle, as well as the configuration changes that will occur as individual islands are sequentially constructed. The model simulations estimated the footprints of the turbidity plumes over a simulated 10 hour construction day.

Model simulations were completed for the construction of each individual island and comprised a total of 13 model runs. Each individual model run was compared against the standards of a short term turbidity value of >29 nephelometric turbidity units (NTU) This value was chosen because FL DEP's water quality criteria for Class III Marine Waters requires that any discharge into Class III waters should have turbidity levels that are not more than 29 NTU above background levels. To address the long term effects of turbidity on seagrass populations located in the project area, a more conservative number of >15 NTU above background levels averaged over a 10-hour construction day was chosen.

Out of the 13 Storm Protection System features, the construction related turbidity for only a single island, Snook Island, exceeded the impact threshold criteria. The model results indicated that a peak of 29.8 NTUs will occur at slack tide, with an average of 15.2 NTUs over a 10-hour construction day. No exceedances were predicted to occur during construction of any of the other Storm Protection System features.

The City of Fort Pierce has performed elutriate testing to determine possible water quality impacts that may occur during construction, in addition to turbidity impacts. Sediments in the project vicinity were analyzed for copper, lead, zinc, arsenic, cadmium, mercury, and PAHs. The results were compared to the Criteria for Surface Water Classification for Class III: Marine Waters. Testing indicated that the sediments will release copper that will result in an exceedance in the Class III marine surface water criteria, but copper already exceeds the Class III limits within and outside the project area.

The City of Fort Pierce has obtained Clean Water Act (Section 404) and Rivers and Harbors (Section 10) permits for the project. The permit application for both Sections 401 and 404 are combined in the State of Florida, with the FL DEP and USACE placing project conditions that will minimize impacts. Ft. Pierce has obtained the FL DEP Permit Number. 56-0129156-011 and the USACE permit number SAJ-1993-41787 (see **Appendix B**).

The FL DEP permit which has been obtained requires the use of sediment control methods to reduce turbidity during construction, and thereby minimize water quality impacts. Two different methods are permitted for work near shore, turbidity barriers and 150 meter mixing zones; the 150 meter mixing zone method will be used within the Intracoastal Waterway. These two methods are discussed below.

A modified turbidity barrier will be used for work that will be conducted near shore. Work conducted near shore will be hampered by water depths greater than 10 feet and high current velocities. (Fixed turbidity barriers are generally ineffective when currents exceed 1 knot.) These conditions make the use of conventional turbidity barriers impractical. Existing seagrass beds located just east of the Storm Protection System must be protected from excessive sedimentation, however. The City of Fort Pierce has determined that a modified turbidity barrier will provide some protection and will minimize the eastward movement of sedimentation into the seagrass beds. The current directions in the project vicinity are primarily towards the north and south directions. The City of Fort Pierce will use fixed turbidity barriers that are aligned in the direction of the currents. In this layout pattern, the turbidity barriers do not experience the full hydrodynamic force of the currents since they flow along the barrier and not directly against it. The turbidity barriers are effective in controlling the movement of sediment across the barrier alignment but do not influence the transport of sediments along current directions.

In addition to the modified turbidity barrier, the City of Fort Pierce will require their contractor to use a mixing zone minimization technique. The FL DEP has approved a permit that allows for a specially permitted mixing zone for sediments that are transported along current directions. In this method, increased turbidity is allowed within a distance of 150 meters in the up and down current directions of the construction operations. A turbidity monitoring program will be installed to prevent water quality impacts from reaching unacceptable limits. The turbidity monitoring will occur once every hour during construction and will include the sampling of both a background location and a location 150 meters downstream of the construction. If the monitoring revealed the turbidity levels 150 meters downstream of construction exceeded 29 NTUs, work will immediately cease, the FL DEP will be notified, and no work will proceed until approved by the FL DEP. The contractors will be required to modify the work procedures that were responsible for the increased turbidity and will be required to install more sediment containment devices.

In addition to modified turbidity barriers and the monitoring of 150-meter mixing zones, water quality impacts will be minimized during construction of the Storm Protection System by the construction methods themselves. Geotubes will be used in the construction of all of the Storm Protection System features. The filter fabric skins of the Geotubes serve to retain a large portion of the fines that contribute to turbidity. In the larger Storm Protection Island, the Geotube will also provide a containment dike that will retain the fill material and minimize turbidity plumes to adjacent waters.

The 11 Free Form Breakwater Habitat Islands will be constructed first because these islands require only upland sand sources, while the Storm Protection Island and Tombolo Point will be constructed with both upland sand and sand dredged from the marina basin. By using this sequence in the construction, the Breakwater

Habitat Islands will act as turbidity curtains during the dredging of the marina basin. The dredging of the marina basin will occur at the same time as the construction of the Storm Protection Island, resulting in a direct deposition of the sand on the cap of the island.

The water quality impacts resulting from the construction portion of the project are expected to be short term and temporary, and are not expected to be significant.

Permanent negative impacts

The restoration of the outer harbor will result in an increase in capacity of seven boats over the pre-disaster conditions. This increased boating will result in very slight increases in turbidity due to propeller action and increases in water quality impacts due to oil and gasoline leakage. The Indian River Lagoon is of sufficient depth that propeller caused turbidity is minimal, and no wake zones have been established within the vicinity of the City Marina, which result in the minimization of boat propellers stirring up bottom sediments. Increases in turbidity from additional boating are therefore not expected to be significant. Water quality impacts from oil and gasoline leakage from boats will also increase due to the increase in boating traffic. These impacts are also expected to be minimal.

Pilings that have been treated with chromated-copper arsenate in order to prevent deterioration will be wrapped to prevent the possible leaching copper into the water column. Water quality in the project area would not experience increases in copper due to the pilings.

Permanent positive impacts

Long term decreases in turbidity are expected as a result of the *Proposed Alternative*. Tidal currents within the Indian River Lagoon in the vicinity of the project are currently 4 knots; this velocity causes some turbidity due to the stirring up of bottom sediments. The placement of the Storm Protection System for hazard mitigation will reduce the currents to 1 knot during normal tide conditions, which will most likely result in lower turbidity levels. Additionally, the installation of the Storm Protection System will reduce the ebb flow currents, which are responsible for transport and deposition of sediments and sand into the deeper areas of the marina. The reduced ebb currents will result in less sediment transport and deposition. This will be a benefit because the need for maintenance dredging will be reduced, thereby reducing the periodic turbidity that occurs due to this activity. Finally, the installation of the Storm Protection System will reduce the shoal migration that is currently occurring southeast of the marina. The shoals move inland due to water currents and result in the need for regular maintenance dredging. The reduced currents will reduce shoal migration, again reducing the need for maintenance dredging.

The strong tidal current regime maintains excellent circulation through the proposed marina and breakwater island complex. Therefore, water quality will not be impacted by the re-instated outer harbor operations. Adequate flushing has been confirmed by a hydrographic study performed by Tetra Tech EC Inc., which demonstrated that the construction of the Storm Protection System will not contribute to a violation of any Florida water quality standards. The model additionally demonstrated that there will be no stagnant areas within the marina that could contribute to chronic buildup of contaminants.

The City Marina is designated as a Clean Marina facility. As a Clean Marina, there are best management practices (BMPs) in place to address possible sources of pollutants before they can become a problem. All docking facilities will have sewage pump-out capabilities. Every slip will be in close proximity to a pump-out connection, and the slip occupants will not have to leave the slip in order to empty their marine sanitary devices. Additional fueling facilities will not be included in the outer harbor. As a Clean Marina, the City Marina has a Spill Prevention and Control Plan for the marina.

In summary, the *Proposed Alternative* will have short-term negative impacts on water quality due to increased turbidity during construction, but will have a long-term beneficial impacts on turbidity due to decreases in current velocity. The Storm Protection System will reduce the amount of sedimentation and shoal migration that occurs, resulting in a reduction in the need for maintenance dredging. The reduction of currents to 1 knot during normal tide conditions will allow for adequate flushing of the marina in order to maintain dissolved oxygen levels and reduce pollutant loads. Both the FL DEP and the USACE permits contain permit conditions that will ensure that water quality impacts will not be significant.

4.2.2 Floodplains

Executive Order (EO) 11988 requires federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. FEMA's regulations for complying with EO 11988 are promulgated in 44 CFR Part 9 and include an eight-step decision making process.

The Fort Pierce City Marina is located in a Coastal High Hazard Zone. The marina area is subject to storm surge flooding that enters through the nearby Fort Pierce Inlet into the waters of the Indian River Lagoon. The inner and outer marina basins are within a VE-zone (coastal flood zone with velocity hazard) with a 100-year flood level of +8-feet NGVD. This base flood elevation includes a wave height component. The 100-year still water elevation in the Indian River Lagoon is 5.1-feet NGVD. The adjacent narrow coastal fringe in the marina area is in an AE-zone with a 100-yr flood elevation of +5-feet NGVD. Immediately

landward of the coastal fringe, the upland area becomes an X-zone that is outside of the 100-year flood zone [FEMA, 1991; FEMA Flood Insurance Rate Map (FIRM) St. Lucie County, Florida and Incorporated Areas, Panel 179 of 410, Map Number 12111C0179 G, November 4, 1992]. (The information described above is shown in **Appendix A, Exhibit 8a** – Flood Insurance Rate Map, and **Exhibit 8b** – FIRM Zone Table.)

Avoidance of the 100-year floodplain for a marina is not possible because a marina is a functionally dependent use of the floodplain. A disaster-wide initial public notice was published state-wide December 3 through 15, 2004; it was published in the Okeechobee News on December 5, 2004. A general final public notice was published state-wide November 11-December 1, 2005; it was published in the Palm Beach Coast on November 23, 2005. USACE published a public notice in conjunction with the Section 404 Clean Water Act permitting process on February 19, 2009. See **Appendix C** for copies of these public notices.

A Public Notice was published by FEMA on October 21, 2010 in the Fort Pierce Tribune. This Public Notice advised the public that a Draft EA had been developed for the project. The Draft EA was made available to interested parties through publication on FEMA's website <http://www.fema.gov/plan/ehp/envdocuments/ea-region4.shtm> and by distribution within the community. The Draft EA served as the final public notice for this project.

No-Action Alternative

The *No-Action Alternative* would have no impacts on the floodplain. The inner harbor would be subject to damages during future flood events due to its location within a VE-zone.

The Proposed Alternative

The *Proposed Alternative* is for the replacement of the outer harbor and installation of a Storm Protection System. The *Proposed Alternative* will result in the placement of approximately 14.66 acres of fill into the Indian River Lagoon due to the installation of the Storm Protection System. This amount of fill will be minimal when compared to the amount of flood storage available for the Indian River Lagoon. The inner and outer harbors will be subject to damages during storm surges during future storm events due to their location within a VE-zone, but will be less vulnerable due to the installation of the Storm Protection System. The Storm Protection System is designed to protect the inner and outer harbors from a 100-year storm event and the resulting flood. Additionally, the Storm Protection System will serve to protect publicly-owned river front property (described in Section 3.3) from a 100-year storm event.

