NOVEMBER 2010

FINAL ENVIRONMENTAL ASSESSMENT

MAINTENANCE DREDGING
ST. AUGUSTINE INLET AND ADJACENT INTRACOASTAL WATERWAY
ST. JOHNS COUNTY, FLORIDA

Includes inlet maintenance dredging for regional sediment management and beneficial use of the dredged material

U.S. Army Corps
of Engineers
JACKSONVILLE
DISTRICT

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

REPLY TO
ATTENTION OF

FINDING OF NO SIGNIFICANT IMPACT
MAINTENANCE DREDGING
ST. AUGUSTINE INLET AND ADJACENT INTRACOASTAL WATERWAY
ST. JOHNS COUNTY, FLORIDA

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

a. The proposed action would be conducted in accordance with the Endangered Species Act, and specifically in compliance with the Regional Biological Opinion issued by the National Marine Fisheries Service and Biological Opinion issued by the US Fish and Wildlife Service. The work would not jeopardize the continued existence of any threatened or endangered species or impact any designated "critical habitat."

b. This project is being coordinated with the State of Florida, and all applicable water quality standards will be met.

c. The proposed work has been determined by the State of Florida to be consistent with the Florida Coastal Zone Management Program.

d. The proposed work has been coordinated with the Florida State Historic Preservation Officer and appropriate federally recognized tribes. It has been determined that the proposed dredging and beach placement options would not adversely affect any properties eligible for or listed on the National Register of Historic Places.

e. Measures will be in place during construction to eliminate, reduce, or avoid adverse impacts below the threshold of significance to fish and wildlife resources.

f. Public benefits will be provided with unobstructed channel navigation.

In consideration of the information summarized, I find that the proposed Federal Navigation Projects, maintenance dredging of St. Augustine Inlet and adjacent Intracoastal Waterway, will not significantly affect the human environment and does not require an Environmental Impact Statement. A copy of this document will be made available to the public at the following website:
http://www.saj.usace.army.mil/Divisions/Planning/Branches/Environmental/DocsNotices_OnLine_StJohnsCo.htm.

ALFRED A. PANTANO, JR.
Colonel, Corps of Engineers
Commanding

9/19/11
Date

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ON
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ST. AUGUSTINE INELT AND ADJACENT INTRACOASTAL WATERWAY
ST. JOHNS COUNTY, FLORIDA

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1 PROJECT PURPOSE AND NEED

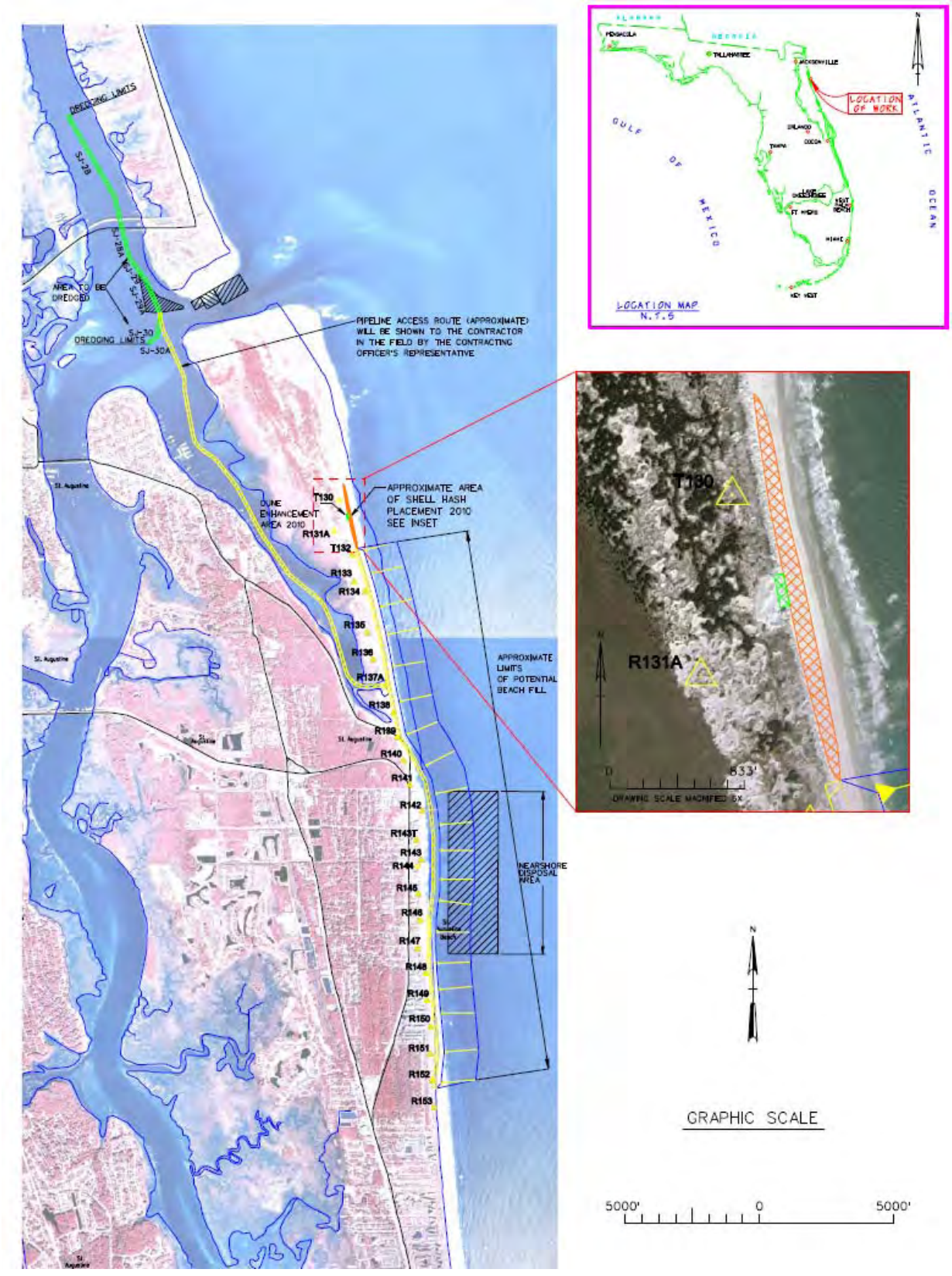
1.1 PROJECT DESCRIPTION.

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is proposing to conduct periodic maintenance dredging of St. Augustine Inlet and the adjacent Intracoastal Waterway (IWW) in St. Johns County, FL. This would include IWW Cuts SJ-28 to SJ-30, a portion of the Inlet flood shoal, and a portion of the inlet entrance channel along Porpoise Point (see Figure 1, Project Map). Beach compatible dredged material would be placed along the shoreline within Anastasia State Park (ASP) and St. Augustine Beach between Florida Department of Environmental Protection (DEP) monuments R-132 to R-152. Non-beach compatible material would be placed in a near-shore placement area between DEP monuments R-141 to R-146. The IWW channel would be maintained to its authorized dimensions of 125-feet wide by 12-feet deep plus 2-feet of allowable over-depth at mean lower low water (MLLW). The inlet entrance channel is authorized to be maintained at a "best fit" alignment within the confines of a 600-foot-wide area, between the north and south jetties. The entrance channel bottom width is to be maintained at 200 feet wide by -16 feet deep MLLW (plus 2 ft of allowable over depth for a total project depth of -18 ft MLLW), along with 50 feet wide settling basins along the north and south sides of the channel. The accumulation of sediment, commonly referred to as shoaling, has restricted the width of the project channels and reduced their depths. In addition, the sediment which has accumulated along Porpoise Point is trapped there by the man-made inlet and is restricting it's width.

1.2 PROJECT NEED OR OPPORTUNITY.

The relatively high rate of shoaling within the IWW and St. Augustine Inlet necessitates frequent maintenance dredging. Last dredged in 2005, the most recent examination survey documented a total in situ shoaling volume of approximately 700,000 cubic yards (cy) within the authorized channels. Minimum depths recorded from the project channels are less than 4 ft causing navigation problems for commercial and recreational vessels. Vessels are currently being forced outside the authorized channels in search of deeper water, waiting for high

Figure 1. Project Map.



tides, or prop dredging through the channels. Removal of the shoal material would maintain the navigable capacity of the project channels. In addition, the sediments accreting on the Porpoise Point shoal (Figure 2) are effectively being removed from the near-shore sediment transport system. So, bypassing this material to the critically eroded down-drift beaches would restore (or mimic through regional sediment management - RSM) the natural transport process.

A DEP Bureau of Beaches and Coastal Systems (BBCS) report (June 2009) on *Critically Eroded Beaches in Florida,* identified 9.8 miles of critically eroded shoreline in St. Johns County. The proposed beach placement area between R-132 to R-152 (Figure 1) composes 3.8 miles of the 9.8 mile DEP designated critically eroded area. In addition, the St. Augustine Inlet Management Plan (Taylor, 1997) recommends to: 1) "Continue to bypass sediment to the down-drift beaches." and 2) "Restore the down-drift beaches, designated by the Department as experiencing critical erosion, to mitigate the effects of the inlet."

Figure 2. Proposed Porpoise Point RSM Dredge Area.

1.3 PROJECT AUTHORITY.

1.3.1 AUTHORIZATION.

- Spanning nearly the entire length of Florida from Jacksonville to Miami, an 8 ft deep x 75 ft wide IWW channel was authorized 21 January 1927 by House document 586, 69th Congress, 2nd Session. The present configuration (12 ft deep x 125 ft wide) was authorized by House Document 740, 79th Congress, 2nd Session, 2 March 1945. Maintenance of the channel is the responsibility of the Corps. The Florida Inland Navigation District (FIND) serves as the IWW local sponsor.

- Authorization was received for improvements to the St. Augustine Harbor and Inlet, under House Document 133, 81st Congress, 1st Session. Maintenance of the harbor and inlet channel is the responsibility of the Corps while the St. Augustine Port, Waterway and Beach District (PWBD) is the Harbor/Inlet local sponsor.

1.4 RELATED ENVIRONMENTAL DOCUMENTS.

Related NEPA, design, and planning documents for the IWW and St. Augustine Inlet, St. Johns County include the following:

- Environmental Assessment, Maintenance Dredging St. Augustine Harbor and Adjacent Segments of the Intracoastal Waterway. U.S. Army Corps of Engineers. Jacksonville, FL. 1998.

- Environmental Assessment, St. Johns County Shore Protection Project. U.S. Army Corps of Engineers. Jacksonville, FL. 1998.

- St. Augustine Inlet Management Study Implementation Plan Certificate of Adoption. Florida Department of Environmental Protection. Tallahassee, FL. 1998

- St. Augustine Inlet Management Plan. St. Johns County, Florida. Taylor Engineering, Inc. Jacksonville, FL. 1997.

- Long-Range Dredged Material Management Plan for the Intracoastal Waterway, St. Johns County, Florida. Taylor Engineering, Inc. Jacksonville, Florida.1989.

- Final Environmental Impact Statement. Beach Erosion Control Study. St. Johns County, Florida. U.S. Army Corps of Engineers. Jacksonville, FL. 1979.

1.5 DECISIONS TO BE MADE.

This Environmental Assessment (EA) will evaluate whether to conduct periodic maintenance dredging of the IWW and portions of St. Augustine Inlet, St. Johns County, FL (hereafter project channels) and, if so, recommend alternatives to accomplish that goal.

1.6 SCOPING AND ISSUES.

1.6.1 RELEVANT ISSUES.

The following issues were identified as relevant to the proposed action and appropriate for further evaluation: threatened and endangered species including sea turtles, West Indian manatee, piping plover, Anastasia island beach mouse (AIBM), and smalltooth sawfish; water quality; essential fish habitat; wildlife resources; air quality; cultural resources; aesthetics; recreation; socio economics; shoreline stabilization; noise; and navigation.

1.6.2 ISSUES ELIMINATED FROM FURTHER ANALYSIS.

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

1.7 ENVIRONMENTAL COORDINATION

1.7.1 WATER QUALITY CERTIFICATION

This project would be performed in compliance with State of Florida water quality standards. In accordance with the Coastal Zone Management Act, a Federal Consistency Determination (CD) has been written for the proposed maintenance dredging (Appendix B) and has been reviewed by the State for their concurrence that the project is consistent with the enforceable policies of the Florida Coastal Management Program. This review was performed concurrently with the State permitting review.

1.7.2 ENDANGERED SPECIES ACT- SECTION 7 COORDINATION

In accordance with Section 7 of the Endangered Species Act, the proposed work has been coordinated with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).

2 ALTERNATIVES

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

2.1 DESCRIPTION OF ALTERNATIVES.

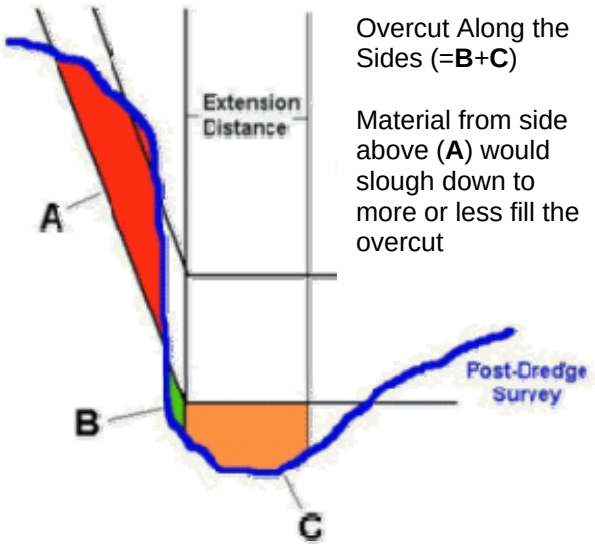
2.1.1 NO-ACTION ALTERNATIVE

The project channels would not be maintenance dredged. This would result in increased shoaling and unsafe navigation conditions for vessels. In addition, the down-drift critically eroded beaches would not receive inlet bypassed sediments.

2.1.2 DREDGING ALTERNATIVE

The proposed periodic maintenance dredging of the project channels would occur as planned (refer to Section 1.1 for more detail). The Corps does not normally specify the type of dredging equipment to be used. This is generally left to the dredging industry to offer the most appropriate and competitive equipment available at the time. Never-the-less, certain types of dredging equipment are normally considered more appropriate depending on the type of material, the depth of the channel, the depth of access to the disposal or placement site, the amount of material, the distance to the disposal or placement site, the wave-energy environment, etc. A more detailed description of types of dredging equipment and their characteristics can be found in Engineer Manual, EM 1110-2-5025, *Engineering and Design - Dredging and Dredged Material Disposal*. This Engineer Manual is available on the internet at http://www.usace.army.mil/publications/eng-manuals/em1110-2-5025/toc.htm.

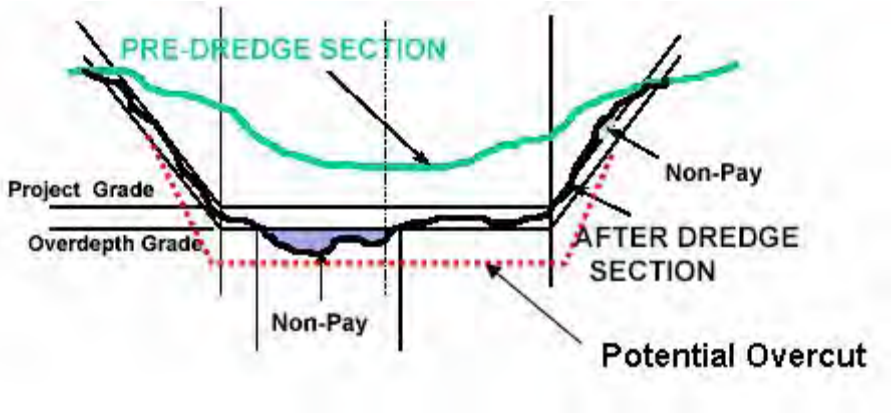
The plans and specifications normally require dredging beyond the project depth or width. The purpose of the "required" additional dredging is to account for shoaling between dredging cycles (reduce the frequency of dredging required to maintain the project depth for navigation). In addition, the dredging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



Overcut Along the Sides (=**B**+**C**)

Material from side above (**A**) would slough down to more or less fill the overcut

variability and inaccuracy of the dredging equipment (normally ±2 feet). In



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

Frequent maintenance dredging operations in the project channels have taken place since they were dredged to the present project depths of -16 ft MLW in 1940 (St. Augustine Inlet) and -12 ft MLW in 1951 (IWW). The most recent IWW maintenance event in 2005 removed approximately 205,000 cubic yards (cy) of material from the project channel and placed this material on the beach placement area. Dredging of the project channels has been typically performed with a hydraulic cutterhead pipeline dredge although a clamshell or small hopper dredge could also perform the work.

Since dredging equipment does not typically result in a perfectly smooth and even channel bottom (see discussion above); a drag bar, chain, or other item may be drug along the channel bottom to smooth down high spots and fill in low spots. This finishing technique also reduces the need for additional dredging to remove

any high spots that may have been missed by the dredging equipment. It may be more cost effective to use a drag bar or other leveling device.

2.1.3 DREDGED MATERIAL PLACEMENT OPTIONS

2.1.2.2 BEACH PLACEMENT

Beach placement — placing on the beach dredged material compatible with the native beach sands — is an approach to dredged material management that the State of Florida encourages. In fact, the DEP BBCS Strategic Beach Management Plan for the Northeast Atlantic Coast Region and the St. Augustine Inlet Management Plan (Taylor, 1997) recommend the placement of beach quality dredged material from the maintenance of the project channels on the beach south of St. Augustine Inlet. The Corps also includes this approach as an essential part of dredged material management for channel reaches which, based on historic data, are likely to contain beach quality sediments. These conditions are most typically encountered immediately adjacent to tidal inlets where waterway shoals are formed primarily by sand driven through the inlet by waves and tides. The material historically dredged here has been beach quality in compliance with the Florida State sand rule and the beaches south of St. Augustine Inlet are designated by DEP as critically eroded. Thus dredged material from the project channels has been routinely placed on the beach south of the inlet. Therefore, beach placement is the primary strategy of dredged material management for the project channels.

2.1.3.2 NEARSHORE PLACEMENT

Material that does not qualify for beach placement would be placed adjacent to the beach area in the nearshore between DEP monuments R-141 to R-146 (Figure 1). The material would have a maximum top elevation of -12 feet MLLW extending to the 20-foot contour. Pursuant to subsection 62B-41.005(15), Florida Administrative Code (the "Florida State sand rule"), sandy sediment derived from the maintenance of coastal navigation channels shall be deemed suitable for beach placement with up to 10 percent fine material passing the #230 sieve. If this material contains between 10 percent and 20 percent fine material passing the #230 sieve by weight, and it meets all other sediment and water quality standards, it shall be considered suitable for placement in the nearshore portion of the beach. Therefore, this placement alternative would only be used if the dredged material were deemed incompatible for beach placement but in compliance with the sand rule for nearshore placement.

2.2 PREFERRED ALTERNATIVE

The preferred alternative is to perform the proposed dredging of the project channels in order to maintain the authorized dimensions. The beach is the preferred

placement alternative due to the need for inlet sediment bypassing of beach quality dredged material to the down-drift critically eroded beach.

2.3 ALTERNATIVES ELIMINATED FROM FURTHER EVALUATION

2.3.2.2 OCEAN DISPOSAL

Ocean disposal of dredged material is not a realistic option for the project channels. Ocean disposal requires the transport of dredged material from the dredging site to an authorized offshore disposal area. In the case of St. Johns County, this operational requirement poses a very costly and difficult task for the following reasons. First, the material must be loaded into hopper barges capable of transiting the relatively shallow depths of the IWW. This consideration places severe limits on hopper capacity. Regulatory restrictions on hopper overflow during filling further limit hopper capacity. These barges must proceed to St. Augustine Inlet for passage to the ocean. Once reaching St. Augustine Inlet the material must then be transferred to deep draft seagoing, Coast Guard approved barges for transport to the authorized disposal area resulting in increased "double handling" costs. A review of offshore disposal areas currently authorized by the U.S. Environmental Protection Agency (EPA) to receive dredged material identified an approved offshore placement site approximately 4 miles east of the St. Johns River Inlet in northern Duval County (approximately 30 miles north of St. Augustine Inlet). Therefore, the costs associated with this type of operation and the likely increase in future regulatory restrictions on the use of ocean dumping, together make reliance on this method of material disposition inappropriate for the long-term maintenance of the project channels.

2.3.2.2 OPEN WATER DISPOSAL

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

2.3.2.2 UPLAND PLACEMENT

Placement of dredged material in an upland dredged material management area (DMMA) is typically preferred for projects where the material has historically been incompatible with beach or nearshore placement. That is not the case for the

dredged material from the project channels which has historically been beach quality. In addition, there are no DMMAs available in the project area. Therefore, since the project channels are man-made, sand drifting in the littoral drift process is trapped by the project channels, and the down-drift shoreline has been designated critically eroded by DEP, upland placement was not considered an acceptable dredged material management strategy for this project.

2.4 COMPARISON OF ALTERNATIVES

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

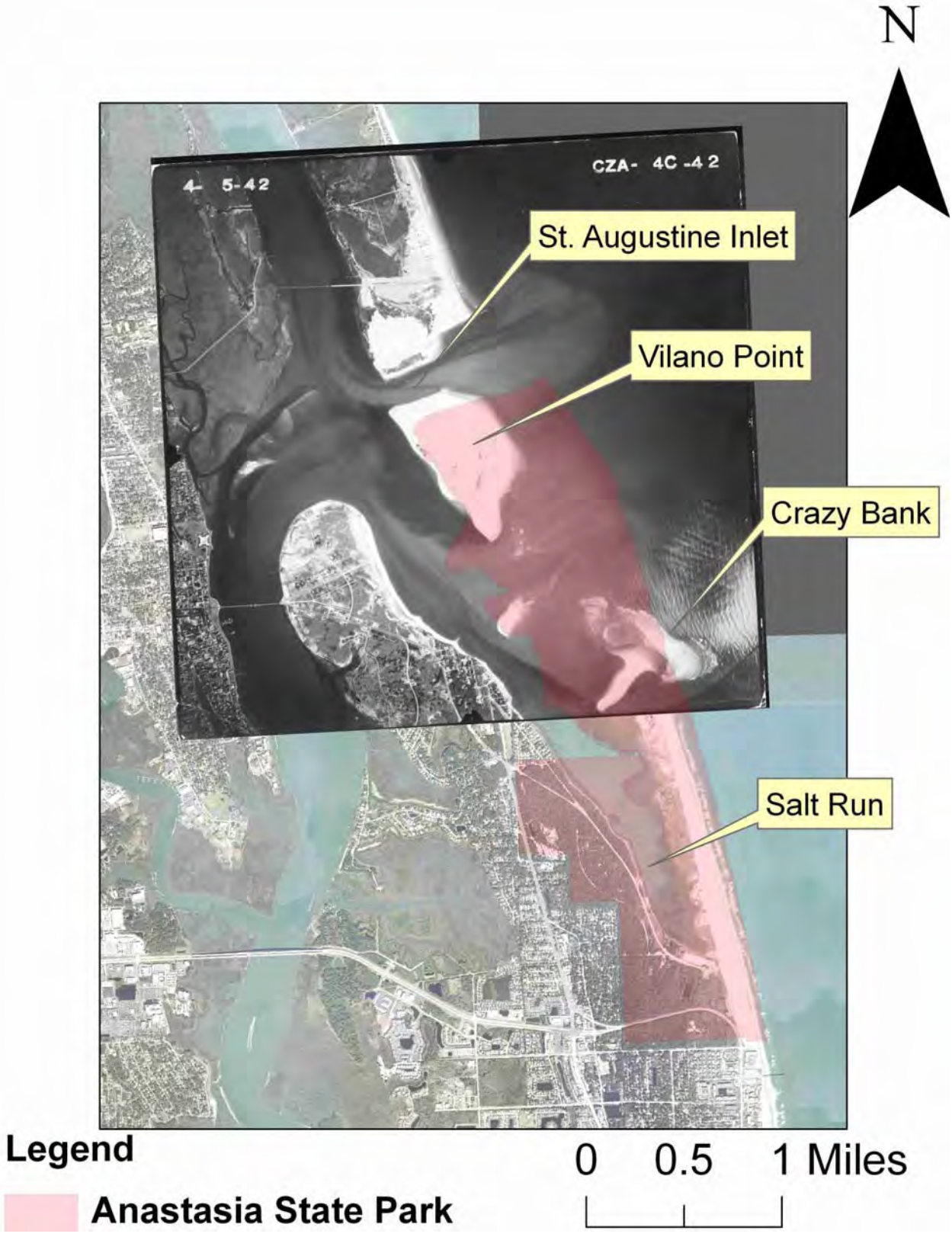
Table 1: Summary of Direct and Indirect Impacts

ALTERNATIVE ENVIRONMENTAL FACTOR	No Action Status Quo	Dredging with Beach Placement	Dredging with Nearshore Placement
SEA TURTLES	No direct effect. Potential loss of nesting habitat from lack of inlet bypassing to down-drift critically eroded beaches.	May affect, but not likely to adversely affect. Placement could occur during the nesting season requiring nest relocation.	May affect, but not likely to adversely affect.
WEST INIDIAN MANATEE	No direct effect. Shoaling would reduce water depths which could have adverse impacts.	May affect, but not likely to adversely affect, with implementation of standard protection measures.	May affect, but not likely to adversely affect, with implementation of standard protection measures.
SMALLTOOTH SAWFISH	No effect.	May affect, but not likely to adversely affect, with implementation of protection measures.	May affect, but not likely to adversely affect, with implementation of protection measures.
PIPING PLOVER	No effect.	May affect, but not likely to adversely affect, with implementation of protection measures.	May affect, but not likely to adversely affect, with implementation of protection measures.

ALTERNATIVE ENVIRONMENTAL FACTOR	No Action Status Quo	Dredging with Beach Placement	Dredging with Nearshore Placement
ANASTASIA ISLAND BEACH MOUSE	No direct effect. Potential dune habitat loss due to lack of inlet sediment bypassing.	May affect, but not likely to adversely affect, with implementation of protection measures.	No effect.
WATER QUALITY	No effect.	Short-term localized increase in turbidity at the dredge site and nearshore area.	Short-term localized increase in turbidity at dredge site and nearshore area.
ESSENTIAL FISH HABITAT	No effect.	Estuarine and Marine water column with unconsolidated sediment and ocean high salinity surf zone habitats would be impacted during dredging and placement activities.	Estuarine and Marine water column with unconsolidated sediment habitat would be impacted during dredging.
FISH AND WILDLIFE RESOURCES	No direct effect. Potential habitat loss due to erosion from lack of inlet sediment bypassing.	Minor impact during beach placement. Nesting, foraging, and resting shorebirds could be impacted during construction.	Wildlife protection measures would be implemented including monitoring for migratory birds and establishing buffer zones around active nests.
AIR QUALITY	No effect.	Minor and short-term impacts caused by dredging equipment.	Minor and short-term impacts caused by dredging equipment.
CULTURAL RESOURCES	No affect to known historic properties present.	No adverse effect to known historic properties.	No adverse effect to known historic properties.
RECREATION	Shoaling would result in moderate adverse impact to recreational boaters.	Moderate long-term benefit to recreational boaters. Short-term disruption of recreation within channels and Beach.	Moderate long-term benefit to recreational boaters. Short-term disruption of recreation within project channel and nearshore.

ALTERNATIVE ENVIRONMENTAL FACTOR	No Action Status Quo	Dredging with Beach Placement	Dredging with Nearshore Placement
AESTHETICS	No effect.	Minor short-term adverse impact due to construction activities.	Minor short-term adverse impact due to construction activities.
NOISE	No effect.	Minor and temporary adverse effect.	Minor and temporary adverse effect.
SOCIO ECONOMICS	Major long-term adverse impact to local, regional and statewide economies.	Major long-term benefit to local, regional and statewide economies.	Major long-term benefit to local, regional and statewide economies.
SHORELINE STABILIZATION	No direct effect. Potential adverse impact from lack of inlet bypassing.	Major short-term benefit from inlet sediment bypassing.	No direct effect. Minor short-term benefit from inlet sediment bypassing.
NAVIGATION	Major long-term adverse impact to vessels, both private and commercial.	Major long-term benefit to vessels, both private and commercial.	Major long-term benefit to vessels, both private and commercial.

Figure 3. 1942 Aerial Overlaying 2008 Aerial.



3 AFFECTED ENVIRONMENT

The Affected Environment section succinctly describes the existing environmental resources of the areas that would be affected if any of the alternatives were implemented. This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, but only those environmental resources that would affect or that would be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "no-action" alternative forms the base line conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

3.1.1 AREA TO BE DREDGED

St. Augustine Inlet lies 1.5 miles east of the city of St. Augustine on the northeast coast of Florida (refer to Figure 1). The inlet and the IWW are man-made, maintained navigation channels serving both commercial and recreational vessels. Originally a natural inlet located south of its current location, the inlet channel was relocated to improve navigational safety in 1940 by land cutting through Vilano Point (Figure 3). By 1952, the previously detached inlet shoals called Crazy Bank (Figure 3) were beginning to attach to the shoreline south of the new inlet thereby closing off the old inlet channel through Salt Run (Figure 3). This created what was later to become ASP (Figure 3). In addition, efforts to stabilize the new inlet between 1941 and 1957 included a northern timber pile and rock sand-trap groin approximately 1,880 feet in length and a 3,695 foot rock south jetty. Finally, the IWW channel was dredged west of the inlet in 1951. Much of the shorelines of the project channels are developed. However, salt marsh and mangrove tidal wetlands, oyster bars, estuarine lagoons, and upland maritime forest habitat exists throughout the project area. ASP is located immediately south of the inlet and east of the IWW. "ASP includes more than 1,600 acres featuring four miles of pristine beach, a tidal salt marsh, and a maritime and upland hammock. There is also an archaeological site where coquina rock was mined to create the nearby Castillo de San Marcos fortress, which is a National Monument." (http://www.floridastateparks.org/anastasia/default.cfm)

3.1.2 BEACH PLACEMENT AREA

Dredged material from the project channels would be placed on the beach south of the inlet between range monuments R-132 and R-152. The beach is comprised primarily of coarse sand and shell and a significant dune system exists within the park (R-132 to R-141). Typical dune vegetation for the area, sea oats (*Uniola*

paniculata), colonizes the dune. Large escarpments caused by wave erosion can occur. Storm surge, caused by hurricanes and winter northeasters, can over-top the park dunes resulting in washovers. However, only scattered sections of dune exist, and the shoreline is entirely developed, within the St. Augustine Beach portion of the placement area (R-141 to R-152). Finally, the shoreline is hardened with a concrete bulkhead and rock revetment at the St. Johns County Ocean Pier (R-142). The exact placement area differs depending on conditions at the time of the dredging event and the quantity of shoal material to be dredged. The 2005 IWW project required beach placement of approximately 205,000 cy between only R-133 to R-137. This placement coincided with a renourishment of the St. Johns County Hurricane and Storm Damage Reduction (HSDR) project which placed 2.4 million cy of sand dredged from the St. Augustine Inlet ebb shoal borrow area onto the beach between R-139 and R-152.

3.1.3 NEARSHORE PLACEMENT AREA

The nearshore placement area is located approximately 3.5 miles south of St. Augustine Inlet offshore of R-141 to R-146 and encompasses approximately 2.7 square miles. The area is sandy bottom varying between -12 and -20 MLLW. In 1994, a side-scan sonar survey was conducted over 2.7 square miles of nearshore substrate, to determine the presence and extent of hard bottom areas in the vicinity of the project. There were no distinguishable bottom features that could be classified as exposed hard bottom or outcrops. Based on core borings, it was determined that rock formations did not exist within the placement area. The existing geologic formation was covered with approximately 10-20 feet of sand (USFWS, 1994). No features such as hardbottoms or rock outcrops are located in the project's impact area (USACE, 1996).

3.2 GEOLOGY

3.2.1 AREA TO BE DREDGED

Bottom substrates within the project channels are comprised of shoal deposits that have formed since the area was last dredged in 2005 for the IWW and 1996 for the inlet entrance channel (Figure 4). Vibracore samples were collected from the project channels in December 2008. Based on the grain size analysis of the samples, the dredged materials from the channels within the dredging depth consist of poorly graded, fine to medium grained sand sized quartz with a visible shell content ranging from 0 to 5%. The mean grain sizes range from 0.15 mm to 0.66 mm. The composite mean grain size is 0.28 mm and the composite silt content is 2.6%. No rock was encountered. The dredged material from the Porpoise Point shoal consists of poorly graded fine-grained, sand-sized quartz and various shell layers. The shell layers consist of sand, occasional gravel-sized shell fragments with trace to some sand-sized quartz.

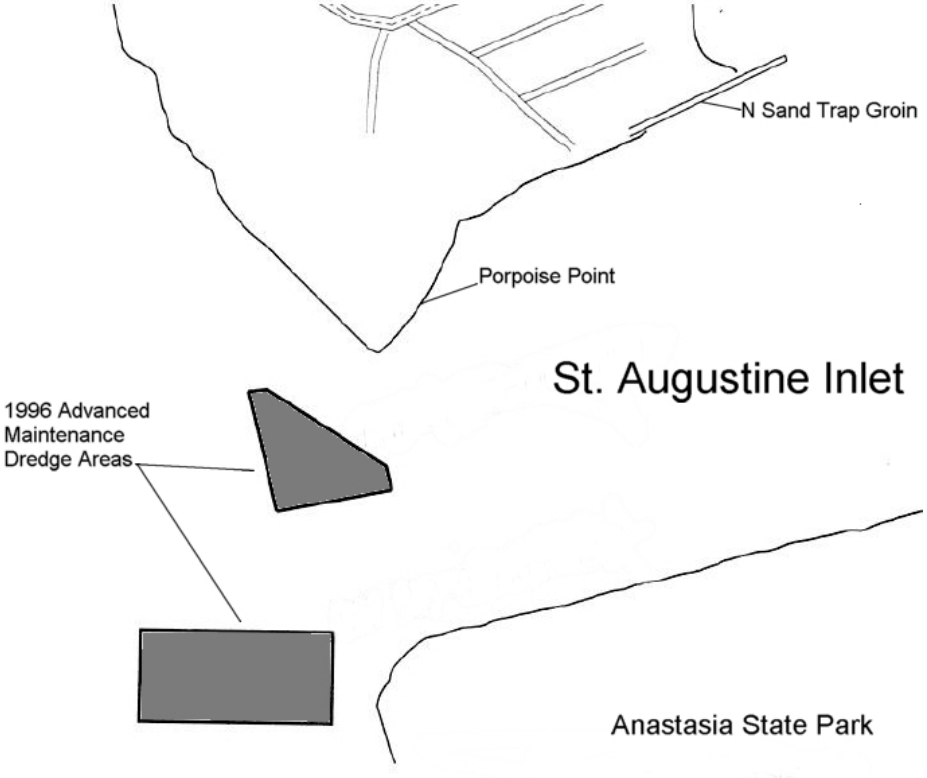
3.2.2 BEACH PLACEMENT AREA

The dune system immediately landward of the beach placement area has been previously restored in many locations using dredged material from the project channels and the HSDR projects ebb shoal borrow area to repair storm damage. Unconsolidated sandy marine sediments are found along the entire length of the nearshore area seaward of the sandy beach placement area. Finally, rock revetment and concrete sea wall shoreline hardening exists in the middle of the beach placement area roughly between R-141 to R-145.5.

3.2.3 NEARSHORE PLACEMENT AREA

The nearshore placement area geology consists of approximately 10-20' of sandy marine sediments covering the Anastasia geologic formation. "The Anastasia Formation is composed of Pleistocene (see time scale) interbedded sands and coquinoid limestones. The most recognized form of the Anastasia is an orangish brown coquina consisting of whole and fragmented mollusk shells in a matrix of sand, cemented by calcite. Coquina has been used as a building stone in Florida for over 400 years."
http://www.floridadep.com/geology/geologictopics/rocks/anastasia.htm

Figure 4. 1996 St. Augustine Inlet Entrance Channel Advanced Maintenance Areas.