4.2.3 Wetlands

EO 11990, Protection of Wetlands, requires federal agencies to take action to minimize the loss of wetlands. The USACE regulates the discharge of dredged or fill material into waters of the U.S., including wetlands, pursuant to Section 404 of the Clean Water Act. FEMA generally relies on the Clean Water Act, Section 404 Permit process to protect wetlands for projects that could impact wetlands. In addition, FEMA applies an eight-step decision making process to comply with EO 11990. FEMA's regulations for complying with EO 11990 are promulgated in *44 CFR Part 9*. The NEPA compliance process also requires the identification of any direct or indirect impacts to wetlands which may result from federally funded actions.

The National Wetland Inventory (NWI) map depicting wetlands in the Fort Pierce quadrangle by the U.S. Fish and Wildlife Service (USFWS) Geocortex Internet Mapping Framework Wetlands Online Mapper was examined for information related to the presence of wetlands within the project area. The NWI map indicates that there are two types of wetlands located in the project vicinity. The shoal area is noted as estuarine and marine. The deeper areas in the Indian River Lagoon are noted as estuarine and marine, deepwater. (see **Appendix A, Exhibit 9** – NWI map). Both of these wetland types are considered open water habitats and not wetlands by the USACE and the U.S. Environmental Protection Agency (USEPA).

A site visit conducted by a Professional Wetland Scientist confirmed that wetlands are not directly or indirectly associated with the proposed site. There would therefore be no wetland impacts from any of the alternatives.

4.3 Coastal Resources

4.3.1. Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) requires states with shorelines in coastal zones to have a Coastal Zone Management Plan (CZMP) to reduce uncontrolled coastal development. Projects falling within these coastal zones must be evaluated to ensure that they are consistent with the CZMP. Projects receiving Federal assistance must follow the procedures outlined in 15 CFR 930.90 – 930.101 for consistency determinations. Under these procedures, grant applicants must submit their proposals to the State agency in charge of the CZMP to obtain a consistency determination. FEMA cannot approve a grant without the State agency's consistency approval.

The State of Florida implements its authority for the CZMA through the issuance of Section 401 Clean Water Act permits, issuance of Environmental Resource Permits, and the Coastal Construction Control Line (CCCL) Program. The CCCL

program establishes a line along sandy beaches within the State for which any work occurring seaward of the line requires a FL DEP permit. The line is established on each beach based on a 100-year storm event and establishes the landward limit of jurisdiction.

The project location is not located seaward of the CCCL line; the Indian River Lagoon is part of Florida's Intracoastal Waterway and is separated from the Atlantic Ocean. The project location is therefore landward of the CCCL line and would not require a CCCL permit.

No-Action Alternative

The *No-Action Alternative* would not require an Environmental Resource Permit. It would have no effect on the coastal zone.

Proposed Alternative

The *Proposed Alternative* requires a Section 401 Clean Water Act permit and an Environmental Resource Permit. Ft. Pierce has obtained a FL DEP permit (Permit Number 56-0129156-011) and a USACE permit (Permit Number SAJ-1993-41787). Issuance of these permits assures compliance with the CZMA. FEMA funding will be conditional upon the City of Fort Pierce being in compliance with all permit conditions.

Coordination with the St. Lucie County Mosquito Control and Coastal Management Services resulted in a request that the City of Fort Pierce coordinate during construction with Port of Fort Pierce shipping operators and recreational boating interests located in the Port. By doing so, compatibility between the construction activities and ongoing Port- and recreation-related activities, as well as compliance with CZMA, will be ensured.

4.3.2 Coastal Barrier Resource Act

The Coastal Barrier Resource Act (CBRA), enacted in 1982, designated various undeveloped coastal barrier islands as units in the Coastal Barrier Resources System. The expenditure of Federal funds in CBRA Units is very limited and subject to FEMA's regulations at 44 CFR 206.340 (Subpart J).

No portions of the Fort Pierce City Marina, nor any portions of the Indian River Lagoon where the proposed Storm Protection System will be installed, are located within CBRA units. There would be no impacts to CBRA units from any of the alternatives.

4.3.3 Navigation Impacts

The proposed project will occur within the Indian River Lagoon. The Indian River Lagoon is a 156-mile estuary that extends parallel to the Atlantic Ocean through six Florida counties. It is utilized extensively for commercial and recreational boating and fishing.

The design of the Storm Protection System contained within the *Proposed Alternative* has been designed to prevent any obstructions to navigation. Neither the public's use of the waterway nor the neighboring proprietors' access to the waterway will be impeded. The Storm Protection Island and 11 Free Form Breakwater Habitat Islands will be constructed on top of existing shoals, within areas that are currently too shallow for navigation. Boaters currently use a channel located to the north of the marina to access the inner marina. The *Proposed Alternative* will utilize the same channel to access the outer marina, maintaining the same navigability.

4.4 Biological Resources

4.4.1 Terrestrial Environment

The local terrestrial environment in the project area has been developed as a marina, public parks, or commercial facilities. The marina, park, and associated commercial facilities are composed of pavement, concrete, or mowed lawn. The Indian River Memorial Park to the north and the Gazebo Park to the south contain mowed lawn with planted palm trees. There is no undisturbed terrestrial environment in the project area.

There would be no terrestrial environment impacts from any of the alternatives.

4.4.2 Aquatic Environment

The aquatic environment in the project vicinity consists primarily of open water within the marina and the Indian River Lagoon. The lagoon has soft sandy substrates with shell hash. Composition is predominantly fine sand mixed with shell fragments. Drift algae are commonly found within the project area, primarily comprised of red algae species (*Gracilaria* spp. and *Laurencia* spp.) and brown alga (*Sargassum natans*). Although less abundant, green algae species are also present in the project vicinity (*Caulerpa mexicana*, *Caulerpa prolifera*, *Caulerpa Sertularioides*, and *Acetabularia* spp.) Drift algae accumulations are a significant biological feature of the Indian River Lagoon ecosystem.^{2,3} There are shoals within the project vicinity, seagrass beds, and un-vegetated tidal bottoms, but there are currently no islands within the Indian River Lagoon in the project area. Additionally, mangrove populations, oysters, and hardbottom reefs are not currently present in the project area.

² Thompson, M.J. 1978. *Species composition and distribution of seagrass beds in the Indian River Lagoon*, Florida Fla. Sci. 4:90-96

³ Virnstein, R.W. and P.A. Carbonara. 1985. *Seasonal abundance and distribution of drift algae and seagrasses in the mid-Indian River Lagoon*, Florida. Aquat. Bot. 23:76-82

No-Action Alternative

The *No-Action Alternative* would have no affect on the aquatic environment in the project area.

Proposed Alternative

The *Proposed Alternative* will have minimal, short term negative impacts on the aquatic environment. Installation of the piers for the new docks and construction of the Storm Protection System will result in increases in turbidity, which has the potential to adversely affect drift algae. This impact is not expected to be significant.

The *Proposed Alternative* will have negative, long term, permanent impacts on 14.66 acres in the Indian River Lagoon, of which 0.43 acres consist of seagrass and 14.23 is unvegetated, sandy bottom. This impact is not considered significant since, 8.31 of the 14.23 acres of unvegetated, sandy bottom will not likely support seagrasses because of existing water depths and bottom scouring from the high currents in the area.

The Storm Protection System will have long term, positive impacts by providing habitat that will be included in the islands. The Storm Protection System will be constructed of various materials placed at different elevations to provide a diversity of habitat. In total, the Storm Protection System will be 14.66 acres in size, composed of a large Storm Protection Island, 11 Free Form Breakwater Habitat Islands, and a peninsular feature called Tombolo Point. These features will create a mosaic of habitats for fish, shellfish, wildlife, and birds. In total, 21.76 acres of habitat will be created, including coastal dunes (shorebird habitat), mangrove fringes, lime-rock habitat (for hard bottom communities), oyster reefs, and seagrass beds.

The main Storm Protection Island will provide 4.25 acres of sandy/shell coastal dune community which could support terns and other shorebirds, 1.30 acres of red mangroves, 1.14 acres of oyster bed recruitment areas, and 2.41 acres of limerock habitat. The same considerations will be included in the design of the 11 smaller Free Form Breakwater Habitat Islands and Tombolo Point. With these portions of the proposed Storm Protection System, a total of 4.55 acres of coastal dune habitat, 1.54 acres of red mangrove fringe areas, 1.23 acres of oyster bed recruitment areas, and 6.27 acres of submerged limerock habitat will be created.

Approximately 4.55 acres of coastal dune community will be created. Many shorebirds could utilize this area for feeding, including the endangered least tern and the threatened roseate tern. It is possible that this habitat may also be used for nesting. It is anticipated that the dune vegetation may be suitable for other birds such as willet, American oystercatchers, Wilson's plovers, Caspian terns, and gull-billed terns.

Approximately 1.54 acres of mangrove fringe will be created. The mangrove fringes will improve water quality, provide habitat for estuarine species, and

stabilize the shorelines of the habitat islands. Red mangroves are proposed for this project because have the highest ecological value; they create habitat for lobster and fish and their extensive root system is best for shoreline stabilization. The red mangroves are also expected to attract wading birds and provide nursery habitat for fish (because of their prop roots).

Approximately 1.23 acres of oyster bed recruitment areas will be created. The oyster bed recruitment areas are expected to provide opportunities for new oyster bed resources in the project vicinity. The Storm Protection Island and Free Form Breakwater Habitat Islands will have sections constructed out of oyster shell, which is hoped to allow for oyster bed recruitment. The Storm Protection System will reduce current velocities and when combined with the oyster shell substrate, will encourage oyster bed development. Oyster beds enhance water quality and serve as habitat for a variety of estuarine species.

Approximately 6.27 acres of limerock habitat will be created. The submerged limerock will function as an artificial reef and provide substrate for vegetation, corals, and other organisms. These hard bottom communities will also serve as juvenile fish nurseries.

In addition, approximately 5.2 acres of seagrass beds are expected to be recruited into the project area. The installation of habitat islands will reduce wave and current energy within the project area, which in turn will serve to encourage the recruitment of seagrasses into the shallow areas, as well as associated infaunal/epifaunal organisms. The recruited seagrass beds will improve water quality, provide habitat for estuarine species, and stabilize the shorelines of the habitat islands. Seagrasses improve water quality by cycling organics, chemical elements, and nutrients from the water and will clarify the water by trapping sediments from the water column. As habitat, the recruited seagrass beds will function as sources of food, areas of shelter, and serve as essential nursery areas for commercial and recreational fishery species and invertebrates.

Sand for the veneer on the Storm Protection Island and Tombolo Point will be obtained from maintenance dredging of the outer harbor to the permitted depth of -8 MLW. The dredging will restore the harbors to the USACE permitted elevations and will produce approximately 8,683 cubic yards of sand. Using the sand obtained from this dredging will insure that the sand cover of these components of the Storm Protection System will consist of native material.

To insure that the habitat components of the Storm Protection System will be successful, the system will be monitored and maintained. Success criteria have been established, as well as frequency and methodology of monitoring. Five years of ecological monitoring, with reports submitted to FL DEP and USACE, will be required. Maintenance activities that will occur include invasive species removal, debris removal, and sign maintenance. Maintenance will occur twice annually, with reports submitted to FL DEP and USACE.

Once completed, ecological resources on the Storm Protection System will not be subject to impact from recreational use. The permitting agencies have required the City of Fort Pierce to implement a city ordinance that prohibits persons from entering the top of the islands created by the Storm Protection System. Signs will be posted advising that there is no access allowed on any of the islands or Tombolo Point.

4.4.3 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 protects fishery resources found off the coasts of the United States, anadromous species, and Continental Shelf fishery resources of the United States. Included in this protection is the protection of essential fish habitat (EFH), or waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

Mangroves are listed as an EFH by the South Atlantic Fishery Management Council. They are an estuarine scrub/shrub EFH for shrimp, red drum, snapper, grouper, and spiny lobster. Mangroves provide habitat and nursery grounds for a wide variety of marine organisms, many of which have important recreational or commercial fisheries value. Mangroves also serve as breeding and roosting sites for many wading birds, including those that are listed as threatened or endangered species. Mangroves also improve water quality by uptaking nutrients and chemicals from the water and stabilizing shorelines. Historically, some of the shoal areas located within the Indian River Lagoon were islands which contained mangrove populations. Mangrove populations are not currently present in the project vicinity.

Oysters are listed as an EFH by the South Atlantic Fishery Management Council because they provide critical habitats for commercial and recreational fisheries species. They create habitat for many estuarine species of plants and animals, including shrimp, speckled sea trout, and drum. Oysters also enhance water quality by acting as biofilters. Oyster populations are not currently present in the project area.

Seagrass is considered an EFH by the South Atlantic Fishery Management Council; it provides estuarine and marine submerged aquatic vegetation for shrimp, red drum, snapper, grouper, and spiny lobster. As habitat, seagrasses function as a source of food, area of shelter, and as essential nursery areas for commercial and recreational fishery species and invertebrates. There are some shoals within the Indian River Lagoon that contain seagrass beds. Seagrass surveys were conducted in 2005, 2006, and 2007 in the vicinity of the outer harbor, the proposed Storm Protection System, and an area south of the proposed Storm Protection System. A total of 96.48 acres of submerged bottoms were surveyed to determine the extent of the seagrass populations in the project area.

A total of 5.13 acres of seagrass habitat have been mapped in the areas surveyed in the three years. (See **Appendix A, Exhibit 10** for the locations of existing seagrass beds.) The seagrass colonies in the project vicinity are made up of a mixed species population, including *Syringodium filiforme*, *Halophila wrightii*, *Halophila decipiens*, and *Halophila johnsonii*. All of the seagrass beds are located in the outer harbor, there are no seagrass beds inside of the inner harbor.

The project area contains un-vegetated tidal bottom, which is considered an EFH.

There are no hardbottom reefs in the project vicinity.

The project area is known EFH for penaeid shrimp complex, red drum, reef fish, stone crab, spiny lobster, migratory/pelagic fish, and snapper/grouper complex.

No-Action Alternative

The *No-Action Alternative* would have no affect on EFH in the project area.

Proposed Alternative

The *Proposed Alternative's* reconstruction of the outer harbor will have minor impacts on EFH. The creation of the Storm Protection System will impact approximately 14.66 acres of EFH habitat, including 14.23 acres of un-vegetated sandy bottom and 0.43 acres of seagrass. The 14.23 acres of un-vegetated sandy bottom consist of 5.92 acres of bottom that may be suitable as seagrass habitat and 8.31 acres of bottom that are not suitable as seagrass habitat. (See **Appendix A, Exhibits 11a** and **11b** for plan views of the impact areas of the Storm Protection Island and Free Form Breakwater Habitat Islands, respectively).

No other additional permanent seagrass impacts are anticipated from the *Proposed Alternative*. The physical modeling that was conducted for the *Proposed Alternative* indicates that the current velocities that will exist within the project vicinity after installation of the Storm Protection System will not result in scour to the existing seagrass beds, nor will it result in the placement of sediments into the existing beds. Additionally, the City of Fort Pierce will require the contractors' watercraft associated with the construction of the facility to operate only within waters of sufficient depth so as to preclude bottom scouring, prop dredging, or damage to seagrass beds.

The Storm Protection System was designed to avoid and minimize seagrass impacts to the greatest extent practicable. The *Proposed Alternative* was chosen after all practicable alternatives were evaluated and considered. The *Proposed Alternative* is the design that impacts the least amount of seagrass while still providing the necessary degree of storm protection.

The potential for temporary impacts to seagrass populations due to increased turbidity during construction was assessed. Model simulations were completed for the construction of each individual island and compared against a value of 29

NTUs at any given time, or 15 NTUs over a 10-hour construction day. Out of the 13 Storm Protection System features, the construction related turbidity for only a single island, Snook Island, exceeded the impact threshold criteria. The model results indicated that turbidity could reach 29.8 NTUs, with an average of 15.2 NTUs occurring over a 10-hour construction day in the vicinity of Snook Island. The model indicated that the plume area will be 191 square feet (0.0044 acres). The area of this plume was overlaid on a map indicating the locations of seagrass beds identified during three years of seagrass surveys. The results indicated that the turbidity plume will not occur where seagrass beds are currently located. Therefore, no secondary impacts to seagrass are expected.

The *Proposed Alternative* is expected to have long term, positive impacts on EFH by creating seagrass recruitment areas, incorporating EFH into the Storm Protection System, restoring damaged seagrass beds at two State of Florida-owned locations, and deeding submerged land containing EFH to the State of Florida. These positive impacts are discussed below.

Positive impacts to EFH will occur through the provision of 5.2 acres of seagrass recruitment areas and the City of Fort Pierce's proposed mitigation for seagrass impacts. The Storm Protection System will reduce the current velocities within the project area. Currently, up to 4 knot flows in the vicinity of the project prevent seagrass recruitment. The slower current velocities that will be present following installation of the Storm Protection System will promote seagrass recruitment; additionally, the shape of the proposed Storm Protection Island and Free Form Breakwater Habitat Islands, and the planted mangroves that will promote sediment accumulation within the crescents, will encourage seagrass recruitment. Modeling determined that 5.2 acres of seagrass recruitment areas will result from the project based on current velocities and water depths (which relate to available light). (See **Appendix A, Exhibit 12** for plan views of seagrass recruitment areas). The recruited seagrass beds will improve water quality and provide habitat for estuarine species.

Positive, long term impacts from the *Proposed Alternative* will also incorporate of EFH into the Storm Protection System. Overall, approximately 1.54 acres of mangrove fringes, 1.23 acres of oyster recruitment areas, and 6.27 acres of limerock reefs will be created. The 1.54 acres of mangrove fringes and 1.23 acres of oyster recruitment areas are considered EFH by the South Atlantic Fishery Management Council.

Additional mitigation required for the impacts to 0.43 acres of seagrass will occur as a requirement of the Section 404 permit from the USACE and the FL DEP permit. Additional mitigation that is being required as a condition of the USACE and/or FL DEP permits includes:

1. All work will be conducted from a shallow-draft barge. The barge will be required to operate within waters of sufficient depth (one-

foot clearance from the deepest draft of the vessel to the top of submerged resources) to preclude bottom scouring, propeller dredging, or damage to submerged surfaces. Piles will be driven from barge-mounted cranes.

2. Restoration of estuarine bottom to enhance seagrass recruitment within an existing seagrass area adjacent to the North Causeway in Fort Pierce will occur. Nearby spoil islands will be scraped down and 2.34-acres of a dredge hole will be filled and then covered with the scrapings from the spoil islands. Bird stakes will be added to the area to encourage roosting of waterfowl, which will add natural fertilizer for revegetating the seagrass beds.
3. The City of Fort Pierce will install channel markings at the North Causeway Island Park and Boat Ramps to protect existing seagrass beds from boaters using these ramps. Existing seagrass damage will undergo restoration where prop scars are not naturally healing.
4. The City of Fort Pierce will deed 26 acres of submerged land to the State of Florida. This 26-acre parcel contains pristine seagrass beds, tidal flats, and submerged mangrove areas; it is located immediately adjacent to the State of Florida's Fort Pierce Inlet State Park. An additional 30 acres will be given to the State as proprietary public interest. This property transfer will offset the functional loss served by barren sand habitat and water column EFH that will be lost due to the Storm Protection System. It will place EFH under State protection, allowing it to remain under protection in perpetuity.
5. Success of 3 acres of the potential 5.2 acres of seagrass recruitment areas will be required as mitigation.

In summary, permanent impacts will occur to seagrass beds as a result of the installation of the Storm Protection System; impacts will occur to 14.66 acres of EFH, most of which is un-vegetated tidal bottom. Included in these 14.66 acres is 0.43 acres of seagrass beds.

The *Proposed Alternative* is expected to have long term, positive impacts on EFH by creating 5.2 acres of seagrass recruitment areas. The project is expected to have positive impacts to EFH in the form of the Storm Protection System, which will create EFH habitat in the form of mangrove fringes, oyster recruitment areas, and limerock reefs. Additionally, the City of Fort Pierce will restore damaged seagrass beds at the North Causeway in Fort Pierce; provide channel markings and restore seagrass beds at the North Causeway Island Park and Boat Ramps; and deed 56 acres of open water and seagrass habitat to the State of Florida.

There is some risk that the proposed EFH mitigation may not function as designed. In recognition of this potential, extensive coordination with resource agencies has resulted in requirements of the FL DEP/USACE permits to include measures to support mitigation success. EFH protective measures including

detailed mitigation and monitoring plans, assurances for management of habitat areas, mitigation contingency plans, sediment and turbidity containment BMPs, island maintenance, and post-construction island performance analysis will all be incorporated into the project. Richard Czlapinski or Brian Proctor of Tetra Tech can provide a copy of these plans upon request (see Section 10.0 for contact information). Per the USACE permit, if any of the proposed mitigation does not function as designed despite maintenance and management plans, alternate compensatory mitigation sufficient to compensate for the loss of aquatic functions will be required.