3.3 THREATENED AND ENDANGERED SPECIES

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

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

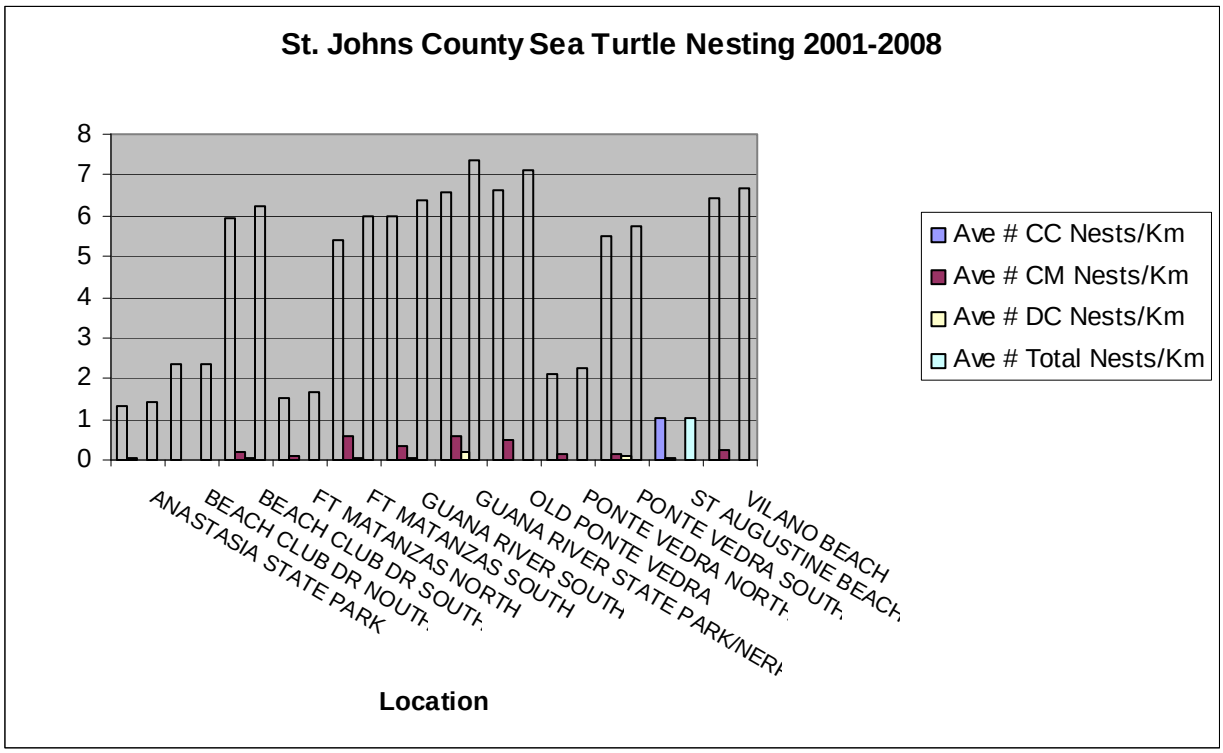
Species	***State Listing****	***Federal Listing****
Green Sea Turtle	LE	LE
Loggerhead Sea Turtle	LT	LT
Leatherback Sea Turtle	LE	LE
Kemp's Ridley Sea Turtle	LE	LE
West Indian Manatee	LE	LE
Smalltooth Sawfish	LE	LE
Piping Plover	LT	LT
Anastasia Island Beach Mouse	LE	LE

* LE = Endangered and LT = Threatened

3.3.1 SEA TURTLES

The coastal waters of St. Johns County provide developmental habitat for immature loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*). In addition, area beaches support nesting populations of green, loggerhead, and leatherback (*Dermochelys coriacea*) sea turtles. Finally, although Kemp's ridley (*Lepidochelys kempii*) sea turtles are known to occur in the vicinity of the project area, nesting has not been documented. The proposed work does not overlap any designated critical habitat for these species. There are twelve Statewide Nesting Beach Survey (SNBS) monitoring zones permitted by the Florida Fish and Wildlife Conservation Commission (FWC) in St. Johns County. "FWC coordinates the collection of nesting data through a network of permit holders consisting of Federal, State, and local park personnel; other government agency personnel; members of conservation organizations, university researchers; and private citizens. Florida staff members coordinate data collection, provide training, and compile annual survey data for publications and data recession." (http://www.floridamarine.org/features/view_article.asp?id=2377) An analysis of FWC SNBS data for St. Johns county indicated that between 2001-2008 monitoring zones Anastasia State Park and St. Augustine Beach ranked eleventh and twelfth respectively in the county on a nest per kilometer basis for all species combined (See table 3). The beach placement area accounts for approximately 3.75 miles of the approximately 11 miles combined monitoring zones Anastasia State Park and St. Augustine Beach which run from the Inlet south to State Road 206 in Crescent Beach.

Figure 5. Sea Turtle Nesting in St. Johns County by Beach Monitoring Zone



3.3.2 WEST INDIAN MANATEE

Manatees can be found in the inshore waters of the project channels and in the coastal waters of the Atlantic Ocean primarily during migration. The proposed work does not overlap any designated critical habitat for this species. Between 1976 and 2010 there have been 83 documented manatee mortalities in St. Johns County. The probable cause of death for 14 (17%) of these mortalities was watercraft (http://research.myfwc.com/manatees/search_summary.asp).

3.3.3 SMALLTOOTH SAWFISH

The endangered smalltooth sawfish (*Pristis pectinata*) may occur in the vicinity of the project. However, densities of this species in these waters are most likely very low. There are two St. Johns County sightings of this large shark-like ray recorded in the Smalltooth Sawfish sightings database (Carvalho, personal communication, 21 April 2009). The first sighting was of a 240 cm juvenile in 1950 with no specific location information other than St. Augustine. The second sighting was in October 2000 of a 61 cm juvenile sawfish in the IWW near St. Augustine. The proposed work does not overlap any proposed critical habitat for this species.

3.3.4 PIPING PLOVER

This shorebird species does not breed in Florida, but spends the winter along the southern Atlantic, Gulf Coast, and Caribbean beaches and barrier islands, where

they are classified as threatened throughout their wintering range. Non-breeding piping plovers (*Charadrius melodus*) were recently documented on the beach at Porpoise Point inside the inlet, one on 24 August and one 30 August 2010 (Borboen, personal communication, 2 September 2010). In addition, "piping plovers can be found anywhere on the beaches of the park (ASP), including the beaches on the west side of Salt Run." (DePue, personal communication, 1 April 2009). The primary constituent elements for piping plover wintering habitat are those habitat components that are essential for the primary biological needs of foraging, sheltering and roosting (USFWS 2010). The primary constituent elements include intertidal beaches and flats (between annual low tide and annual high tide) and associated dune systems and flats above the annual high tide (USFWS 2010). Optimal wintering habitat does occur within and adjacent to the project channels and beach placement area.

3.3.5 ANASTASIA ISLAND BEACH MOUSE

Historically, the endangered Anastasia Island beach mouse (AIBM)(*Peromyscus polionotus phasma*) was located in the coastal dunes from the Duval/St. Johns County line southward to Matanzas Inlet. However, much of the habitat within the range of the AIBM has been converted to condominiums and housing developments. "The AIBM has maintained a stable population at ASP. ASP continues to provide 3.5 miles of suitable habitat to support AIBM." (USFWS 2007) In addition, AIBM are present at Fort Matanzas National Monument (FMNM) at the south end of Anastasia Island. Finally, "AIBM have been located between ASP and FMNM on both private lands as well as several St. Johns County Parks (10 miles)." (USFWS 2007). Beach mice occupy both frontal (primary and secondary) and scrub dunes on a permanent basis and studies have found no detectable differences between scrub and frontal dunes in beach mouse body mass, home range size, dispersal, reproduction, survival, food quality, and burrow site availability (Swilling et al. 1998; Swilling 2000; Sneckenberger 2001).

Figure 6. Project Area Resource Map.

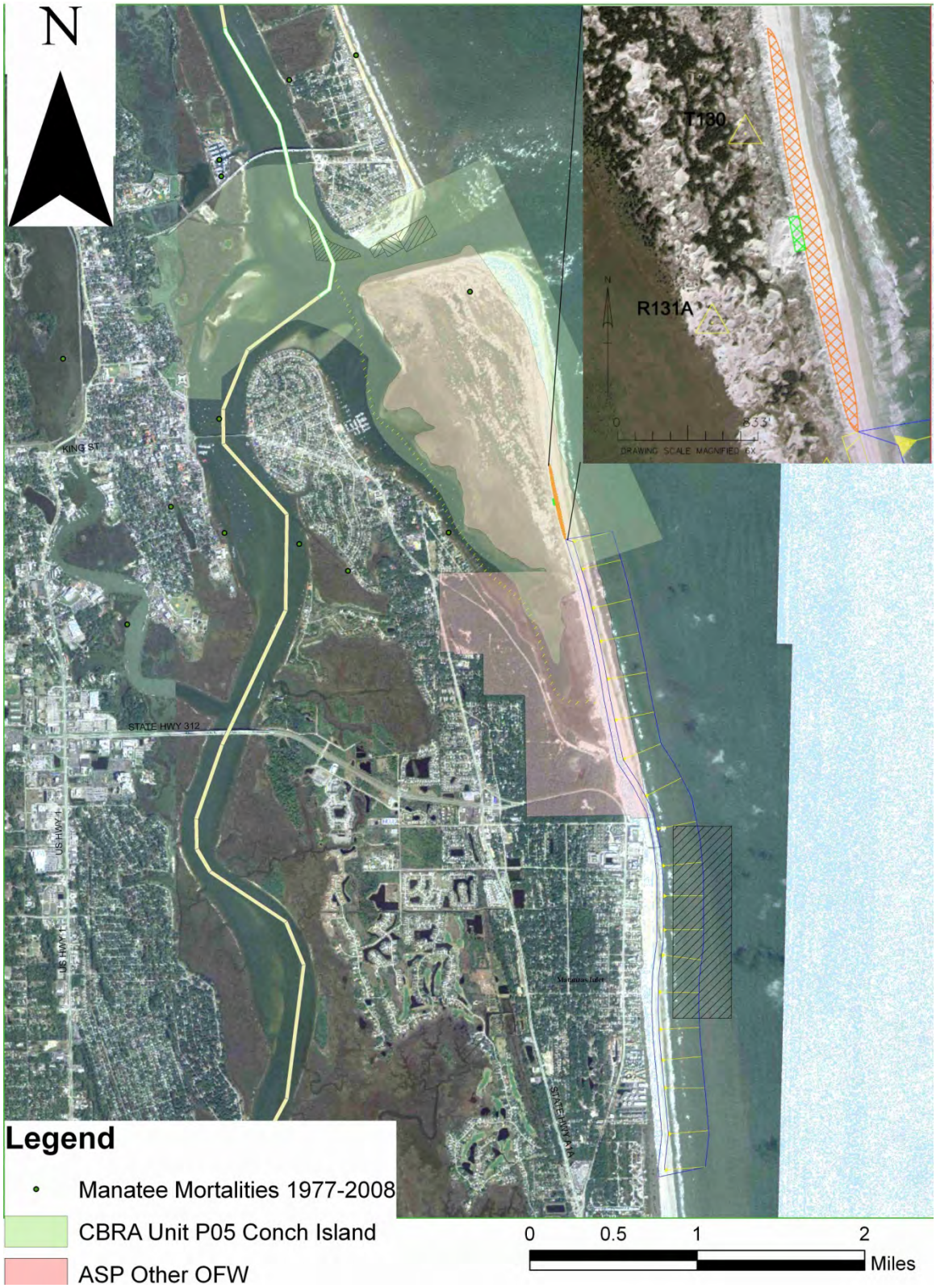
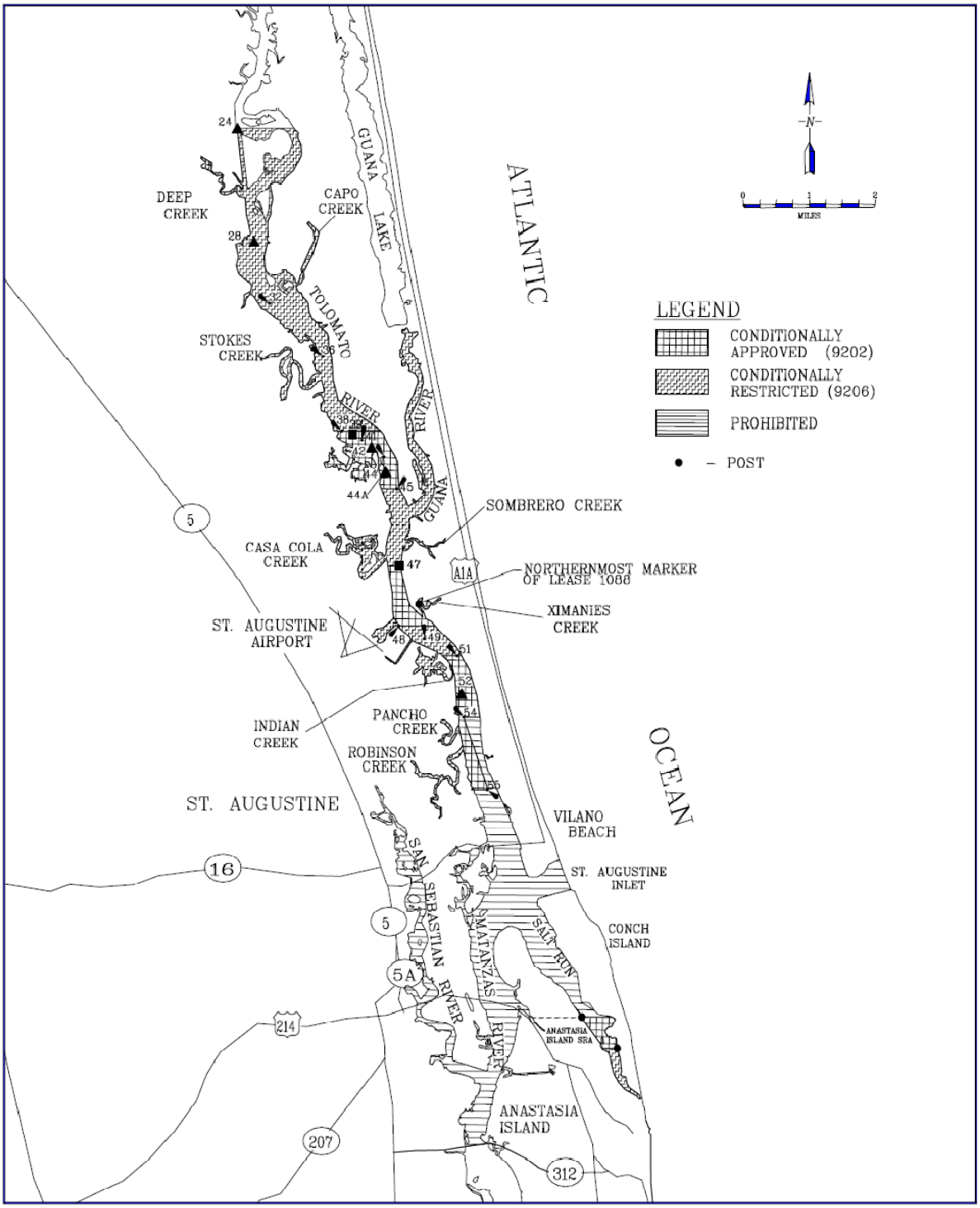


Figure 7. Shellfish Harvesting Area Status
(http://www.floridaaquaculture.com/pdfmaps/92.pdf)

SHELLFISH HARVESTING AREA CLASSIFICATION MAP #92 (Effective: March 11, 2007)
North St. Johns (#92) Shellfish Harvesting Area in St. Johns County



3.4 WATER QUALITY

3.4.1 WATER USE CLASSIFICATION

Portions of the waters within the proposed dredging area have been designated by the State of Florida as Class II - Shellfish Propagation or Harvesting - Generally coastal waters where commercial shellfish harvesting occurs. In addition, ASP including a portion of the waters within Salt Run is designated by the State of Florida as an "Other" Outstanding Florida Water (OFW)(Figure 3). OFWs are waters designated worthy of special protection because of their natural attributes. Finally, at the time of this writing, shellfish harvesting was prohibited from the projects channels (Figure 7).

3.4.2 SEDIMENT ANALYSIS

Vibracore samples were collected from the project channels in December 2008. Based on the grain size analysis of the samples, the dredged materials from the channels within the dredging depth consist of poorly graded, fine to medium grained sand sized quartz with a visible shell content ranging from 0 to 5 %. The mean grain sizes range from 0.15 mm to 0.66 mm. The composite mean grain size is 0.28 mm and the composite silt content is 2.6 %. No rock was encountered. The dredged material from the Porpoise Point shoal consists of poorly graded fine-grained, sand-sized quartz and various shell layers. The shell layers consist of sand, occasional gravel-sized shell fragments with trace to some sand-sized quartz

3.5 ESSENTIAL FISH HABITAT

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act of 1996, waters and substrate within the project area have been identified as Essential Fish Habitat (EFH) by the South Atlantic Fishery Management Council (1998). EFH is defined as those waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity. Estuarine/inshore EFH within the footprint of the project channels consists of estuarine water column with an unconsolidated substrate. There are also wide expanses of salt marsh (Estuarine Emergent Marsh) with some mangroves (Estuarine scrub/shrub) paralleling the IWW and Salt Run pipeline route along the eastern and western shorelines. Finally, oyster reef/shell bank EFH exists in the project area as well. Marine/offshore EFH within the boundaries of the beach and nearshore placement areas consists of water column with an unconsolidated substrate and ocean high salinity surf zones. Species managed by the NMFS that are common within the project channels and placement areas can be found in Table 3, and possible prey species in Table 4.

Table 3. Federally Managed Species of Shellfish and Finfish that are Common within the Project Area.

Species	Life Stage	Substrate Preference*			
		Unconsolidated Sediment	Salt Marsh/Mangrove	Ocean High Salinity Surf Zones	Oyster Reef/Shell Bank
Brown shrimp *Farfantepenaeus aztecus*	A, J, L	A, J, L	J, L		
White Shrimp *Litopenaeus setiferus*	A, J	A, J	J, L		
Hard clams	A, J	A, J			
Menhaden *Brevoortia* sp.	A, J, L	A	J, L	A	
American Shad *Alosa sapidissima*	A, J, L	A, J, L	A, J, L		
White grunt *Haemulon plumieri*	A, J	A, J	A, J		A, J
Sheepshead *Archosargus probatocephalus*	A, J, L	A, J	J, L		A
Flounder *Paralichthys sp.*	A, J, L	A, J	J	A	
Crevalle Jack *Caranx hippos*	A, J, L	A, J, L	J, L		A
Gray Snapper *Lutjanus griseus*	A, J, L	A, J, L	A, J, L		A, J, L
Goliath Grouper *Epinephelus itajara*	J	J	J		J

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

Species	Life Stage	Substrate Preference*			
		Unconsolidated Sediment	Salt Marsh/Mangrove	Ocean High Salinity Surf Zones	Oyster Reef/Shell Bank
Whitings *Menticirrhus sp.*	A, J	J	J	A, J	
Bay anchovy *Anchoa mitchilli*	A, J, L	A, J, L	L	A	
Sheepshead minnow *Cyprinodon variegatus*	A, J, L	A, J	A, J, L		
Atlantic menhaden *Brevoortia tyrannus*	A, J, L	A	J, L	A	
Quahog *Mercenaria mercenaria*	A, J	A, J			
Grass shrimp *Palaemonetes pugio*	A, J	A, J	A, J		A, J

Species	Life Stage	Substrate Preference*			
		Unconsolidated Sediment	Salt Marsh/Mangrove	Ocean High Salinity Surf Zones	Oyster Reef/Shell Bank
Striped mullet *Mugil cephalus*	A, J	A, J	A, J	A, J	
Spot *Leiostomus xanthurus*	A, J	A	J		
Atlantic croaker *Micropogonias undulates*	A, J	A, J	J, L	A	A
Silversides *Menidia menidia*	A, J, L	A, J, L	A, J, L	A	

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

*Substrate preference, unconsolidated sediment, salt marsh/mangrove, ocean high-salinity surf zones, and oyster reef/shell bank habitats occur in or near the project area.
A = adult; J = juvenile; L = larvae

3.6 FISH AND WILDLIFE RESOURCES

Marine life common to northeast Florida can be found within the project channels and placement areas. The bottlenose dolphin is common throughout the coastal waters of St. Johns County. Sub-tidal oyster beds do not occur within the project channels due to depth and vessel traffic. However, oyster beds can be found within the shallower waters adjacent to the channels. Other macro invertebrates commonly found in soft-bottom estuarine habitat within Florida include annelids, a variety of mollusks besides oysters, arthropods, sponges and polyps (Hoffman and Olsen 1982). Some species of migratory birds, especially common passerines, are known to nest on ASP and Porpoise Point. Colonial nesting species, such as wading birds or terns, have been observed there as well. Common species of mammals, amphibians, and reptiles known to occur in northeast Florida may be found at the beach placement area as well.

3.7 AIR QUALITY

"Florida is one of only three states east of the Mississippi River to meet all national ambient air quality standards established by the EPA to protect public health, including air quality standards for ground-level ozone."
(http://www.dep.state.fl.us/secretary/news/2006/04/0406_02.htm)

3.8 CULTURAL RESOURCES

In 1565, Pedro Menendez de Aviles was en route to the providence of Florida, then a Spanish territory. His orders were to create a Spanish presence in the area to prevent any further French advancement into Spanish lands. The intrusion into Spanish lands by Jean Ribualt in Port Royal had forced Philip II to act to preserve his lands. The creation of Fort Caroline on the St. Johns Rivers by Laudoniere

pushed the French intrusion further south. Menendez was to gather a group of colonist and soldiers and create a garrison/colony in La Florida. He was to accomplish this before the French had time to re-supply and fortify their position at Fort Caroline. In September of 1565, Menendez claimed the land for the city of St. Augustine as a defensive position, having failed to reach Fort Carolina before the French reinforcements arrived.

With five ships and 600 people, the Spanish territory of Florida was colonized. The city of St. Augustine was created as a garrison for defense from a French attack. Located on a harbor with a sand bar across the entrance, this port became the location of the longest continuous Spanish presence in Florida. The city grew out of the garrison over the next two hundred years while maintaining its military role.

Key in the development of the city and garrison was its limited access at the St. Augustine inlet. The inlet was historically a series of shifting sand bars that only permitted shallower draft vessels to cross. This shallow access prevented large foreign ships of war from entering the channel and sailing directly up to the city. Today the historic inlet has closed in and only portions of it remain in the form of Salt Run which is now a small bay adjacent to Anastasia Island. The current inlet was created by the Corps in 1940 when a land cut was made across the southern tip of Vilano Point.

The project area includes portions of St. Augustine inlet, a section of the IWW within the Tolomato River and beach and nearshore placement areas along Anastasia Island. There have been a total of ten previous studies conducted near the project area. These surveys have resulted in the identification of four known archeological resources and four potential resources being identified within or adjacent to the project area. Site 8SJ4889, The Dixie Crystal has been identified as a historic ship wreck and may be potentially eligible for inclusion in the National Register Historic Places. Currently insufficient information exists to make a formal determination of the wrecks eligibility. A 150 foot buffer was recommended for navigation projects working near it to protect the resource. In addition to the Dixie Crystal, four targets were identified as potential resources with the St. Augustine entrance channel (Hall 2000). No diver evaluations were performed on the targets and a buffer of 200 feet was recommended. Along the area of beach disposal three known resources exist. The three sites are 8SAJ69NR (Spanish Coquina Quarries), SJ3318 (St. Augustine Beach Site), and SJ4873 (13th Street Wreck). The Spanish Quarries located along Salt Run served as the historic stone quarries for the city of St. Augustine and the Castillo de San Marcos. This site is listed on the National Register of Historic Places. The St. Augustine Beach Site is the location of a vessel fragment that was recovered from the beach. At the time of its identification it was removed from the beach. The 13th Street Wreck is a deeply buried vessel that was

exposed in the 1980's. Subsequent attempts to locate the vessel have failed. Additional resources located nearby include Native American sites such as shell middens and mounds but none are known to extend into the project area.

3.9 RECREATION RESOURCES

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

3.10 AESTHETIC RESOURCES

The project area consists of Federal navigation channels, upland park lands and sandy beaches bordered by various types of natural areas and development. The IWW and Atlantic coastline in the vicinity of the project are picturesque.

3.11 NOISE

The ambient sound level of a region is the total noise generated, including sounds from natural and artificial sources. The magnitude and frequency of environmental noise may vary considerably over the course of a day and throughout the month because of changing weather conditions and seasonal vegetative cover. Background noise from vessel traffic, urban beach, residential development, and nearby roadways appears to be moderate.

3.12 SOCIO-ECONOMIC

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

- $213 million in business volume
- $73 million in personal income
- 2,157 jobs
- $487.7 to $725.9 million in property values

(source: GEC, 2005)

3.13 SHORELINE STABILIZATION

Recent inspections indicate that the shorelines in the vicinity of IWW cuts SJ-28 to 30 appear to be relatively stable. However, the shoreline within the inlet throat along Porpoise Point is subject to frequent changes (Figure 8). In addition, as

FIGURE 8. Porpoise Point Shoreline Change 1995-2008

discussed in section 3.1.2, storm surge, caused by hurricanes and winter northeasters, over-top the dunes resulting in washovers. In fact, a dune washover occurred immediately north of R-131 (See Figures 1 and 6).

3.14 NAVIGATION

The IWW in Florida annually transports over 1.7 million tons of commercial cargo and over 500,000 recreational vessels (FIND 2008). There were 13,325 pleasure craft and 309 commercial vessels registered in St. Johns County in 2009 (http://www.flhsmv.gov/dmv/vslfacts.html). St. Augustine Inlet is an improved tidal inlet connecting the San Sebastian River and the IWW Federal navigation channels to the Atlantic Ocean. Originally a natural inlet located south of its current location, the inlet was relocated in 1940 as part of the St. Augustine Harbor Navigation Project in response to public interests. Efforts to stabilize the inlet and improve navigation, between 1941 and 1957, have resulted in the construction of a north sand trap groin approximately 1,880 feet in length and a 3,695 foot south jetty. The authorized 16 foot inlet entrance channel is maintained at the best natural alignment while the geographically fixed IWW channel is maintained at 12 foot deep.

4 ENVIRONMENTAL EFFECTS

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

4.1 THREATENED AND ENDANGERED SPECIES

4.1.1 NO-ACTION ALTERNATIVE

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

4.1.2 DREDGING ALTERNATIVE

In accordance with Section 7 of the Endangered Species Act, consultation with the USFWS and NMFS was performed. The Corps has determined that the proposed dredge work may affect, but is not likely to adversely affect sea turtles in the water, manatees, or the smalltooth sawfish. This determination was based on the implementation of species specific protective measures and the type of dredging equipment typically used to maintain the IWW. The terms and conditions of the 1998 NMFS South Atlantic Division Regional Biological Opinion (RBO) will be followed for these species.

4.1.2.1 Sea Turtles and Smalltooth Sawfish

Since it is likely that a hydraulic cutter suction pipeline dredge would be used for this project, adverse impacts or "takings" of sea turtles within the proposed work area would not be anticipated. Pursuant to the RBO, these types of dredges do not pose a risk to sea turtles like hopper dredges do. In addition, due to the nature of the dredging equipment and the very low anticipated sawfish abundance, the project is expected to have minimal impact on this species. Any sawfish foraging within or transiting through the project area could be reasonably expected to avoid the relatively slow moving dredge equipment. However, in order to minimize potential adverse impacts to sea turtles and smalltooth sawfish, the following measures would be implemented:

- The contractor would instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel would be responsible for observing water-related activities for the presence of these species.

• The contractor would advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or small tooth sawfish, which are protected under the Endangered Species Act of 1973.

• Siltation barriers would be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment.

• All vessels associated with the construction project would operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels would preferentially follow deep-water routes (e.g., marked channels) whenever possible.

• If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions would be implemented to ensure its protection. These precautions would include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment would cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-foot radius of the equipment. Activities would not resume until the protected species has departed the project area of its own volition.

• Any collision with and/or injury to a sea turtle or smalltooth sawfish would be reported immediately to the NMFS Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

4.1.2.2 West Indian Manatee

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

• The contractor would instruct all personnel associated with construction activities about the potential presence of manatees in the area and the need to avoid collisions with them.

• If siltation barriers are used, they shall be made of material in which manatees cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment. Barriers must not block manatee entry to or exit from essential habitat.

• If a manatee were sighted within 100 yards of the project area, all appropriate precautions would be implemented by the contractor to ensure protection of the manatee. These precautions would include the operation of all moving equipment no closer than 50 feet of a manatee. If a manatee were closer than 50 feet to moving equipment or the project area, the equipment would be shut down and all construction activities would cease to ensure protection of the manatee. Construction activities would not resume until the manatee has departed the project area.

• All vessels associated with the project would operate at 'no wake' speeds at all times while in shallow waters or channels where the draft of the boat provides less than three feet clearance from the bottom. Boats used to transport personnel would be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any workboat would follow routes of deep water to the greatest possible extent. Shore crews would use upland road access if available.

• Mooring bumpers would be placed on all large vessels wherever and whenever there is a potential for manatees to be crushed between two moored vessels. The bumpers would provide a minimum stand-off distance of four feet.

• All personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act and the Marine Mammal Protection Act.

4.1.3 MATERIAL PLACEMENT OPTIONS

As with the proposed dredging, the Corps also consulted with the USFWS and NMFS on material placement within the nearshore and beach placement areas. The Corps has determined that placement of the dredged material into the nearshore is not likely to adversely affect swimming sea turtles, smalltooth sawfish, or the manatee. The terms and conditions of the RBO will be followed for these species as listed in 4.1.2.1 and 4.1.2.2 above. In addition, the Corps has determined that the placement of dredged material onto the beach may affect, but is not likely to jeopardize the continued existence of nesting sea turtles or AIBM and is not likely to adversely affect the piping plover. The USFWS concurred with these determinations by issuing a biological opinion (BO) dated 16 April 2010. These determinations were based on the implementation of protective measures for these species.

4.1.3.1 Sea Turtles

Beach placement could occur year-round under the following conditions:

• Only beach compatible material containing no more than 10% fine material passing a #230 sieve would be placed on the beach.

• Daily sea turtle nest monitoring and relocation would be required. Only nests that would be affected by construction activities would be relocated to a nearby self-release beach site in a secure setting where artificial lighting would not interfere with hatchling orientation.

• Sand compaction and escarpment monitoring would occur post placement.

• Staging areas for construction equipment would be located off the beach to the maximum extent practicable.

• Direct lighting of the beach and near shore waters would be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all U.S. Coast Guard, EM 385-1-1, and Occupational Safety and Health Administration (OSHA) requirements.

4.1.3.2 Piping Plover

Per the USFWS BO, the proposed project may affect but is not likely to adversely affect wintering piping plover provided implementation of the following conditions.

• The contractor would stage equipment off the beach.

• The water and land-based loading and unloading of equipment, materials, supplies, and personnel would be limited to the footprint of the staging and storage area, with the exception of the transportation of job-related personnel, which may occur along the Atlantic coast shoreline.

• Piping plover optimal habitat including the north and south side of the Inlet shall be avoided to the maximum extent practicable when placing sand, equipment staging, travel corridors, and pipeline alignment.

• The contractor would avoid sand placement within 500 feet of the newly formed inlet area to minimize the impacts to piping plover roosting habitat within the vicinity of the newly formed inlet.

• The contractor would avoid sand placement at the washover/fan formation areas to the maximum extent practicable.

4.1.3.3 Anastasia Island Beach Mouse

Beach placement conditions for the AIBM include the following.

• Beach mouse habitat would be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent practicable.

• All construction activity would remain at least 5 to 10 feet away from the toe of the dune.

• ASP personnel would trap the pipeline access corridor for 5 days prior to pipeline placement and removal.

4.2 WATER QUALITY

4.2.3 NO-ACTION ALTERNATIVE

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

4.2.4 DREDGING ALTERNATIVE

The primary anticipated change in water quality at the dredging site would be a temporary increase in turbidity. According to the State of Florida's Class II water quality standards, turbidity levels during dredging or placement of dredged material are not to exceed 29 nephelometric turbidity units (NTUs) above background levels at the edge of normally a 150-meter mixing zone. In order to comply with this standard, turbidity will be monitored according to State protocols during the proposed dredging work. If at any time the turbidity standard were exceeded, those activities causing the violation would temporarily cease.

4.2.5 MATERIAL PLACEMENT OPTIONS

As with the dredging activity, the primary change in water quality during placement of dredged material within the nearshore and beach would be a temporary increase in turbidity. These activities would be monitored similar to the dredging activity.

4.3 ESSENTIAL FISH HABITAT

4.3.3 NO-ACTION ALTERNATIVE

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

4.3.4 DREDGING ALTERNATIVE

The proposed maintenance dredging of the project channels could impact approximately 74 acres (9,533 feet x 125 foot wide IWW channel = 27.4 acres +

19.6 acres flood shoal advanced maintenance area + 27 acre Porpoise Point RSM dredge area) of previously dredged estuarine/inshore water column and unconsolidated substrate. In addition, tidal inlets (including their ebb and flood tide shoals), are designated by the South Atlantic Fishery Management Council as Habitat Areas of Particular Concern (HAPC) for penaeid shrimp and species within the snapper-grouper complex as well as EFH for coastal migratory pelagic species. Species managed by the NMFS that are common within the project area can be found in Table 4, and prey species in Table 5. The Corps has determined that the proposed action would not have a substantial adverse impact on EFH or federally managed fisheries along the eastern coast of Florida. This determination was based on the fact that the substrate of the project area is naturally dynamic and unconsolidated, and measures shall be taken to protect adjacent habitat. Turbidity could affect vision of marine life within the sediment plume as well as those marine organisms with gills, but these effects would be temporary as they would be limited to the actual dredging and placement operations. Routine maintenance dredging may suppress re-colonization of certain benthic organisms and therefore could impact other trophic levels within the food chain. However, it is important to note that the project channels are man-made, the actual channel widths encompass a fraction of the entire water body, and similar habitat occurs immediately adjacent to the channels. EFH coordination with the NMFS was completed by Corps letter dated 10 May 2010. In that letter the Corps addressed the NMFS EFH recommendation that fishery resource impacts could be reduced by implementing a time-of-year dredging restriction. The Corps agrees a fall-winter dredging window could further minimize impacts and will consider this suggestion as funding and scheduling allow. However, the IWW and inlet dredging are anticipated to take up to 90 days every 3 to 4 years and migrating larvae and/or juvenile fish could be subject to project related elevated turbidity and suspended sediment levels during that time period. In addition, some entrainment of these organisms can be reasonably expected should hydraulic dredging equipment be used.

4.3.5 MATERIAL PLACEMENT OPTIONS

Placement of dredged material into the nearshore or beach could directly and indirectly impact approximately 260 acres of marine/offshore water column and unconsolidated substrate and 20,000 feet of ocean high salinity surf zone respectively. Sand could be placed every three to four years and, therefore, the possibility of longer term adverse impacts (i.e. suppression of re-colonization of the infaunal community) is possible. However, placement along portions of these areas has occurred on multiple occasions over the past 70 years. In addition, the dredged sediment is anticipated to be similar in composition to the existing beach and nearshore sediments and only small portions of the placement areas are anticipated to be used during each individual dredging event. As stated above, EFH coordination with the NMFS was completed by Corps letter dated 10 May 2010.

In addition to the infaunal impacts, NMFS also expressed concern for migrating larvae and juvenile fish and suggested evaluating the practicality of a seasonal dredging restriction to minimize migrating organism impacts. As stated above, the Corps agrees a fall-winter dredging window could further minimize impacts and will consider this suggestion when funding and scheduling allow. However, the IWW and inlet dredging are anticipated to take up to 90 days every 3 to 4 years and migrating larvae and/or juvenile fish could be subject to project related elevated turbidity and suspended sediment levels during that time period.

4.4 FISH AND WILDLIFE RESOURCES

4.4.3 NO-ACTION ALTERNATIVE

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

4.4.4 DREDGING ALTERNATIVE

As previously stated, dredging the project channels would result in impacts to benthos. The bottom of the channels would normally be re-colonized with organisms such as annelids and arthropods from adjacent similar habitats. Since the channel area closest to the inlet is anticipated to be dredged every 3 to 4 years, benthic organisms might not fully recover. However, it is important to note that the IWW and inlet are routinely maintained man-made channels, the actual channel widths encompass a fraction of the entire water body, and similar habitat occurs immediately adjacent to the channels. Sub-tidal oyster beds should not occur within the project footprint but these and other resources would be avoided during dredging. Finally, due to the demonstrated regional significance of Porpoise Point to colonial nesting shorebirds (Borboen, personal communication, 30 August 2010; Kropp personal communication, 2 March 2010), the Corps has committed to dredging this portion of the project outside the shorebird nesting season (approximately April 1 – August 31) to avoid shorebird mortality in compliance with the Migratory Bird Treaty Act.

4.4.5 MATERIAL PLACEMENT OPTIONS

This project could place dredged material within the nearshore or beach every three to four years so re-colonization of the areas by benthic organisms could be depressed. The beach is critically eroding and is within the limits of the previously authorized St. Johns County hurricane and storm damage reduction project. The Corps would implement its migratory bird protection policy if work were performed at the beach during the nesting season, April 1 through August 31. The policy requires monitoring the site during the nesting season. If nests were found, then a buffer zone of at least 200 feet would be placed around each nest. The beach attracts foraging, roosting, and nesting wading and shorebirds. However, no

significant adverse impacts to migratory birds are anticipated with the migratory bird protection policy in effect. Other types of wildlife that utilize the sites would be temporarily displaced during construction.