4.4.4 Threatened and Endangered Species

Under Section 7 of the Endangered Species Act (ESA), as amended, Federal agencies, in consultation with the USFWS or the NMFS for marine mammals and fish, are required to evaluate the effects of their actions on threatened or endangered species and their critical habitats, and to take steps to conserve and protect these species.

In accordance with Section 7 of the ESA of 1973, the project area was evaluated for the potential for occurrences of federally-threatened and endangered species. Formal consultation with NMFS and USFWS has occurred in conjunction with the USACE permit application process for the project. Technical assistance has been provided by USFWS and NMFS for the purpose of providing information in support of this EA.

Smalltooth sawfish (*Pristis pectinata*) is a federally endangered species found in shallow, subtropical waters. Historically found from Long Island, NY to Brazil, this species is now found mainly off of Florida's coast. The Indian River Lagoon contains habitat that is utilized by this fish.

Sea turtles are known to utilize the Indian River Lagoon. Species include the federally threatened loggerhead (*Caretta caretta*) and green sea (*Chelonia mydas*); and the federally endangered leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricate*), and Kemp's ridley (*Lepidochelys kempii*). There are no known nesting sites for sea turtles in the immediate vicinity of the project.

Johnson's seagrass (*Halophila johnsonii*), a federally threatened plant, is only found along a 125-mile stretch of Florida coast between Indian River County and Miami-Dade County. Johnson's seagrass occurs in patches throughout its range and is present in the project area, primarily in mixed seagrass beds.

The project area contains West Indian manatee (*Trichechus manatus*) critical habitat and is known to be inhabited by manatees (federally listed as endangered). The project is located adjacent to Moore Creek, which was a discharge point for warm water from the Fort Pierce Utility Authority's H.D. King Power Plant. This plant was decommissioned in May 2008 and no longer provides a warm water

discharge point. Manatee utilization of Moore Creek is expected to be reduced as a result of this. Manatees may continue to use the area because of seagrass beds in the project vicinity; they are currently found in more sheltered portions of the Indian River Lagoon.

No-Action Alternative

The *No-Action Alternative* would have no affect on threatened or endangered species in the project area.

Proposed Alternative

Formal consultation with USFWS and NMFS through the issuance of a Biological Opinion for smalltoothed sawfish, swimming sea turtles, and Johnson's seagrass has occurred through the USACE permitting process. The NMFS has determined that the *Proposed Alternative*

- may affect, but is not-likely to adversely affect, endangered small toothed sawfish and endangered/threatened swimming sea turtles,
- is likely to adversely affect Johnson's seagrass, but it is not likely to jeopardize its continued existence, and
- is not likely to adversely affect the endangered West Indian manatee.

A copy of the Biological Opinion can be found in **Appendix B**.

Conservation measures for the minimization of potential impacts required by the NMFS and the USFWS will be incorporated into the project as USACE and FL DEP permit conditions. Impacts and minimizations measures are discussed below.

Small Toothed Sawfish and Sea Turtles

The NMFS has determined that the *Proposed Alternative* may affect, but is not-likely to adversely affect, endangered smalltoothed sawfish and endangered/threatened swimming sea turtles.

Neither smalltooth sawfish impacts nor sea turtle impacts are anticipated from construction of the project, but impacts could occur during dredging operations. The marina will be dredged to a depth of -8.0 feet MLW as part of the project. It is rare, but turtles and fish have been known to be caught up in dredging equipment. NMFS determined in their Biological Opinion that the risk of injury or death resulting from interactions with equipment or materials is discountable as these species are highly mobile and can easily avoid these interactions. Special conditions will be placed by NMFS on the project for the protection of sea turtles and smalltooth sawfish to further reduce the chance of interaction. (A copy of NMFS's March 23, 2006 *Sea Turtle and Smalltooth Sawfish Construction Conditions* can be found in **Appendix B**.) The following is a summary of these conditions:

- all personnel associated with the project must be aware of the potential presence of sea turtles and smalltooth sawfish. All construction personnel will be responsible for observing water-related activities for the presence of these species;
- all construction personnel must be aware that there are civil and criminal penalties for harming, harassing, or killing these species;
- siltation or turbidity barriers will be constructed so that neither sea turtles nor smalltooth sawfish can become entangled;
- siltation barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat;
- all vessels associated with the construction project will operate at “no wake/idle” speeds at all times;
- if a sea turtle or smalltooth sawfish is seen within 100 yards of the construction, all appropriate precautions will be implemented; and
- if a sea turtle or smalltooth sawfish is seen within 50 yards of the construction, operation of any mechanical construction equipment will cease immediately.

NMFS has also determined in their Biological Opinion that the creation of additional mooring docks will not necessarily introduce new vessels nor increase vessel traffic. If new vessels are introduced, the number of additional boats accommodated by the docks is far below the level of vessel traffic that available information indicates is associated with vessel strikes. The effects resulting from loss or exclusion of foraging and refuge habitat will be insignificant. NMFS concluded that the project is not expected to create the likelihood of injury by annoying them to such an extent as to significantly disrupt behavioral patterns.

Johnson's Seagrass

Impacts are anticipated to Johnson's seagrass due to the construction of the Storm Protection System. Full underwater surveys were conducted in 2005, 2006, and 2007 for the purposes of mapping seagrass populations. Based on these surveys, 5.13 acres of seagrass beds are located in the project vicinity, of which 0.43 acre will be impacted by the *Proposed Alternative* through displacement and shading. The beds that will be impacted include mixed beds that contain five species of seagrass, including Johnson's seagrass, as well as beds that contain just Johnson's seagrass. Of this 0.43 acre total, 0.06 acres of impacts will occur in mono-specific beds of *Halophila johnsonii*; 0.04 acres of impacts will occur in seagrass beds that contain *H. johnsonii* plus shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*), and paddle grass (*Halophila decipiens*).

A Biological Opinions has been issued by NMFS, along with recommended minimization and mitigation requirements. Although 0.43 acre of impacts to seagrass beds will occur, the amount of Johnson's seagrass is a small percentage of this impact. Secondary impacts will be minimized through implementation of NMFS conditions identified in the *NMFS-COE Key Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's Seagrass*, and

the associated *Dock Construction Guidelines in Florida for Docks or Other Minor Structures*. (These conditions can be found in **Appendix B**.) The impacts to Johnson's seagrass are therefore not anticipated to be significant.

The NMFS has determined in their Biological Opinion that the *Proposed Alternative* is likely to adversely affect Johnson's seagrass, but it is not likely to jeopardize its continued existence. The October 28, 2008 report states:

“The proposed construction activities will result in the removal of 0.08 acre of Johnson's seagrass. This constitutes a small reduction in the numbers of the species; however, NMFS believes that the species' status will not be affected by this very small reduction..... Therefore, we believe the reduction in numbers of Johnson's seagrass will not appreciably reduce the species' likelihood of survival in the wild.”

NMFS has provided conditions for the protection of endangered species to be included as conditions of the USACE issued permit.

West Indian Manatee

The USACE has determined that the *Proposed Action* may affect, but is not likely to adversely affect, the endangered West Indian manatee. Concurrence from USFWS on this determination is pending.

The project will institute manatee protection in all aspects of its construction and use. Boat speed restrictions are currently in place to reduce boat-related manatee mortalities. The City Marina is located within a year-round idle speed zone. In addition, the City of Fort Pierce had adopted ordinances that allow the City to enforce the speed zones within their jurisdiction. By creating and enforcing these designated speed zones, the number of manatee mortalities is minimized to the greatest extent practicable. Since the year 2000, there have been only four watercraft related manatee mortalities in all of St. Lucie County.

During construction, additional manatee protections will be required. USFWS advised that the project must be reviewed by the State of Florida's Fish and Wildlife Conservation Commission (FWCC). The FWCC will place conditions on the project to ensure the minimization of impacts. (A copy of FWCC's *Standard Manatee Conditions for Work-In-Water* can be found in **Appendix B**.) The project must also be reviewed for confirmation that it is consistent with the *Lucie County Manatee Protection Plan* and *USACE/USFWS Manatee Key 2005 Plan*. The following are typical conditions placed on a project by FWCC and USFWS:

- in water construction will not be allowed between Nov 15th and March 31st;
- all persons associated with the project will be instructed about the presence of manatees and the criminal or civil penalties for harming them;

- siltation or turbidity barriers will be constructed so that manatees cannot become entangled;
- all in-water operations will be shut down if a manatee comes within 50 feet of the operation;
- temporary signs concerning manatees will be posted during construction;
- approved manatee education boards may be required to be installed around the marina facilities;
- a slow/no wake speed zone will be established in the marina; and
- a manatee observer may be required during in-water construction.

General Minimization Measures

The following measures will be incorporated into the project in order to further minimize impacts to threatened or endangered species from the installation of the Storm Protection System.

- Fill material for Storm Protection System construction will be required to exhibit the same sediment characteristics of the surrounding sediments. Additionally, fill material will consist of limestone rocks or oyster shells and will not be made of concrete or other fill.
- Use of sediment and turbidity BMPs will be required for Storm Protection System construction.
- All work will be conducted from a shallow-draft barge. The barge is required to operate within waters of sufficient depth (one-foot clearance from the deepest draft of the vessel to the top of submerged resources) to preclude bottom scouring, propeller dredging, or damage to submerged surfaces. Piles will be driven from barge-mounted cranes.
- All permit conditions that are placed on the project by USFWS, NMFS, FL DEP, or FWCC will be adhered to.

Compliance with all permit conditions that are placed on the project by USFWS, NMFS, FL DEP, or FWCC will be a condition of FEMA funding.

4.5 Socioeconomic Issues

4.5.1 Socioeconomic Impacts

The Fort Pierce City Marina is an important economic factor to the City of Fort Pierce and an important regional resource. The marina plays a significant role in boating on Florida's Atlantic coast because it is the only public marina with ocean access between Port Canaveral and Fort Lauderdale, each 150 miles away in either direction. The Fort Pierce Marina specializes in overnight dockage for transients and tourists. In addition to providing vital transient docking services, the Fort Pierce City Marina provides economic benefits to the City through the sale of fuel, docking fees, and money derived from tourist services such as restaurants, shopping, vessel provisioning, hotels, and local repair facilities.

When the City Marina was in full operation, it hosted approximately 12 fishing tournaments yearly. These fishing tournaments provided significant revenue for the City of Fort Pierce. For example, the Southern Kingfish National tournament is a five-day event that brought in an estimated \$1.2 million in annual revenue. The total for the 12 fishing tournaments is estimated at \$2.8 million in revenue per year. In addition, the City of Fort Pierce's Tiki Bar provided \$180,000 in revenue in 2006. Tiki Bar revenues are partially derived from boating traffic. The City Marina operates a ships store that derives portions of its revenue from boating traffic; revenue from the ships store was \$85,000 in 2006. The City Marina dispenses gasoline and diesel fuel; revenue from fuel sales was \$750,000 in 2004. Rental of the City Marina for events results in an estimated \$12,000 per year; other rentals provide an estimated \$23,000 per year; and live aboard fees provide an estimated \$8,500 per year.