Figure 9. Porpoise Point Least Tern Adults and Chick Behind Nesting Habitat Demarcation 6 July 2010.

4.5 AIR QUALITY

4.5.3 NO-ACTION ALTERNATIVE

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

4.5.4 DREDGING ALTERNATIVE

Dredging equipment would emit exhaust fumes, but this is anticipated to be a temporary and minor degradation of local air quality. The contract specifications would require the contractor to minimize pollution of air resources such as controlling particulates, i.e. excess machinery emissions.

4.5.5 MATERIAL PLACEMENT OPTIONS

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

4.6 CULTURAL RESOURCES

It is anticipated that no historic properties would be adversely affected by the 2011 project event. The Corps has conducted substantial surveys as part of the study of the IWW portion of the project area which resulted in the 2009 Southeastern Archaeological Research, Inc. (SEARCH) report entitled: *Historic Assessment and Remote Sensing Survey of the Intracoastal Water Way near St. Augustine. St. Johns County, Florida* (DHR Letter dated 1 December 2009), and the 2010 "*Addendum Report: Archeological Diver Identification of Ten Potentially Significant Submerged Targets, Intracoastal Waterway Near St. Augustine, St. Johns County, Florida*". The first survey resulted in the identification of 78 target and anomalies. The addendum resulted in the examination of 10 targets that were comprised of 38 targets in 9 clusters and 1 single side scan target. The clusters were determined to be located within the project confines of the IWW and are located within or near areas of planned dredge actives. The remaining targets identified in the 2009 survey will be buffered according to SEARCH's recommendation of 100 feet for targets (NR4, 5, 9, II, 18, 63, 66, 69, 72, 75, MR 1, 11, 12, 13, 18, 25, 55, 62, 63, 64, 65, 67, 76, 79, SS 3, 4, 6, 7, 8, and SR 6, 9, 115, 117) Targets SR 66, 69, 76, 77, 81 which comprise the Dixie Crystal [8S4889] will have the recommended buffer of 150 feet.

In addition, the Corps previously tested the area of planned maintenance dredging in the St. Augustine channel. The resulting report, *Cultural Resources Marine Remote Sensing Survey and Terrestrial Survey al St. Augustine Entrance Channel, St. Johns County*, Florida, by Mid-Atlantic Technology and Environmental Research, Inc. identified six magnetic anomalies four of which (SA-OS-2, -3, -4, -6) were recommend for avoidance with a 200 foot buffer (DHR File No. 2001 -321). These buffers will be maintained and avoided by the current project. In addition, per the request of the Florida State Historic Preservation Officer, a monitor will examine the beach placement area after material has been placed there.
Finally, the beach placement areas were also tested. New South Associates study, *Cultural Resource Survey for the St. Johns County Shore Protection Project*, did not result in the identification of any significant resources being identified within the placement area (DHR File No. 2010-02392 and Seminole THPO No. 005568). This area was also coordinated with Florida DEP Park's personnel who manage the beach placement area and determined that no resources within the park would be affected by planned placement activities. Based on these surveys and the use of

monitoring during the dredging activities at Porpoise Point, there will be "no adverse effect to historic properties" from the proposed 2011 maintenance dredging of the IWW and St. Augustine Inlet with use of the beach placement area and dune restoration at Anastasia Island (DHR File No 2010-03936& 04838-B). However, should use of the nearshore placement area become necessary, additional consultation with the SHPO and appropriate federally recognized tribes would be required.

4.6.3 NO-ACTION ALTERNATIVE

There would be no impact to significant cultural resources eligible for or listed on the National Register of Historic Places.

4.7 RECREATIONAL RESOURCES

4.7.3 NO-ACTION ALTERNATIVE

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

4.7.4 DREDGING ALTERNATIVE

Maintenance dredging of the project channels would provide a moderate long-term benefit to recreational boating. Recreational traffic within the IWW and inlet channels could be temporarily disrupted due to construction activities. Finally, dredging of the Porpoise Point shoal is expected to result in some shoreline sloughing which could reduce the area available for beach driving, surf fishing, and other beach recreational activities at that specific location.

4.7.5 MATERIAL PLACEMENT OPTIONS

The nearshore placement area is open to the public recreational boating, and therefore the use of that area could be temporarily impacted recreational resources. Recreational use of the beach would be temporarily disrupted if dredged material was placed at this location. However, placement there could also help maintain the recreational beach berm.

4.8 AESTHETIC RESOURCES

4.8.3 NO-ACTION ALTERNATIVE

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

4.8.4 DREDGING ALTERNATIVE

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

4.8.5 MATERIAL PLACEMENT OPTIONS

Aesthetic resources, or visual appeal, of the nearshore and beach placement areas would be temporarily adversely impacted if dredged material was placed at these locations.

4.9 NOISE

4.9.3 NO-ACTION ALTERNATIVE

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

4.9.4 DREDGING ALTERNATIVE

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

4.9.5 MATERIAL PLACEMENT OPTIONS

The nearshore and beach placement areas are bounded by residential development and the noise created by construction equipment could result in a temporary adverse effect on the local community.

4.10 SHORELINE STABILIZATION

4.10.3 NO-ACTION ALTERNATIVE

There would be no impact to shoreline stabilization if the proposed dredging were not performed.

4.10.4 DREDGING ALTERNATIVE

Adverse impacts caused by the IWW dredging to shoreline stabilization are not anticipated. Furthermore, although some shoreline sloughing is anticipated along Porpoise Point should that area be dredged, bypassing the material trapped there would benefit down-drift shorelines.

4.10.5 MATERIAL PLACEMENT OPTIONS

Placement of dredged material onto the beach could benefit this critically eroding area. In addition, material placed in the nearshore could augment sand in the littoral drift system which could be beneficial to shoreline stabilization.

4.11 SOCIO-ECONOMIC

4.11.3 NO-ACTION ALTERNATIVE

There would be a long-term adverse impact to commercial traffic and other marine related business if the IWW and inlet channels were not maintained. The estimated adverse impacts to St. Johns County are summarized below:

- Decrease of $139 million in business volume
- Decrease of $49 million in personal income
- Decrease of 1,385 jobs
- Decrease of $271.4 million in property values

(source: GEC 2005)

4.11.4 DREDGING ALTERNATIVE

Commercial shipping and other marine related business would benefit if the proposed work was performed. There were 13,325 pleasure craft and 309 commercial vessels registered in St. Johns County in 2009 (http://www.flhsmv.gov/dmv/vslfacts.html).

4.11.5 MATERIAL PLACEMENT OPTIONS

There would be minimal impact to the local, regional and statewide economies with the use of the nearshore placement area. On the other hand, beach placement could help maintain a recreational beach which generates revenue from tourism.

4.12 NAVIGATION

4.12.3 NO-ACTION ALTERNATIVE

If the authorized depth of the project channels were not maintained, then shoaling would make them un-navigable for vessel traffic including commercial vessels and pleasure craft.

4.12.4 DREDGING ALTERNATIVE

Performing the proposed work would result in safe navigation conditions. Vessel traffic within the IWW and inlet channels could be temporarily disrupted due to construction activities.

4.12.5 MATERIAL PLACEMENT OPTIONS

The use of the beach placement area would have minimal impact on navigation. However, if a hydraulic pipeline dredge is used, temporary impacts to vessel traffic could occur due to the presence of the floating and submerged pipeline. Similarly, temporary navigation impacts could also occur with use of the nearshore placement area.

4.13 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Table 5

summarizes the impact of such cumulative actions by identifying the past, present, and reasonably foreseeable future condition of the various resources which are directly or indirectly impacted by the proposed action and its alternatives. The table also illustrates the with-project and without-project condition (the difference being the incremental impact of the project). Also illustrated is the future condition with any reasonable alternatives (or range of alternatives).

TABLE 5: SUMMARY OF CUMULATIVE IMPACTS (NOTE: The inlet was physically relocated and stabilized starting in 1940. The IWW was completely man made and dredging to it's current depths was completed by 1951. Therefore, the timeline for this cumulative impacts analysis is from 1940 to the present, and is limited in space to the project area.)

	Past (historical project impacts)	Present (current project impacts)	Future without project	Future with proposed dredging and beach placement	Future with proposed dredging and nearshore placement
Sea turtles	Relocation of the inlet and construction of the IWW altered the hydrology of the system ultimately stabilizing nesting beach habitat.	Use of clamshell or cutterhead results in no mortalities. Sand bypass enhances nesting beach habitat.	Degradation of nesting beach due to critical erosion.	Minimal effect from use of clamshell or cutterhead dredge. Temporary impact to nesting during construction and while berm equilibrates.	Minimal effect with use of clamshell or cutterhead dredge.
Manatees	Stabilization of the inlet and dredging of the IWW increased vessel traffic.	Minimal effect with use of standard protection measures.	Channel depths would decrease.	Minimal effect with use of standard protection measures.	Minimal effect with use of standard protection measures.
Smalltooth sawfish	Mortality from commercial fishing by-catch.	Minimal effect.	Minimal effect.	Minimal effect with use of standard protection measures.	Minimal effect with use of standard protection measures.
Piping Plover	Stabilization of inlet and dredging of IWW altered tidal flows affecting wintering habitat.	Minimal effect with use of standard protection measures.	Minimal effect.	Minimal effect with use of standard protection measures.	Minimal effect.
Anastasia Island Beach Mouse	Relocation and stabilization of the inlet helped create ASP habitat.	Minimal effect with use of standard protection measures.	No inlet bypassing = degradation and loss of habitat due to erosion.	Minimal effect with use of trapping and protection measures.	No effect.
Water quality	Temporary increase in turbidity with past dredging. Long-term alteration of system hydrology from relocation of inlet and dredging of IWW.	Pollution prevention measures have resulted in Class II designation. Temporary increase in turbidity during dredging.	Pollution prevention measures should continue. Decreased depths could lead to chronic turbidity from prop dredging.	Temporary increase in turbidity during dredging.	Temporary increase in turbidity during dredging.
Essential Fish Habitat	Inlet and IWW increased tidal flushing. No substantial effect on Federally managed fish species.	No substantial effect on Federally managed fish species with avoidance of resources outside the channels.	No effect.	No substantial effect on Federally managed fish species with avoidance of resources outside the channels. Dredging frequency depresses benthic recovery post placement.	No substantial effect with avoidance of resources outside the channels. Dredging frequency depresses benthic recovery post placement.

	Past (historical project impacts)	Present (current project impacts)	Future without project	Future with proposed Dredging and beach placement	Future with proposed dredging and nearshore placement
Fish and Wildlife Resources	Loss of terrestrial and aquatic habitat with relocation of inlet and dredging of IWW. Stabilization of inlet helped create ASP.	Minimal impact on migratory birds with protective measures. Other wildlife temporarily displaced during beach placement.	No inlet bypassing = degradation and loss of habitat due to erosion.	Maintenance dredging and beach placement would impact benthic organisms. Minimal impact on migratory birds with protective measures. Other wildlife temporarily displaced when beach site is used.	Maintenance dredging would impact benthic organisms. Wildlife temporarily displaced when nearshore placement is used.
Air Quality	Local emissions increased with creation of navigation channels. Minor emissions from dredging equipment.	Minor emissions from dredging equipment. In attainment with air quality standards.	No effect.	Minor emissions from dredging equipment. Expected to be in attainment.	Minor emissions from dredging equipment. Expected to be in attainment.
Cultural Resources	No Historic Properties affected.	No adverse effects to Historic Properties.	No Historic Properties affected.	No adverse effects to Historic Properties. Monitoring required on beach placement area during dredging of Porpoise Point	No adverse effects to Historic Properties anticipated. Additional Consultation required.
Recreation Resources	Construction of navigation channels created recreational opportunities (boating).	Dredging beneficial to boating. Dredging equipment temporarily disrupts boat traffic.	Impact to recreational boating from channel shoaling.	Dredging beneficial to recreational boating. Dredging equipment could temporarily disrupt boat traffic. Loss of beach driving area at PP.	Dredging beneficial to recreational boating. Dredging equipment could temporarily disrupt boat traffic.
Aesthetic Resources	Construction of inlet and IWW affected local aesthetic resources.	Equipment temporarily affects aesthetic resources.	No effect.	Equipment would temporarily affect aesthetic resources.	Equipment would temporarily affect aesthetic resources.
Noise	Construction of navigation channels increased local noise levels.	Equipment noise is minimal.	No effect.	Equipment noise would be minimal.	Equipment noise would be minimal.
Shoreline Stabilization	Stabilization of inlet and dredging of IWW affected hydrology of the system.	Beach placement beneficial to shoreline stabilization.	No inlet bypassing = shoreline recession due to erosion.	Beach placement could benefic shoreline stabilization. Dredging could increase vessel traffic which could exacerbate shoreline erosion.	Nearshore placement could benefit shoreline stabilization through inlet bypassing to augment littoral drift.
Socio-Economics	Construction of navigation channels created a significant positive economic stimulus.	Inlet and IWW continue to provide an economic stimulus.	There would be a significant adverse economic impact if the proposed work was not performed.	There would be a significant positive economic impact if the proposed work was performed.	There would be a significant positive economic impact if the proposed work was performed.

	Past (historical project impacts)	Present (current project impacts)	Future without project	Future with proposed dredging and beach placement	Future with proposed dredging and nearshore placement
Navigation	Stabilization of inlet and dredging of IWW improved navigation along the northeast coast of Florida.	Continued maintenance dredging provides safe navigation.	There would be a significant adverse impact to navigation if the proposed work was not performed.	There would be a significant beneficial impact to navigation if the proposed work was performed.	There would be a significant beneficial impact to navigation if the proposed work was performed.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.14.3 IRREVERSIBLE

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

4.14.4 IRRETRIEVABLE

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

4.15 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

The dredging of the project channels and placement of dredged material onto the beach would adversely impact benthic organisms, some fish species, and temporarily adversely impact wildlife on the beach. Some shoreline sloughing at Porpoise Point can be expected during that portion of the maintenance dredging and could result in some loss of shorebird nesting habitat.

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

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

4.17 INDIRECT EFFECTS

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

4.18 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

This project has wide support and is compatible with Federal, State, and most local objectives.

4.19 CONFLICTS AND CONTROVERSY

• Dredging of the IWW would be done in a manner that would avoid or minimize impacts to resources outside the project channels.

• The dredging would be performed in compliance with the State water quality standards.

• St. Johns County was issued an Incidental Take Permit (ITP) pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended by the USFWS for the incidental take of federally listed sea turtles and Anastasia Island beach mice on selected Atlantic coast beaches of St. Johns County causally related to vehicular driving and associated activities. The St. Johns County Habitat Conservation Plan (HCP) was developed in support of the County's ITP application. The ITP limits public vehicular beach access between 8:00 PM and 8:00 AM from May 1 through October 31. However, specifically excluded from the scope of the HCP are: "Activities associated with beach nourishment and other federally permitted beach projects, including those involving the use of vehicles on the beach." (St. Johns County, 2003) The USFWS has issued a BO which covers the Corps action of year-round dredging and beach placement including sea turtle nest relocation from the project footprint as required.

• Concerns have been raised during the public coordination of this document regarding loss of shorebird habitat resulting from the dredging of the Porpoise Point shoal. Some shoreline sloughing can be expected to result in the loss of shorebird habitat. However, the periodic bypassing of the inlet sediment to the down-drift critically eroding beaches is supported by the St. Augustine Inlet Management Plan. In addition, this portion of the maintenance dredging project will be scheduled outside the shorebird nesting season to further reduce impacts to these resources.

• The FWC raised concern regarding potential sea turtle nesting impacts in the shell hash shorebird enhancement area. Additional monitoring will be required for this area which should identify any impacts from the shell placement, both beneficial and adverse. This in turn will allow for adaptive management of subsequent dredged material placement actions to optimize environmental benefits while minimizing any adverse impacts.

4.20 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

There is a potential for shoreline sloughing along Porpoise Point from the dredging of the shoal there. The exact amount is uncertain. Additional consultation will be needed to evaluate potential impacts to Cultural Resources if the nearshore placement area is to be used. Because this additional consultation may require additional work, there may be "unknown" risks associated with nearshore placement activities.

4.21 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

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

4.22 ENVIRONMENTAL COMMITMENTS

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

1. A clamshell or cutterhead dredge would most likely be used to perform the proposed work; therefore, adverse impacts to sea turtles and smalltooth sawfish would not be anticipated. Dredged material would only be placed on the beach pursuant to the conditions listed in section 4.1.3 above; therefore adverse impacts to nesting sea turtles, AIBM and Piping Plover would be minimized. Other sea turtle, AIBM, Piping Plover and sawfish protective measures, such as informing contract personnel of the presence of these species in the area and the need to avoid collisions/harm to them as well as equipment lighting requirements shall also be implemented.

2. Standard protective measures for manatees shall be required.

3. The District's migratory bird protection policy shall be implemented. In addition, the Porpoise Point shoal dredging would be scheduled outside the shorebird nesting season.

4. The work shall be performed in compliance with State water quality standards.

5. Air emissions such as vehicular exhaust and dust shall be controlled.

6. The contracting officer would notify the contractor in writing of any observed noncompliance with Federal, State, or local laws or regulations, permits and other elements of the contractor's Environmental Protection Plan. The contractor would, after receipt of such notice, inform the contracting officer of proposed corrective action and take such action as may be approved. If the contractor fails to comply

promptly, the contracting officer would issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions would be granted or costs or damages allowed to the contractor for any such suspension.

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

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

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

4.23 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.23.3 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project was compiled and the draft EA was prepared and noticed on 23 October 2009. Comments received have been incorporated into this document. The project is in compliance with the National Environmental Policy Act.

4.23.4 ENDANGERED SPECIES ACT OF 1973

The project has been fully coordinated under the Endangered Species Act and therefore, is in full compliance with the act. Consultation was completed with the USFWS by issuance of their BO dated 16 April 2010.

4.23.5 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the USFWS. A Coordination Act Report is not required for the proposed work. This project is in full compliance with the act.

4.23.6 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

(PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order 11593)
Archival research, and consultation with the Florida State Historic Preservation Officer (SHPO), has been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593 (DHR File No. 2010-03936 and 04838-B). This project has been coordinated with the SHPO and appropriate federally recognized tribes. The project would not adversely affect historic properties included in or eligible for inclusion in the National Register of Historic places. The project is in compliance with each of these federal laws.

4.23.7 CLEAN WATER ACT OF 1972

The project shall be in compliance with this act. A Section 401 water quality certification shall be obtained from the Florida Department of Environmental Protection. All State water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A. A public notice was issued in a manner which satisfies the requirements of Section 404 of the Clean Water Act.

4.23.8 CLEAN AIR ACT OF 1972

Vehicular emission and airborne dust particulates resulting from construction activities shall be controlled. This project has been coordinated with EPA and is in compliance with Section 309 of the act.

4.23.9 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. State consistency review has been performed during the coordination of the draft EA and the project is consistent with the Florida Coastal Zone Management Program.

4.23.10 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by the IWW dredging and use of either placement area. Therefore, this act is not applicable to the proposed work.

4.23.11 WILD AND SCENIC RIVER ACT OF 1968

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

4.23.12 MARINE MAMMAL PROTECTION ACT OF 1972

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

4.23.13 ESTUARY PROTECTION ACT OF 1968

The protective measures described in section 4 would insure avoidance and minimization of impacts to the San Sebastian and Tolomato Rivers from the proposed dredging. This project is in compliance with this act.

4.23.14 FEDERAL WATER PROJECT RECREATION ACT

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

4.23.15 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project has been coordinated with the State and is in compliance with the act.

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

The majority of the project lies within Coastal Barrier Resource Act (CBRA) unit P-05. Maintenance dredging of the IWW is consistent with provisions of the CBRA which excepts: "maintenance of existing channel improvements... and including the disposal of dredge materials related to such improvements". CBRA has no requirement to dispose of the material within the same CBRA Unit. CBRA does not otherwise regulate how the maintenance material may be used. This CBRA exemption was verified by Service letter dated 25 September 2003.

4.23.17 RIVERS AND HARBORS ACT OF 1899

The proposed work could temporarily obstruct navigable waters of the United States but would ultimately improve navigability of these waters. The proposed action had been subjected to the public notice and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

4.23.18 ANADROMOUS FISH CONSERVATION ACT

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

4.23.19 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

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

4.23.20 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (3[33 U.S.C. 1402](f)) does not apply to the disposal of material for beach nourishment or to the placement of material for a purpose other than disposal (i.e. placement of rock material as an artificial reef or the construction of artificial reefs as mitigation). Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project. The disposal activities addressed in this EA have been evaluated under Section 404 of the Clean Water Act.

4.23.21 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

The Corps has determined that the project would not have a substantial adverse impact on EFH or federally managed fish species occurring along the east-central coast of Florida. The proposed work has been fully coordinated with the NMFS. EFH coordination was completed by Corps letter dated 10 May 2010. The project is in full compliance with the act.

4.23.22 E.O. 11990, PROTECTION OF WETLANDS

There would be nominal impacts to wetlands by project activities (pipeline). This project is in compliance with the goals of this Executive Order.

4.23.23 E.O. 11988, FLOOD PLAIN MANAGEMENT

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

4.23.24 E.O. 12898, ENVIRONMENTAL JUSTICE

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

4.23.25 E.O. 13089, CORAL REEF PROTECTION

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

4.23.26 E.O. 13112, INVASIVE SPECIES

This project would not introduce any invasive species.

5 LIST OF PREPARERS

5.1 PREPARERS

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

5.2 REVIEWERS

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

6 PUBLIC INVOLVEMENT

6.1 SCOPING AND DRAFT EA

A Public Notice was issued for this action on 23 October 2009. The draft EA and Finding of No Significant Impact (FONSI) has been made available to the public. Comments received have been incorporated into this document.

6.2 AGENCY COORDINATION

Coordination has been conducted with appropriate agencies and described in this report. Agency coordination letters have been placed in Appendix C.

6.3 LIST OF RECIPIENTS

Per the Public Notice, copies of the draft EA have been made available to appropriate stakeholders. A list of stakeholders receiving notification can be found within the Public Notice in Appendix C.

6.4 COMMENTS RECEIVED AND RESPONSE

Comments received and responses have been incorporated into this document and are discussed in section 4.19.

REFERENCES

Borboen, M. (mborboen@audubon.org)(2 September 2010). Fw: Porpoise Point August 30. Email to: Lauritsen, A. (Ann_Marie_Lauritsen@fws.gov).

Carvalho, J. (jcarvalho@flmnh.ufl.edu)(21 April 2009). Re: Sawfish sighting 323 additional information? Email to: DeMarco, P. (Paul.M.DeMarco@usace.army.mil).

DePue, J. (Jason.DePue@dep.state.fl.us)(1 April 2009). RE: Piping Plover Occurences within AISP. Email to: DeMarco, P. (Paul.M.DeMarco@usace.army.mil).

Florida Department of Environmental Protection. 2009. http://www.dep.state.fl.us/secretary/news/2006/04/0406_02.htm

Florida Department of Highway Safety and Motor Vehicles. 2010. http://hsmv.state.fl.us/dmv/vslfacts.html

Florida Marine Research Institute. 2010. http://research.myfwc.com/manatees/search_summary.asp

Florida Museum of Natural History-Ichthyology. 2008. http://www.flmnh.ufl.edu/fish/Education/bioprofile.htm

Gulf Engineers and Consultants, Inc. 2005. Final Report: An Economic Analysis of the District's Waterways in St. Johns County. Baton Rouge, Louisiana.

Hall, W. 2000. Cultural Resources Marine Remote Sensing Survey and Terrestrial Survey at St. Augustine Entrance Channel, St. Johns County, Florida. Report for U.S. Army Corps of Engineers, Jacksonville, Florida.

Hoffman, E.G. and S.H. Olsen. 1982. Benthic macroinvertebrate study conducted for ITT Rayioner Fernandina Division. Report for ITT Rayioner, Inc., Olympic Research Division, Shelton, Washington.

Kropp, A. (Alex.Kropp@MyFWC.com)(2 March 2010). RE: FWC's Comments on Draft EA, St. Augustine inlet and Atlantic Intracoastal Waterway Maintenance Dredging. Email to: DeMarco, P. (Paul.M.DeMarco@usace.army.mil).

Sneckenberger, S.I. 2001. Factors influencing habitat use by the Alabama beach mouse *(Peromyscus polionotus ammobates).* Master's thesis. Auburn University, Auburn, Alabama.

South Atlantic Fishery Management Council. 1998. Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council.

St. Johns County Planning Division Growth Management Services. 2003. Habitat Conservation Plan - A Plan for the Protection of Sea Turtles and Anastasia Island Beach Mice on the Beaches of St. Johns County, Florida.

Swilling, W.R. 2000. Ecological dynanlics of the endangered Alabama beach mouse *(Peromyscus polionotus ammobates).* Master's thesis. Auburn University, Alabama.

Swilling, W.R. Jr., M.C. Wooten, N. R. Holler, and W. J. Lynn. 1998. Population dynamics of Alabama beach mice *(Peromyscus polionotus ammobates)* following Hurricane Opal. American Midland Naturalist 140: 287-298.

Taylor, et. al., 1997. St. Augustine Inlet Management Plan. Taylor Engineering, Inc., Jacksonville, Florida.

U.S. Fish and Wildlife Service, 2007. 5-Year Review, Anastasia Island Beach Mouse. North Florida Field Office, Jacksonville, Florida.

U.S. Fish and Wildlife Service, 2010. Biological Opinion for Maintenance Dredging St. Augustine Inlet and Vicinity IWW, St. Johns County, FL. North Florida Field Office, Jacksonville, Florida.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

MAINTENANCE DREDGING
ST. AUGUSTINE INLET AND ADJACENT INTRACOASTAL WATERWAY
ST. JOHNS COUNTY, FLORIDA

I. Project Description

a. Location. The proposed work would be performed within the St. Augustine Inlet entrance channel and adjacent IWW federal navigation channel, St. Johns County, Florida. Placement operations would occur at designated locations (please see Figure 1).

b. General Description. The work would involve periodic maintenance dredging of approximately 700,000 cubic yards of material from the project channels. Dredged material would be placed in the beach or nearshore placement areas.

c. Authority and Purpose. Spanning nearly the entire length of Florida from Jacksonville to Miami, an 8 ft deep x 75 ft wide channel was authorized 21 January 1927 by House document 586, 69th Congress, 2nd Session. The present configuration (12 ft deep x 125 ft wide) was authorized by House Document 740, 79th Congress, 2nd Session, 2 March 1945. Authorization was received for improvements to the St. Augustine Harbor and Inlet, under House Document 133, 81st Congress, 1st Session. Maintenance of the channels is the responsibility of the Corps. The Florida Inland Navigation District serves as the IWW local sponsor while the St. Augustine Port, Waterway and Beach District is the Harbor/Inlet local sponsor. Maintenance dredging would maintain the authorized depths of the project channels.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Dredged material from the project channels typically consists of shoal material containing silt, clay, sand and shell. Silt content averages 2.6% (please see Section 3.2 for more information).

(2) Quantity of Material. Up to 700,000 cubic yards would be periodically removed.

(3) Source of Material. From the St. Augustine Inlet entrance channel and the adjacent IWW federal navigation channel (please refer to Section 1.1 for more information).

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

(1) Location. The beach and nearshore placement areas (please see Figure 1. Project Map and Section 2 for more information).

(2) Size. Beach: 690 acres; Nearshore: 260 acres.

(3) Type of Site: Beach: open water (ocean) and sand beach berm; Nearshore: open water (ocean).

(4) Type(s) of Habitat. Beach is open water habitat with unconsolidated substrate and high-energy surf zone; Nearshore is open water habitat with unconsolidated substrate (please see Section 3 for more information).

(5) Timing and Duration of Discharge. Timing is undetermined except for the Porpoise Point shoal portion which would be dredged September - April and duration is generally less than four months. Beach and nearshore placement could occur year-round.

f. Description of Disposal Method. Dredging is typically performed by cutterhead suction pipeline dredge. Material is hydraulically pumped via pipeline to beach or nearshore for disposal.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The project channels have sloped bottoms with authorized depths (please see Section 1.1 for more information). Actual depths vary widely though due to shoaling and local hydrodynamic processes.

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

(3) Dredged/Fill Material Movement. Material placed on the beach and in the nearshore becomes part of the littoral drift system.

(4) Physical Effects on Benthos. Benthic organisms would be impacted by dredging activity and placement operations. Re-colonization should

begin in less than one year. However, full recovery may slow since dredging occurs every 3-4 years.

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

b. Water Circulation. Fluctuation and Salinity Determinations.

(1) Water Column Effects.

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

(2) Current Patterns and Circulation.

(a) Current Patterns and Flow: Currents in the project area are primarily tidal. Dredging of the Porpoise Point shoal should widen the inlet which could slow tidal flows until sediments re-accrete there.
(b) Velocity: No significant effect possibly reduced tidal velocities within the inlet.
(c) Stratification: No significant effect.
(d) Hydrologic Regime: No significant effect.

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

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

(5) Actions to minimize impacts. The project would not affect water levels but could slow flow patterns. Turbidity would be monitored per the requirements of the State permit. If at any time the turbidity standard were exceeded, those activities causing the violation would cease.

c. Suspended Particulate/Turbidity Determinations.

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

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

(a) Light Penetration: Light penetration would decrease during dredging and placement operations.
(b) Dissolved Oxygen: Dissolved oxygen levels would not be significantly altered by this project.
(c) Toxic Metals and Organics: This project would not cause any significant release of toxic metals or organics.
(d) Pathogens: This project would not cause any release of pathogens.
(e) Aesthetics: Turbidity would temporarily impact aesthetic quality of the project channels and beach placement area.

(3) Effects on Biota.

(a) Primary Production, Photosynthesis: The project would not have a significant impact on primary production or photosynthesis.
(b) Suspension/Filter Feeders: Turbidity would affect suspension/ filter feeders, but the effects would not be significant.
(c) Sight Feeders: Sight feeders would be affected by turbidity, but the effects would not be significant.

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

d. Contaminant Determinations. Levels of contaminants are not expected to have a significant impact on plankton, benthos, nekton, or the aquatic food web. Re-suspension of sediment within the channels is expected to have minimal impact on these organisms.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton: Significant effects on plankton are not anticipated.
(2) Effects on Benthos: Benthos would be impacted by the project, but benthic organisms would be expected to begin recovery within one year. However, full recovery may be slow since dredging occurs every 3-4 years.
(3) Effects on Nekton: Significant effects on nekton are not anticipated.
(4) Effects on Aquatic Food Web: As stated earlier, benthos would be impacted, but additional significant effects on the food web are not anticipated.
(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Refuges: Dredging of the IWW is not expected to have a significant impact on the adjacent areas. This work would be performed in compliance with the Water Quality Certification issued by the State of Florida.
(b) Wetlands: The proposed work would not have a significant affect to wetlands.
(c) Mud Flats: The proposed work would not have a significant affect to mud flats.
(d) Vegetated Shallows: The proposed work would not affect vegetated shallows.
(e) Coral Reefs: There are no coral reefs in the project area.
(f) Riffle and Pool Complexes: There are no riffle and pool complexes in the project area.

(3) Threatened and Endangered Species. The project would not have a significant impact on threatened and endangered species. AIBM trapping would relocate any mice from the pipeline corridor, sea turtle nests would be relocated from the beach placement area, and Piping Plover optimal habitat would be avoided to the maximum extent practicable thereby minimizing impacts to these species.

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

(5) Actions to Minimize Impacts. Measures shall be taken to avoid or minimize impacts to threatened and endangered species as well as other wildlife (please refer to Section 4 and 4.22).

e. Proposed Disposal Site Determinations

(1) Mixing Zone Determination. This determination will be in accordance with the Water Quality Certification issued for this project.

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

(3) Potential Effects on Human Use Characteristic.

(a) Municipal and Private Water Supply: No effects are anticipated.
(b) Recreational and Commercial Fisheries: Impacts to fisheries would not be significant (please see Sections 3.5 and 4.3).
(c) Water Related Recreation: Construction activities would temporarily disrupt water related recreation.
(d) Aesthetics: Construction would temporarily impact aesthetics.
(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves: The project channels lie adjacent to ASP. Work would be conducted in compliance with the Water Quality Certification issued by the State of Florida.

f. Determination of Cumulative Effects on the Aquatic Ecosystem. Periodic maintenance dredging and placement operations would have impacts on the aquatic ecosystem. Most impacts should be relatively short-term; however, populations of benthic organisms within the project channels and placement areas may never fully recover because the high rate of shoaling requires dredging every 3-4 years (please see Section 4.3 for more information).

h. Determination of Secondary Effects on the Aquatic Ecosystem. Maintaining the authorized depths of the channels may provide a stimulus for economic growth and could encourage additional vessel traffic.

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

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

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem: No practical alternative exists which meets the project

objectives that do not involve discharge of fill into waters of the United States.

c. Compliance with Applicable State Water Quality Standards: After consideration of material placement site dilution and dispersion, the discharge of fill materials would not cause or contribute to, violations of any applicable State water quality standards for Class II and III Waters. Dredging would be performed in compliance with the Water Quality Certification issued by the State of Florida.

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

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

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

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

(1) Significant Adverse Effects on Human Health and Welfare

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

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

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

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

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

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

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

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems: Most impacts should be relatively short-term; however, populations of benthic organisms within the channels and placement areas may be depressed

because dredging is required every 3-4 years due to the high rate of shoaling.

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

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

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem: Measures shall be taken to minimize impacts (please see Section 4.22 for more information).

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

FINDING OF COMPLIANCE
FOR
MAINTENANCE DREDGING
ST. AUGUSTINE INLET AND ADJACENT IWW
ST. JOHNS COUNTY, FLORIDA

1. No significant adaptations of the guidelines were made relative to this evaluation.

2. One beach placement and one nearshore placement site are available for this project. Use of either of these sites (Figure 1) would not result in significant impacts to water level fluctuation, circulation or currents.

3. The planned disposal of dredged material at either site would not violate any applicable State water quality standards with the possible exception of turbidity. Therefore, turbidity standards would be monitored per the Water Quality Certification issued by the State of Florida. If a turbidity violation is noted, then those activities causing the violation shall be terminated. The disposal operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

4. Use of the beach and nearshore disposal sites would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended. Consultation with the U.S. Fish and Wildlife Service has been completed.

5. The proposed disposal of dredged material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on life stages of aquatic life and other wildlife, aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values will not occur.

6. Appropriate steps shall be taken to minimize potential adverse impacts of the discharge on aquatic systems.

7. On the basis of the guidelines the proposed disposal sites for the discharge of dredged material are specified as complying with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

APPENDIX B - COASTAL ZONE MANAGEMENT CONSISTENCY

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES

MAINTENANCE DREDGING
ST. AUGUSTINE INLET AND ADJACENT IWW
ST. JOHNS COUNTY, FLORIDA

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

Response: The proposed plans and information have been voluntarily submitted to the State in compliance with this chapter.

2. Chapters 163(part II), 186, and 187, County, Municipal, State and Regional Planning. These chapters establish the Local Comprehensive Plans, the Strategic Regional Policy Plans, and the State Comprehensive Plan (SCP). The SCP sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed project has been coordinated with various Federal, State and local agencies during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the shorefront development and infrastructure.

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

Response: The proposed project involves the maintenance dredging of St. Augustine Inlet and the adjacent IWW in order to maintain safe navigation conditions. Therefore, this project is consistent with the efforts of Division of Emergency Management.

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

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

Response: The proposed project complies with State regulations pertaining to the above resources. The work complies with the intent of this chapter.

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

Response: Since the affected property already is in public ownership or is under an easement for public placement use, this chapter does not apply.

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

Response: The proposed project has been coordinated with the State of Florida regarding project activities within and adjacent to ASP. The project is consistent with this chapter.

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

Response: This project has been coordinated with the State Historic Preservation Officer (SHPO). Because of the nature of the project there is little potential for impact to historic properties. The project is consistent with this chapter.

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

Response: The proposed maintenance dredging encourages commercial and recreational use that in turn provides economic benefits to the area. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

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

Response: The maintenance dredging of the inlet and IWW promotes commercial and recreational navigation within the area and therefore is consistent with the goals of this chapter.

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

Response: The proposed maintenance dredging would not have a substantial adverse impact on saltwater living resources. Benthic organisms may be adversely affected by the work, and full recovery may be delayed within the channels or at the placement areas due to the fact that dredging and sand placement is required every 3-4 years. However, the project footprint is relatively small and lies adjacent to similar habitat. Therefore, substantial impacts to the aquatic ecosystem are not anticipated. Based on the overall impacts of the project, the project is consistent with the goals of this chapter.

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

Response: The project would not have a substantial adverse impact on living land and freshwater resources. Use of the placement areas could temporarily adversely impact wildlife, but these areas should be re-colonized between uses.

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

Response: This project does not involve water resources as described by this chapter.

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

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

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

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

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

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

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

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

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

Response: An Environmental Assessment addressing project impacts has been prepared and has been reviewed by the appropriate resource agencies including the Florida Department of Environmental Protection. Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. A Water Quality Certification is being sought from the State. The project complies with the intent of this chapter.

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

Response: Agricultural lands do not occur in the vicinity of the project; therefore this chapter does not apply.

APPENDIX C - PERTINENT CORRESPONDENCE

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

REPLY TO
ATTENTION OF

Operations Division
Public Notice No. PN-OD-IWW-287 23 October 2009

PUBLIC NOTICE

TO WHOM IT MAY CONCERN: The Jacksonville District, U.S. Army Corps of Engineers, has applied to the State of Florida, Department of Environmental Protection for water quality certification in the form of a permit for the maintenance dredging of the Federal Intracoastal Waterway, St. Augustine Inlet which may also include advanced inlet maintenance dredging of the shoals along Vilano Point for Regional Sediment Management, and adjacent Harbor flood shoal areas, St. Johns County, Florida. Public coordination required with that application will be forthcoming. The dredged material would be placed either on the beach at Anastasia Island State Park (AISP), St. Augustine Beach between Florida Department of Environmental Protection(FDEP)Monuments R-132 to R-152 or in the nearshore placement area between FDEP Monuments R-141 to R-146. This Federal project is currently being evaluated and coordinated pursuant to 33 CFR 335 through 338.

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

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

WATERWAY & LOCATION: Federal Intracoastal Waterway, St. Augustine Inlet, and adjacent Harbor flood shoal areas, St. Johns County, Florida.

WORK & PURPOSE: The proposed work consists of performing maintenance dredging of the federally authorized Intracoastal Waterway, St. Augustine Inlet which may also include advanced inlet maintenance dredging of the shoals along Vilano Point for Regional Sediment Management, and adjacent Harbor flood shoal areas, St. Johns County, Florida. Dredged material would be placed either on the beach at Anastasia Island State Park (AISP), St. Augustine Beach between Florida Department of Environmental Protection (FDEP) Monuments R-132 to R-152 (approximately 2-5 miles south of St. Augustine Inlet) or in the nearshore placement area between FDEP Monuments R-141 to R-146 (approximately 4 miles south of the Inlet). Approximately 400,000 cubic yards of material will potentially be dredged from IWW cuts SJ-28 to SJ-30, the inlet, and advanced maintenance areas by hydraulic cutter-suction dredge. All dredging operations will conform to the provisions of the State Water Quality Certificate.

The purpose of the maintenance dredging is to restore full navigation depth of the Federal navigation projects and to bypass material trapped by the inlet to critically eroded down-drift beaches. Dredging will serve to eliminate the hazardous, and in some instances impassable navigation conditions created by shoaling as well as return material to the natural sediment transport process.

Copies of the Project Condition Surveys are available for review online at:
http://www.saj.usace.army.mil/Divisions/Operations/Branches/HydroSurvey/survey/09-120.pdf

http://www.saj.usace.army.mil/Divisions/Operations/Branches/HydroSurvey/survey/08-129.pdf

PROJECT AUTHORIZATION: Rivers and Harbors Act of 2 March 1945, House Document 740, 79th Congress; and House Resolution Number 95-1247, 18 October 198, 95 Congress, 2nd Session. Coastal shoreline protection for St. Johns County was authorized by the Water Resources Development Act of 1986, under Public Law 99-662, on November 17, 1986

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

1. Section 404 of the Clean Water Act of 1977 (PL 95-217) (33 U.S.C. 1344).

2. Section 302 of the Marine Protection, Research, and Sanctuaries Act of 1972 (PL 92-532, 86 Stat. 1052).

3. The National Environmental Policy Act of 1969 (PL 91-190) (42 U.S.C. 4321-4347).

4. Sections 307(c) (1) and (2) of the Coastal Zone Management Act of 1972 (16 U.S.C. 1456(c) (1) and (2), 86 Stat. 1280).

5. The Fish and Wildlife Act of 1956 (16 U.S.C. 472a et seq).

6. The Migratory Marine Game-Fish Act of 1959 (16 U.S.C. 760c-760g).

7. The Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661-666c).

8. The Endangered Species Act of 1973 (PL 93-205) (16 U.S.C. 668aa-668cc-6, 87 Stat. 884).

9. The National Historic Preservation Act of 1966 (16 U.S.C. 470, 80 Stat. 915).

10. Section 313 of the Clean Water Act of 1977 (33 U.S.C. 1323, 85 Stat. 816).

11. The Magnuson-Stevens Fishery Conservation and Management Act of 1966 (16 USC 1801 et seq. PL 104-208).

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

EVALUATION:

a. Environmental Assessment (EA): An draft EA for St. Augustine Inlet and Vicinity Intracoastal Waterway, St. Johns County maintenance dredging has been prepared and is available for

review online at: ftp://ftp.saj.usace.army.mil/pub/Public_Dissemination/IWW%20and%20St.%20Augustine%20Inlet/or a copy of this draft EA can be made available upon request.

b. Environmental Impact Statement (EIS): The evaluation of the proposed maintenance dredging and beach or nearshore placement suggests that the proposed action would have no significant impacts on the quality of the human environment and an Environmental Impact Statement, pursuant to the National Environmental Policy Act (NEPA), will not be required.

c. Threatened or Endangered Species: Consultation with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act will be conducted. Beach placement activities may affect nesting sea turtles but would be not likely to adversely affect the Anastasia Island Beach Mouse (*Peromyscus polionotus phasma*) or the Piping Plover (*Charadrius melodus*) and therefore the appropriate protection measures shall be implemented. Manatees may occur in the vicinity of the project. Therefore, standard protective measures would be taken during dredging activities.

d. Coastal Zone Management: The Florida Department of Environmental Protection (FDEP) has been contacted via a permit application regarding permitting for maintenance dredging of the Federal channel and for the proposed sediment placement alternatives. Issuance of a permit will signify consistency with CZMA.

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

f. Cultural Resources: Cultural resource surveys are being conducted to determine if the proposed project possesses any potential to affect historic properties. Results of these surveys will be coordinated with the Florida State Historic Preservation Officer (SHPO) and other interested parties.

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

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

FEDERAL AGENCIES:
FEDERAL HIGHWAY ADMINISTRATION
U.S. COAST GUARD
U.S. FISH & WILDLIFE SERVICE
ATLANTIC MARINE CENTER
NATIONAL MARINE FISHERIES SERVICE
NATIONAL PARK SERVICE
U.S. GEOLOGICAL SURVEY
FEDERAL ENERGY REGULATIONS
U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION
FEDERAL MARITIME COMMISSION
U.S. DEPARTMENT OF AGRICULTURE

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

ENVIRONMENTAL ORGANIZATIONS:
FLORIDA AUDUBON SOCIETY
NATIONAL AUDUBON SOCIETY
FLORIDA WILDLIFE FEDERATION
SIERRA CLUB
FLORIDA DEFENDERS OF THE ENVIRONMENT
NATIONAL ESTUARY PROGRAM
SAVE THE MANATEE CLUB

NATURE CONSERVANCY

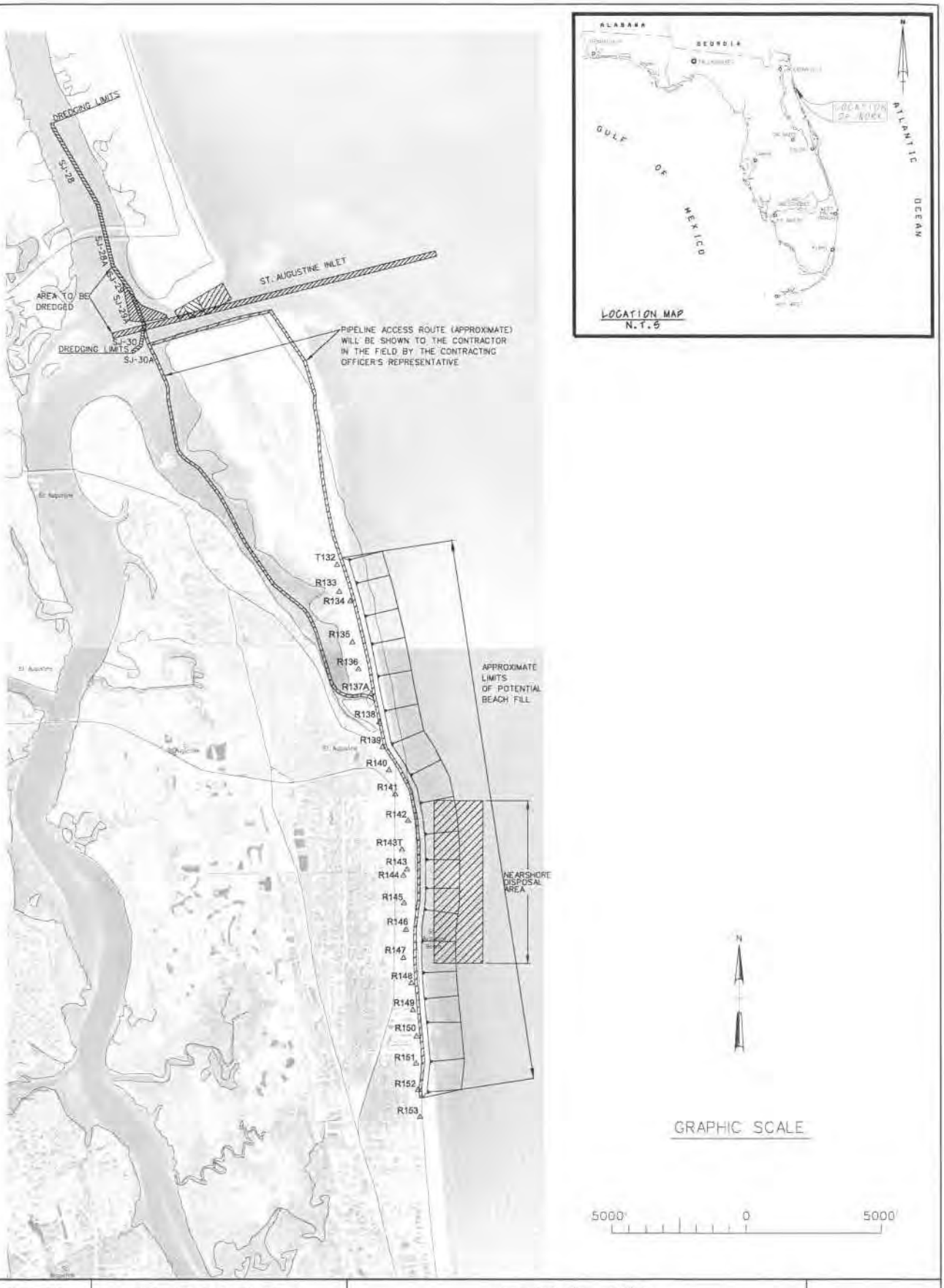
LOCAL GOVERNMENTS:
ST. JOHNS COUNTY, FLAGLER COUNTY, FL
CITY OF ST. AUGUSTINE, FL

FOR THE COMMANDER:

Encl

Jim W. Jeffords, Jr. P.E.
Chief, Operations Division

bcc:
CESAJ-DP-C (Trulock)



US Army Corps of Engineers

NOT FOR CONSTRUCTION
60% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
LOCATION MAP

PLATE
C1-1

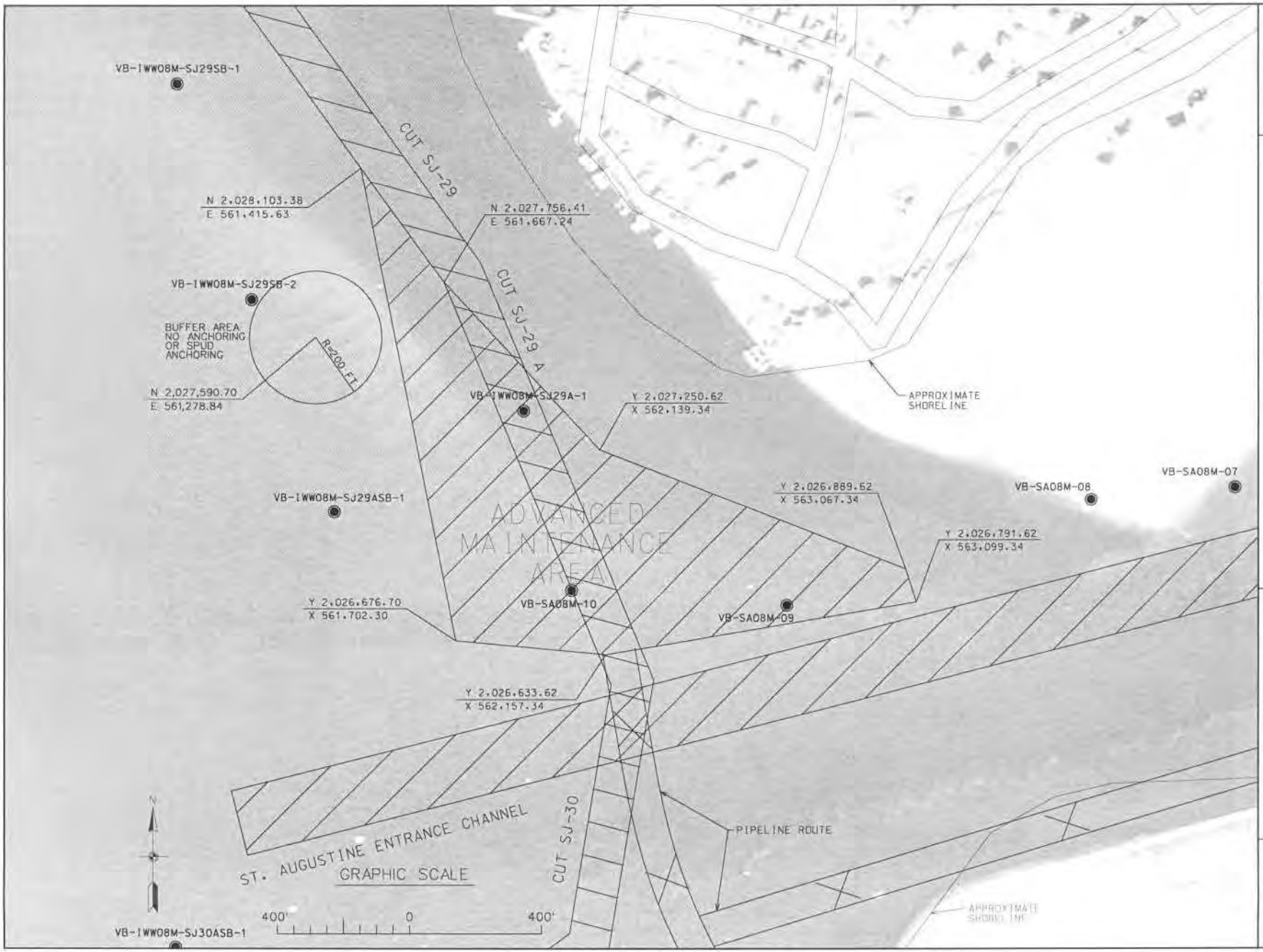


PLATE
C1-10

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
DREDGING AREA

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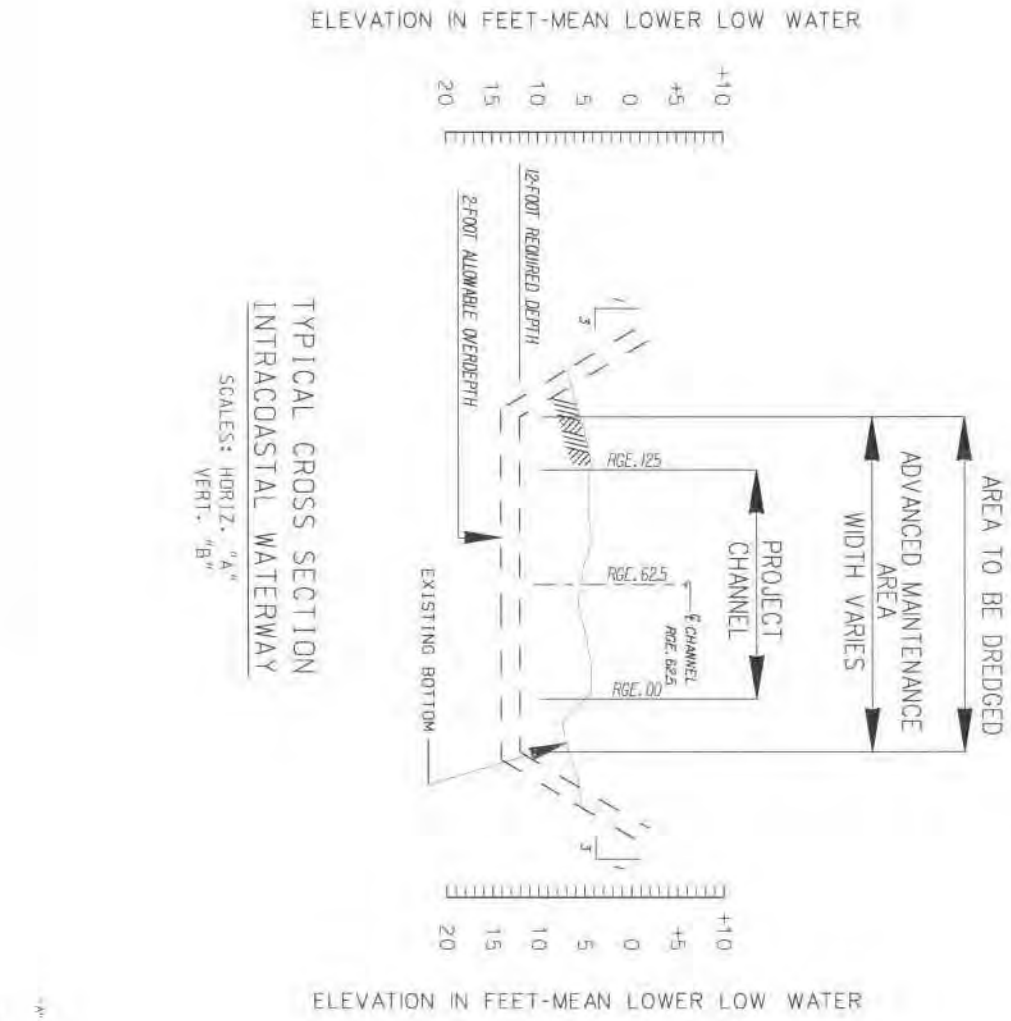
60% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers



TYPICAL CROSS SECTION
INTRACOASTAL WATERWAY

SCALES: HORIZ. "A"
VERT. "B"

GRAPHIC SCALES

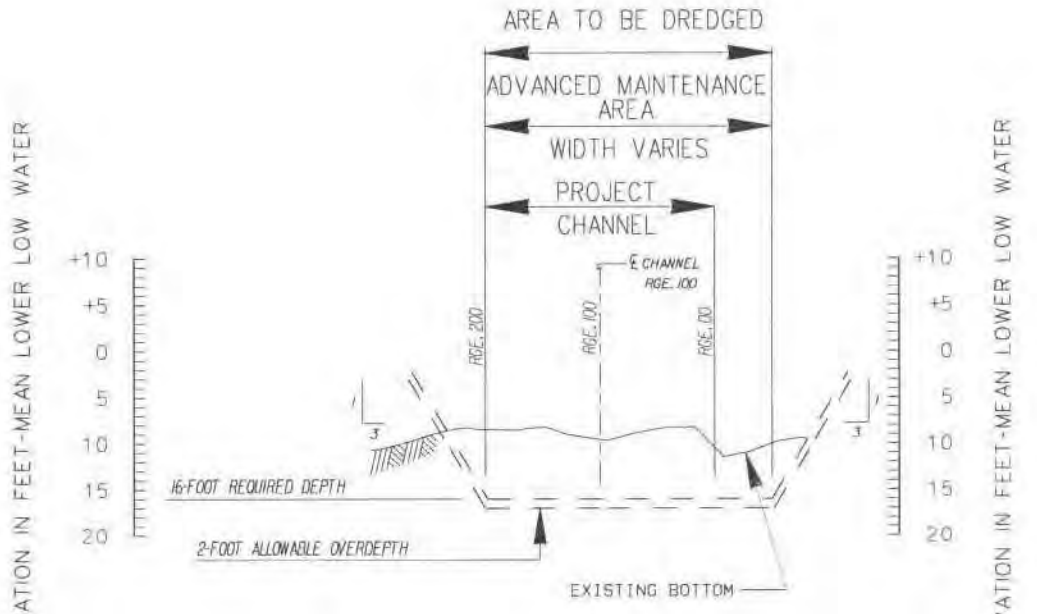
US Army Corps of Engineers

NOT FOR CONSTRUCTION
60% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
ST. AUGUSTINE INLET

PLATE
C1-11



TYPICAL CROSS SECTION
ST. AUGUSTINE INLET

SCALES: HORIZ. "A"
VERT. "B"

NOTE: AS AUTHORIZED BY CONGRESSIONAL DOCUMENT 133/81/1, A CHANNEL 16 FEET DEEP BY 200 FEET WIDE ALONG BEST NATURAL ALIGNMENT. ADVANCED MAINTENANCE AREA DEPTHS VARY ACCORDING TO DRAWING C2-11

GRAPHIC SCALES

"A" 50' 0 50' 100'

"B" 10 0 10' 20'

NOT FOR CONSTRUCTION
80% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
ST. AUGUSTINE INLET

PLATE
C2-10

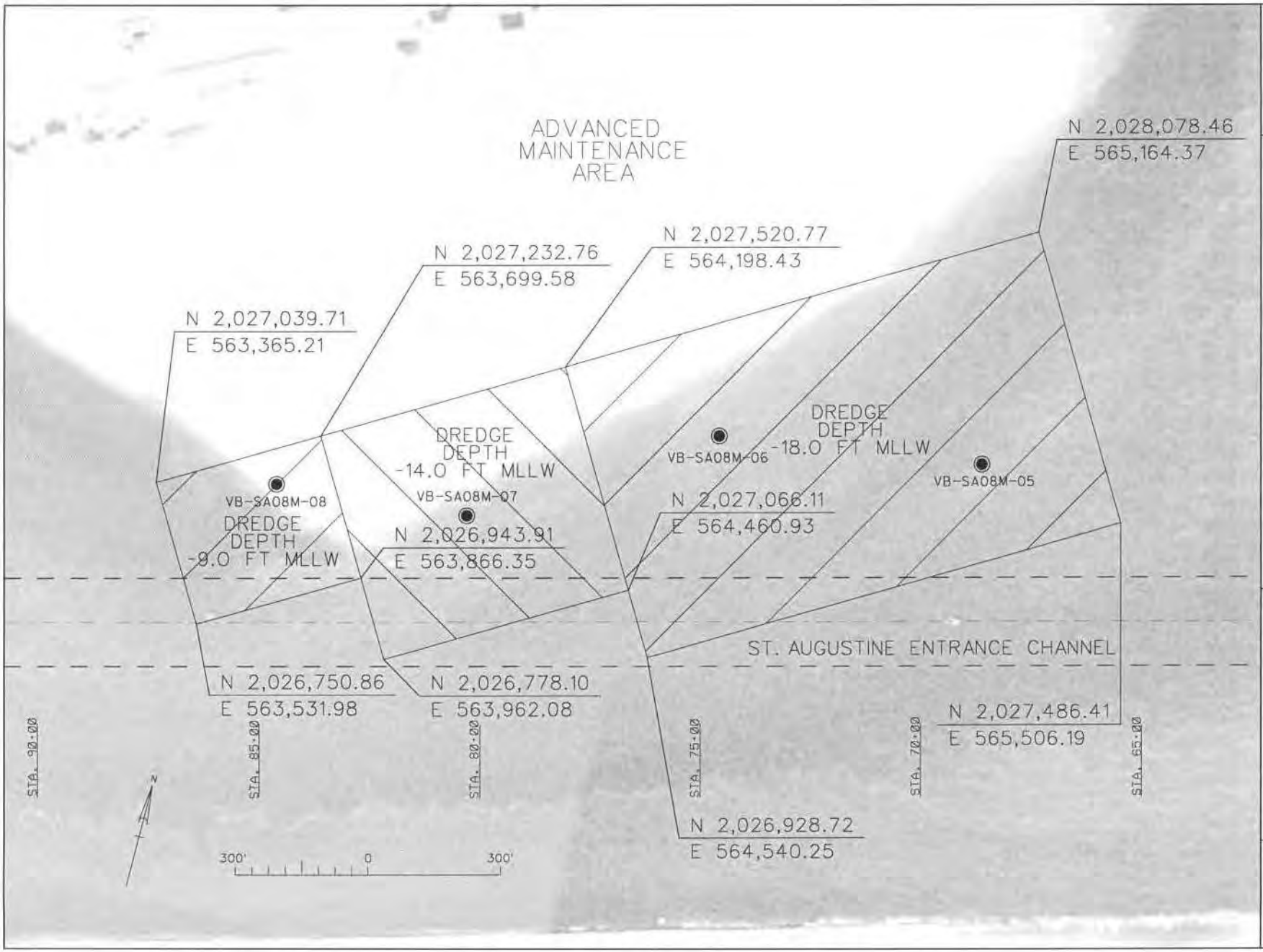


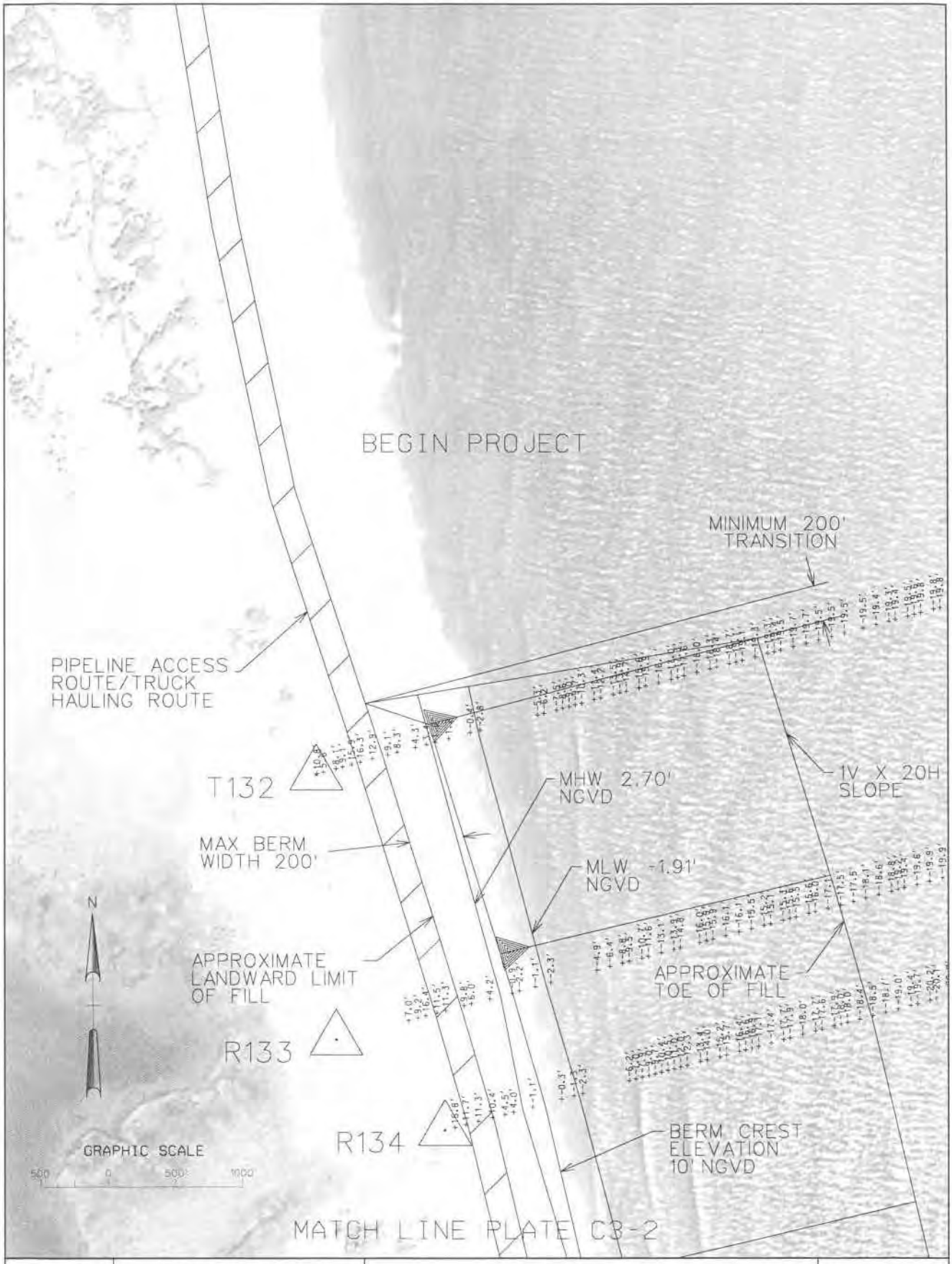
PLATE
C2-11

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
ADVANCED MAINTENANCE AREA

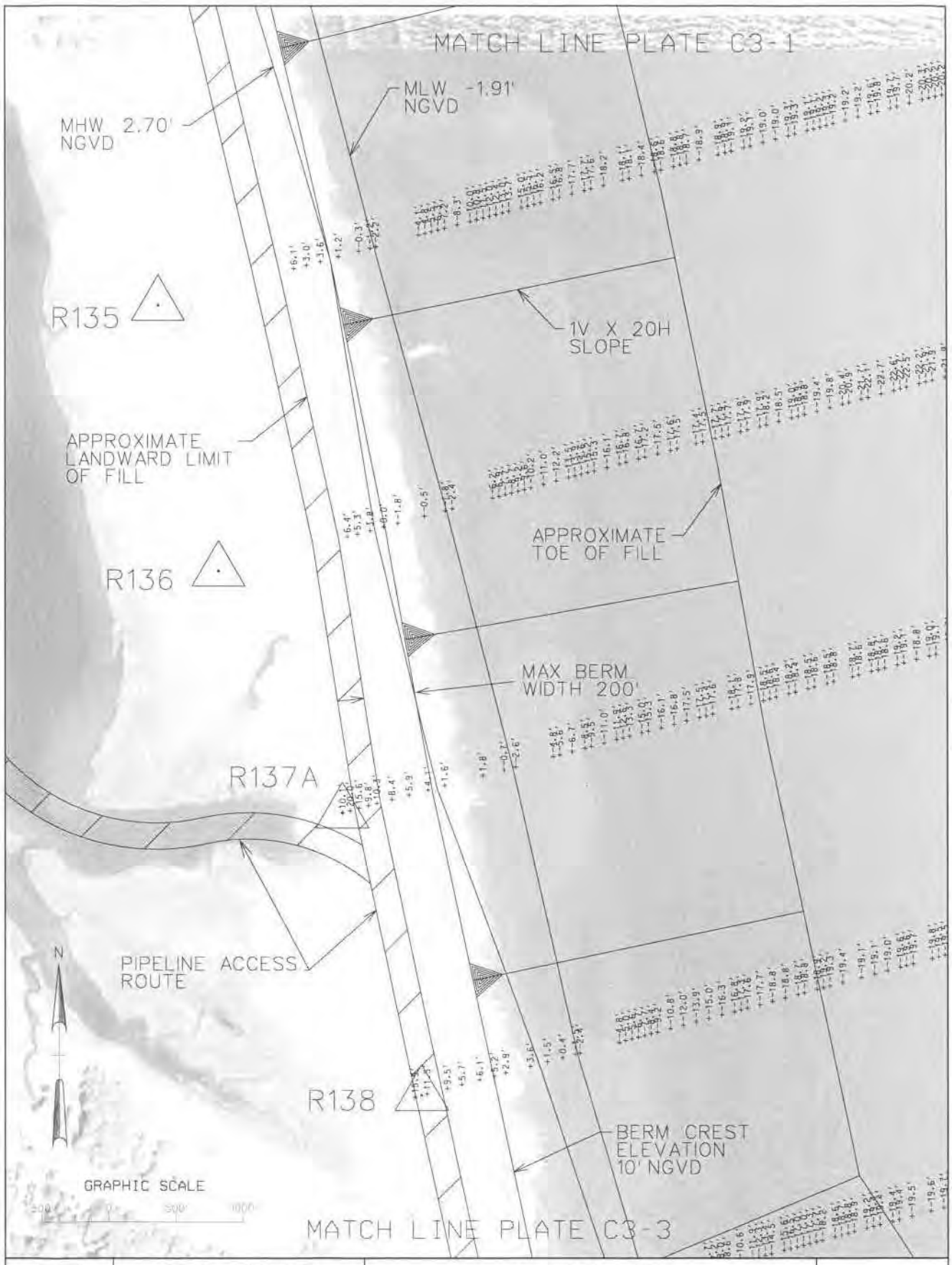
NOT FOR CONSTRUCTION
60% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

US Army Corps of Engineers
Jacksonville District



US Army Corps of Engineers	NOT FOR CONSTRUCTION 60% PLAN DRAWINGS DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	ST. AUGUSTINE, FLORIDA MAINTENANCE DREDGING PERMIT DRAWING OCT. 2009 POTENTIAL BEACH FILL	PLATE C3-1



US Army Corps of Engineers	NOT FOR CONSTRUCTION 60% PLAN DRAWINGS DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	ST. AUGUSTINE, FLORIDA MAINTENANCE DREDGING PERMIT DRAWING OCT. 2009 POTENTIAL DISPOSAL AREA	PLATE C3-2

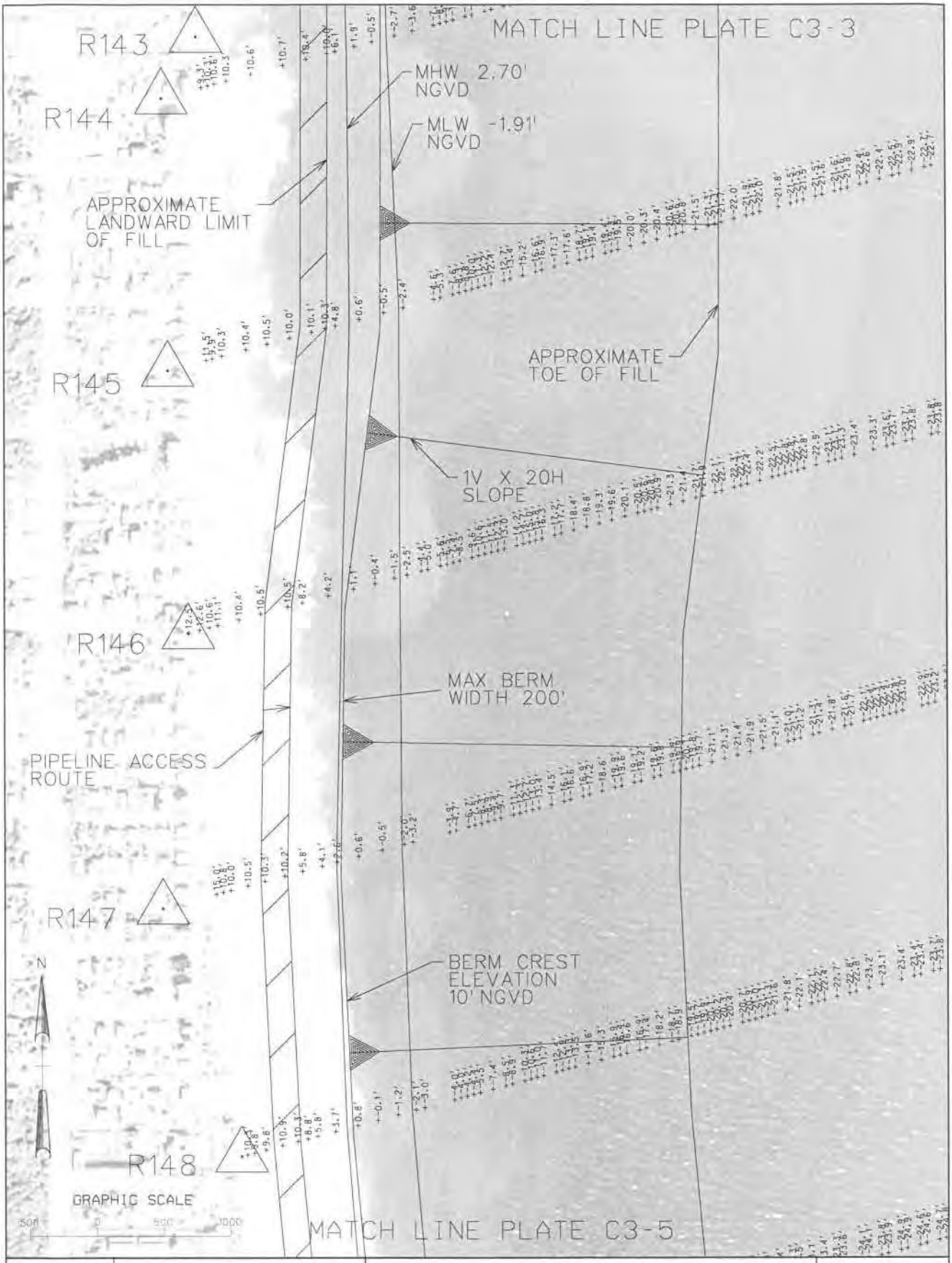
US Army Corps of Engineers

NOT FOR CONSTRUCTION
60% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
POTENTIAL DISPOSAL AREA

PLATE
C3-3



US Army Corps of Engineers

NOT FOR CONSTRUCTION
60% PLAN DRAWINGS

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
POTENTIAL DISPOSAL AREA

PLATE
C3-4

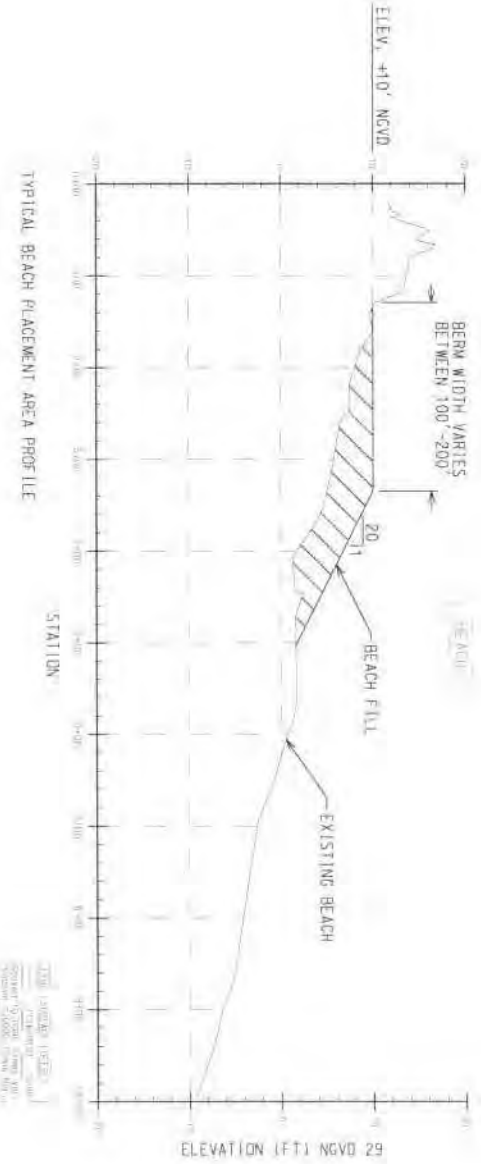
US Army Corps of Engineers
Jacksonville District