The City Marina housed approximately 4,500 transient vessels in 2004. These vessels paid docking fees and utilized marina facilities. Overnight docking is popular at Fort Pierce and boaters utilize the eating, shopping, and entertainment facilities in Fort Pierce.

Total revenue produced by the City Marina and ancillary functions/businesses for the City of Fort Pierce in 2004 is estimated at \$2.9 million. For each year that the outer marina is not in operation, the City of Fort Pierce loses an estimated \$1.5 million in annual revenue. Similarly, it is estimated that the economic loss is \$8.5 million annually in St. Lucie County. Currently, funds generated from the City Marina are utilized to fund other public works projects within the City of Fort Pierce. Examples of the types of projects funded by revenue generated from the City Marina include the development of the Indian River Veterans' Park to the north, and provision of holiday decorations for the City.

No-Action Alternative

The *No-Action Alternative* would have a negative impact on economic resources within the City of Fort Pierce. This alternative does not provide for the restoration of the outer harbor and the approximately 130 slips that were lost. Loss of this dockage represents loss in future revenues generated for the City of Ft, Pierce (\$1.5 million annually), for St. Lucie County (\$8.5 million), and from businesses associated with the City Marina that benefit from the boating public.

Proposed Alternative

The *Proposed Alternative* will restore the outer harbor and reinstate the lost revenue generated from the approximate 130 slips that were lost. It is estimated that revenues produced by boating traffic should result in an increase of 30 – 40% over current conditions when 137 slips are installed. Additionally, the installation of the Storm Protection System will provide hazard mitigation against future 100-year storm events. Hurricane Frances resulted in the loss of the 69 vessels for an approximate \$19 million dollars worth of damage; the loss of the marina was an

additional \$16 million. In addition, \$15 million of public infrastructure was lost when the City's waterfront was destroyed. The proposed Storm Protection System is intended to prevent storm-related damages during future storm events up to a 100-year storm event.

The restoration of the lost docking slips will restore the lost revenue from docking fees, fuel sales, ships store revenue, and rental fees; it will restore business generated at the commercial facilities that benefit from the boating industry; and it will reduce the costs associated with repairs due to future storm events. This will result in a significant positive impact to economic resources.

The *Proposed Alternative* will be funded in part by the City of Fort Pierce. Funding provided by FEMA will not cover the entire cost, and the City of Fort Pierce will contribute \$6.5 million towards the project. This cost will be off-set by the savings that are anticipated by the waterfront protection that will result in eliminating the need to spend taxpayer dollars on costly restorations during future events. Because of this, the *Proposed Alternative* is expected to favorably affect the economic welfare of the community. Additionally, the *Proposed Alternative* will have a favorable affect on the economic welfare of the local marina and recreational industries.

4.5.2 Recreational Impacts

The Fort Pierce City Marina provides recreational opportunities to the public in the form of fishing, boat rentals, and charter fishing. Additionally, the waterfront park is used for regular gatherings such as the Friday Fest and the Farmer's Market. The park, marina, river walk, and amphitheater are host to many annual art and music festivals. The City Marina hosts several large-scale fishing tournaments each year.

No-Action Alternative

The *No Action Alternative* would result in recreational impacts. The loss of boat slips would result in the loss of recreational opportunities, and the City's ability to host large-scale fishing tournaments is jeopardized. Additionally, recreational activities that take place at the waterfront park, river walk, and amphitheater would be at risk from future storm events.

Proposed Alternative

The *Proposed Alternative* has a positive impact on recreation. Restoration of the boat slips will restore recreational opportunities and allow the City of Fort Pierce to host large-scale fishing tournaments. Additionally, recreational activities that take place at the waterfront park, river walk, and amphitheater will be protected against loss due to future storm events.

4.5.3 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898, entitled, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”. This EO directs federal agencies, “to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. . . .” Its goals are to achieve environmental justice, foster non-discrimination in federal programs that substantially affect human health or the environment, and to give minority or low-income communities greater opportunities for public participation in and access to information on matters relating to human health and the environment.

The City of Fort Pierce is located in St. Lucie County, Florida. The mean household income in 1999 was \$25,121, which was below the State of Florida mean of \$38,819. At the time of the 2000 census, the per capita income in Fort Pierce was \$14,345, compared with \$21,587 nationally. The percentage of the Fort Pierce population that was earning an income below the poverty level was 30.9% in 1999, compared to the State percentage of 12.5%. The City of Fort Pierce has a large minority population; 15.0% of the population is Hispanic or Latino in origin; 40.9% are Black or African American.; 24.8% speak a language other than English at home.⁴

Minority-owned firms within the City of Fort Pierce were approximately 34.7% of the total in 1997, with woman-owned firms at approximately 20.8% of the total in 1997 (US Census 2000).

There is the potential for the presence of ethnic, racial, or religious minorities or elderly/handicapped groups using the shore area and park adjacent to the project area. None of the alternatives would cause adverse impacts regarding park use to any of these groups.

No-Action Alternative

The *No Action Alternative* would have the potential to impact any minority-owned firm that depends on the boating industry for a portion of its revenue. This alternative does not provide for the restoration of the outer harbor and the 130 slips that were lost. Loss of this dockage could represent a loss in revenue from the boating industry. This impact would not be anticipated to represent a significantly disproportionate impact to minority-owned firms, however.

Proposed Alternative

The *Proposed Alternative* will restore the outer harbor and reinstate the lost revenue generated from the slips that were lost. This alternative has the potential

⁴ Source: <http://quickfacts.census.gov/qfd/states/12/1224300.html>

to positively impact any minority-owned businesses that derive a portion of their income from the boating industry. This positive impact is not anticipated to be significant.

4.6 Air and Noise Impacts

4.6.1 Air Quality

The National Ambient Air Quality Standards (NAAQS), established by the USEPA, set maximum allowable concentration limits for six criteria air pollutants to protect the public's health, safety, and welfare as a result of the Federal Clean Air Act of 1970. The Clean Air Act Amendments of 1990 [42 USC 7401, *et. seq.*], mandated a reduction in the emissions of the following six criteria pollutants: nitrogen dioxide, sulfur dioxide, carbon monoxide, lead, ozone, and particulate matter (microscopic solid or liquid particles suspended in air). Areas in which air pollution levels persistently exceed the NAAQS may be designated as "non-attainment." areas; states in which a non-attainment area is located must develop and implement a State Implementation Plan containing policies and regulations that will bring about attainment of the NAAQS.

No portion of this project is within a designated non-attainment area for any of the criteria air pollutants for which the USEPA established standards⁵. The project does not involve increasing automobile or significantly increasing boat traffic in the area, nor does it increase traffic capacity because the proposed project is only minimally enlarged compared to pre-disaster conditions (with regards to boat traffic capacity). The proposed project does not have the potential to significantly change emissions. Construction impacts will be minor and short-term.

No significant air quality impacts would be expected to occur as a result of any of the alternatives.

4.6.2 Noise Impacts

Noise is federally regulated by the Noise Control Act enacted in 1972 (*PL 92-574*). The USEPA guidelines, and those of many federal agencies, state that outdoor sound level in excess of 65 dBA (decibels, "A-weighted" noise scale) are "normally unacceptable" for noise-sensitive residential land uses such as residences, schools, and hospitals.

The City of Fort Pierce has a noise ordinance which requires that all construction equipment be operated in accordance with manufacturer's specifications, including the maintenance and use of manufacturer's mufflers and noise-reducing equipment.

⁵ Source: <http://www.epa.gov/oar/oaqps/greenbk/>, last updated June 20, 2007

No-Action Alternative

The *No-Action Alternative* would not generate any construction or additional operating noise. Not replacing the marina's outer harbor docking facilities would result in minor changes in the ambient noise levels by reducing the amount recreational boating traffic. This decrease would not result in significant changes to ambient noise levels because boat docking that is occurring within the inner harbor and the outer harbor is of a sufficient distance that noise levels would be only minimally perceptible at the waterfront.

Proposed Alternative

The *Proposed Alternative* will result in short term noise impacts during construction. All of the construction noises will be of short duration, localized, and will not have a sustained affect on the adjacent commercial properties, parks, or facilities. The short durations of noise generated during construction will not be significant.

Minimal long term noise impacts will occur due to noise generated from the boat traffic. These increases will not result in significant changes to ambient noise levels because the boat docking that is occurring within the inner harbor and the outer harbor is of a sufficient distance that noise levels will be only minimally perceptible at the waterfront.

Neither the short durations of noise generated during construction nor the long term noise impacts from boat traffic are anticipated to be significant.

4.7 Cultural Resources

Cultural resources include archaeological and historical objects, sites, districts; historic buildings and structures, cultural landscapes, and sites and resources of concern to local Native Americans and other ethnic groups. Impacts to historic properties are required to be considered and protected under Section 106 of the National Historic Preservation Act, as amended, and implemented by 36 CFR Part 800. These and other related statutes require Federal agencies to take into account the potential consequences of their decisions, and to incorporate into their actions appropriate measures to avoid, minimize, or mitigate any adverse impacts to historic resources (to the maximum extent possible or practicable) resulting from such actions. Requirements include identification of historic properties that may be impacted by the proposed action or within the project's area of potential effect. Historic properties are defined as archaeological sites, standing structures, or other historic resources listed in or eligible for listing in the National Register of Historic Places (36 CFR 60.4).

FEMA must determine, in consultation with the appropriate State Historic Preservation Officer (SHPO) and (if applicable) Tribal Historic Preservation Officer, what effect, if any, their actions would have on historic properties and determine if the project would have an adverse effect on these properties. FEMA must consult with the appropriate agencies on ways to avoid, minimize, or mitigate the adverse effect.

4.7.1 Historic Resources

The Florida SHPO and FEMA have entered into a Programmatic Agreement for the administration of FEMA programs in Florida. In accordance with this agreement, FEMA Historic Specialists have reviewed this project and have determined that it will have no effect on historic properties due to the absence of historic resources in the vicinity, and the disturbed nature of the project area. Under the Programmatic Agreement, no further consultation is required because the project meets the Appendix B Programmatic Allowance set forth in Section I, which excludes previously disturbed areas from SHPO or Advisory Council review. A copy of the letter to SHPO advising them of this finding can be found in **Appendix B**.

Consultation with the SHPO also occurred via the FL DEP and the USACE permitting process. In letters dated April 13, 2007 and December 16, 2008, the SHPO stated that a review of the Florida Master File and their “records indicates that no cultural resources are recorded within the project area.” A copy of the SHPO’s December 16, 2008 letter can be found in **Appendix B**.