NOT FOR CONSTRUCTION
60% PLAN DRAWINGS

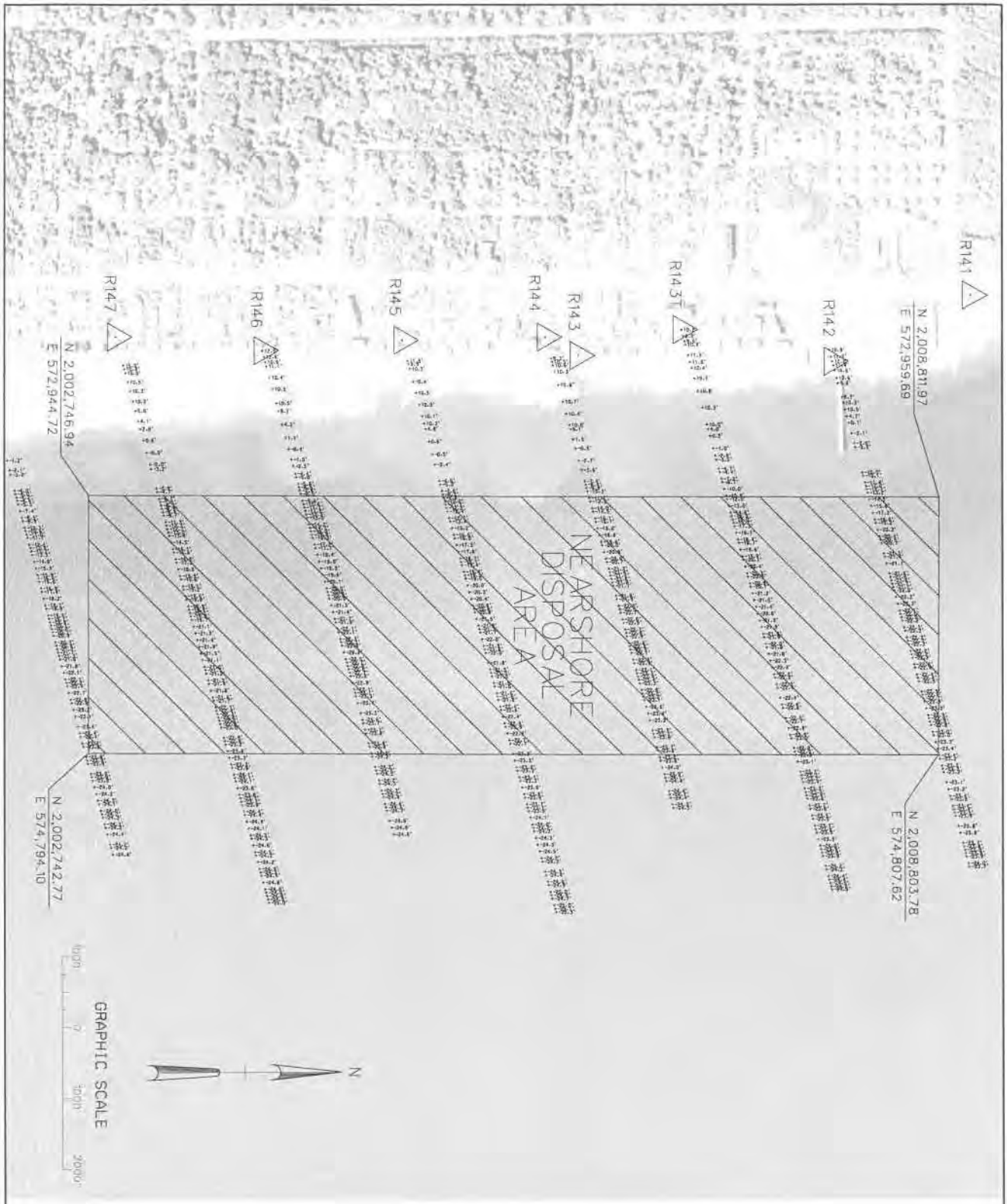
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

ST. AUGUSTINE, FLORIDA
MAINTENANCE DREDGING
PERMIT DRAWING
OCT. 2009
POTENTIAL DISPOSAL AREA

PLATE
C3-5



US Army Corps of Engineers	NOT FOR CONSTRUCTION 60% PLAN DRAWINGS DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	ST. AUGUSTINE, FLORIDA MAINTENANCE DREDGING PERMIT DRAWING OCT. 2009 BEACH PROFILE	PLATE C3-6



US Army Corps of Engineers	NOT FOR CONSTRUCTION 60% PLAN DRAWINGS DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT, CORPS OF ENGINEERS JACKSONVILLE, FLORIDA	ST. AUGUSTINE, FLORIDA MAINTENANCE DREDGING PERMIT DRAWING OCT. 2009 NEARSHORE DISPOSAL AREA	PLATE C3-7

Florida Department of Environmental Protection

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

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

December 22, 2009

Ms. Catherine L. Brooks
Jacksonville District, Planning Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Department of the Army, Jacksonville District Corps of Engineers – Draft Environmental Assessment, St. Augustine Inlet and Atlantic Intracoastal Waterway Maintenance Dredging with Beach Placement – St. Augustine, St. Johns County, Florida.
SAI # FL200910284998C

Dear Ms. Brooks:

The Florida State Clearinghouse has coordinated a review of the Draft Environmental Assessment (EA) under the following authorities: Presidential Executive Order 12372; Section 403.061(40), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

The Florida Department of Environmental Protection's (DEP) Division of Recreation and Parks (DRP) notes that in prior meetings and correspondence between the U.S. Army Corps of Engineers (USACE) and DRP, the previously used western pipeline route through Salt Run for beach placement of dredged material was being considered. The eastern pipeline route depicted in Figure 2 of the Draft EA runs the full length of the beach at Anastasia State Park and would cause greater disturbance to shorebird, beach mice and sea turtle habitat and inhibit park operations and beach visitation. DRP staff requests that the eastern pipeline route be removed from consideration. Any alternate pipeline routes through park lands for future dredging events of this project could be evaluated and determined through a formal Use Agreement for the particular event.

DRP staff also requests further clarification of the beach nourishment differences between Alternatives 2 and 3. The USACE is advised to consider (in Alternatives 2

and 3) extending beach nourishment northward of the proposed limit of R-132, to approximately R-130, to allow sand placement to repair the existing breached area of the dune near R-131. In addition, DRP requests that contractors utilized for this project keep all project equipment and activities at least 15 feet seaward of the toe of the primary dune at all times to minimize impacts to Anastasia Island Beach Mouse habitat. DRP District 3 biologists will need at least three weeks advance notice prior to pipeline placement for trapping and relocation of beach mice from potentially impacted areas of the pipeline corridor. Special conditions requiring pre-construction meetings and habitat inspections will be included in the Use Agreement for each dredging event.

The Florida Fish and Wildlife Conservation Commission (FWC) notes that the proposed project would remove approximately six acres or more of intertidal beach adjacent to the historic location of the Vilano Beach least tern colony. Vilano Beach harbors vegetated dunes and open beach that provide valuable nesting, resting and feeding habitats for a variety of shorebird and seabird species. The removal of intertidal beach could result in further erosion and flooding of least tern nesting habitat located just landward of this area, which has been among the largest and most consistently occupied nesting sites for this species on Florida's Atlantic Coast over the past four years. The FWC recommends shifting dredging activities southward by 100 to 200 feet or more to avoid intertidal beaches and reduce potential impacts to nesting least terns. Conducting dredging activities outside of the April through August nesting season will also reduce disturbance. Please see the enclosed FWC letter and contact Mr. Alex Kropp at (352) 342-0063 for further information and assistance.

The Florida Department of State (DOS) concurs with the USACE's recommendations for a cultural resource survey. The resultant survey report must conform to the specifications set forth in Chapter 1A-46, *Florida Administrative Code*, and be forwarded to the DOS to complete the review process. Please refer to the enclosed DOS letter for additional information.

Based on the information contained in the Draft EA and enclosed state agency comments, the state has determined that, at this stage, the proposed activity is consistent with the Florida Coastal Management Program (FCMP). To ensure the project's continued consistency with the FCMP, the concerns identified by our reviewing agencies must be addressed prior to project implementation. The state's continued concurrence will be based on the activity's compliance with FCMP authorities, including federal and state monitoring of the activity to ensure its continued conformance, and the adequate resolution of issues identified during this

and subsequent reviews. The state's final concurrence of the project's consistency with the FCMP will be determined during the environmental permitting process.

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

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

cc: Gregg Walker, DEP, DRP-BNCR
Roxane Dow, DEP, BBCS
Mary Ann Poole, FWC
Laura Kammerer, DOS

Florida
Department of Environmental Protection

"More Protection, Less Process"

Categories

Project Information

Project:	FL200910284998C
Comments Due:	12/01/2009
Letter Due:	12/11/2009
Description:	DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT CORPS OF ENGINEERS - DRAFT ENVIRONMENTAL ASSESSMENT, ST. AUGUSTINE INLET AND ATLANTIC INTRACOASTAL WATERWAY MAINTENANCE DREDGING WITH BEACH PLACEMENT - ST. AUGUSTINE, ST. JOHNS COUNTY, FLORIDA.
Keywords:	ACOE - MAINTENANCE DREDGING ST. AUGUSTINE INLET AND ICWW - ST. JOHNS CO.
CFDA #:	12.101

Agency Comments:

NE FLORIDA RPC - NORTHEAST FLORIDA REGIONAL PLANNING COUNCIL

No Comments

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

FWC staff notes that the proposed project would remove approximately six acres or more of intertidal beach adjacent to the historic location of the Vilano Beach least tern colony. Vilano Beach harbors vegetated dunes and open beach that provide valuable nesting, resting and feeding habitats for a variety of shorebird and seabird species. The removal of intertidal beach could result in further erosion and flooding of least tern nesting habitat located just landward of this area, which has been among the largest and most consistently occupied nesting sites for this species on Florida's Atlantic Coast over the past four years. The FWC recommends shifting dredging activities southward by 100 to 200 feet or more to avoid intertidal beaches and reduce potential impacts to nesting least terns. Conducting dredging activities outside of the April through August nesting season will also reduce disturbance. Please see the enclosed FWC letter and contact Mr. Alex Kropp at (352) 342-0063 for further information and assistance.

STATE - FLORIDA DEPARTMENT OF STATE

The DOS concurs with the USACE's recommendations for a cultural resource survey. The resultant survey report must conform to the specifications set forth in Chapter 1A-46, F.A.C., and be forwarded to the DOS to complete the reviewing process.

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

The DEP Division of Recreation and Parks (DRP) notes that in prior meetings and correspondence between the USACE and DRP, the previously used western pipeline route through Salt Run for beach placement of dredged material was being considered. The eastern pipeline route depicted in Figure 2 of the Draft EA runs the full length of the beach at Anastasia State Park and would cause greater disturbance to shorebird, beach mice and sea turtle habitat and inhibit park operations and beach visitation. DRP staff requests that the eastern pipeline route be removed from consideration. Any alternate pipeline routes through park lands for future dredging events of this project could be evaluated and determined through a formal Use Agreement for the particular event. DRP staff also requests further clarification of the beach nourishment differences between Alternatives 2 and 3. The USACE is advised to consider (in Alternatives 2 and 3) extending beach nourishment northward of the proposed limit of R-132, to approximately R-130, to allow sand placement to repair the existing breached area of the dune near R-131. In addition, DRP requests that contractors utilized for this project keep all project equipment and activities at least 15 feet seaward of the toe of the primary dune at all times to minimize impacts to Anastasia Island Beach Mouse habitat. DRP District 3 biologists will need at least three weeks advance notice prior to pipeline placement for trapping and relocation of beach mice from potentially impacted areas of the pipeline corridor. Special conditions requiring pre-construction meetings and habitat inspections will be included in the Use Agreement for each dredging event.

ST. JOHNS RIVER WMD - ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

The District has no comments on the Draft Environmental Assessment.

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

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000

Florida Department of
Environmental Protection

Memorandum

TO: Florida State Clearinghouse

FROM: Gregg Walker, Natural Resources Specialist
Bureau of Natural and Cultural Resources
Division of Recreation and Parks

DATE: December 2, 2009

SUBJECT: U.S. Army Corps of Engineers – Draft Environmental Assessment, St. Augustine Inlet and Atlantic Intracoastal Waterway Maintenance Dredging with Beach Placement - St. Augustine, St. Johns County, FL. SAI # FL09-4998C

The DEP Division of Recreation and Parks (DRP) appreciates being included in the State Clearinghouse Coordination and Review Process with regard to the Environmental Assessment (EA) of the proposed St. Augustine Inlet and Intracoastal Waterway Dredging project. DRP staff are currently consulting with the U.S. Army Corps of Engineers directly through the Joint Coastal Permitting (JCP) process, which was initiated prior to this Clearinghouse process.

The following DRP comments are items that have been discussed with the U.S. Army Corps of Engineers (Corps) as result of the DEP's JCP application review process. Concerns are reiterated here where there appears to be discrepancy between DRP understanding of the project and the draft Environmental Assessment document:

1. EA—Page 4 (Figure 2: Plan View Map): In meetings and correspondence between the Corps staff and DRP staff, the previously used pipeline routing for pumping dredged materials to the beaches has been considered. That route is the western route shown on Figure 2, through Salt Run and crossing the dune in the State Park near range monument R-133. The eastern route shown on this map - entirely seaward of the dune, is along the full length of Anastasia State Park beach. This route would cause greater disturbance to shorebird, beach mice, and sea turtles that utilize this northern beach and dune area of the park for nesting and foraging. Also, this route would be more detrimental to park operations and beach visitors. No beach placement of sand is planned for the northern half of the park's beaches, so the need for this route does not seem justified. DRP would therefore like to see this eastern pipeline route removed from consideration as an option from the Corps' permit and construction documents. Alternate pipeline routes through park lands for future dredging events of this project could be evaluated and agreed through a formal Use Agreement for the particular event.

2. EA – Pages 15-16: Alternatives 2 and 3 discuss the same beach nourishment areas (R-132 to R-152). DRP has the understanding that the exact beach placement for each dredging event will determined by the areas of greatest need within this range. For particular dredging events this could mean beach nourishment only within the Park (implied of Alternative 2) that extends from the inlet to R-141, or only south of the park (R-141 to R-152) or a combination. Please clarify any differences between these two alternatives.

3. As previously discussed, please consider (in Alternatives 2 and 3) extending beach nourishment northward of the proposed limit of R-132 – to approximately R-130. In studies of the St. Augustine coastal systems, it is claimed that sand placed north of R-132 would drift north, toward the inlet. Thus, sand placed between R-130 and R-132 could more naturally feed the beach to the north end of the park (that has lost significant, undeveloped beach and dune habitat to erosion over the past several years). Sand placed in this additional 2000-foot segment of beach should not contribute significantly to the infilling of the St. Augustine Inlet. Extending this permitted beach template north to R-130 could also allow for sand placement to repair the existing breached area of the dune near R-131.

4. EA – Page 54, 4.3.2.5 and Anastasia Island Beach Mouse (AIBM): As discussed in the October 27th meeting at the park, DRP requests that contractors utilized for this project will keep all equipment, pipeline, and at least 15 feet seaward of the toe of the primary dune at all times. Any areas of exceptions due to narrow beach width or other circumstances will be determined at a pre-construction meeting on site. Also, DRP District 3 biologists will need at least three weeks advance notice prior to the pipeline placement for trapping and relocation of AIBM from potentially impacted areas of the pipeline corridor. These will be special conditions in the Use Agreement for each dredging event. To meet these conditions, a meeting would be scheduled at least three weeks prior to construction. This meeting would include the contractor, Corps project management, District 3 biologists, and the park manager. The corridor for pipeline routing would be inspected, and all areas of potential impact to the AIBM could then be clearly identified. Pipeline routes through the southern park beach, where new dune formations and vegetation have created new AIBM habitat, should also be identified at this time.

Thank you for the opportunity to comment on this important project and we look forward to working with the U.S. Army Corps of Engineers through the JCP permitting process and the State Clearinghouse Coordination and Review Process.

Florida Fish and Wildlife Conservation Commission

Commissioners
Rodney Barreto
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Miami
Kathy Barco
Vice-Chair
Jacksonville
Ronald M. Bergeron
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Richard A. Corbett
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Executive Director
Nick Wiley
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Karen Ventimiglia
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Office of Planning and Policy Coordination
Nancy Linehan
Director
(850) 487-3794
(850) 410-5265 FAX
(850) 410-5272
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(800) 955-8770 (V)
MyFWC.com

December 17, 2009

RECEIVED
DEC 21 2009
DEP Office of
Intergovt'l Programs

Ms. Lauren Milligan
Florida State Clearinghouse
Department of Environmental Protection
3900 Commonwealth Blvd., Mail Station 47
Tallahassee, FL 32399-3000

Re: SAI #FL200910284998C, USACE – Draft Environmental Assessment, St. Augustine Inlet and Atlantic Intracoastal Waterway Maintenance Dredging with Beach Placement – St. Augustine, St. Johns County

Dear Ms. Milligan:

The Division of Habitat and Species Conservation of the Florida Fish and Wildlife Conservation Commission (FWC) has coordinated agency review of the referenced document, and provides the following comments and recommendations. These are being provided in accordance with the National Environmental Policy Act, Fish and Wildlife Coordination Act, and the Florida Coastal management Program/Coastal Zone Management Act.

Project Description

The U.S. Army Corps of Engineers (ACOE) proposes to conduct maintenance dredging of the Intracoastal Waterway (IWW) and the authorized federal portion of the St. Augustine Harbor and Inlet, including portions of Vilano Point. Approximately 400,000 cubic yards of material would be dredged every three to four years, including advance maintenance of waterway shoals along Vilano Point by removing 250,000 cubic yards. Dredged sand would be placed on the shoreline at Anastasia Island State Park and on St. Augustine Beach.

Potentially Affected Resources

Vilano Beach harbors vegetated dunes and open beach that provide are valuable nesting, resting, and feeding habitats for a variety of shorebird and seabird species. High levels of recreational activity in this area likely reduce diversity of wintering and migratory shorebirds, but a variety of gulls, terns, plovers, and sandpipers can be observed resting and foraging at the point (Alex Kropp, FWC Regional Species Conservation Biologist, pers. obs.). Piping Plovers (*Charadrius melodus*) have been observed at nearby Anastasia Island State Park (Jason Depue, Florida Park Service and Monique Borboen, Audubon of Florida, pers. comm.). This species may use nearby Vilano Point beach as well; however, to our knowledge, no formal wintering/migratory shorebird data have yet been collected for this site.

The least tern (*Sternula antillarum*; state-listed as threatened) nests on the higher, drier portions of open, backshore beaches during the months of April through August. The St. Johns Shorebird Partnership (a partnership of local, state, federal and non-governmental

organizations; see http://flshorebirdalliance.org) posts and monitors Vilano Beach each year to protect nesting least terns from human disturbance. Data collected from the partnership is entered into FWC's Beach-nesting Bird Database (www.myfwc.com/shorebirds/bnb). Estimated minimum size for the Vilano Beach least tern colony was 127 nests in 2006, 63 nests in 2007, and 52 nests in 2009. These numbers are larger than all but two other sites that still possess suitable nesting habitat for this species (Fort Matanzas National Monument and Amelia Island State Park) along the Atlantic coast of Florida. No least terns nested at the southern end of Vilano ("Porpoise Point") in 2008, a year when beach erosion reduced available nesting habitat (Alex Kropp, FWC, pers. obs.).

The St. Johns Shorebird partnership has also observed the Wilson's plover (*Charadrius wilsonia*) nesting at Vilano Beach. Nesting was reported in 2006, 2007, and 2009. This species may nest on the open beach, near the seaward side of the primary dunes, or behind these dunes. Peak counts for this species occurred this year, with nine chicks seen on June 21, 2009.

Potential Effects of the Proposal

The proposed project would remove approximately six acres or more of intertidal beach adjacent to the historic location of the Vilano Beach least tern colony [Paul Demarco, U.S. Army Corps of Engineers (ACOE), pers. comm.]. Removing intertidal beach from this location would likely cause further erosion and flooding of least tern nesting habitat located just landward of this area. Partial flooding of the least tern colony was observed in the summer of 2009, when beach widths/elevations were similar to their present state (Alex Kropp, FWC, pers. obs.). Impacts to the beach in this area would increase the risk of flooding and take of active least tern nests during future breeding seasons. It may also limit, or eliminate, suitable habitat available for nesting least terns.

Reducing or eliminating suitable nesting habitat for least terns on Porpoise Point has regional implications. As described above, this area has been among the largest and most consistently occupied nesting sites for this species on the Atlantic coast of Florida over the past four years.

Issues and Recommendations

The FWC understands that maintenance dredging is a necessary activity in maintaining a navigable channel through the St. Augustine Inlet; however, we believe that shifting dredging activities southward by roughly 100 to 200 feet or more, to avoid intertidal beaches, would greatly reduce impacts to nesting least terns in this area. Conducting dredging activities outside the April through August nesting season will also reduce disturbance to nesting terns. The ACOE believes these actions may be feasible, but additional study of this area is needed (Paul DeMarco, ACOE, pers. comm.).

Summary

Vilano beach is a regionally significant nesting habitat for the state threatened least tern. Wilson's plovers also nest in this area. This beach also provides resting and foraging habitat for a variety of migratory and wintering shorebirds and seabirds. We recommend that maintenance dredging be shifted southward to reduce impacts to the size and suitability of least tern nesting habitat on Vilano Beach. We also recommend that dredging activities take place outside least tern nesting season. We appreciate the opportunity to comment on this project and look forward to future coordination and follow-up discussion on this issue. Please contact Mr. Alex Kropp at (352) 342-0063 if you have further questions.

Sincerely,

Mary Ann Poole

Mary Ann Poole
Commenting Program Administrator

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St Augustine Inlet and AIW_2482_121709

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Intergovt'l Programs

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

Ms. Laurie Milligan
Florida State Clearing House
3900 Commonwealth Boulevard, MS-47
Tallahassee, Florida 32399-3000

December 11, 2009

Re: DHR Project File No. 2009-06862/ Received by DHR: October 29, 2009
Applicant Name: U.S. Army Corps of Engineers
Application No.: FL200910284998C
Project Description: St. Augustine Inlet and Vicinity Maintenance Dredge
County: St. Johns

Dear Ms. Milligan:

Our office received and reviewed the above referenced project application in accordance with Section 106 of the National Historic Preservation and the National Environmental Policy Acts as amended, to assess possible adverse impacts to cultural resources (any prehistoric or historic district, site, building, structure, or object) listed, or eligible for listing, in the National Register of Historic Places.

Our office concurs with the USACE's recommendation for a cultural resource survey. The resultant survey report must conform to the specification set forth in Chapter 1A-46, *Florida Administrative Code,* and be forwarded to this agency in order to complete the reviewing process for this proposed project and its impacts.

If you have any questions concerning our comments, please contact Michael Hart, Historic Sites Specialist, by phone at (850) 245-6333, or by electronic mail at mrhart@dos.state.fl.us. Your continued interest in protecting Florida's historic properties is appreciated.

Sincerely,

Laura A. Kammerer

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

Pc: Jim Jeffords, Jr. P.E./ Jacksonville District Corps of Engineers

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

FWS Log Number: 41910-2010-F-0105

April 16, 2010

Colonel Alfred A. Pantano, Jr. District Engineer
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232
(Attn: Catherine Brooks)

FWS Log Number: 41910-2010-F-0105

Dear Colonel Pantano:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the proposed maintenance dredging of the Intracoastal Waterway (IWW) located along the St. Augustine segment in St. Johns County, Florida and its effects on the nesting loggerhead (*Caretta caretta*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles, wintering piping plover (*Charadrius milodus*), West Indian manatee (*Trichechus manatus*) and the Anastasia Island beach mouse (*Peromyscus polionotus phasma*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The project also includes the dredging of the shoal along the Vilano Point in St. Augustine. The dredged material may be placed along the shoreline of Anastasia Island State Park (ASP) and St. Augustine Beach between Florida Department of Environmental Protection (FDEP) Monuments R-132 and R-152 or disposed between FDEP Monuments R-141 to R-146 located in St. John's County, Florida. November 18, 2009, request for formal consultation was received on November 18, 2009.

For the 2010 dredging event, the State of Florida has requested that the U.S. Army Corps of Engineers (Corps) assist ASP in restoring a dune system that was breached on Conch Island as a result of a storm event. Material from maintenance dredging St. Augustine Inlet will be used for

this project. The ASP will remove sea oats from the area and trap any beach mice present. The sandy material would be placed along the beach and mechanically moved to the dune area by either a front-end loader or bulldozer. The sea oats would be transplanted back to the newly formed dune.

The Corps determined that this project may affect the loggerhead, green, leatherback, hawksbill and Kemp's ridley sea turtles, and the Anastasia Island beach mouse. In addition, the Corps made a determination that the project may affect but was not likely to adversely affect the West Indian (Florida) manatee (*Trichechus manatus*) and the wintering piping plover (*Charadrius melodus*).

Florida manatee

The Corps determined that the proposed project may affect but is not likely to adversely affect the Florida manatee. The Service has reviewed the Biological Assessment and concurs that, if the Standard Manatee Construction Conditions are made a condition of the permit and implemented, then these activities will not result in take of the Florida manatee. We also conclude that these activities will not adversely modify its critical habitat. That finding will fulfill section 7 requirements of the Act. In addition, because no incidental take of manatees is anticipated, no such authorization under the Marine Mammal Protection Act (MMPA) would be needed.

Piping plover (*Charadrius milodus*)

During the Florida Winter Piping Plover Census, non-breeding piping plovers were documented at the ASP in St. Johns County, Florida.

Wintering piping plovers prefer coastal habitat that include sand flats adjacent to inlets or passes, sandy mud flats along prograding spits (areas where the land rises with respect to the water level), ephemeral pools, and overwash areas as foraging habitats. These substrate types have a richer infauna than the foreshore of high energy beaches and often attract large numbers of shorebirds.

Vilano Point previously had driving lanes that existed in the dune system but were closed due to the St. Johns County Habitat Conservation Plan. This area may now provide foraging and roosting habitat for the wintering piping plover. Vilano Beach provides resting and foraging habitat for a variety of migratory and wintering shorebirds and seabirds. Approximately 6 acres of the proposed approximately 27 acre advanced inlet maintenance dredging area is intertidal beach with the remaining approximately 21 acres being sandy inlet shoals below the approximate low water line.

The Service has determined that the proposed project may affect but is not likely to adversely affect the piping plover provided the inclusion of the following conditions:
For dredging of Porpoise Point:

1. Prior to construction, the Corps shall survey and map optimal non-breeding piping plover habitat (intertidal portions of ocean beaches, ephemeral pools, washover areas, mudflats, sand flats, algal flats, shoals, wrack lines, and shorelines of coastal ponds).

2. Piping plover optimal habitat shall be avoided to the maximum extent practicable when dredging Porpoise Point.

3. Postconstruction, the Corps shall survey and map the optimal non-breeding piping plover habitat to i. determine the extent (direct and indirect) of intertidal habitat removed during the dredging project and ii. The time and extent the optimal habitat re-accumulated in this area. These surveys shall include aerial photography interpretation and periodic hydrographic surveys. The Corps shall provide this survey information to the Service. Prior to the next maintenance dredging, the Corps will meet with the Service to discuss the information from these surveys and any additional measures to minimize impacts to piping plover optimal habitat.

4. Each time a dredging activity is planned the St. Augustine Inlet area, the Corps shall work with the Service, National Oceanic and Atmospheric Administration (NOAA), FDEP, Florida Fish and Wildlife Conservation Commission (FWC), and St. Johns County to explore using the dredged materials to enhance adjacent emerged and submerged shoals and bayside habitats within and adjacent to the project area. The additional costs associated with increased distance for sediment placement should be considered during pre-project budget planning exercises. The Corps shall meet with the Service prior to the next maintenance dredging and nourishment to discuss specific minimization measures through modifications of pipeline alignment and associated construction activities.

5. The Corps will work with the Service to develop shore protection guidelines that can be utilized during future project planning to protect and/or enhance these areas. The Service will coordinate with St. Johns County, FWC, and other key shorebird partners in the development of these guidelines.

6. The water and land-based loading and unloading of equipment, materials, supplies, and personnel shall be limited to the footprint of the staging and storage area, with the exception of the transportation of job-related personnel, which may occur along the Atlantic coast shoreline.

For sand placement on ASP:

1. Prior to construction, a survey for optimal non-breeding piping plover habitat shall be conducted in the project area (low lying areas, washover passes, inlets, ephemeral ponds, lagoons, sand bars, shoals and mud and sand flats).

2. Piping plover optimal habitat shall be avoided to the maximum extent practicable when placing sand. Site selection for equipment staging, travel corridors, and pipeline alignment shall stay just above or just below the primary "wrack" line and swash zone.

3. On ASP, piping plovers have been observed using areas near the surf, back beach and sand bars. These areas shall be avoided to the maximum extent practicable when designating travel corridors and staging areas for equipment.

4. All construction vehicles including all-terrain vehicles traversing the beach shall avoid the soft sand areas in the wrack zone to the maximum extent practicable.

5. Consistent monthly piping plover surveys are conducted on ASP. Survey information from one year pre-construction and two years post construction shall be sent to the Service's Jacksonville Field Office. This data will be analyzed and any additional minimization measures shall be discussed with the Corps prior to the next nourishment event.

CONSULTATION HISTORY

On October 27, 2009, the Service attended a meeting to discuss the proposed project.

On November 18, 2009, the Service received a letter from the Corps requesting reinitiation of formal consultation.

On December 1, 2009, The Service sent a letter to the Corps requesting additional information on piping plovers.

On December 10, 2009, the Corps sent the Service additional information on Vilano Point.

On February 16, 2010, the Corps sent the Service via electronic mail, a description of a modification to the proposed project for the 2010 dredging event.

On March 17, 2010, the Service attended a meeting via conference call with the Corps, FDEP, and FWC to discuss the placement of the shell material on ASP.

The Service had sufficient information to issue a BO for the proposed project. Information for this BO was obtained by email correspondence, meetings, site visits, telephone conversations

and other sources of information. A complete administrative record of this consultation is on file at the Service's Jacksonville Field Office.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Beach nourishment was first completed within the project area by January 2003. Material was placed from 600-feet north of FDEP R-Monument 137A south to approximately 600-feet south of FDEP R-Monument 151. Additional sand was placed 0.9 miles north onto ASP up to FDEP R-Monument 132. The additional sand placement included dune construction along the entire length of the nourishment in ASP. The Corps proposed to perform routine maintenance dredging of the entrance channel to St. Augustine Inlet and associated Intracoastal Waterway (IWW). Approximately 400,000 cubic yards of material would be dredged every 3 to 4 years to maintain free and unobstructed navigation. Material will be placed on the beach between FDEP R-Monument 132 to FDEP R-Monument 137. The sand placement will be seaward of the fore-dune with no construction. To minimize impacts to the Anastasia Island beach mouse (AIBM), the equipment and pipelines will not be placed within 10-feet of the fore-dune and secondary dune. The dune corridor for the pipeline placement will be 60 feet and will be reconstructed and revegetated following project construction.

For the 2010 maintenance dredging event the Corps may use approximately 4,000 cubic yards of compatible sand to repair a dune overwash area just north of R-131 including sea oat planting and also truck haul from R-131 between 3,000 - 6,000 cubic yards of suitable dredged materials (shell hash) to construct an elevated berm east of the inlet south jetty along the northeastern tip of the park between R-123 and R-125. The dune system that was breached on Conch Island will be restored. Material from maintenance dredging St. Augustine Inlet will be used for this project. The ASP will remove sea oats from the area and trap any beach mice present. The sandy material would be placed along the beach and mechanically moved to the dune area by either a front-end loader or bulldozer. This work will occur only during the day during the sea turtle nesting season. Sand fencing and planting shall occur on all restored dune and occur immediately after sand is placed on the beach.

Trucks haul from R-131 between 3,000 - 6,000 cubic yards of suitable dredged materials (shell hash to construct an elevated berm east of the restored dune between approximately R-129 and R-132. The elevated berm will be approximately 4 to 6 acres of a 6-9" layer and approximately 110 feet wide by 2,460 feet long above Mean High Water Line.

Conservation Measures

Sea Turtles

1. ASP biologists conduct an ongoing sea turtle monitoring program and expect this to continue for the life of the project.

STATUS OF THE SPECIES/CRITICAL HABITAT

The Service has responsibility for implementing recovery of sea turtles when they come ashore to nest. This BO addresses nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) has jurisdiction over sea turtles in the marine environment.

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle was federally listed as a threatened species on July 28, 1978 (43 FR 32800). The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans.

The loggerhead sea turtle grows to an average weight of about 200 pounds and is characterized by a large head with blunt jaws. Adults and subadults have a reddish-brown carapace. Scales on the top of the head and top of the flippers are also reddish-brown with yellow on the borders. Hatchlings are a dull brown color (NMFS 2002a). The loggerhead feeds on mollusks, crustaceans, fish, and other marine animals.

The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. It may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and ship wrecks are often used as feeding areas.

Within the Northwest Atlantic, the majority of nesting activity occurs from April through September, with a peak in June and July (Williams-Walls *et al.* 1983, Dodd 1988, Weishampel *et al.* 2006). Nesting occurs within the Northwest Atlantic along the coasts of North America, Central America, northern South America, the Antilles, Bahamas, and Bermuda, but is concentrated in the southeastern U.S. and on the Yucatán Peninsula in Mexico on open beaches or along narrow bays having suitable sand (Sternberg 1981, Ehrhart 1989, Ehrhart *et al.* 2003, NMFS and FWS 2008).

No critical habitat has been designated for the loggerhead sea turtle.

Green Sea Turtle

The green sea turtle was federally listed as on July 28, 1978 (43 FR 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered; all other populations are listed as threatened. The green sea turtle has a worldwide distribution in tropical and subtropical waters.

The green sea turtle grows to a maximum size of about 4 feet and a weight of 440 pounds. It has a heart-shaped shell, small head, and single-clawed flippers. The carapace is smooth and colored gray, green, brown and black. Hatchlings are black on top and white on the bottom (NMFS 2002b). Hatchling green turtles eat a variety of plants and animals, but adults feed almost exclusively on seagrasses and marine algae.

Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (NMFS and Service 1991a). Nesting also has been documented along the Gulf coast of Florida from Escambia County through Franklin County in northwest Florida and from Pinellas County through Collier County in southwest Florida (FWC Statewide Nesting Beach Survey database). Green turtles have been known to nest in Georgia, but only on rare occasions (Georgia Department of Natural Resources statewide nesting database). The green turtle also nests sporadically in North Carolina and South Carolina (North Carolina Wildlife Resources Commission statewide nesting database; South Carolina Department of Natural Resources statewide nesting database). Unconfirmed nesting of green turtles in Alabama has also been reported (Bon Secour National Wildlife Refuge nesting reports).

Green sea turtles are generally found in fairly shallow waters (except when migrating) inside reefs, bays, and inlets. The green turtle is attracted to lagoons and shoals with an abundance of marine grass and algae. Open beaches with a sloping platform and minimal disturbance are required for nesting.

Critical habitat for the green sea turtle has been designated for the waters surrounding Culebra Island, Puerto Rico, and its outlying keys.

Leatherback Sea Turtle

The leatherback sea turtle was federally listed as an endangered species on June 2, 1970 (35 FR 8491). Leatherbacks have the widest distribution of the sea turtles with non-breeding animals have been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard 1992). Foraging leatherback excursions have been documented into higher-latitude sub-polar waters. They have evolved

physiological and anatomical adaptations (Frair et al. 1972, Greer et al. 1973) that allow them to exploit waters far colder than any other sea turtle species would be capable of surviving.

The adult leatherback can reach 4 to 8 feet in length and weigh 500 to 2,000 pounds. The carapace is distinguished by a rubber-like texture, about 1.6 inches thick, made primarily of tough, oil-saturated connective tissue. Hatchlings are dorsally mostly black and are covered with tiny scales; the flippers are edged in white, and rows of white scales appear as stripes along the length of the back (NMFS 2002c). Jellyfish are the main staple of its diet, but it is also known to feed on sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed. This is the largest, deepest diving of all sea turtle species.

Nesting grounds are distributed worldwide with nesting on beaches in the tropics and sub-tropics. The Pacific Coast of Mexico historically supporting the world's largest known concentration of nesting leatherbacks. The largest nesting colony in the wider Caribbean region is found in French Guiana, but nesting occurs frequently, although in lesser numbers, from Costa Rica to Columbia and in Guyana, Surinam, and Trinidad (NMFS and Service 1992; National Research Council 1990a).

The leatherback nests on shores of the Atlantic, Pacific and Indian Oceans and regularly nests in the U.S., in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (NMFS and Service 1992). Leatherback turtles have been known to nest in Georgia, South Carolina, and North Carolina, but only on rare occasions (North Carolina Wildlife Resources Commission; South Carolina Department of Natural Resources; and Georgia Department of Natural Resources statewide nesting databases). Leatherback nesting has also been reported on the northwest coast of Florida (LeBuff 1990; FWC Statewide Nesting Beach Survey database); and in southwest Florida a false crawl (non-nesting emergence) has been observed on Sanibel Island (LeBuff 1990).

Adult females require sandy nesting beaches backed with vegetation and sloped sufficiently so the distance to dry sand is limited. Their preferred beaches have proximity to deep water and generally rough seas.

Marine and terrestrial critical habitat for the leatherback sea turtle has been designated at Sandy Point on the western end of the island of St. Croix, U.S. Virgin Islands (50 CFR 17.95).

Hawksbill Sea Turtle

The hawksbill sea turtle was federally listed as an endangered species on June 2, 1970 (35 FR 8491). The hawksbill is found in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean.

Hawksbills typically weigh around 176 pounds or less in the wider Caribbean; hatchlings average about 1.6 inches straight length and range in weight from 0.5 to 0.7 ounces. The

carapace is heart shaped in young turtles, and becomes more elongated or egg-shaped with maturity. The top scutes are often richly patterned with irregularly radiating streaks of brown or black on an amber background. The head is elongated and tapers sharply to a point. The lower jaw is V-shaped (NMFS 2002d).

Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Dade Counties) and the Florida Keys (Monroe County) (Meylan 1992; Meylan et al. 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan et al. 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NMFS and Service 1993).

Critical habitat for the hawksbill sea turtle has been designated for selected beaches and/or waters of Mona, Monito, Culebrita, and Culebra Islands, Puerto Rico.

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was federally listed as endangered on December 2, 1970 (35 FR 18320). The Kemp's ridley, along with the flatback sea turtle (*Natator depressus*), has the most geographically restricted distribution of any sea turtle species. The range of the Kemp's ridley includes the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland.

Adult Kemp's ridleys, considered the smallest marine turtle in the world, weigh on average around 100 pounds with a carapace measuring between 24-28 inches in length. The almost circular carapace has a grayish green color while the plastron is pale yellowish to cream in color. The carapace is often as wide as it is long. Their diet consists mainly of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The majority of nesting for the entire species occurs on the primary nesting beach at Rancho Nuevo (Marquez-M. 1994). Outside of nesting, adult Kemp's ridleys are believed to spend most of their time in the Gulf of Mexico, while juveniles and subadults also regularly occur along the eastern seaboard of the U.S. (Service and NMFS 1992). There have been rare instances when immature ridleys have been documented making transatlantic movements (Service and NMFS 1992). It was originally speculated that ridleys that make it out of the Gulf of Mexico might be lost to the breeding population (Hendrickson 1980), but data indicate that many of these turtles are capable of moving back into the Gulf of Mexico (Henwood and Ogren 1987). In fact, there are documented cases of ridleys captured in the Atlantic that migrated back to the nesting beach at Rancho Nuevo (Schmid and Witzell 1997, Schmid 1998, Witzell 1998).

Hatchlings, after leaving the nesting beach, are believed to become entrained in eddies within the Gulf of Mexico, where they are dispersed within the Gulf and Atlantic by oceanic surface

currents until they reach about 7.9 inches in length, at which size they enter coastal shallow water habitats (Ogren 1989).

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

Life history

Loggerhead Sea Turtle

Loggerheads are long-lived, slow-growing animals that use multiple habitats across entire ocean basins throughout their life history. This complex life history encompasses terrestrial, nearshore, and open ocean habitats. The three basic ecosystems in which loggerheads live are the:

1. Terrestrial zone (supralittoral) - the nesting beach where both oviposition (egg laying) and embryonic development and hatching occur.

2. Neritic zone - the inshore marine environment (from the surface to the sea floor) where water depths do not exceed 656 feet. The neritic zone generally includes the continental shelf, but in areas where the continental shelf is very narrow or nonexistent, the neritic zone conventionally extends to areas where water depths are less than 656 feet.

3. Oceanic zone - the vast open ocean environment (from the surface to the sea floor) where water depths are greater than 656 feet.

Maximum intrinsic growth rates of sea turtles are limited by the extremely long duration of the juvenile stage and fecundity. Loggerheads require high survival rates in the juvenile and adult stages, common constraints critical to maintaining long-lived, slow-growing species, to achieve positive or stable long-term population growth (Congdon et al. 1993; Heppell 1998; Crouse 1999; Heppell et al. 1999, 2003; Musick 1999).

The generalized life history of Atlantic loggerheads is shown in Figure 1 (from Bolten 2003).

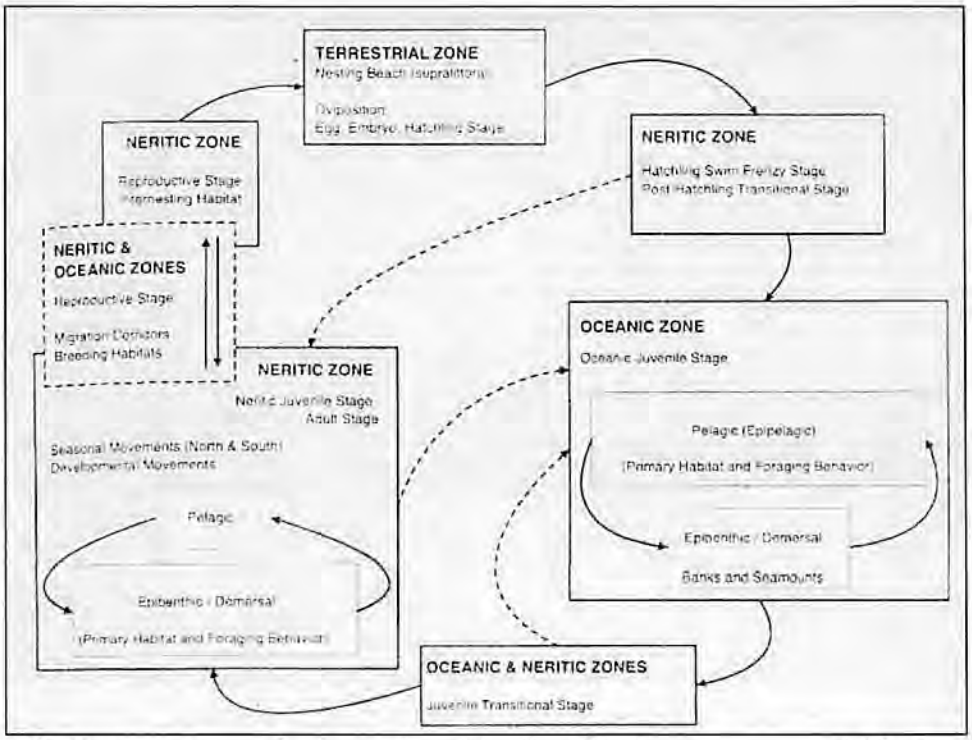


Figure 1. Life history stages of a loggerhead turtle. The boxes represent life stages and the corresponding ecosystems, solid lines represent movements between life stages and ecosystems, and dotted lines are speculative (Bolten 2003).

Numbers of nests and nesting females are often highly variable from year to year due to a number of factors including environmental stochasticity, periodicity in ocean conditions, anthropogenic effects, and density-dependent and density-independent factors affecting survival, somatic growth, and reproduction (Meylan 1982, Hays 2000, Chaloupka 2001, Solow et al. 2002). Despite these sources of variation, and because female turtles exhibit strong nest site fidelity, a nesting beach survey can provide a valuable assessment of changes in the adult female population, provided that the study is sufficiently long and effort and methods are standardized (Meylan 1982, Gerrodette and Brandon 2000, Reina et al. 2002). Table 1 summarizes key life history characteristics for loggerheads nesting in the U.S.

Table 1. Typical values of life history parameters for loggerheads nesting in the U.S. (NMFS and Service 2008).

Life History Trait	**Data**
Clutch size (mean)	100-126 eggs[1]
Incubation duration (varies depending on time of year and latitude)	Range = 42-75 days[2,3]
Pivotal temperature (incubation temperature that produces an equal number of males and females)	29.0°C[5]
Nest productivity (emerged hatchlings/total eggs) x 100 (varies depending on site specific factors)	45-70%[2,6]
Clutch frequency (number of nests/female/season)	3-4 nests[7]
Internesting interval (number of days between successive nests within a season)	12-15 days[8]
Juvenile (<87 cm CCL) sex ratio	65-70% female[4]
Remigration interval (number of years between successive nesting migrations)	2.5-3.7 years[9]
Nesting season	late April-early September
Hatching season	late June-early November
Age at sexual maturity	32-35 years[10]
Life span	>57 years[11]

1 Dodd 1988.
2 Dodd and Mackinnon (1999, 2000, 2001, 2002, 2003, 2004).
3 B. Witherington, FWC, pers. comm. 2006 (information based on nests monitored throughout Florida beaches in 2005, n=865).
4 National Marine Fisheries Service (2001); A. Foley, FWC, pers. comm. 2005.
5 Mrosovsky (1988).
6 B. Witherington, FWC, pers. comm. 2006 (information based on nests monitored throughout Florida beaches in 2005, n=1,680).
7 Murphy and Hopkins (1984); Frazer and Richardson (1985); Ehrhart, unpublished data; Hawkes *et al.* 2005; Scott 2006; Tony Tucker, Mote Marine Laboratory, personal communication, 2008.
8 Caldwell (1962), Dodd (1988).
9 Richardson et al. (1978); Bjorndal et al. (1983); Ehrhart, unpublished data.
10 M. Snover, NMFS, pers. comm. 2005.
11 Dahlen et al. (2000).

Loggerheads nest on ocean beaches and occasionally on estuarine shorelines with suitable sand. Nests are typically laid between the high tide line and the dune front (Routa 1968, Witherington 1986, Hailman and Elowson 1992). Wood and Bjorndal (2000) evaluated four environmental factors (slope, temperature, moisture, and salinity) and found that slope had the greatest influence on loggerhead nest-site selection on a beach in Florida. Loggerheads appear to prefer relatively narrow, steeply sloped, coarse-grained beaches, although nearshore contours may also play a role in nesting beach site selection (Provancha and Ehrhart 1987).

The warmer the sand surrounding the egg chamber, the faster the embryos develop (Mrosovsky and Yntema 1980). Sand temperatures prevailing during the middle third of the incubation period also determine the sex of hatchling sea turtles (Mrosovsky and Yntema 1980). Incubation temperatures near the upper end of the tolerable range produce only female hatchlings while incubation temperatures near the lower end of the tolerable range produce only male hatchlings.

Loggerhead hatchlings pip and escape from their eggs over a 1- to 3-day interval and move upward and out of the nest over a 2- to 4-day interval (Christens 1990). The time from pipping to emergence ranges from 4 to 7 days with an average of 4.1 days (Godfrey and Mrosovsky 1997). Hatchlings emerge from their nests en masse almost exclusively at night, and presumably using decreasing sand temperature as a cue (Hendrickson 1958, Mrosovsky 1968, Witherington et al. 1990). Moran *et al.* (1999) concluded that a lowering of sand temperatures below a critical threshold, which most typically occurs after nightfall, is the most probable trigger for hatchling emergence from a nest. After an initial emergence, there may be secondary emergences on subsequent nights (Carr and Ogren 1960, Witherington 1986, Ernest and Martin 1993, Houghton and Hays 2001).

Hatchlings use a progression of orientation cues to guide their movement from the nest to the marine environments where they spend their early years (Lohmann and Lohmann 2003). Hatchlings first use light cues to find the ocean. On naturally lighted beaches without artificial lighting, ambient light from the open sky creates a relatively bright horizon compared to the dark silhouette of the dune and vegetation landward of the nest. This contrast guides the hatchlings to the ocean (Daniel and Smith 1947, Limpus 1971, Salmon et al. 1992, Witherington 1997, Witherington and Martin 1996, Stewart and Wyneken 2004). Loggerheads in the Northwest Atlantic display complex population structure based on life history stages. Based on mtDNA, oceanic juveniles show no structure, neritic juveniles show moderate structure, and nesting colonies show strong structure (Bowen et al. 2005). In contrast, a survey using microsatellite (nuclear) markers showed no significant population structure among nesting populations (Bowen et al. 2005), indicating that while females exhibit strong philopatry, males may provide an avenue of gene flow between nesting colonies in this region.

Green Sea Turtle

Green turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3 nests. The interval between nesting events within a season varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Average clutch size reported for Florida was 136 eggs in 130 clutches (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually two, three, four or more years intervene between breeding seasons (NMFS and Service 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Leatherback Sea Turtle

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 nests (NMFS and Service 1992). The interval between nesting events within a season is about 9 to 10 days. Clutch size averages 80 to 85 yolked eggs, with the addition of usually a few dozen smaller, yolkless eggs, mostly laid toward the end of the clutch (Pritchard 1992). Nesting migration intervals of 2 to 3 years were observed in leatherbacks nesting on the Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald and Dutton 1996). Leatherbacks are believed to reach sexual maturity in 6 to 10 years (Zug and Parham 1996).

Hawksbill Sea Turtle

Hawksbills nest on average about 4.5 times per season at intervals of approximately 14 days (Corliss et al. 1989). In Florida and the U.S. Caribbean, clutch size is approximately 140 eggs, although several records exist of over 200 eggs per nest (NMFS and Service 1993). On the basis of limited information, nesting migration intervals of 2 to 3 years appear to predominate. Hawksbills are recruited into the reef environment at about 14 inches in length and are believed to begin breeding about 30 years later. However, the time required to reach 14 inches in length is unknown and growth rates vary geographically. As a result, actual age at sexual maturity is unknown.

Kemp's Ridley Sea Turtle

Nesting occurs from April into July during which time the turtles appear off the Tamaulipas and Veracruz coasts of Mexico. Precipitated by strong winds, the females swarm to mass nesting emergences, known as *arribadas* or *arribazones*, to nest during daylight hours. The period between Kemp's ridley arribadas averages approximately 25 days (Rostal et al. 1997), but the precise timing of the arribadas is highly variable and unpredictable (Bernardo and Plotkin 2007). Clutch size averages 100 eggs and eggs typically take 45 to 58 days to hatch depending on temperatures (Marquez-M. 1994, Rostal 2007).

Some females breed annually and nest an average of 1 to 4 times in a season at intervals of 10 to 28 days. Analysis by Rostal (2007) suggested that ridley females lay approximately 3.075 nests per nesting. Interannual remigration rate for female ridleys is estimated to be approximately 1.8 (Rostal 2007) to 2.0 years (Marquez Millan et al. 1989, TEWG 2000). Age at sexual maturity is believed to be between 10 to 17 years (Snover et al. (2007).

Population dynamics

Loggerhead Sea Turtle

The loggerhead occurs throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. However, the majority of loggerhead nesting is at the western rims of the Atlantic and Indian Oceans. The most recent reviews show that only two loggerhead nesting beaches have greater than 10,000 females nesting per year (Baldwin et al. 2003, Ehrhart et al. 2003, Kamezaki et al. 2003, Limpus and Limpus 2003, Margaritoulis et al. 2003): South Florida (U.S.) and Masirah (Oman). Those beaches with 1,000 to 9,999 females nesting each year are Georgia through North Carolina (U.S.), Quintana Roo and Yucatán (Mexico), Cape Verde Islands (Cape Verde, eastern Atlantic off Africa), and Western Australia (Australia). Smaller nesting aggregations with 100 to 999 nesting females annually occur in the Northern Gulf of Mexico (U.S.), Dry Tortugas (U.S.), Cay Sal Bank (Bahamas), Sergipe and Northern Bahia (Brazil), Southern Bahia to Rio de Janerio (Brazil), Tongaland (South Africa), Mozambique, Arabian Sea Coast (Oman), Halaniyat Islands (Oman), Cyprus, Peloponnesus (Greece), Island of Zakynthos (Greece), Turkey, Queensland (Australia), and Japan.

The loggerhead is commonly found throughout the North Atlantic including the Gulf of Mexico, the northern Caribbean, the Bahamas archipelago, and eastward to West Africa, the western Mediterranean, and the west coast of Europe.

The major nesting concentrations in the U.S. are found in South Florida. However, loggerheads nest from Texas to Virginia. Total estimated nesting in the U.S. has fluctuated between 47,000 and 90,000 nests per year over the last decade (FWC, unpublished data; GDNR, unpublished data; SCDNR, unpublished data; NCWRC, unpublished data). About 80% of loggerhead nesting in the southeast U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties). Adult loggerheads are known to make considerable migrations between foraging areas and nesting beaches (Schroeder et al. 2003, Foley et al. 2008). During non-nesting years, adult females from U.S. beaches are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles, and Yucatán.

From a global perspective, the U.S. nesting aggregation is of paramount importance to the survival of the species as is the population that nests on islands in the Arabian Sea off Oman (Ross 1982, Ehrhart 1989). The status of the Oman loggerhead nesting population, reported to be the largest in the world (Ross 1979), is uncertain because of the lack of long-term standardized nesting or foraging ground surveys and its vulnerability to increasing development

pressures near major nesting beaches and threats from fisheries interaction on foraging grounds and migration routes (E. Possardt, Service, personal communication 2005). The loggerhead nesting aggregations in Oman and the U.S. account for the majority of nesting worldwide.

Green Sea Turtle

About 150 to 3,000 females are estimated to nest on beaches in the continental U.S. annually (FWC 2005). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NMFS and Service 1998a). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine Island, Australia, where thousands of females nest nightly in an average nesting season (Limpus et al. 1993). In the Indian Ocean, major nesting beaches occur in Oman where 30,000 females are reported to nest annually (Ross and Barwani 1995).

Leatherback Sea Turtle

A dramatic drop in nesting numbers has been recorded on major nesting beaches in the Pacific. Spotila et al. (2000) have highlighted the dramatic and possible extirpation of leatherbacks in the Pacific.

The East Pacific and Malaysia leatherback populations have collapsed. Spotila et al. (1996) estimated that only 34,500 females nested annually worldwide in 1995, which is a dramatic decline from the 115,000 estimated in 1980 (Pritchard 1982). In the eastern Pacific, the major nesting beaches occur in Costa Rica and Mexico. At Playa Grande, Costa Rica, considered the most important nesting beach in the eastern Pacific, numbers have dropped from 1,367 leatherbacks in 1988-1989 to an average of 188 females nesting between 2000-2001 and 2003-2004. In Pacific Mexico, in 1982 through aerial surveys of adult female leatherbacks this area became the most important leatherback nesting beach in the world. Tens of thousands of nests were laid on the beaches in 1980s but during the 2003-2004 seasons a total of 120 nests were recorded. In the western Pacific, the major nesting beaches lie in Papua New Guinea, Papua, Indonesia, and the Solomon Islands. These are some of the last remaining significant nesting assemblages in the Pacific. Compiled nesting data estimated approximately 5,000-9,200 nests annually with 75% of the nests being laid in Papua, Indonesia.

However, the most recent population size estimate for the North Atlantic alone is a range of 34,000-94,000 adult leatherbacks (Turtle Expert Working Group 2007). In Florida, an increase in leatherback nesting numbers from 98 nests in 1989 to between 800 and 900 nests in the early 2000s has been documented.

Nesting in the Southern Caribbean occurs in the Guianas (Guyana, Suriname, and French Guiana), Trinidad, Dominica, and Venezuela. The largest nesting populations at present occur in

the western Atlantic in French Guiana with nesting varying between approximately 5,029 and 63,294 nests between 1967 and 2005 (Turtle Expert Working Group 2007). Trinidad supports an estimated 6,000 leatherbacks nesting annually, which represents more than 80% of the nesting in the insular Caribbean Sea. Leatherback nesting along the Caribbean Central American coast takes place between the Honduras and Colombia. In Atlantic Costa Rica, at Tortuguero the number of nests laid annually between 1995 and 2006 was estimated to range from 199-1,623; modeling of these data indicated that the nesting population has decreased by 67.8% over this time period.

In Puerto Rico, the main nesting areas are at Fajardo on the main island of Puerto Rico and on the island of Culebra. Between 1978 and 2005, nesting increased in Puerto Rico with a minimum of 9 nests recorded in 1978 and a minimum of 469-882 nests recorded each year between 2000 and 2005. Recorded leatherback nesting on the Sandy Point National Wildlife Refuge on the island of St. Croix, U.S. Virgin Islands between 1990 and 2005, ranged from a low of 143 in 1990 to a high of 1,008 in 2001. In the British Virgin Islands, annual nest numbers have increased in Tortola from 0-6 nests per year in the late 1980s to 35-65 nests per year in the 2000s.

The most important nesting beach for leatherbacks in the eastern Atlantic lies in Gabon, Africa. It was estimated there were 30,000 nests along 60 miles (96.5 km) of Mayumba Beach in southern Gabon during the 1999 - 2000 nesting season. Some nesting has been reported in Mauritania, Senegal, and the Bijagos Archipelago of Guinea-Bissau, Turtle Islands and Sherbro Island of Sierra Leone, Liberia, Togo, Benin, Nigeria, Cameroon, Sao Tome and Principe, continental Equatorial Guinea, Islands of Corisco in the Gulf of Guinea and the Democratic Republic of the Congo, and Angola. A larger nesting population is found on the island of Bioko (Equatorial Guinea).

Hawksbill Sea Turtle

About 15,000 females are estimated to nest each year throughout the world with the Caribbean accounting for 20 to 30 percent of the world's hawksbill population. Only five regional populations remain with more than 1,000 females nesting annually (Seychelles, Mexico, Indonesia, and two in Australia) (Meylan and Donnelly 1999). Mexico is now the most important region for hawksbills in the Caribbean with about 3,000 nests/year (Meylan 1999). Other significant but smaller populations in the Caribbean still occur in Martinique, Jamaica, Guatemala, Nicaragua, Grenada, Dominican Republic, Turks and Caicos Islands, Cuba, Puerto Rico, and U.S. Virgin Islands. In the U.S. Caribbean, about 150 to 500 nests per year are laid on Mona Island, Puerto Rico and 70 to 130 nests/year are laid on Buck Island Reef National Monument, U.S. Virgin Islands. In the U.S. Pacific, hawksbills nest only on main island beaches in Hawaii, primarily along the east coast of the island of Hawaii. Hawksbill nesting has also been documented in American Samoa and Guam (NMFS and Service 1998b).

Kemp's Ridley Sea Turtle

Most Kemp's ridleys nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a small number of Kemp's ridleys nest consistently along the Texas coast (Turtle Expert Working Group 1998). In addition, rare nesting events have been reported in Alabama, Florida, Georgia, South Carolina, and North Carolina. Historic information indicates that tens of thousands of ridleys nested near Rancho Nuevo, Mexico, during the late 1940s (Hildebrand 1963). The Kemp's ridley population experienced a devastating decline between the late 1940s and the mid 1980s. The total number of nests per nesting season at Rancho Nuevo remained below 1,000 throughout the 1980s, but gradually began to increase in the 1990s. In 2007, 11,268 nests were documented along the 18.6 miles (30 km) of coastline patrolled at Rancho Nuevo, and the total number of nests documented for all the monitored beaches in Mexico was 15,032 (Service 2007c). During the 2007 nesting season, an arribada with an estimated 5,000 turtles was recorded at Rancho Nuevo from May 20 to May 23. In addition, 128 nests were recorded during 2007 in the U.S., primarily in Texas.

Status and Distribution

Loggerhead Sea turtle

Five recovery units (subpopulations) have been identified in the Northwest Atlantic based on genetic differences and a combination of geographic distribution of nesting densities and geographic separation (NMFS and FWS 2008):

1. Northern Recovery Unit (NRU) - defined as loggerheads originating from nesting beaches from the Florida-Georgia border through southern Virginia (the northern extent of the nesting range).

2. Peninsula Florida Recovery Unit (PFRU) - defined as loggerheads originating from nesting beaches from the Florida-Georgia border through Pinellas County on the west coast of Florida, excluding the islands west of Key West, Florida.

3. Dry Tortugas Recovery Unit (DTRU) - defined as loggerheads originating from nesting beaches throughout the islands located west of Key West, Florida.

4. Northern Gulf of Mexico Recovery Unit (NGMRU) - defined as loggerheads originating from nesting beaches from Franklin County on the northwest Gulf coast of Florida through Texas.

5. Greater Caribbean Recovery Unit (GCRU) - composed of loggerheads originating from all other nesting assemblages within the Greater Caribbean (Mexico through French Guiana, The Bahamas, Lesser Antilles, and Greater Antilles).

Mitochondrial DNA analyses show that there is limited exchange of females among these recovery units (Ehrhart 1979; Foote et al., 2000; Hawkes et al. 2005; J. Richardson, personal communication cited in NMFS 2001). Based on the number of haplotypes, the highest level of loggerhead mtDNA genetic diversity in the Northwest Atlantic has been observed in females of the Greater Caribbean Recovery Unit that nest at Quintana Roo, Mexico (Encalada et al. 1999; Nielsen et al. in press).

Nuclear DNA analyses show that there are no substantial subdivisions across the loggerhead nesting colonies in the southeastern United States. Male-mediated gene flow appears to be keeping the subpopulations genetically similar on a nuclear DNA level (Francisco-Pearce 2001).

Historically, the literature has suggested that the northern U.S. nesting beaches (NRU and NGMRU) produce a relatively high percentage of males and the more southern nesting beaches (PFRU, DTRU, and GCRU) a relatively high percentage of females (e.g., Hanson et al. 1998; NMFS 2001; Mrosovsky and Provancha 1989). The NRU and NGMRU were believed to play an important role in providing males to mate with females from the more female-dominated subpopulations to the south. However, in 2002 and 2003, researchers studied loggerhead sex ratios for two of the U.S. nesting subpopulations, the northern and southern subpopulations (NGU and PFRU, respectively) (Blair 2005; Wyneken et al. 2005). The study produced interesting results. In 2002, the northern beaches produced more females and the southern beaches produced more males than previously believed. However, the opposite was true in 2003 with the northern beaches producing more males and the southern beaches producing more females in keeping with prior literature. Wyneken et al. (2005) speculated that the 2002 result may have been anomalous; however, the study did point out the potential for males to be produced on the southern beaches. Although this study revealed that more males may be produced on southern recovery unit beaches than previously believed, the Service maintains that the NRU and NGMRU play an important role in the production of males to mate with females from the more southern recovery units.

The NRU is the second largest loggerhead nesting aggregation in the Northwest Atlantic. Annual nest totals from northern beaches averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (Georgia Department of Natural Resources, unpublished data; North Carolina Wildlife Resources Commission, unpublished data, South Carolina Department of Natural Resources, unpublished data), representing approximately 1,272 nesting females per year (4.1 nests per female, Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3% annually. Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 1.9% annual decline in nesting in South Carolina since 1980. Overall, there is strong statistical data to suggest the NRU has experienced a long-term decline.

The PFRU is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census of the PFRU undertaken from 1989 to 2007 reveals a mean of 64,513 loggerhead nests per year representing approximately 15,735 females nesting per year (4.1 nests

per female, Murphy and Hopkins 1984) (Commission, unpublished data). This near-complete census provides the best statewide estimate of total abundance, but because of variable survey effort, these numbers cannot be used to assess trends. Loggerhead nesting trends are best assessed using standardized nest counts made at Index Nesting Beach Survey (INBS) sites surveyed with constant effort over time. An analysis of these data has shown a decline in nesting from 1989-2008 (Witherington et al. 2009). The analysis that reveals this decline uses nest-count data from 345 representative Atlantic-coast index zones (total length = 301 km) and 23 representative zones on Florida's southern Gulf coast (total length = 23 km). The spatial and temporal coverage (annually, 109 days and 368 zones) accounted for an average of 70% of statewide loggerhead nesting activity between 1989 and 2008. Negative binomial regression models that fit restricted cubic spline curves to aggregated nest-counts were used in trend evaluations. Results of the analysis indicated that there had been a decrease of 26% over the 20-year period and a 41% decline since 1998. The mean annual rate of decline for the 20-year period was 1.6%.

The NGMRU is the third largest nesting assemblage among the four U.S. recovery units. Nesting surveys conducted on approximately 300 km of beach within the NGMRU (Alabama and Florida only) were undertaken between 1995 and 2007 (statewide surveys in Alabama began in 2002). The mean nest count during this 13-year period was 906 nests per year, which equates to about 221 females nesting per year (4.1 nests per female, Murphy and Hopkins 1984) (Commission, unpublished data). Evaluation of long-term nesting trends for the NGMRU is difficult because of changed and expanded beach coverage. Loggerhead nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time. There are 12 years (1997-2008) of Florida INBS data for the NGMRU (Commission, unpublished data). A log-linear regression showed a significant declining trend of 4.7% annually.

The DTRU, located west of the Florida Keys, is the smallest of the identified recovery units. A near-complete nest census of the DTRU undertaken from 1995 to 2004, excluding 2002, (9 years surveyed) reveals a mean of 246 nests per year, which equates to about 60 females nesting per year (4.1 nests per female, Murphy and Hopkins 1984) (Commission, unpublished data). Surveys after 2004 did not include principal nesting beaches within the recovery unit (i.e., Dry Tortugas National Park). The nesting trend data for the DTRU are from beaches that are not part of the INBS program but are part of the Statewide Nesting Beach Survey (SNBS) program. There are 9 years of data for this recovery unit. A simple linear regression accounting for temporal autocorrelation revealed no trend in nesting numbers. Because of the annual variability in nest totals, a longer time series is needed to detect a trend.

The GCRU is composed of all other nesting assemblages of loggerheads within the Greater Caribbean. Statistically valid analyses of long-term nesting trends for the entire GCRU are not available because there are few long-term standardized nesting surveys representative of the region. Additionally, changing survey effort at monitored beaches and scattered and low-level nesting by loggerheads at many locations currently precludes comprehensive analyses. The most

complete data are from Quintana Roo, Yucatán, Mexico, where an increasing trend was reported over a 15-year period from 1987-2001 (Zurita et al. 2003). However, nesting since 2001 has declined and the previously reported increasing trend appears not to have been sustained (Julio Zurita, personal communication, 2006). Other smaller nesting populations have experienced declines over the past few decades (e.g., Amorocho 2003).

Recovery Criteria

DEMOGRAPHIC RECOVERY CRITERIA:

1. **Number of Nests and Number of Nesting Females**
   a. **Northern Recovery Unit**
      (1) There is statistical confidence (95%) that the annual rate of increase over a generation time of 50 years is 2% or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests is NC=14% [2,000], SC=66% [9,200], and GA=20% [2,800]).
      (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

   b. **Peninsular Florida Recovery Unit**
      (1) There is statistical confidence (95%) that the annual rate of increase over a generation time of 50 years is statistically detectable (1%) resulting in a total annual number of nests of 106,100 or greater for this recovery unit.
      (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

   c. **Dry Tortugas Recovery Unit**
      (1) There is statistical confidence (95%) that the annual rate of increase over a generation time of 50 years is 3% or greater resulting in a total annual number of nests of 1,100 or greater for this recovery unit.
      (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

   d. **Northern Gulf of Mexico Recovery Unit**
      (1) There is statistical confidence (95%) that the annual rate of increase over a generation time of 50 years is 3% or greater resulting in a total annual number of nests of 4,000 or greater for this recovery unit (approximate distribution of nests (2002-2007) is FL= 92% [3,700] and AL=8% [300]).
      (2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

e. **Greater Caribbean Recovery Unit**

(1) The total annual number of nests at a minimum of three nesting assemblages, averaging greater than 100 nests annually (e.g., Yucatán, Mexico; Cay Sal Bank, The Bahamas) has increased over a generation time of 50 years.

(2) This increase in number of nests must be a result of corresponding increases in number of nesting females (estimated from nests, clutch frequency, and remigration interval).

2. **Trends in Abundance on Foraging Grounds**

A network of in-water sites, both oceanic and neritic, distributed across the foraging range is established and monitoring is implemented to measure abundance. There is statistical confidence (95%) that a composite estimate of relative abundance from these sites is increasing for at least one generation.

3. **Trends in Neritic Strandings Relative to In-water Abundance**

Stranding trends are not increasing at a rate greater than the trends in in-water relative abundance for similar age classes for at least one generation.

LISTING FACTOR RECOVERY CRITERIA:

1. **Present or Threatened Destruction, Modification, or Curtailment of a Species Habitat or Range**

a. **Terrestrial**

(1) Beach armoring, shoreline stabilization structures, and all other barriers to nesting are categorized and inventoried for areas under U.S. jurisdiction. A peer-reviewed strategy is developed and implemented to ensure that the percentage of nesting beach free of barriers to nesting is stable or increasing relative to baseline levels.

(2) Beach sand placement projects conducted in areas under U.S. jurisdiction are in compliance with state and FWS criteria and are conducted in a manner that accommodates loggerhead needs and does not degrade or eliminate nesting habitat.

(3) At least 982 miles of loggerhead nesting beaches and adjacent uplands (current amount as identified in Appendix 4) under U.S. jurisdiction are maintained within conservation lands in public (Federal, state, or local) or private (NGO and private conservation lands) ownership that are managed in a manner compatible with sea turtle nesting.

(4) A peer-reviewed model is developed that describes the effects of sea level rise on loggerhead nesting beaches, and steps have been taken to mitigate such effects.

(5) Nesting beaches outside U.S. jurisdiction are managed for compatibility with loggerhead nesting.

b. Marine (estuarine, neritic, and oceanic)

A peer-reviewed, comprehensive strategy is developed and implemented to identify, prioritize, and protect marine habitats (e.g., feeding, migratory, inter-nesting) important to loggerheads.

2. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

a. Legal harvest (both commercial and subsistence) in the Caribbean, Atlantic, and Mediterranean is identified and quantified. A strategy is developed and implemented to eliminate legal harvest through international agreements.

b. A scientifically based nest management plan outlining strategies for protecting nests (under U.S. jurisdiction) from natural and manmade impacts is developed and implemented.

3. Disease or Predation

a. Ecologically sound predator control programs are implemented to ensure that the annual rate of mammalian predation on nests (under U.S. jurisdiction) is 10% or below within each recovery unit based on standardized surveys.

b. A peer-reviewed strategy is developed to recognize, respond to, and investigate mass/unusual mortality or disease events.