4.7.2 Archaeological Resources

The State of Florida’s Master Site File was examined and no historic or prehistoric archaeological sites are known to exist in the project vicinity. In addition, the project area has been dredged many times and no archaeological resources have ever been found. Because the project area has not received any professional underwater archaeological investigations, the SHPO has requested that precautions be taken to protect any unexpected finds that are discovered during the work. Based on SHPO requirements, the funding provided by FEMA will be contingent on compliance with the following:

If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The City of Fort Pierce shall contact the Florida Department of State, Division of Historical Resources, Review and Compliance Section at 850-245-6333, as well as Ms. Heather Batson of FEMA (Contact information can be found in Section 7.0). Project activities shall not resume without verbal and/or written authorization. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, *Florida Statutes*.

The City of Fort Pierce shall develop contingency plans for responding to any fortuitous finds or unexpected discoveries. In addition, the City of Fort Pierce shall include their contingency plan on all plans and specifications developed for the project.

Sand from an inland sand source will be necessary for some of the construction material for the Storm Protection Island, 11 Free Form Breakwater Habitat Islands, and Tombolo Point. Stewart Mining Industries in St. Lucie County has been chosen to provide this sand. Stewart Mining Industries is a commercial sand mining operation that has been in operation for many years. The SHPO has confirmed that no historic or prehistoric archaeological sites are expected to exist in association with Stewart Mining Industries.

During the construction process, during any activities which involve ground disturbance activities (including submerged land disturbances), the City of Fort Pierce and its designated contractors shall monitor all excavation activities. If during this process an excavation uncovers items, or evidence thereof, which might be of archaeological, historic, or architectural interest, the condition stated above shall be complied with.

It is not anticipated that any of the alternatives would encounter or impact any archaeological resources.

4.8 Safety

4.8.1 Health and Safety

The Fort Pierce City Marina is a public facility that provides access for recreational use of the Indian River Lagoon. Because it is a water-based recreational facility, there are some health and safety issues inherent in its use.

The Fort Pierce City Marina has high current flows in the outer basin and, as a result, docking at the outer harbor can be difficult. During dockage, there have been frequent minor collisions with other boats, the mooring piles, or the docks; these collisions usually involve visiting boaters. If a boater is unaware of the currents, boats can drift sideways as they are attempting to moor. These accidents are very minor and are rarely reported.

Accidents of a more serious nature occur less frequently. The Fort Pierce City Marina has had 12 accidents with over \$500 in damage reported to the FWCC since August 1998; 7 of these were more substantial and resulted in more than \$3,000 in boat damage. There has been one drowning which occurred within the marina. This accident happened in July 2001 when the current swept the victim under an adjacent dock.

Emergencies and minor collisions that occur on land in the vicinity of the Fort Pierce City Marina are responded to by the Fort Pierce Police Department. In the

harbor, the first responders are generally the St. Lucie County Sheriff's Department or the U.S. Coast Guard. The U.S. Coast Guard has a station at the Fort Pierce Inlet. If any fires or spills occur, the St. Lucie County fire department responds.

The Fort Pierce City Marina plays a significant role in safety for boaters on Florida's Atlantic coast because it is the only public marina with ocean access between Port Canaveral and Fort Lauderdale, each 150 miles away in either direction. In the event of a storm, the Fort Pierce City Marina can be used for emergency dockage to provide safe harbor during the storm.

No-Action Alternative

The *No-Action Alternative* would have both positive and negative impacts on safety. This alternative would result in a positive impact because it would eliminate the incidents of minor accidents in the outer harbor due to docking under high current conditions. With no docking facilities, there would be no boats docking.

Negative impacts would occur if the outer harbor were not installed because the number of facilities available for mooring during a storm event would be reduced. This would result in an unknown number of boaters not having safe harbor during a storm.

Proposed Alternative

The *Proposed Alternative* will have positive impacts on safety. The restoration of the outer harbor will restore docking where currents have routinely create difficulties in mooring. The Storm Protection System will reduce current velocities to 1 knot during normal tide conditions, thereby decreasing the difficulty of mooring and decreasing the number of accidents.

The *Propose Alternative* will also have a positive impact on more serious accidents such as the drowning that occurred in 2001. The weaker currents will be less likely to sweep a victim away. The *Proposed Alternative* will have additional positive impacts because it will result in the addition of dockage that will be available during a storm event, thereby increasing the availability of slips for boaters looking for safe harbor during a storm.

4.8.2 Executive Order 13045

In addition to the health and safety of the public, the Fort Pierce City Marina must also consider the health and safety of the children in the community and the boating public. On 21 April 1997, President Clinton signed EO 13045 entitled "Protection of Children from Environmental Health Risks and Safety Risks". EO 13045 directs federal agencies to "make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address

disproportionate risks to children that result from environmental health risks or safety risks.”⁶

The Fort Pierce City Marina is a public facility that provides access for the recreational use of the Indian River Lagoon. Because the City Marina is a water-based recreational facility, there are some health and safety issues inherent in its use. These health and safety issues are discussed at length in Section 4.8.1.

None of the alternatives would have a disproportional affect on children. Although children may be at a greater risk should they fall into the water, the harbors are primarily utilized by adults. It is expected that any children present, especially in the outer harbor, would be under the supervision of an adult. Risks to children should therefore be minimized.

4.8.3 Americans with Disabilities Act

The project will follow “American with Disabilities Act Accessibility Guidelines for Buildings and Facilities,” *36 CFR Part 1191*, to ensure the project meets the goals of the Americans with Disabilities Act.

4.9 Public Services and Utilities

Public services generally refer to police, fire, ambulance, and transit services. Utilities include electrical, potable water, sanitary/storm water management, etc.

Emergencies and minor collisions that occur on land in the vicinity of the Fort Pierce City Marina are responded to by the Fort Pierce Police Department. In the harbor, the first responders are generally the St. Lucie County Sheriff’s Department or the U.S. Coast Guard. The U.S. Coast Guard has a station at the Fort Pierce Inlet. If any fires or spills occur, the St. Lucie County fire department responds. In addition, the City Marina has two slips occupied by local and state law enforcement vessels.

Utilities that are available at the Fort Pierce City Marina include potable water, sewage pump-out, garbage, telephone, internet, and cable.

Both the existing public services and the existing utilities are of sufficient capacity to service the Fort Pierce City Marina. These services were pre-existing to the storm event and significant increases in need are not anticipated from any alternative.

4.10 Cumulative and Secondary Impacts

This section addresses the cumulative and secondary impacts of the proposed action. Cumulative effects are those “. . . impacts which result from the incremental consequences of an action when added to other past and reasonably foreseeable future

⁶ EO 13045; signed 21 April 1997; 62 FR 19885, 23 April 1997; revoked E.O 12606, 2 September 1987; amended by: EO 13229, 9 October 2001; EO 13296, 18 April 2003.

actions” (40 CFR 1508.7). An example of a cumulative effect would be the degradation of a stream’s water quality by several developments which taken individually would have minimal effects, but as a collective action would cause a measurable negative impact. Secondary effects are those impacts which are “. . . caused by an action and are later in time or further removed in distance but are still reasonably foreseeable” (40 CFR 1508.8), such as a new development attracted to the vicinity of an intersection created by a new highway facility.

4.10.1 Cumulative Impacts

Available water quality data indicates that some areas in the Indian River Lagoon do not meet water quality standards for certain parameters. The restoration of the Fort Pierce City Marina will restore 137 boat slips and attract an equal number of boats to the area. Incidental leaks of oil and fuel from these boats could cause further, minor declines in water quality. These incidental increments in contaminant levels are not anticipated to result in contaminant levels exceeding water quality standards beyond what currently exists.

Cumulative water quality impacts are not anticipated to be significant during construction. The City of Fort Pierce will control turbidity during construction to reduce water quality impacts. For near shore work and work within the Indian River Lagoon, the contractor will be required to use both mixing zones and fixed turbidity barriers. These measures, discussed in Section 4.2.1, will ensure that cumulative impacts will not result in turbidity levels exceeding water quality standards.

EFH and Johnson’s seagrass are affected by various authorized activities, including recreational boating, beach nourishment projects, permitted dredging, dock and marina construction, bridge construction, U.S. Coast Guard traffic, etc. The NMFS’ October 28, 2008 Biological Opinion states that the *Proposed Alternative* will not jeopardize the continued existence of Johnson’s seagrass; it is therefore expected that the cumulative impacts of adding the *Proposed Alternative* will not jeopardize the existence of this species. EFH habitat and seagrass impacts will be mitigated for through the creation of seagrass recruitment areas, mangroves, oyster beds, and artificial reefs, thereby further minimizing the potential for cumulative impacts.

4.10.2 Secondary Impacts

The *Proposed Alternative* is for the rebuilding of the Fort Pierce City Marina outer harbor and installation of a Storm Protection System for hazard mitigation. Increased sedimentation and/or deposition of fill within the Indian River Lagoon could occur if the Storm Protection System were to fail. If failure occurred, sand placed within the geotubes that form the Storm Protection System could be released to the environment. The probability of this occurring will increase following multiple storm events, if maintenance did not occur between events. In

order to minimize the probability of this occurring, the City of Fort Pierce has developed an *Island Performance Plan*. The Plan dictates detailed inspection procedures for monitoring the structural integrity of the Storm Protection System. Visual inspections will occur on an annual basis, as well as following severe storms or after unusual circumstances such as a vessel impact on the system. If visual inspections identify significant anomalies in the system, more comprehensive topographic and bathymetric surveys will be completed to quantify the damage and serve as the basis for repair. For purposes of weather-triggered inspections, severe storms are defined as weather events that include sustained winds of 58 miles per hour or greater. Secondary impacts related to the failure of the Storm Protection System are not anticipated due to implementation of the *Island Performance Plan*.

Johnson's seagrass has one of the most limited geographic distributions of any seagrass in the world (NMFS, October 28, 2008 Biological Opinion). Principal threats include habitat degradation and destruction and storm events. Recreational boat traffic can result in the destruction of benthic habitat. The restoration of the Fort Pierce City Marina could add to the adverse impacts to this species due to an increase in boat traffic. Additionally, the maintenance dredging of the marina can result in direct impacts either by removing seagrasses or altering benthic topography, or in indirect impacts by increasing turbidity due to the stirring up of sediments.

Secondary negative impacts to Johnson's seagrass resulting from the *Proposed Alternative* will be minimal because the Indian River Lagoon is of sufficient depth that propeller caused turbidity is minimal. Additionally, no wake zones have been established within the vicinity of the City Marina, which result in the minimization of boat propellers stirring up bottom sediments. Future maintenance dredging of the marina will occur with either the *No Action* or *Proposed Alternatives*, resulting in the potential for secondary Johnson's seagrass impacts. Use of appropriate BMPs during maintenance dredging will minimize turbidity, thereby minimizing secondary impacts to the extent possible. Direct secondary impacts due to dredging operations may not be avoidable, but are not anticipated to be significant based on the NMFS Biological Opinion.

The *Proposed Alternative* also has positive impacts. Because the Storm Protection System lowers the currents within the marina, shoaling is lessened and the frequency of maintenance dredging will be reduced.

Positive secondary impacts related to socioeconomics will also occur. The City of Fort Pierce was experiencing an economic revitalization because of the marina. The location of the marina in the City's downtown area has resulted in the development of hotels and condominiums. This in turn promotes the development of additional restaurants and other tourist based commercial enterprises.

Many of the businesses located within the City of Fort Pierce derive a portion of their sales from the boating industry. If the *No Action Alternative* was chosen and the Fort Pierce City Marina was not restored, loss of business at various commercial facilities that derive a portion of their revenue from the boating industry could occur. This could result in business closures.

5.0 PUBLIC INVOLVEMENT

The purpose for involving the public in the development of an EA is to “encourage and facilitate public involvement in decisions which affect the quality of the human environment” (40 CFR 1500.2) and to ensure “that environmental information is available to public officials and citizens before decisions are made” (40 CFR 1500.1(b)).

Disaster-wide initial public notice was published state-wide December 3 through 15, 2004; it was published in the Okeechobee News on December 5, 2004. No comments were received from that notice. A general final public notice was published state-wide November 11-December 1, 2005; it was published in the Palm Beach Coast on November 23, 2005. No comments were received from either notice. Copies of these public notices can be found in **Appendix C**.

The USACE provided a public notice as part of their permitting process. The first public notice was released October 31, 2007. Because of changes in the project design that occurred through the FL DEP permitting process, a second public notice was released February 19, 2009. A copy of this public notice can be found in **Appendix C**. The only substantial comments that were received were from NMFS. NMFS requested that the USACE determine the probability that the Storm Protection System could fail during a future storm event. Independent reviews of the project were conducted by Moffat & Nichol (August 2008) and the U.S. Army Engineer Research Development Center, Coastal and Hydraulics Laboratory. These reviews indicated that the system is designed appropriately to withstand a 100-year storm event. Additionally, the monitoring and maintenance program of the Storm Protection System which will be instituted should safeguard against failure.

The City of Fort Pierce provided opportunities for the residents of the City, as well as the general public, to provide input into the project. The project was included in several City Commission Meetings, including:

- February 1, 2005 Original Contract presentation from Tetra Tech
- April 19, 2005 Conceptual Plan presentation from Tetra Tech
- June 5, 2006 Survey work and Mitigation Planning were discussed
- August 18, 2006 Status Report and Physical Model Testing were discussed
- September 18, 2006 Seagrass Studies were discussed
- October 3, 2006 Status Update and Basin Dredging Request were discussed
- August 20, 2007 Additional Seagrass Studies were discussed
- August 7, 2008 The Requests for Additional Information from FDEP was Discussed
- March 16, 2009 Permitting Status Update presentation from Tetra Tech

The City of Fort Pierce provided several City workshops related to the project. These workshops occurred on January 31, 2008; March 25, 2008; and July 24, 2008. A presentation to the St. Lucie Waterfront Council occurred on January 17, 2008. On February 18, 2008, a presentation of the project was given to the Fort Pierce Advisory

Council. On May 13, 2008, a project overview was presented to the Treasure Coast Chapter of the Marine Industries Association.

The project has been the subject of several newspaper articles in the Palm Beach Post and Fort Pierce Tribune. August 12, 2007; August 25, 2007; and September 7, 2008 articles described the project in detail and advised which City employees were involved.

In accordance with the FL DEP permitting procedures, a project specific final notice was sent on February 18, 2009 to all of the property owners located within a 500-foot radius of the project location.

FL DEP issued a Notice of Intent to Issue a Permit on September 16, 2009. The required public notice was advertized in the St Lucie News Tribune on September 24, 2009. No adverse comments were received in response to the notice.

Periodic status reports have been presented to the City Commission as part of the Commission's public meeting schedule. These Commission meetings are televised on St. Lucie County TV, which is a 24-hour, 7-days-a-week government access cable channel programmed and operated by the St. Lucie County Florida Board of County Commissioners.

A project specific Public Notice was published by FEMA on October 21, 2010 in the Fort Pierce Tribune. This Public Notice advised the public that a Draft EA had been developed for the project. The public was advised on how to obtain copies of the EA and invited to comment. The Draft EA was also made available to interested parties through publication on FEMA's website <http://www.fema.gov/plan/ehp/envdocuments/ea-region4.shtm> and by distribution within the community. The Draft EA served as the final public notice for this project. The Draft EA was distributed to interested parties at the following locations.

**St Lucie County: Fort Pierce Branch
Library**
101 Melody Lane
Fort Pierce, Florida 34950
(772) 462-1615

Mr. Ed Seissiger
Engineering Project Coordinator
City of Fort Pierce
Fort Pierce City Hall, 100 N. U.S. 1
1st Floor Engineering Office
Fort Pierce, Florida 34954
(772) 460-2200

The public was and is invited to comment on the proposed project.

6.0 AGENCY COORDINATION AND PERMITS

6.1 Agency Coordination

Formal consultation with NMFS, USFWS, and SHPO occurred in conjunction with the USACE/FL DEP permit application process for the project. Technical assistance has been provided by USFWS and NMFS for the purpose of providing information in support of this EA. USFWS provided standard manatee conditions for in-water work (a copy of these conditions can be found in **Appendix B**). NMFS provided information regarding sea turtle and smalltooth sawfish construction conditions (a copy of this information can be found in **Appendix B**). Copies of correspondence related to the consultation with SHPO can be found in **Appendix B**.

On August 11, 2009, the project was presented to the State of Florida’s Governor and Cabinet members sitting as Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees) for final approval. The Board of Trustees was requested to act on those aspects of the project which requires authorization to use sovereignty submerged lands (14.66 acres of fill). The project was approved with a unanimous vote.

The Draft EA was sent to the following agencies and organizations for their comments. Comments received have been incorporated into this Final EA.

Federal Emergency Management Agency Attention: Ms. Heather Batson Environmental Liaison Officer 36 Skyline Drive Lake Mary, FL 32746	Federal Emergency Management Agency Attention: Mr. Sid Melton Infrastructure Branch Director 36 Skyline Drive Lake Mary, FL 32746
FIND St. Lucie County Attention: Ms. Gail Kavanagh Commissioner 6560 South Federal Highway Port St. Lucie, FL 34952	Florida Dept. of Environmental Protection Southeast District Office Attention: Jennifer Smith Environmental Resources Program 400 North Congress Avenue West Palm Beach, FL 33401
Florida Department of State Division of Historical Resources Attention: Ms. Barbara Mattick Director, State Historic Preservation Officer 500 S. Bronough Street Tallahassee, FL 32399-0250	Florida Fish and Wildlife Conservation Commission Attention: Mr. Mark Robson Division of Marine Fisheries Management 2590 Executive Center Circle E Suite 204 Tallahassee, FL 32301
Florida Fish and Wildlife Conservation Commission South Region Attention: Mr. Chuck Collins 8535 Northlake Boulevard West Palm Beach, FL 33412	Florida Park Service Bureau of Parks, District 5 Attention: Mr. Ernest M. Cowan 13798 S.E. Federal Highway Hobe Sound, FL 33455

National Marine Fisheries Service Southeast Regional Office Attention: Mr. David M. Bernhart Protected Resources Division 263 13 th Avenue South St. Petersburg, FL 33701	National Marine Fisheries Service Attention: Miles M. Croom Assistant Regional Administrator Habitat Conservation Division 263 13 th Avenue South St. Petersburg, FL 33701
National Marine Fisheries Service Southeast Regional Office Attention: Dr. Roy E. Crabtree 363 13 th Avenue South St. Petersburg, FL 33701	National Marine Fisheries Service Attention: Ms. Jocelyn Karazsia 400 North Congress Ave. Suite 120 West Palm Beach, FL 33401
St. Lucie County Coastal Resources Supervisor Attention: Mr. James B. Oppenborn 3150 Will See Road Fort Pierce, FL 34982	U.S. Army Corps of Engineers Jacksonville Regulatory Division Attention: Mr. Garret Lipps 4400 PGA Boulevard Suite 500 Palm Beach Gardens, FL 33410
U.S. Environmental Protection Agency Region 4 Attention: Jennifer Derby Wetlands and Marine Regulatory Center 61 Forsyth Street, Southwest Atlanta, Georgia 30303-8960	U.S. Environmental Protection Agency South Florida Office Mr. Ron Miedema 400 North Congress Avenue. Suite 120 West Palm Beach, Florida 33401
U.S. Fish & Wildlife Service South Florida Ecological Services Office Attention: Mr. Paul Souza, Field Supervisor 1339 20th Street Vero Beach, FL 32960	

The public comment period for the Draft EA closed on November 2, 2010. Three comments were received, one each from St. Lucie County, Mosquito Control and Coastal Management Services; Florida Department of State, Division of Historical Resources; and National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Information obtained from, or project conditions requested by, these three agencies have been incorporated into this Final EA.

The St. Lucie County Mosquito Control and Coastal Management Services letter advises that should any of the proposed off-site mitigation be unsuccessful, credits are available in this agency's forested mitigation bank located at Bear Point. Additionally, they requested that the City of Fort Pierce coordinate during construction with Port of Fort Pierce shipping operators and recreational boating interests located in the Port. By doing so, compatibility between the construction activities and ongoing Port- and recreation-related activities will be ensured.

The Florida Department of State, Division of Historical Resources requested that conditions be placed on the project in the event that artifacts or human remains are found. Additionally, they requested that the City of Fort Pierce develop contingency plans in the event of a fortuitous find, and that this contingency plan be identified on all plans and specifications developed for the project.

The National Oceanic and Atmospheric Administration, National Marine Fisheries Service provided clarifications on essential fish habitat impacts and proposed mitigation. They also provided copies of correspondence related to coordination with the U.S. Army Corps of Engineers during the permitting process.

6.2 Permits and Conditions

The City of Fort Pierce is required to obtain Clean Water Act permits for the project. The permit application for both Sections 401 and 404 are combined in the State of Florida, with the FL DEP and USACE placing project conditions that will minimize impacts. FL DEP has issued Permit Number 56-0129156-011 and USACE has issued Permit Number SAJ-1993-41787 for this project.

Conditions placed on the project by the FL DEP, NMFS, SHPO, USACE, or FEMA (as a condition of funding) include the following.

The FL DEP permit requires the use of sediment control to reduce turbidity during construction, and thereby minimize water quality impacts. Two different methods will be used for work near shore, turbidity barriers and 150 meter mixing zones; one method will be used within the Intracoastal Waterway, 150 meter mixing zones.