4. Inadequacy of Existing Regulatory Mechanisms

a. Light management plans, which meet minimum standards identified in the Florida Model Lighting Ordinance (Florida Administrative Code Rule 62B-55), are developed, fully implemented, and effectively enforced on nesting beaches under U.S. jurisdiction. Annual percentage of total nests with hatchlings disoriented or misoriented by artificial lighting does not exceed 10% based on standardized surveys.

b. Specific and comprehensive Federal legislation is developed, promulgated, implemented, and enforced to ensure long-term (including post-delisting) protection of loggerheads and their terrestrial and marine habitats, including protection from fishery interactions.

c. State and local legislation is developed and/or maintained, promulgated, implemented, and enforced to ensure long-term (including post-delisting) protection of loggerheads and their terrestrial and marine habitats, including protection from fishery interactions.

d. Foreign nations with significant loggerhead foraging or migratory habitat have implemented national legislation and have acceded to international and multi-lateral agreements to ensure long-term protection of loggerheads and their habitats. Nations that have important foraging or migratory habitat include Canada, Mexico,

Cuba, The Bahamas, Turks and Caicos Islands, Nicaragua, Panama, Colombia, Spain, Portugal, Morocco, and Cape Verde Islands.

e. Nations that conduct activities affecting loggerheads in foraging or migratory habitats in the North Atlantic Basin and the western Mediterranean have implemented national legislation and have acceded to international and multi-lateral agreements to ensure long-term protection of loggerheads and their habitats throughout the high seas and in foreign EEZs.

5. **Other Natural or Manmade Factors Affecting Its Continued Existence**
   a. A peer-reviewed strategy is developed and fully implemented to minimize fishery interactions and mortality for each domestic commercial fishing gear type that has loggerhead bycatch.
   b. A peer-reviewed strategy is developed and fully implemented in cooperation with relevant nations to minimize fishery interactions and mortality of loggerheads in foreign EEZs and on the high seas.
   c. A peer-reviewed strategy is developed and fully implemented to quantify, monitor, and minimize effects of trophic changes on loggerheads (e.g., diet, growth rate, fecundity) from fishery harvests and habitat alterations.
   d. A peer-reviewed strategy is developed and fully implemented to quantify, monitor, and minimize the effects of marine debris ingestion and entanglement in U.S. territorial waters, the U.S. EEZ, foreign EEZs, and the high seas.
   e. A peer-reviewed strategy is developed and fully implemented to minimize vessel strike mortality in U.S. territorial waters and the U.S. EEZ.

Green Turtle

Nesting data collected as part of the Florida SNBS program (2000-2006) show that a mean of approximately 5,600 nests are laid each year in Florida. Nesting occurs in 26 counties with a peak along the east coast, from Volusia through Broward Counties. The green turtle nesting population of Florida appears to be increasing based on 19 years (1989-2007) of INBS data from throughout the state. The increase in nesting in Florida is likely a result of several factors, including: (1) a Florida statute enacted in the early 1970s that prohibited the killing of green turtles in Florida; (2) the species listing under the ESA in 1973, affording complete protection to eggs, juveniles, and adults in all U.S. waters; (3) the passage of Florida's constitutional net ban amendment in 1994 and its subsequent enactment, making it illegal to use any gillnets or other entangling nets in state waters; (4) the likelihood that the majority of Florida adult green turtles reside within Florida waters where they are fully protected; (5) the protections afforded Florida green turtles while they inhabit the waters of other nations that have enacted strong sea turtle conservation measures (e.g., Bermuda); and (6) the listing of the species on Appendix I of CITES, which stopped international trade and reduced incentives for illegal trade from the U.S.

Recovery Criteria

The U.S. Atlantic population of green sea turtles can be considered for delisting when, over a period of 25 years the following conditions are met:

1. The level of nesting in Florida has increased to an average of 5,000 nests per year for at least six years. Nesting data shall be based on standardized surveys.

2. At least 25 percent (65 miles) of all available nesting beaches (260 miles) are in public ownership and encompass at least 50 percent of the nesting activity.

3. A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.

4. All priority one tasks identified in the recovery plan have been successfully implemented.

The current "Recovery Plan for the U.S. Population of Atlantic Green Turtle (*Chelonia mydas*)" was completed in 1991, the Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*)" was completed in 1998, and the "Recovery Plan for U.S. Pacific Populations of the East Pacific Green Turtle (*Chelonia mydas*)" was completed in 1998. The recovery criteria contained in the plans, while not strictly adhering to all elements of the Recovery Planning Guidelines (Service and NOAA), are a viable measure of the species status.

Leatherback Sea Turtle

Declines in leatherback nesting have occurred over the last two decades along the Pacific coasts of Mexico and Costa Rica. The Mexican leatherback nesting population, once considered to be the world's largest leatherback nesting population (historically estimated to be 65 percent of worldwide population), is now less than one percent of its estimated size in 1980. Spotila et al. (1996) estimated the number of leatherback sea turtles nesting on 28 beaches throughout the world from the literature and from communications with investigators studying those beaches. The estimated worldwide population of leatherbacks in 1995 was about 34,500 females on these beaches with a lower limit of about 26,200 and an upper limit of about 42,900. This is less than one third the 1980 estimate of 115,000. Leatherbacks are rare in the Indian Ocean and in very low numbers in the western Pacific Ocean. The largest population is in the western Atlantic. Using an age-based demographic model, Spotila et al. (1996) determined that leatherback populations in the Indian Ocean and western Pacific Ocean cannot withstand even moderate levels of adult mortality and that even the Atlantic populations are being exploited at a rate that cannot be sustained. They concluded that leatherbacks are on the road to extinction and further population declines can be expected unless action is taken to reduce adult mortality and increase survival of eggs and hatchlings.

In the U.S., nesting populations occur in Florida, Puerto Rico, and the U.S. Virgin Islands. In Florida, the SNBS program has documented an increase in leatherback nesting numbers from 98 nests in 1988 to between 800 and 900 nests per season in the early 2000s (FWC SNBS; Stewart and Johnson 2006). Although the SNBS program provides information on distribution and total abundance statewide, it cannot be used to assess trends because of variable survey effort. Therefore, leatherback nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time (1989-2007). An analysis of the INBS data has shown a substantial increase in leatherback nesting in Florida since 1989 (FWC INBS; Turtle Expert Working Group 2007).

Recovery Criteria

The U.S. Atlantic population of leatherbacks can be considered for delisting when the following conditions are met:

1. The adult female population increases over the next 25 years, as evidenced by a statistically significant trend in the number of nests at Culebra, Puerto Rico, St. Croix, U.S. Virgin Island, and along the east coast of Florida.

2. Nesting habitat encompassing at least 75 percent of nesting activity in U.S. Virgin Islands, Puerto Rico, and Florida is in public ownership.

3. All priority one tasks identified in the recovery plan have been successfully implemented.

The current "Recovery Plan for the Leatherback Turtles (*Dermochelys coriacea*)" in the U.S. Caribbean, Atlantic, and Gulf of Mexico" was signed in 1992 and the "Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*)" was signed in 1998. The recovery criteria contained in the plans, while not strictly adhering to all elements of the Recovery Planning Guidelines (Service and NOAA), are a viable measure of the species status.

Hawksbill Sea Turtle

The hawksbill sea turtle has experienced global population declines of 80 percent or more during the past century and continued declines are projected (Meylan and Donnelly 1999). Most populations are declining, depleted, or remnants of larger aggregations. Hawksbills were previously abundant, as evidenced by high-density nesting at a few remaining sites and by trade statistics.

Recovery Criteria

The U.S. Atlantic population of hawksbills can be considered for delisting when the following conditions are met:

1. The adult female population is increasing, as evidenced by a statistically significant trend in the annual numbers of nests on at least five index beaches, including Mona Island and Buck Island Reef National Monument (BIRNM).

2. Habitat for at least 50 percent of the nesting activity that occurs in the U.S. Virgin Islands (USVI) and Puerto Rico is protected in perpetuity.

3. Numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, USVI, and Florida.

4. All priority one tasks identified in the recovery plan have been successfully implemented.

Kemp's Ridley Sea Turtle

Today, under strict protection, the population appears to be in the early stages of recovery. The recent nesting increase can be attributed to full protection of nesting females and their nests in Mexico resulting from a bi-national effort between Mexico and the U.S. to prevent the extinction of the Kemp's ridley, and the requirement to use Turtle Excluder Devices (TEDs) in shrimp trawls both in the United States and Mexico.

The Mexico government also prohibits harvesting and is working to increase the population through more intensive law enforcement, by fencing nest areas to diminish natural predation, and by relocating most nests into corrals to prevent poaching and predation. While relocation of nests into corrals is currently a necessary management measure, this relocation and concentration of eggs into a "safe" area is of concern since it makes the eggs more susceptible to reduced viability.

Recovery Criteria

The goal of the recovery plan is for the species to be reduced from endangered to threatened status. The Recovery Team members feel that the criteria for a complete removal of this species from the endangered species list need not be considered now, but rather left for future revisions of the plan. Complete removal from the federal list would certainly necessitate that some other instrument of protection, similar to the Marine Mammal Protection Act, be in place and be

international in scope. Kemp's ridley can be considered for reclassification to threatened status when the following four criteria are met:

1. Protection of the known nesting habitat and the water adjacent to the nesting beach (concentrating on the Rancho Nuevo area) and continuation of the bi-national project.

2. Elimination of the mortality from incidental catch from commercial shrimping in the U.S. and Mexico through the use of TEDs and full compliance with the regulations requiring TED use.

3. Attainment of a population of at least 10,000 females nesting in a season.

4. All priority one recovery tasks in the recovery plan are successfully implemented.

The current Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) was signed in 1992. Significant new information on the biology and population status of Kemp's ridley has become available since 1992. Consequently, a full revision of the recovery plan has been undertaken by the Service and NMFS and is nearing completion. The revised plan will provide updated species biology and population status information, objective and measurable recovery criteria, and updated and prioritized recovery actions. The Service and NMFS completed a five-year status review of the Kemp's ridley sea turtle in August 2007 (NMFS and Service 2007d). Recommendations provided in the five-year review focused on the protection of the species both in the water (enforcement of TED use) and on land (nesting habitat).

Common threats to sea turtles in Florida

Anthropogenic (human) factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs, and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums), which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the western North Atlantic coast, other areas along these coasts have limited or no protection.

Anthropogenic threats in the marine environment include oil and gas exploration and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching and fishery interactions.

Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor, particularly for green turtles. This disease has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. The tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens may die.

Loss of nesting habitat related to coastal development has had the greatest impact on nesting sea turtles in Florida. Beachfront development not only causes the loss of suitable nesting habitat, but can result in the disruption of powerful coastal processes accelerating erosion and interrupting the natural shoreline migration (National Research Council 1990b). This may in turn cause the need to protect upland structures and infrastructure by armoring, groin placement, beach emergency berm construction and repair, and beach nourishment which cause changes in, additional loss or impact to the remaining sea turtle habitat.

Hurricanes

Hurricanes were probably responsible for maintaining coastal beach habitat upon which sea turtles depend through repeated cycles of destruction, alteration, and recovery of beach and dune habitat. Hurricanes generally produce damaging winds, storm tides and surges, and rain and can result in severe erosion of the beach and dune systems. Overwash and blowouts are common on barrier islands. Hurricanes and other storms can result in the direct or indirect loss of sea turtle nests, either by erosion or washing away of the nests by wave action or inundation or "drowning" of the eggs or hatchlings developing within the nest or indirectly by loss of nesting habitat. Depending on their frequency, storms can affect sea turtles on either a short-term basis (nests lost for one season and/or temporary loss of nesting habitat) or long term, if frequent (habitat unable to recover). How hurricanes affect sea turtle nesting also depends on its characteristics (winds, storm surge, rainfall), the time of year (within or outside of the nesting season), and where the northeast edge of the hurricane crosses land.

Artificial beachfront lighting may cause disorientation (loss of bearings) and misorientation (incorrect orientation) of sea turtle hatchlings. Visual signs are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967; Mrosovsky and Shettleworth 1968; Dickerson and Nelson 1989; Witherington and Bjorndal 1991). Artificial beachfront lighting is a documented cause of hatchling disorientation and misorientation on nesting beaches (Philibosian 1976; Mann 1977; FWC 2006). The emergence from the nest and crawl to the sea is one of the most critical periods of a sea turtle's life. Hatchlings that do not make it to the sea quickly become food for ghost crabs, birds, and other predators or become dehydrated and may never reach the sea. Some types of beachfront lighting attract hatchlings away from the sea while some lights cause adult turtles to avoid stretches of brightly illuminated beach. Research has documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights (Witherington 1992).

Predation of sea turtle eggs and hatchlings by native and introduced species occurs on almost all nesting beaches. Predation by a variety of predators can considerably decrease sea turtle nest hatching success. The most common predators in the southeastern United States are ghost crabs (*Ocypode quadrata*), raccoons (*Procyon lotor*), feral hogs (*Sus scrofa*), foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), coyotes (*Canis latrans*), armadillos (*Dasypus novemcinctus*), and fire ants (*Solenopsis* spp.) (Dodd 1988, Stancyk 1995). In the absence of nest protection programs in a number of locations throughout the southeast U.S., raccoons may depredate up to 96 percent of all nests deposited on a beach (Davis and Whiting 1977, Hopkins and Murphy 1980, Stancyk et al. 1980, Talbert et al. 1980, Schroeder 1981, Labisky et al. 1986). As nesting habitat dwindles, it is essential that nest production be naturally maximized so the turtles may continue to exist in the wild.

In response to increasing predation of sea turtle nests by coyotes, foxes, hogs, and raccoons, multi-agency cooperative efforts have been initiated and are ongoing throughout Florida, particularly on public lands.

The operation of motor vehicles on the beach affects sea turtle nesting by: interrupting a female turtle approaching the beach; headlights disorienting or misorienting emergent hatchlings; vehicles running over hatchlings attempting to reach the ocean; and vehicle tracks traversing the beach which interfere with hatchlings crawling to the ocean. Hatchlings appear to become diverted not because they cannot physically climb out of the rut (Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon (Mann 1977). The extended period of travel required to negotiate tire tracks and ruts may increase the susceptibility of hatchlings to dehydration and depredation during migration to the ocean (Hosier et al. 1981). Driving directly above or over incubating egg clutches or on the beach can cause sand compaction which may result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings, decreasing nest success and directly killing pre-emergent hatchlings (Mann 1977, Nelson and Dickerson 1987, Nelson 1988).

The physical changes and loss of plant cover caused by vehicles on dunes can lead to various degrees of instability, and therefore encourage dune migration. As vehicles move either up or down a slope, sand is displaced downward, lowering the trail. Since the vehicles also inhibit plant growth, and open the area to wind erosion, dunes may become unstable, and begin to migrate. Unvegetated sand dunes may continue to migrate across stable areas as long as vehicle traffic continues. Vehicular traffic through dune breaches or low dunes on an eroding beach may cause accelerated rate of overwash and beach erosion (Godfrey et al. 1978). If driving is required, the area where the least amount of impact occurs is the beach between the low and high tide water lines. Vegetation on the dunes can quickly re-establish provided the mechanical impact is removed.

In 1985, the Florida Legislature severely restricted vehicular driving on Florida's beaches, except that which is necessary for cleanup, repair, or public safety. This legislation also allowed an

exception for five counties to continue to allow vehicular access on coastal beaches due to the availability of less than 50 percent of its peak user demand for off-beach parking. The counties affected by this exception are Volusia, St. Johns, Gulf, Nassau, and Flagler Counties, as well as limited vehicular access on Walton County beaches for boat launching.

Analysis of the species/critical habitat likely to be affected

The proposed action has the potential to adversely affect nesting females, nests, and hatchlings within the proposed project area. The effects of the proposed action on sea turtles will be considered further in the remaining sections of this biological opinion. Potential effects include destruction of nests deposited within the boundaries of the proposed project, harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities, disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting, behavior modification of nesting females due to escarpment formation within the project area during a nesting season resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs. The quality of the placed sand could affect the ability of female turtles to nest, the suitability of the nest incubation environment, and the ability of hatchlings to emerge from the nest.

Critical habitat has not been designated in the continental United States; therefore, the proposed action would not result in an adverse modification.

ANASTASIA ISLAND BEACH MOUSE

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The formal taxonomic classification of beach mouse subspecies follows the geographic variation in pelage and skeletal measurements documented by Bowen (1968). This peer-reviewed, published classification was also accepted by Hall (1981). Since the listing of the beach mice, further research concerning the taxonomic validity of the subspecific classification of beach mice has been initiated and/or conducted. Preliminary results from these studies support the separation of beach mice from inland forms, and support the currently accepted taxonomy (Bowen 1968) (*i.e.*, each beach mouse group represents a unique and isolated subspecies). Recent research using mitochondrial DNA data illustrates that Gulf Coast beach mouse subspecies form a well-supported and independent evolutionary cluster within the global population of the mainland or inland old field mice (J. Van Zant and M. Wooten, Auburn University, personal communication 2006).

The old-field mouse (*Peromyscus polionotus)* is different in form and structure as well as being genetically diverse throughout its range in the southeastern United States (Bowen 1968, Selander

et al. 1971). Currently there are sixteen recognized subspecies of old-field mice (Hall 1981). Eight subspecies of the old-field mouse occupy coastal rather than inland habitat and are referred to as beach mice (Bowen 1968). Two existing subspecies of beach mouse and one extinct subspecies are known from the Atlantic coast of Florida and five subspecies of the beach mice live along the Gulf coast of Alabama and northwestern Florida.

Rivers and various inlets bisect the Atlantic beaches and naturally isolate habitats in which the beach mice live. The outer coastline and barrier islands are typically separated from the mainland by lagoons, swamps, tidal marshes, and flatwood areas with hardpan soil conditions. However, these dispersal barriers are not absolute; sections of sand peninsulas may from time to time be cut off by storms and shift over time due to wind and current action. Human development has also fragmented the ranges of the subspecies, and as a consequence of coastal development and the dynamic nature of the coastal environment; beach mouse populations are generally comprised of various disjunct populations.

The AIBM was listed as endangered under the Act in 1989 (54 FR 20598). Critical habitat was not designated for the subspecies. The AIBM is also listed as an endangered species by the State of Florida. The distribution of the AIBM has declined significantly, particularly in the northern part of its range. AIBM was historically known from the vicinity of the Duval-St. Johns County line southward to Matanzas Inlet, St. Johns County, Florida (Frank and Humphrey 1992). Currently AIBM populations are found along 14.5-miles of Anastasia Island, mainly on 3.5 miles at ASP and one mile at Fort Matanzas National Monument (FMNM). AIBM have been found at low densities in remnant dunes on the remainder of the island. Beach mice have also been located along sections of the 4.2 miles of dune habitat at Guana Tolomoto Matanzas National Estuarine Research Reserve (GTMNERR)-Guana River. Anastasia Island is separated from the mainland of Florida to the west by extensive salt marshes and the Mantazas River, to the north by the St. Augustine Inlet, and to the south by the Matanzas Inlet which are both maintained and open. This has restricted the range of AIBM to 14.5 mile length of Anastasia Island and sections of GTMNERR-Guana River (**Figure 2**).

In 1992 to 1993, the Service funded the reintroduction of AIBM to GTMNERR in St. Johns County where historical habitat for the subspecies existed (Service 1993). GMTNERR-Guana River is 9 miles north of the existing population of beach mice at ASP. Fifty-five mice (27 females and 28 males) were trapped at FMNM and ASP from September 24, to November 12, 1992, and placed in soft-release enclosures at the state park on September 27, and November 12, 1992. During follow-up trapping conducted in February 1993, beach mice occupied the entire 4.2-mile length of the park; 34 were captured and it was estimated that the population totaled 220. Quarterly trapping has been conducted since the reintroduction and mice have not been captured since September 2006. This may be a result of habitat loss or alteration from storms.

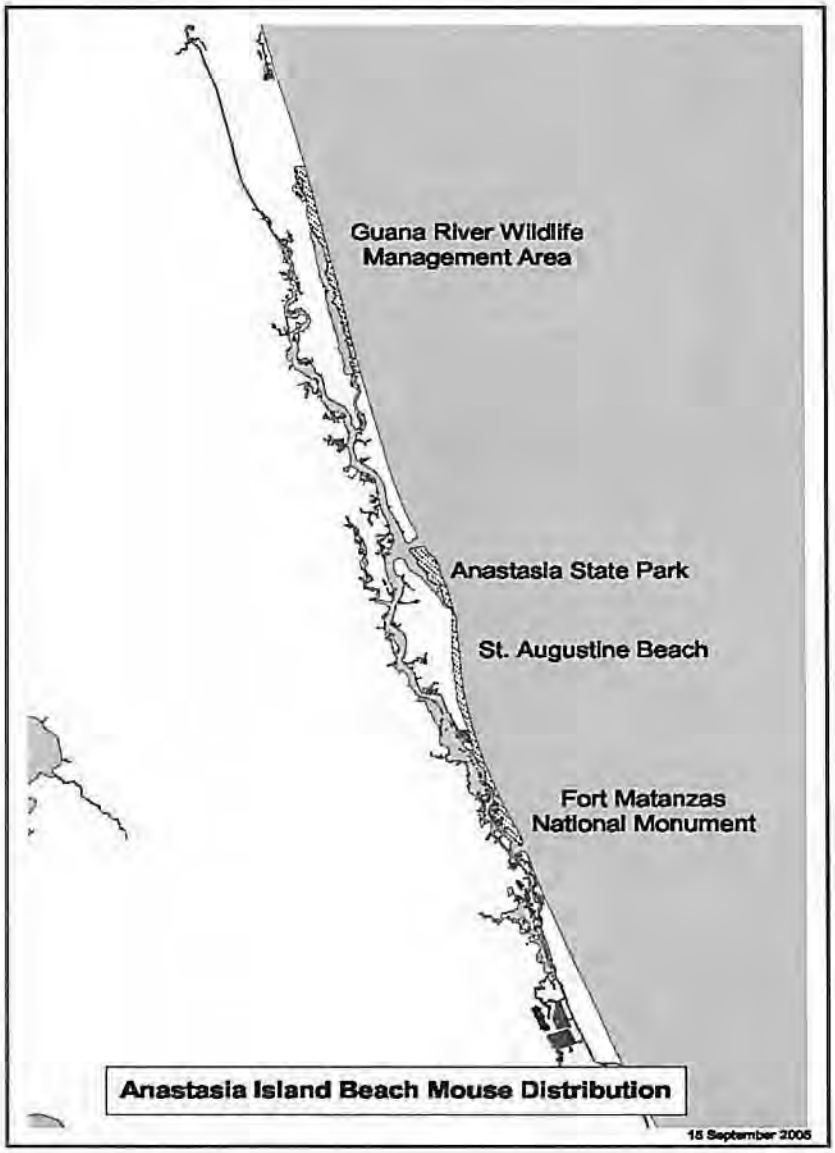


Figure 2. The distribution of the Anastasia Island beach mouse.

Life history

Beach mice are differentiated from the inland subspecies by the variety of fur (pelage) patterns on the head, shoulders, and rump. The overall dorsal coloration in coastal subspecies is lighter in color and less extensive than on those of the inland subspecies (Sumner 1926, Bowen 1968). Similarly, beach mouse subspecies can be differentiated from each other by pelage pattern and coloration.

The AIBM averages 5.45 inches in total length (average of 10 individuals); with 2.05 inches mean tail length (James 1992). This subspecies has a very pale, buff-colored head and back with extensive white coloration underneath the sides (Howell 1939). Bowen (1968) noted two distinct rump color pigmentations, one tapered and the other a squared pattern, which extended to the thighs.

Behavior

Peromyscus polionotus is the only member of the genus that digs an extensive burrow. Beach mice are semifossorial, using their complex burrows as a place to rest during the day and between nightly foraging bouts, escape from predators, have and care for young, and hold limited food caches. Burrows of *P. polionotus* generally consist of an entrance tunnel, nest chamber, and escape tunnel. Burrow entrances are usually placed on the sloping side of a dune at the base of a shrub or clump of grass. The nest chamber is formed at the end of the level portion of the entrance tunnel at a depth of 23.6 to 35.4 inches, and the escape tunnel rises from the nest chamber to within 9.8 inches of the surface (Blair 1951). Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 1.5 to 2.5 inches in diameter. The nest comprises about one fourth of the size of the cavity and is composed of sea oat roots, stems, leaves and the chaffy parts of the panicles (Ivey 1949). Beach mice have been found to select burrow sites based on a suite of biotic and abiotic features including dune slope, soil compaction, vegetative cover, and height above sea level (Lynn 2000a; Sneckenberger 2001). A shortage of potential burrow sites is considered to be a possible limiting resource.

Reproduction and Demography

Studies on *Peromyscus* species in peninsular Florida suggest that these species may achieve greater densities and undergo more significant population fluctuations than their temperate relatives, partially because of their extended reproductive season (Bigler and Jenkins 1975). Subtropical beach mice can reproduce throughout the year; however their peak reproductive activity is generally during late summer, fall, and early winter. Extine (1980) reported peak reproductive activity for SEBM on Merritt Island during August and September, based on external characteristics of the adults. This peak in the timing and intensity of reproductive activity was also correlated to the subsequent peak in the proportion of juveniles in the population in early winter (Extine 1980). Peak breeding season for Gulf Coast beach mice is autumn and winter, declining in spring, and falling to low levels in summer (Rave and Holler 1992, Blair 1951). However, pregnant and lactating beach mice have been observed in all seasons (Moyers et al. 1999).

Sex ratios in beach mouse populations are generally 1:1 (Extine 1980; Rave and Holler 1992). Beach mice are believed to be generally monogamous (Smith 1966, Foltz 1981, Lynn 2000a). While a majority of individuals appear to pair for life, paired males may sire extra litters with unpaired females. Beach mice are considered sexually mature at 55 days of age; however some

are capable of breeding earlier (Weston 2007). Gestation averages 28 to 30 days (Weston 2007) and the average litter size is four pups (Fleming and Holler 1990). Littering intervals may be as short as 26 days (Bowen 1968).

Habitat and Movement

Beach mice inhabit coastal dune ecosystems on the Atlantic Coast of Florida. The dune habitat is generally categorized as: primary dunes (characterized by sea and other grasses), secondary dunes (similar to primary dunes, but also frequently include such plants as woody goldenrod (*Chrysoma pauciflosculosa*), false rosemary (*Conradina canescens*), and interior or scrub dunes (often dominated by scrub oaks and yaupon holly (*Ilex vomitoria*). Contrary to the early belief that beach mice were restricted to (Howell 1909, 1921, Ivey 1949), or preferred the frontal dunes (Blair 1951, Pournelle and Barrington 1953, Bowen 1968), more recent research has shown that scrub habitat serves an invaluable role in the persistence of beach mouse populations (Swilling et al. 1998, Sneckenberger 2001). Beach mice occupy scrub dunes on a permanent basis and studies have found no detectable differences between scrub and frontal dunes in beach mouse body mass, home range size, dispersal, reproduction, survival, food quality, and burrow site availability (Swilling et al. 1998, Swilling 2000, Sneckenberger 2001). While seasonally abundant, the availability of food resources in the primary and secondary dunes fluctuates (Sneckenberger 2001). In contrast, the scrub habitat provides a more stable level of food resources, which becomes crucial when food is scarce or nonexistent in the primary and secondary dunes. This suggests that access to primary, secondary, and scrub dune habitat is essential to beach mice at the individual level.

The sea oat zone of primary dunes is considered essential habitat of beach mice on the Atlantic Coast (Humphrey and Barbour 1981, Humphrey et al. 1987, Stout 1992). The SEBM has also been reported from sandy areas of adjoining coastal strand/scrub vegetation (Extine 1980, Extine and Stout 1987), which refers to a transition zone between the fore dune and the inland plant community (Johnson and Barbour 1990). Beach mouse habitat is heterogeneous, and distributed in patches that occur both parallel and perpendicular to the shoreline (Extine and Stout 1987). Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of several feet.

Essential habitat of the AIBM is characterized by patches of bare, loose, sandy soil (Humphrey and Frank 1992a). Although they are mainly found in the sea oat zone of the primary zone, they will occur in sandy areas with broomsedge (*Andropogon* sp.) (Service 1993). Ivy (1949) reported AIBM to occur in woody vegetation as far as 500 feet inland. Pournelle and Barrington (1953) found this subspecies in scrub as far as 1800 feet from the dunes. Because this habitat occurs in a narrow band along Florida's coast, structure and composition of the vegetative communities that form the habitat can change dramatically over distances of only a few feet. Much of the habitat within the range of the AIBM has been converted to condominiums and housing developments. The majority of the high quality habitat, densely occupied by beach

mice, remains along the length of both ASP and Fort Matanzas National Monument (FMNM), at either end of Anastasia Island.

Foraging

Beach mice are nocturnal and forage for food throughout the dune system. Beach mice feed primarily upon seeds and fruits, and appear to forage based on availability and have shown no preferences for particular seeds or fruits (Moyers 1996). Beach mice also eat small invertebrates, especially during late spring and early summer when seeds are scarce (Ehrhart 1978, Moyers 1996). Research suggests that the availability of food resources fluctuates seasonally in Gulf Coast coastal dune habitat, specifically that the frontal dunes appear to have more species of high quality foods, but these sources are primarily grasses and annuals that produce large quantities of small seeds in a short period of time. Foods available in the scrub consist of larger seeds and fruits that are produced throughout a greater length of time and linger in the landscape (Sneckenberger 2001). Nutritional analysis of foods available in each habitat revealed that seeds of plant species in both habitats provide a similar range of nutritional quality.

Population dynamics

Population size

Estimating animal abundance or population size is an important and challenging scientific issue in wildlife biology (Otis et al. 1978, Pollock et al. 1990). A number of different census methods are available to estimate wildlife populations, each with particular benefits and biases. Beach mouse surveys involve live trapping mark-recapture studies, which is a common method with small mammals. A five-night minimum trapping period has been standard practice since 1987 for Gulf Coast beach mice. As the referenced trapping events were not designed similarly or using a standardized sampling techniques, data should not be compared between subspecies or trapping events, nor should densities (mice per 100 trap nights) be inferred beyond the trapping area during that trapping session.

Population densities of beach mice typically reach peak numbers in the late autumn into spring (Rave and Holler 1992, Holler et al. 1997). Peak breeding period occurs in fall and winter, apparently coinciding with the increased availability of seeds and fruits from the previous growing season. Seasonal and annual variation in size of individual populations may be great (Rave and Holler 1992, Holler et al. 1997). Food supplementation studies showed that old field mouse populations increased when foods were abundant; thus, populations of old field mice appear to be food-limited (Smith 1971, Galindo-Leal and Krebs 1998). Similar studies have not been conducted with beach mouse populations.

Although the distribution of the AIBM has declined significantly, particularly in the northern part of its range, the populations at ASP and FMNM have continued to fluctuate seasonally between two and 90 mice per acre. It is thought that populations should be characterized by a

range rather than a static value (Frank and Humphrey 1992). Quarterly surveys of these two sites have shown that the populations have remained stable. Due to the limited dune habitat at the Park, this population has not been able to maintain a stable population and it is unknown how many mice remain.

Population variability

Beach mouse populations fluctuate on a seasonal and annual basis. Attempts to explain population dynamics have revealed an incomplete understanding of the species and its population cycles. It is clear that beach mice, like all rodents, are known for high reproductive rates and experience extreme highs and lows in population numbers. Depressed beach mouse populations may be associated with tropical storms and drought, perhaps resulting from reduced habitat and food resources. These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair 1951, Bowen 1968, Smith 1971, Hill 1989, Rave and Holler 1992, Swilling et al. 1998, Swilling 2000).

Status and Distribution

The distribution of the AIBM has declined significantly, particularly in the northern part of its range. Historically, it was reported to occur from the vicinity of the Duval-St. Johns County line southward to Matanzas Inlet, St. Johns County, Florida (Humphrey and Frank 1992a). It currently occurs only on Anastasia Island, primarily at the north (ASP) and south (FMNM) ends of the island, although beach mice still occur at low densities in remnant dunes along the entire length of the island (Service 1993). The original distribution consisted of about 50 linear miles of beach; current populations occupy about 14 linear miles of beach with possibly only 3 miles supporting viable populations (Service 1993).

In 1992 to 1993, 55 mice (27 females and 28 males) were reintroduced to GMTNERR-Guana River in St. Johns County. In 1993, the population was estimated at 220 mice. Quarterly trapping has been conducted since the reintroduction and mice have not been captured since September 2006. This may be a result of habitat loss or alteration from storms.

The primary reason for the significant reduction in the range of the AIBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated AIBM habitat in the northern two-thirds of its range. This increased urbanization has also increased the recreational use of dunes, and harmed the vegetation essential for dune maintenance. Loss of dune vegetation results in widespread wind and water erosion and reduces the effectiveness of the dune to protect other beach mouse habitat. In addition to this increased urbanization, coastal erosion is responsible for the loss of the dune environment along the Atlantic coast, particularly during tropical storms and hurricanes. The extremely active 2004 hurricane season had a severe affect on Florida's Atlantic coast beaches and beach mouse habitat.

The encroachment of residential housing onto the Atlantic coast also increases the likelihood of predation by domestic cats and dogs. ASP has successfully reduced feral cat populations at the recreation area and has seen a benefit to the beach mice. Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice and introduced rats.

The Recovery Plan (Service 1993) for the AIBM identifies the primary recovery objectives for the subspecies. The Anastasia Island beach mouse can be considered for reclassification from endangered to threatened status if five viable, self-sustaining populations can be established. Because the majority of this subspecies' historical range has been permanently destroyed, it is not likely that it can be fully recovered or delisted. For the AIBM to be considered for downlisting to threatened, it is required that those populations at the northern and southern end of Anastasia Island continue to be viable. Each population should support a breeding population of 500 individuals. Two additional viable populations shall be established within the mainland portion of the historic range. All of these populations should be monitored for five years.

Threats

Habitat Loss or Degradation

Coastal dune ecosystems are continually responding to inlets, tides, waves, erosion and deposition, longshore sediment transport and depletion, and fluctuations in sea level. The location and shape of barrier island beaches perpetually adjusts to these physical forces. Winds move sediment across the dry beach forming dunes and the island interior landscape. The natural communities contain plants and animals that are subject to shoreline erosion and deposition, salt spray, wind, drought conditions, and sandy soils. Vegetative communities include foredunes, primary and secondary dunes, interdunal swales, sand pine scrub, and maritime forests. During storm events, overwash is common and may breach the island at dune gaps or other weak spots, depositing sediments on the interior and backsides of islands, increasing island elevation and accreting the sound shoreline. Breaches may result in new inlets through the island.

The quality of the dune habitat (primary, secondary, and scrub) is an important factor in maintaining and facilitating beach mouse recovery. Habitat manipulation is an old and widely used tool in wildlife management. It is especially useful in improving habitat suitability to increase local populations of a species. For beach mice, improving habitat can enhance the abundance and diversity of food resources, increase the chances of meeting a mate, and reduce competition for food and burrow sites.

Long term trapping data has shown that beach mouse densities are cyclic and fluctuate by magnitudes on a seasonal and annual basis. These fluctuations can be a result of reproduction rates, food availability, habitat quality and quantity, catastrophic events, disease, and predation (Blair 1951, Bowen 1968, Smith 1971, Hill 1989, Rave and Holler 1992, Swilling et al. 1998, Swilling 2000, Sneckenberger 2001). Without suitable habitat sufficient in size to support the

natural cyclic nature of beach mouse populations, subspecies are at risk from local extirpation and extinction, and may not attain the densities necessary to persist through storm events and seasonal fluctuations of resources.

Habitat loss and fragmentation associated with residential and commercial real estate development is the primary threat contributing to the endangered status of beach mice (Holler 1992a, 1992b; Humphrey 1992). Coastal development has fragmented all the subspecies into disjunct populations. Isolation of habitats by imposing barriers to species movement is an effect of fragmentation that equates to reduction in total habitat (Noss and Csuti 1997). Furthermore, isolation of small populations of beach mice reduces or precludes gene flow between populations and can result in the loss of genetic diversity. Demographic factors such as predation (especially by domestic cats), diseases, and competition with house mice, are intensified in small, isolated populations, which may be rapidly extirpated by these pressures. Especially when coupled with events such as storms, reduced food availability, and/or reduced reproductive success, isolated populations may experience severe declines or extirpation (Caughley and Gunn 1996). The influence these factors have on populations or individuals is largely dependent on the degree of isolation.

The conservation of multiple large, contiguous tracts of habitat is essential to the persistence of beach mice. At present, large parcels exist mainly on public lands. Protection, management, and recovery of beach mice on public areas have been complicated by increased recreational use as public lands are rapidly becoming the only natural areas left on the coast. Public lands and their staff are now under pressure to manage for both the recovery of endangered species and recreational use. Where protection of large contiguous tracts of beach mouse habitat along the coast is not possible, establishing multiple independent populations is the best defense against local and complete extinctions due to storms and other stochastic events (Danielson 2005). Protecting multiple populations increases the chance that at least one population within the range of a subspecies will survive episodic storm events and persist while vegetation and dune structure recover.