Any pilings within the Indian River Lagoon that are treated with chromated copper arsenate will be wrapped to prevent possible leaching of copper into the water column.

Mitigation is required for the impacts to 0.43 acres of seagrass, as determined by the USACE and FL DEP permits. Mitigation that is required includes:

1. All work will be conducted from a shallow-draft barge. The barge is required to operate within waters of sufficient depth (one-foot clearance from the deepest draft of the vessel to the top of submerged resources) to preclude bottom scouring, propeller dredging, and damage to submerged surfaces. Piles will be driven from barge-mounted cranes.
2. Restoration of estuarine bottom to enhance seagrass recruitment within a seagrass area adjacent to the North Causeway in Fort Pierce will be provided. Nearby spoil islands will be scraped down and 2.34-acres of a dredge hole will be filled and then covered with the scrapings from the spoil islands. Bird stakes will be added to the area to encourage roosting of waterfowl, which will add natural fertilizer for revegetating the seagrass beds.

3. The City of Fort Pierce will provide channel markings at the North Causeway Island Park and Boat Ramp. The City will install signage to protect existing seagrass beds from boaters using these ramps. Existing seagrass damage will undergo restoration where prop scars are not naturally healing.
4. The City of Fort Pierce will deed 26 acres of submerged land to the State of Florida. This 26-acre parcel contains pristine seagrass beds, tidal flats, and submerged mangrove areas; it is located immediately adjacent to the State of Florida's Fort Pierce Inlet State Park. An additional 30 acres will be given to the State as proprietary public interest.

NMFS special conditions for the protection of sea turtles and smalltooth sawfish, as described in *Sea Turtle and Smalltooth Sawfish Construction Conditions*, will be implemented.

NMFS conditions identified in the *NMFS-COE Key Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's Seagrass* will be implemented. Additionally, USACE/NMFS's *Dock Construction Guidelines* will be implemented.

The FWCC's *Standard Manatee Conditions for Work-In-Water* conditions will be implemented. The project must also be reviewed for confirmation that it is consistent with the Lucie County Manatee Protection Plan and USACE/USFWS Manatee Key 2005 Plan.

Fill material for the exposed sections of the Storm Protection System will exhibit the same sediment characteristics of the surrounding sediments. Additionally, fill material will consist of limestone rocks or oyster shells and will not be made of concrete or other fill.

A lease is required from the State of Florida for sovereign submerged lands for the southern marina facility in the outer harbor. In addition, a lease will be required for the habitat islands. The City of Fort Pierce will obtain these leases.

FEMA funding is conditional upon the City of Fort Pierce obtaining all applicable permits, including but not limited to Sections 401 and 404 Clean Water Act permits from the FL DEP and USACE, and adherence to all permit conditions. Compliance with permit conditions established by the SHPO, NMFS, USFWS, USACE, FL DEP, and FWCC as part of this permitting process will ensure that applicable environmental regulations are adhered to.

During the construction process, during any activities which involve ground disturbance activities (including submerged land disturbances), the City of Fort Pierce and its designated contractors shall monitor all excavation activities. If during this process an excavation uncovers items, or evidence thereof, which might be of archaeological, historic, or architectural interest, the following condition shall be complied with.

If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The City of Fort Pierce shall contact the Florida Department of State, Division of Historical Resources, Review and Compliance Section at 850-245-6333, as well as Ms. Heather Batson of FEMA (Contact information can be found in Section 7.0). Project activities shall not resume without verbal and/or written authorization. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, *Florida Statutes*.

The City of Fort Pierce shall develop contingency plans for responding to any fortuitous finds or unexpected discoveries. In addition, the City of Fort Pierce shall include their contingency plan on all plans and specifications developed for the project.

The Storm Protection System will be monitored in accordance with the *City of Fort Pierce Island Performance Plan*. In conformance with this plan, repairs to the rock revetment and t-groin structures will be required when a damage value of $S = 3$ (or greater) occurs.

The City of Fort Pierce will obtain and maintain insurance coverage and/or establish and maintain an island maintenance and performance fund sufficient to cover the repair of the Storm Protection System in accordance with FEMA hazard mitigation program requirements.

The Storm Protection System will be monitored and maintained in accordance with the *City of Fort Pierce Waterfront Storm Protection System Habitat Monitoring Plan* to provide assurances that the proposed habitat areas, planted and naturally recruited, will be monitored and maintained for success.

The Storm Protection System will be monitored and maintained in accordance with the *City of Fort Pierce Waterfront Storm Protection Island Maintenance Plan* that outlines a program for routine island maintenance activities that will support the planned ecological communities.

During Construction, the City of Fort Pierce will coordinate with shipping operators and recreational boating interests located in the Port of Fort Pierce. The City shall ensure that compatibility between the construction activities and ongoing Port- and recreation-related activities is maintained.

7.0 CONCLUSIONS

In compliance with requirements of the NEPA, this Final EA describes the anticipated effects the Proposed Action and other alternatives would have on the physical environment, water resources and water quality, biological resources, cultural resources, and socioeconomic resources.

Hurricane Frances caused a significant amount of damage to the City of Fort Pierce's downtown City Marina. The outer harbor was completely destroyed; docks near the entrance to the inner harbor were severely damaged when the hurricane took out concrete pilings anchoring the floating docks. The City Marina provides vital transient docking services to the boating public and provides economic benefits to the City through the sale of fuel, docking fees, and profits derived from tourist services such as restaurants, shopping, vessel provisioning, hotels, and local repair facilities. Additionally, the marina provides economic benefits to the City through revenue realized from various fishing tournaments and boat shows.

FEMA's Public Assistance Program will provide funding to the City of Fort Pierce to repair the City Marina and install a Storm Protection System that will provide protection for both the inner and outer harbor areas from a 100-year storm event. The Storm Protection System will be composed of a Storm Protection Island, 11 Free Form Breakwater Habitat Islands, and a peninsula called Tombolo Point. These components will be constructed using sand filled geotubes of 35-foot circumference, which will form the outer boundary of the structure. Once the geotubes are filled, the internal area will be filled with sand anchored by T-shaped riprap revetments (t-groins). The large Storm Protection Island will include various construction materials placed at different elevations to provide a diversity of habitat. The 11 Free Form Breakwater Habitat Islands will be constructed east and northeast of the outer harbor and Tombolo Point will be constructed south of the harbor; these areas will also be constructed to provide a diversity of habitats.

Short term impacts to water quality will occur as a result of construction. These impacts will be minimized through the use of turbidity curtains and permitted mixing zones. Conditions for work in water will be adhered to for the protection of manatees, smalltooth sawfish, and sea turtles. Long term benefits will occur because the Storm Protection System will enhance the Indian River Lagoon by creating habitats such as oyster beds, lime-rock artificial reefs, mangrove fringes, and coastal dune communities. Mangroves and coastal dune vegetation will be planted to stabilize the islands and to provide habitat, oyster shells and submerged limerock will be used at lower elevations to promote the establishment of hardbottom reefs. The Storm Protection System will result in lowering currents within the Indian River Lagoon, which will improve boater safety, reduce the need for maintenance dredging, and promote seagrass recruitment.

The project may affect but is not likely to adversely affect smalltooth sawfish, sea turtles, and manatees. The project will likely adversely affect but not likely jeopardize the continued existence of Johnson's seagrass. No significant long-term impacts to the floodplain or wetlands will occur. There will be no effect to historic properties or cultural

resources. All adverse impacts will be minimized to the extent practicable through the implementation of appropriate BMPs and project conditions; mitigation will be implemented to offset impacts to seagrass resources. The project requires permits from the FL DEP and USACE; the City of Fort Pierce has obtained said permits and shall adhere to all permit conditions. By adhering to permit conditions, FEMA can reasonably ascertain that no significant impacts will occur to environmental resources. Compliance with permit conditions established by the SHPO, NMFS, USFWS, USACE, and FL DEP as part of this permitting process will ensure that applicable environmental regulations are adhered to.

Conclusion

Based on this Final EA and in accordance with NEPA, the CEQ regulations for implementing NEPA (44 CFR Parts 1500 through 1508) and FEMA regulations for environmental consideration pertaining to NEPA compliance (44 CFR Part 10), FEMA has determined that the proposed action will have no significant adverse impact on the biological or human environment. As a result of this FONSI, an EIS will not be prepared and the proposed project may proceed.

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9.0 LIST OF PREPARERS

<p>Mr. William Barbel Senior Project Scientist AECOM 303 East Wacker Dr, Suite 600 Chicago, IL 60601-5276</p>	<p>Heather Batson Environmental Specialist FEMA Region IV/Florida Recovery Office 36 Skyline Drive Lake Mary, FL 32746 Heather.Batson@dhs.gov 407-268-8946 or 407-286-8236</p>
<p>Jayne E. Bergstrom Former Permitting Task Manager Formerly with Tetra Tech EC, Inc. 759 South Federal Highway Stuart, FL 34990</p>	<p>Richard Czlapinski, PE Discipline Lead - Coastal Engineering Tetra Tech EC, Inc 1901 South Congress Ave, Suite 270 Boynton Beach, FL 33426 Richard.Czlapinski@tteci.com 561-735-0482 Ex 202</p>
<p>Vedat Demirel FEMA Technical Reviewer Formerly with Moffat and Nichol 1509 West Swann Ave. Tampa, FL 33606</p>	<p>Kenneth Hemstreet Former Senior Project Engineer Formerly with AECOM 303 East Wacker Dr, Suite 600 Chicago, IL 60601</p>
<p>Dean Kubitschek Marine Manager City of Fort Pierce 1 Avenue A Fort Pierce, FL 34950</p>	<p>Wendi Nance Biologist/Permitting Specialist Tetra Tech EC, Inc. 759 South Federal Highway Stuart, FL 34994</p>
<p>Cheryl Nash Senior Project Scientist/EA Manager AECOM 303 East Wacker Dr. Chicago, IL 60601 Cheryl.Nash@aecom.com 630-816-6419</p>	<p>Mark Pirrello FEMA Technical Reviewer Moffat and Nichol 1509 West Swann Ave. Tampa, FL 33606</p>
<p>Brian Proctor Tetra Tech EC, Inc. 759 South Federal Highway Stuart, FL 34990 Brian.Proctor@tteci.com 772-781-3472</p>	<p>Christa Razem City of Fort Pierce 1 Avenue A Fort Pierce, FL 34950 772-460-2200</p>
<p>Ed Seissiger Fort Pierce City Hall 100 North U.S. 1 Fort Pierce, FL 34954 772-460-2200</p>	<p>Brian Smith Sr. Project Manager, QA/QC AECOM 303 East Wacker Dr Chicago, IL 60601</p>