Habitat connectivity also becomes essential where mice occupy fragmented areas lacking one or more habitat types. If scrub habitat is lacking from a particular tract, adjacent or connected tracts with scrub habitat are necessary for food and burrow sites when resources are scarce in the frontal dunes, and are essential to beach mouse populations during and immediately after hurricanes. Trapping data suggests that beach mice occupying the scrub following hurricanes recolonize the frontal dunes once vegetation and some dune structure have recovered (Swilling et al. 1998, Sneckenberger 2001). Similarly, when frontal dune habitat is lacking from a tract and a functional pathway to frontal dune habitat does not exist, beach mice may not be able to attain the resources necessary to expand the population and reach the densities necessary to persist through the harsh summer season or the next storm. Functional pathways may allow for natural behavior such as dispersal and exploratory movements, as well as gene flow to maintain genetic variability of the population within fragmented or isolated areas. To that end, contiguous tracts

or functionally connected patches of suitable habitat are essential to the long-term conservation of beach mice.

A lack of suitable burrow sites may be a consequence of habitat degradation. Beach mice use burrows to avoid predators, protect young, store food, and serve as refugia between foraging bouts and during periods of rest. Beach mice have been shown to select burrow sites based on a suite of abiotic and biotic factors. A limitation in one or more factors may result in a shortage of suitable sites and the availability of potential burrow sites in each habitat may vary seasonally. Beach mice tend to construct burrows in areas with greater plant cover, less soil compaction, steep slopes, and higher elevations above sea level (Lynn 2000, Sneckenberger 2001). These factors are likely important in minimizing energy costs of burrow construction and maintenance while maximizing the benefits of burrow use by making a safe and physiologically efficient refuge. Similar to food resources, this fluctuation in availability of burrow sites suggests that a combination of primary, secondary and scrub dune habitat is essential to beach mice at the individual level.

Predation

Beach mice have a number of natural predators including coachwhip (*Masticophis flagellum*) corn snakes (*Elaphe guttata guttata*), pygmy rattlesnake (*Sistrurus miliarius*), Eastern diamondback rattlesnake (*Crotalus adamanteus*), short-eared (*Asio flammeus*) and great-horned owls (*Bubo virginianus*), great blue heron (*Ardea herodias*), northern harrier (*Circus cyaneus*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*) skunk (*Mephitis mephitis*), weasel (*Shallela frenata*), and raccoon (*Procyon lotor*) (Blair 1951; Bowen 1968; Holler 1992; Novak 1997; Moyers et al. 1999; Van Zant and Wooten 2003). Predation in beach mouse populations that have sufficient recruitment and habitat availability is natural and not a concern. However, predation pressure from natural and non-native predators may result in the extirpation of small, local populations of beach mice.

Free-roaming and feral pets are believed to have a devastating effect on beach mouse persistence (Bowen 1968, Linzey 1978) and are considered to be the main cause of the loss of at least one population of beach mice (Holliman 1983). Cat tracks have been observed in areas of low trapping success for beach mice (Moyers et al. 1999). The PHVA for the ABM indicated that if each population had as few as one cat, which ate one mouse a day, rapid extinction occurred in over 99 percent of all iterations (Taylor-Holzer 2005).

In response to increasing depredation of sea turtle nests by coyote, fox, hogs, and raccoon, multi-agency cooperative effort have been initiated and are ongoing throughout Florida, in particular on public lands. These programs also benefit beach mice.

Hurricanes

Hurricanes can severely affect beach mice and their habitat, as tidal surge and wave action overwash habitat, leaving a flat sand surface denuded of vegetation; sand is deposited inland, completely or partially covering vegetation; blowouts between the ocean and bays and lagoons leave patchy landscapes of bare sand; primary dunes are sheared or eroded; and habitat is completely breached, creating channels from the ocean to bays and lagoons. Other effects include direct mortality of individuals, relocation/dispersal, and subsequent effects of habitat alterations (that impact such factors as forage abundance/production and substrate elevation). Habitat impacts can be widespread, encompassing the range of the subspecies.

Until frontal dune topography and vegetation redevelop, scrub habitat maintains beach mice populations and provides the majority of food resources and potential burrow sites (Lynn 2000a, Sneckenberger 2001). While storms temporarily reduce population densities (often severely), this disturbance regime maintains open habitat and retards plant succession, yielding a habitat more suitable for beach mice than one lacking disturbance. The low-nutrient soil of the coastal dune ecosystem often receives a pulse of nutrients from the deposition of vegetative debris along the coastline (Lomascolo and Aide 2001). Therefore, as the primary and secondary dunes recover, beach mice recolonize this habitat readily as food plants develop to take advantage of the newly available nutrients. Recovery times vary depending upon factors such as hurricane characteristics (*i.e.*, severity, amount of associated rain, directional movement of the storm eye, storm speed), successional stage of habitat prior to hurricane, elevation, and restorative actions post hurricane. Depending on these factors, recovery of habitat may take from one year to over 40 years.

The impact of hurricanes on plant communities temporarily affects food availability, and hence can limit population densities in impacted habitats soon after storms. Observations indicate that Hurricane Opal (a Category 3 storm in November 1995) caused a decrease in one population of ABM by 30 percent (Swilling et al. 2000). However, population densities in scrub habitat typically increased following hurricanes (Swilling et al. 2000). Sneckenberger (2001) also found atypical numbers of ABM in scrub following a hurricane. Five months post-storm, "densities (individuals/km) were up to 7.5 times greater in scrub areas than in frontal dune grids." Impacts of the storm may have been apparent as long as 17 months after the storm when scrub densities remained triple those of frontal dunes (Sneckenberger 2001). Moyers et al. (1999) found similar results for CBM at Grayton Beach State Park. When frontal and primary dunes sustained extensive damage during Hurricane Opal in 1995, beach mice were captured behind what remained of primary dune habitat. By 1998, however, primary dunes and the immediate habitat inland appeared to support higher numbers of beach mice.

In addition to the overall change in post Hurricane Opal distribution of ABM, Swilling et al. (1998) found the mean percent of newly marked individuals increased from 14 percent for the

three trapping periods before the storm to an average of 26.7 percent for the same interval post hurricane. The average for the three trapping periods immediately following was even higher, at 42.7 percent of the individuals captured. Swilling et al. (1998) concluded that this increased presence of new individuals reflected increased reproduction. A statistical analysis of the data indicated that the number of females exhibiting signs of reproduction was significantly higher than normal (18.9 percent higher). Moyers et al. (1999) also found similar results at Topsail Hill Preserve State Park. Four to five months following Hurricane Opal, all female CBM captured were pregnant or lactating. Trapping six months after the hurricane, Moyers et al. (1999) noted that 51.5 percent of captured CBM were new unmarked beach mice.

Although hurricanes can significantly alter beach mouse habitat and population densities in certain habitats, some physical effects may benefit the subspecies. Hurricanes are probably responsible for maintaining coastal dune habitat upon which beach mice depend through repeated cycles of destruction, alteration, and recovery of dune habitat. Holler et al. (1999) suggested that hurricanes could function to break up population subgroups and force population mixing. The resultant breeding between members of formerly isolated subgroups increases genetic heterogeneity and could decrease the probability of genetic drift and bottlenecks.

Beachfront Lighting

Artificial lighting increases the risk of predation and influences beach mouse foraging patterns and natural movements as it increases their perceived risk of predation. Foraging activities and other natural behaviors are influenced by many factors. Artificial lighting alters behavior patterns causing beach mice to avoid otherwise suitable habitat and decreases the amount of time they are active (Bird et al. 2004). The presence of vegetative cover reduces predation risk and perceived predation risk of foraging beach mice, and allows for normal movements, activity, and foraging patterns. Foraging in sites with vegetative cover is greater and more efficient than in sites without cover (Bird 2002). Beach mice have also been found to select habitat for increased percent cover of vegetation, and decreased distance between vegetated patches (Smith 2003).

Genetic variability

Selander et al. (1971) conducted an electrophoretic study on 30 populations of *P. polionotus*, including populations of beach mouse subspecies. Based on 30 allozyme loci, they estimated that the level of allozyme variation found in beach mouse populations was at least 40 percent lower than the level of variation in nearby inland populations. This work indicates that beach mouse populations already have lower genetic variability before inbreeding, bottleneck events, or founder effects that may occur in a reintroduced population. Lower levels of heterozygosity has been linked to less efficient feeding, fewer demonstrations of social dominance and exploratory behavior, and smaller body size (Smith et al. 1975, Garten 1976, Teska et al. 1990). Research focused on inbreeding depression in old-field mice (including one beach mouse subspecies), determined that the effects of inbreeding negatively influenced factors such as litter size, number of litters, and juvenile survivorship (Lacy et al. 1995).

Analysis of the Species/Critical Habitat Likely to be Affected

Beach mice are currently federally protected because of their low numbers caused by habitat loss with continuing threats to their habitat and resulting affects from storm and post-storm events. The primary reason for the significant reduction in their range is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated beach mouse habitat. Coastal urbanization has also increased the recreational use of beachfront areas. Dune habitat maintenance is an important component of beach mouse conservation. Providing a healthy and continuous dune system assures mouse population stability. Integral to this is keeping visitors to the beach off the dunes and replanting as necessary when impacts occur or are observed. The extremely active 2004 and 2005 hurricane seasons also had a severe affect on Florida's beaches and beach mouse habitat.

Generally, beach nourishment or dredged navigation channel material is not placed on existing beach mouse habitat consisting of vegetated dunes. Typical effects from these activities to beach mice and their habitats consist of the staging and storage of equipment, work vehicles, or materials and beach access for beach nourishment construction or dredged material placement. These effects may result in the permanent and temporary loss, degradation, or fragmentation of beach mouse habitat and changes in essential life history behaviors (dispersal and movement, foraging, seeking mates, breeding, and care of young). Beach mice spend their entire lives within the dune ecosystem and are nocturnal. Nourishment projects may occur at anytime of the year depending on their location and are usually conducted on a 24/7 schedule. The quality of the placed sand could affect the suitability of the beach and dunes to support beach mouse burrow construction and food sources. The effect of the activities covered under the consultation with incorporation of the proposed conservation measures on beach mice overall survival and recovery are considered in this biological opinion.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for Northern Florida Atlantic beaches extends from April 15 through November 30. Incubation ranges from about 45 to 95 days.

The proposed sand placement project area has a significant number of loggerhead nests. The proposed sand placement area lies within the St. Johns County beaches index nesting beach survey. Between 205 and 313 loggerhead nests were deposited annually on the St. Johns County beaches project area from 2004 through 2008.

The ASP project area has a number of loggerhead nests. Between 4 and 13 loggerhead nests were deposited annually on ASP from 2003 through 2007.

Green Sea Turtle

The green sea turtle nesting and hatching season for Northern Florida Atlantic extends from May 15 through November 15. Incubation ranges from about 45 to 75 days.

The proposed sand placement project area has a significant number of green turtle nests. The proposed sand placement area lies within the St. Johns County beaches index nesting beach survey. Between 10 and 33 green turtle nests were deposited annually on the St. Johns County beaches project area from 2004 through 2008.

The ASP project area has a number of green turtle nests. Between 0 and 2 green turtle nests were deposited annually on ASP from 2003 through 2007.

Leatherback Sea Turtle

The leatherback sea turtle nesting and hatching season for Northern Florida Atlantic beaches extends from April 15 through September 30. Incubation ranges from about 55 to 75 days.

The proposed sand placement project area has a significant number of leatherback turtle nests. The proposed sand placement area lies within the St. Johns County beaches index nesting beach survey. Between 0 and 5 leatherback turtle nests were deposited annually on the St Johns County beaches project area from 2004 through 2008.

From 2003 through 2007, the ASP has had no leatherback turtle nesting. One non-nesting event was recorded in 2003.

Hawksbill Sea Turtle

The hawksbill sea turtle nesting and hatching season for Nouthern Florida Atlantic beaches extends from June 1 through December 31. Incubation lasts about 60 days.

Hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Dade Counties) and the Florida Keys (Monroe County) (Meylan 1992, Meylan *et al.* 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan *et al.* 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1993).

Anastasia Island Beach Mouse

The known distribution of the AIBM is a result of cursory surveys and intermittent trapping involving different projects. There has not been a systematic trapping study done in order to determine the status of each subspecies throughout their ranges.

Factors affecting the species environment within the action area

EFFECTS OF THE ACTION

Common threats to sea turtles in Florida

Coastal Development

Loss of nesting habitat related to coastal development has had the greatest impact on nesting sea turtles in Florida. Beachfront development not only causes the loss of suitable nesting habitat, but can result in the disruption of powerful coastal processes accelerating erosion and interrupting the natural shoreline migration (National Research Council 1990b). This may in turn cause the need to protect upland structures and infrastructure by armoring, groin placement, beach emergency berm construction and repair, and beach nourishment which cause changes in, additional loss or impact to the remaining sea turtle habitat.

Hurricanes

Hurricanes were probably responsible for maintaining coastal beach habitat upon which sea turtles depend through repeated cycles of destruction, alteration, and recovery of beach and dune habitat. Hurricanes generally produce damaging winds, storm tides and surges, and rain and can result in severe erosion of the beach and dune systems. Overwash and blowouts are common on barrier islands. Hurricanes and other storms can result in the direct or indirect loss of sea turtle nests, either by erosion or washing away of the nests by wave action or inundation or "drowning" of the eggs or hatchlings developing within the nest or indirectly by loss of nesting habitat. Depending on their frequency, storms can affect sea turtles on either a short-term basis (nests lost for one season and/or temporary loss of nesting habitat) or long term, if frequent (habitat unable to recover). How hurricanes affect sea turtle nesting also depends on its characteristics (winds, storm surge, rainfall), the time of year (within or outside of the nesting season), and where the northeast edge of the hurricane crosses land.

Because of the limited remaining nesting habitat, frequent or successive severe weather events could threaten the ability of certain sea turtle populations to survive and recover. Sea turtles evolved under natural coastal environmental events such as hurricanes. The extensive amount of pre-development coastal beach and dune habitat allowed sea turtles to survive even the most severe hurricane events. It is only within the last 20 to 30 years that the combination of habitat loss to beachfront development and destruction of remaining habitat by hurricanes has increased

the threat to sea turtle survival and recovery. On developed beaches, typically little space remains for sandy beaches to become re-established after periodic storms. While the beach itself moves landward during such storms, reconstruction or persistence of structures at their pre-storm locations can result in a major loss of nesting habitat.

Erosion

The designation of a Critically Eroded Beach is a planning requirement of the State's Beach Erosion Control Funding Assistance Program. A segment of beach shall first be designated as critically eroded in order to be eligible for State funding. A critically eroded area is a segment of the shoreline where natural processes or human activity have caused or contributed to erosion and recession of the beach or dune system to such a degree that upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost. Critically eroded areas may also include peripheral segments or gaps between identified critically eroded areas because their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects (FDEP 2005). It is important to note, that for an erosion problem area to be critical, there shall exist a threat to or loss of one of four specific interests – upland development, recreation, wildlife habitat, or important cultural resources. The total of critically eroded beaches statewide in Florida for 2007 is 388 miles of 497 miles of shoreline. Seventy-eight (78) percent of the State's shoreline is considered to be critically eroded.

Beachfront Lighting

Artificial beachfront lighting may cause disorientation (loss of bearings) and misorientation (incorrect orientation) of sea turtle hatchlings. Visual signs are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967; Mrosovsky and Shettleworth 1968; Dickerson and Nelson 1989; Witherington and Bjorndal 1991). Artificial beachfront lighting is a documented cause of hatchling disorientation and misorientation on nesting beaches (Philibosian 1976; Mann 1977; FWC 2006). The emergence from the nest and crawl to the sea is one of the most critical periods of a sea turtle's life. Hatchlings that do not make it to the sea quickly are eaten by ghost crabs, birds, and other predators or become dehydrated and die before reaching the ocean. Some types of beachfront lighting attract hatchlings away from the sea while some lights cause adult turtles to avoid stretches of brightly illuminated beach. Research has documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights (Witherington 1992). During the 2007 sea turtle nesting season in Florida, over 64,000 turtle hatchlings were documented as being disoriented (**Table 2**) (FWC/FWRI 2007, http://www.myfwc.com/seaturtle/Lighting/Light_Disorient.htm). Exterior and interior lighting associated with condominiums had the greatest impact causing approximately 42 percent of documented hatchling disorientation/misorientation. Other causes included urban sky glow and street lights (http://www.myfwc.com/seaturtle/Lighting/Light_Disorient.htm).

Table 2. Documented Disorientations along the Florida coast.

Year	Total Number of Hatchling Disorientation Events	Total Number of Hatchlings Involved in Disorientation Events	Total Number of Adult Disorientation Events
2001	743	28,674	19
2002	896	43,226	37
2003	1,446	79,357	18
2004	888	46,487	24
2005	976	41,521	50
2006	1,521	71,798	40
2007	1,410	64,433	25
2008	1192	49,623	62

Predation

Depredation of sea turtle eggs and hatchlings by natural and introduced species occurs on almost all nesting beaches. Depredation by a variety of predators can considerably decrease sea turtle nest hatching success. The most common predators in the southeastern United States are ghost crabs (*Ocypode quadrata*), raccoons (*Procyon lotor*), feral hogs (*Sus scrofa*), foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), coyotes (*Canis latrans*), armadillos (*Dasypus novemcinctus*), cats (*Felis catus)*, and fire ants (*Solenopsis* spp.) (Dodd 1988, Stancyk 1995). Raccoons are particularly destructive on the Atlantic coast and may take up to 96 percent of all nests deposited on a beach (Davis and Whiting 1977, Hopkins and Murphy 1980, Stancyk et al. 1980, Talbert et al. 1980, Schroeder 1981, Labisky et al. 1986). As nesting habitat dwindles, it is essential that nest production be naturally maximized so the turtles may continue to exist in the wild.

In response to increasing depredation of sea turtle nests by coyote, fox, hog, and raccoon, multi-agency cooperative efforts have been initiated and are ongoing throughout Florida, particularly on public lands.

Climate Change

Based on the present level of available information concerning the effects of global climate change on the status of sea turtles, the Service acknowledges the potential for changes to occur in the action area, but presently has no basis to evaluate if or how these changes are affecting sea turtles or its designated critical habitat. Nor does our present knowledge allow the Service to project what the future effects from global climate change may be or the magnitude of these potential effects.

Factors affecting the species environment within the action area

Coastal development

Beach mice were listed as an endangered and threatened species primarily because of the fragmentation, adverse alteration and loss of habitat due to coastal development. The threat of development-related habitat loss continues to increase. Other contributing factors include low population numbers, habitat loss from a variety of reasons (including hurricanes), predation or competition by animals related to human development (cats and house mice), and the existing strength or lack of regulations regarding coastal development.

Hurricanes

Hurricanes were probably responsible for maintaining coastal beach habitat upon which beach mice depend through repeated cycles of destruction, alteration, and recovery of dune habitat. Hurricanes generally produce damaging winds, storm tides and surges, and rain and can result in severe erosion of the beach and dune systems. Overwash and blowouts are common on barrier islands. Hurricanes can impact beach mice either directly (*e.g.*, drowning) or indirectly (*e.g.*, loss of habitat). Depending on their frequency, storms can affect beach mice on either a short-term basis (*e.g.*, temporary loss of habitat) or long term (*e.g.*, loss of food, which in turn may lead to increased juvenile mortality, resulting in a depressed breeding season). How hurricanes affect beach mice also depends on the characteristics (winds, storm surge, rainfall), the time of year (within or outside of the nesting season), and where the northeast edge of the hurricane crosses land.

Because of the limited remaining habitat, frequent or successive severe weather events could compromise the ability of certain populations of beach mice to survive and recover. Beach mice evolved under natural coastal environmental events such as hurricanes. The extensive amount of pre-development coastal beach and dune habitat allowed beach mice to survive even the most severe hurricane events. It is only within the last 20 to 30 years that the combination of habitat loss to beachfront development and destruction of remaining habitat by hurricanes has increased the threat to beach mice survival and recovery. On developed beaches, typically little space remains for sandy beaches to become re-established after periodic storms. While the beach itself moves landward during such storms, reconstruction or persistence of structures at their pre-storm locations can result in a major loss of habitat for beach mice.

Beachfront Lighting

Artificial lighting along developed areas of the both coastlines continues to cause concern for beach mouse recovery. While a majority of coastal local governments and counties have adopted beachfront lighting ordinances compliance and enforcement is lacking in some areas. Further, the lighting in areas outside the beachfront ordinance coverage areas continues to have unregulated lighting resulting in urban glow. Even the darker areas of conservation managed lands are subject to being surrounded by the sky glow.

Predation

A major continuing threat to beach mice is predation by cats and other non-native species. The domestic cat *Felis catus* is not native to North America and is considered a separate species from its wild ancestral species, *Felis silvestris*. Cats are hunters, retaining this behavior from their ancestors. However, wildlife in the western Hemisphere did not evolve in the presence of a small, abundant predator like the domestic cat, and thus did not develop defenses against them. Cats were introduced to North America a few hundred years ago.

Free-ranging pet and feral cats prey on small mammals, birds, and other native wildlife. In the U.S., on a nationwide basis, cats kill over a billion small mammals and hundreds of millions of birds each year. Worldwide, cats are second only to habitat destruction in contributing to the extinction of birds. Cats have been documented to take beach mice, sea turtle hatchlings, shorebirds, and migratory birds. A significant issue in the recovery of beach mice is predation by free-ranging pet and feral cats. Beach mice have a number of natural predators including snakes, owls, herons, and raccoons. Predation is part of the natural world. However, predation pressure from both natural and non-native predators may result in the extirpation of small, local populations of beach mice in a very short time.

EFFECTS OF THE ACTION

Factors to be considered

Aspects of the sand placement and dredged material placement activities will occur within habitat that is used by beach mice year round. The activities include the storage of equipment, work vehicles, or materials and creation, expansion, or use of beach access points for beach nourishment construction or dredged material spoil placement. The work, depending on the location, may be conducted any time of the year. Most effects would be expected to be temporary. These short-term and temporary impacts could include loss of foraging habitat, altered beach mouse movement and dispersal activities. Long-term and permanent impacts from the sand placement activities such as excavation of dune habitat and degradation could impact beach mice by fragmentation of their habitat.

There are typically different "levels" of access sites needed for a project. The primary access is a "lay-down" yard, where pipe is delivered and stored, and storage trailers, and other equipment and materials are stored. These are typically big paved parking lots, so that the contractor's trucks can access the area to drop off and pick up equipment. There's typically a beach access at that point to get the pipe and equipment onto the beach and that access is usually at least 50-ft wide (the pipes are frequently 40- to 50-ft sections).

"Intermediate areas" are used at about the quarter points of the project length. These are used for the fuel tank, welding equipment, and other items or systems that get used a couple of times a day. These locations can vary from two to three miles apart.

Then there are access points to allow project vehicles and trucks on and off the beach. Based on previous projects it would be expected to have single-vehicle entry points at one-half to one-mile mile intervals.

Protective, avoidance, and minimization measures have been incorporated into the project plan to avoid or minimize the potential impacts from the beach nourishment and dredged spoil material placement activities. However, even with these measures, impacts to beach mice are expected to occur from some aspects of the project activities. The activities are expected to directly or indirectly adversely affect beach mice. The work may occur on public and/or private lands.

Proximity of Action: Some aspects of the beach nourishment and dredged material placement activities would occur directly in beach mouse habitat. The storage or staging of pipe and other equipment, and vehicles, use or creation of beach access points, and placement of pipe, nourishment or dredged material could occur in habitat occupied or used by AIBM. Beach mice spend their entire life cycle within the coastal dune system.

Timing: The timing of the activities would directly and indirectly impact beach mice and their habitat depending on the season. Beach mice reproduce year round with more mice being produced in the late winter and early spring. Impacts could include but would not be limited to disrupting mice seeking mates, constructing nest burrows, foraging for food, caring for their young, and young mice leaving the nest burrow dispersing into new habitat.

Nature of the Effect: The effects of the activities may include the temporary loss of habitat including the loss of a few beach mice from excavation of habitat for beach access and reduction of beach mouse activity including feeding, reproduction, and movement from loss or alteration of habitat. Activities that decrease the amount or quality of dune habitat or movement could affect beach mice by reducing the amount of available habitat and fragmenting the habitat.

Duration: Time to complete the project construction may vary depending on the project length, weather, and other factors (equipment mobilization and break downs, availability of fuel, lawsuits, etc.). Project work could take as little as a month and as long as a year or two.

Disturbance frequency: Depending on the nourishment and dredging project frequency, this could result in impacts to beach mice and their habitats at any time during the year on a minimum cycle of every three years.

Disturbance intensity and severity: The Action Area encompasses a small portion of the range of each species and the overall intensity of the disturbance is expected to be minimal. The severity is also likely to be slight as few if any mice would be lost and dune habitats can be restored quickly if protected from other impacts (pedestrians and vehicles).

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any cumulative effects in the project area.

CONCLUSION

Sea turtles

After reviewing the current status of the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles, the environmental baseline for the Action Area, the effects of the proposed sand placement activities and the cumulative effects, it is the Service's biological opinion that the proposed project, is not likely to jeopardize the continued existence of the loggerhead, green, leatherback, hawksbill or Kemp's ridley sea turtles. No critical habitat has been designated for any of the sea turtle species in the continental United States; therefore, none will be affected.

The conservation of the five loggerhead recovery units in the Northwest Atlantic is essential to the recovery of the loggerhead sea turtle. Each individual recovery unit is necessary to conserve genetic and demographic robustness, or other features necessary for long-term sustainability of the entire population. Thus, maintenance of viable nesting in each recovery unit contributes to the overall population. One of the five loggerhead recovery units in the Northwest Atlantic occur within the Action Area, the PFRU. The PFRU averages 64,513 nests per year. The entire recovery unit occurs within Florida and consists of approximately 1,166 miles of shoreline. Of the available nesting habitat within the PFRU, the project will occur on no more than 20,000 linear feet of beach for beach placement and 5,000 linear feet of beach for nearshore placement.

Generally, green, leatherback. hawksbill, and Kemp's ridley nesting overlaps with or occurs within the beaches where loggerhead sea turtle nests on both the Atlantic and Gulf of Mexico beaches. Thus, for green, leatherback, hawksbill, and Kemp's ridley sea turtles, sand placement activities will affect no more than 20,000 linear feet of beach for beach placement and 5,000 linear feet of beach for nearshore placement of the approximately 1,400 miles of available sea turtle nesting habitat in the southeastern U.S.

Research has shown that the principal effect of sand placement on sea turtle reproduction is a reduction in nesting success, and this reduction is most often limited to the first year following project construction. Research has also shown that the impacts of a sand placement project on sea turtle nesting habitat are typically short-term because a nourished beach will be reworked by natural processes in subsequent years, and beach compaction and the frequency of escarpment formation will decline. Although a variety of factors, including some that cannot be controlled, can influence how a sand placement project will perform from an engineering perspective, measures can be implemented to minimize impacts to sea turtles.

Beach Mice

The AIBM are located completely on county, state, or federally protected lands, except for a small area in St. Johns County in which the AIBM are found on private lands along the Florida coast.

After reviewing the current status of the species of the AIBM, the environmental baseline for the Action Area, the effects of beach nourishment and dredged material placement and associated activities, the minimization of impacts from the 'Terms and Conditions', and the cumulative

effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of any of the AIBM.

As discussed in the Effects of the Action section of this opinion, we would not expect the carrying capacity of beach mouse habitat within the Action Area to be reduced. Beach mouse habitat will continue to provide for the biological needs of the subspecies as demonstrated below:

1. No permanent lost of beach mouse habitat will occur within the Action Area from the project construction or maintenance.

2. Temporary impacts to beach mouse habitat will be restored within the Action Area after project completion.

3. A full complement of beach mouse habitat will remain within the Action Area after project completion.

Temporary impacts are expected to be limited to the construction/maintenance phase of the project and habitat restoration period following the project, which could be completed between one month and two years.

While a few beach mice may be lost, beach mice recover well from population size reductions (Wooten 1994) given sufficient habitat is available for population expansion after the bottleneck occurs. Therefore, we do not consider the potential loss of individuals to be significant.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the

permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service anticipates no more than 20,000 linear feet for beach placement, no more than 5,000 linear feet of beach for nearshore placement, and 60 feet of vegetated dune within the pipeline corridor could be taken as a result of this proposed action. The take is expected to be in the form of: (1) destruction of all nests that may be constructed and eggs that may be deposited from March 1 through April 30 and from September 1 through September 30 and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited from October 1 through February 28 (or 29 as applicable) when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Fish and Wildlife Service.

Incidental take is anticipated for no more than 20,000 linear feet for beach placement, 5,000 linear feet of beach for nearshore placement, and 60 feet of vegetated dune within the pipeline corridor. The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) the turtles nest primarily at night and all nests are not found because [a] natural factors, such as rainfall, wind, and tides may obscure crawls and [b] human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program; (2) the total number of hatchlings per undiscovered nest is unknown; (3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown; (4) an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area; (5) lights may misdirect an unknown number of hatchlings and cause death; and (6) escarpments may form and cause an unknown number of females from accessing a suitable nesting site. However, the level of take of these species can be anticipated by the disturbance and renourishment of suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) beach renourishment will likely occur during a portion of the nesting season; (3) the renourishment project will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter and/or misdirect nesting females and hatchlings.

The Service anticipates incidental take of the AIBM would be difficult to detect for the following reasons: (1) an unknown number of beach mice may be injured, crushed or buried during beach access construction work and remain entombed in the sand; (2) beach mice are nocturnal, are small, and finding a dead or injured body is unlikely because of predation, and (3) changes in

beach mouse essential life behaviors may not be detectable in standardized monitoring surveys.

For projects that occur within beach mouse habitat it is anticipated that no more than 60 linear feet of beach mouse habitat could be affected for beach access within a subspecies range statewide as a result of the sand placement activities.

The incidental take is expected to be in the form of: (1) harm or harassment to all beach mice occupying the created or expanded beach access points; (2) harassment of beach mice from disturbance of foraging opportunities within the access areas during the construction period; (3) harassment of beach mice from temporary loss of foraging and burrow habitat; and (4) harassment of beach mice from temporary restriction of movement across access areas.

EFFECT OF THE TAKE

Sea Turtles

In this BO, the Service determined that this level of anticipated take is not likely to result in jeopardy to the loggerhead, green, leatherback, hawksbill or Kemp's ridley sea turtles. Critical habitat has not been designated in the project area; therefore, the project will not result in destruction or adverse modification of critical habitat for any of the sea turtle species.

Incidental take of nesting and hatchling sea turtles and sea turtle nests is anticipated to occur during project construction and during the life of the project. Take will occur on nesting habitat consisting of the length of the beach where the restoration material will be placed but is not expected to exceed 20,000 linear feet for beach placement and 5,000 linear feet for nearshore placement.

Beach Mouse

In this BO, the Service determined that this level of anticipated take is not likely to result in jeopardy to the AIBM. Critical habitat for the AIBM has not been designated; therefore, the project will not result in destruction or adverse modification of critical habitat for either subspecies.

Incidental take of the AIBM is anticipated to occur at beach access locations for the sand placement activities. Take will occur during project construction where beach access points are expanded or created and where equipment is staged or stored within beach mouse habitat along approximately 60 feet of vegetated dunes for beach access.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of loggerhead, green, hawksbill, leatherback sea turtles, and the AIBM.

1. Beach quality sand suitable for sea turtle nesting, successful incubation, hatchling emergence and beach mouse burrow construction must be used on the project site.

2. All derelict concrete, metal, coastal armoring geotextile material or other debris must be removed from the beach prior to any sand placement.

3. Predator-proof trash receptacles must be installed and maintained at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice.

4. A meeting between representatives of the contractor, the Service, the FWC, and the permitted sea turtle surveyor, and other species surveyors as appropriate, shall be held prior to the commencement of work on this project.

5. During the sea turtle nesting season, daytime surveys for nesting sea turtles shall be conducted. If nests are constructed in the area of beach nourishment, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation. Nest relocation shall not occur upon completion of the project.

6. Beach compaction shall be monitored and tilling (non-vegetated areas to a minimum depth of 36 inches) shall be conducted if needed immediately after completion of the sand placement project and prior to the next three nesting seasons to reduce the likelihood of impacting sea turtle nesting and hatching activities. (NOTE: Out-year beach compaction monitoring and tilling are not required if placed material no longer remains on the dry beach.)

7. Escarpment formation shall be monitored and leveling shall be conducted if needed immediately after completion of the sand placement project and prior to the next three nesting seasons to reduce the likelihood of impacting nesting and hatchling sea turtles.

8. Construction equipment and materials shall be stored in a manner that will minimize impacts to nesting and hatchling sea turtles and beach mice to the maximum extent practicable.

9. Lighting associated with the project construction shall be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles and nocturnal activities of beach mice.

10. During the sea turtle nesting season, the contractor shall not extend the beach fill more than 500 feet along the shoreline between dusk and the following day until the daily nesting survey has been completed and the beach cleared for fill advancement. An exception to this may occur if there is a permitted sea turtle surveyor present on-site at night to monitor and report any sea turtles that may emerge within the project area.

11. Beach mouse habitat shall be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent practicable.

12. Equipment placement or storage shall be excluded in the area between 5 to 10 feet seaward of the existing dune toe or 10 percent of the beach width (for projects occurring on highly eroded beach segments) seaward of the dune toe in areas of occupied beach

mouse habitat.

13. Existing vegetated habitat at the beach access point must be protected to the maximum extent practicable and must be delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. Any vegetated areas impacted must be restored to pre-construction conditions.

14. The ASP will implement a trapping program to remove the AIBM from the 25-foot corridor in the action area prior to pipeline placement and removal.

15. Beach access points shall be restored to dune habitat within 3 months following project completion. The habitat restoration must consist of restoring the dune topography and planting with appropriate native dune vegetation (i.e., native to coastal dunes in the respective county and grown from plant stock from that region of Florida).

16. All truck haul construction shall be conducted during the day during sea turtle nesting season.

17. All vegetation planting shall be designed and conducted to minimize impacts to sea turtles and beach mice.

18. All sand fencing shall be designed and conducted to minimize impacts to sea turtles and beach mice.

19. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to the Service by March 1 of the year following completion of the proposed work for each year when the activity has occurred.

20. The Service and the FWC must be notified if a sea turtle adult, hatchling, or egg, or beach mouse is harmed or destroyed as a direct or indirect result of the project.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the CORPS must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The terms and conditions associated with a final statewide programmatic BO will supersede any terms and conditions applied to this individual consultation.

1. Beach compatible fill must be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material must be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm and 4.76mm (classified as sand by either the Unified Soils or the Wentworth classification), must be similar in color and grain size

distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the historic beach sediment at the disposal site, and must not contain:

1a. Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve;

1b. Greater than 5 percent, by weight, fine gravel retained on the #4 sieve (- 2.25φ);

1c. Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;

1d. Construction debris, toxic material or other foreign matter; and

1e. Material that will result in cementation of the beach.

If rocks or other non-specified materials appear on the surface of the filled beach in excess of 50 percent of background in any 10,000 square foot area, then surface rock should be removed from those areas. These areas must also be tested for subsurface rock percentage and remediated as required. If the natural beach exceeds any of the limiting parameters listed above, then the fill material must not exceed the naturally occurring level for that parameter on nearby native beaches.

Pursuant to subsection 62B-41.005(15), Florida Administrative Code (F.A.C.), sandy sediment derived from the maintenance of coastal navigation channels must be deemed suitable for beach placement with up to 10 percent fine material passing the #230 sieve, provided that it meets the criteria contained in 2b to 2e above and water quality standards. If this material contains between 10 percent and 20 percent fine material passing the #230 sieve by weight, and it meets all other sediment and water quality standards, it must be considered suitable for placement in the nearshore portion of the beach.

These standards must not be exceeded in any 10,000 square foot section extending through the depth of the nourished beach. If the native beach exceeds any of the limiting parameters listed above, then the fill material must not exceed the naturally occurring level for that parameter on nearby native beaches.

2. All derelict concrete, metal, and coastal armoring geotextile material and other debris shall be removed from the beach prior to any sand placement to the maximum extent practicable. If debris removal activities take place during the sea turtle nesting season (April 15 through September 30), the work shall be conducted during daylight hours only and shall not commence until completion of the sea turtle survey each day.

3. Predator-proof trash receptacles shall be installed and maintained at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice. The contractors conducting the work shall provide predator proof trash receptacles for the construction workers. All contractors and their employees shall be briefed on the importance of not littering and keeping the project area trash and debris free.

4. A meeting between representatives of the contractor, the Service, the FWC, the permitted sea turtle surveyor, and other species surveyors as appropriate, shall be held prior to the

commencement of work on projects. At least 10-business days advance notice shall be provided prior to conducting this meeting. The meeting will provide an opportunity for explanation and/or clarification of the sea turtle and beach mouse protection measures as well as additional guidelines when construction occurs during the sea turtle nesting season, such as storing equipment, minimizing driving, feral cat observation and reporting within the work area as well as follow up meetings during construction.

5. For sand placement projects that occur during the period from April 15 through September 30, daily early morning (before 9 a.m.) surveys shall be conducted, and eggs shall be relocated per the requirements below (5a to 5c). Sea turtle nesting surveys shall be conducted as indicated below.

   Nesting surveys shall be initiated 65 days prior to sand placement activities or by April 15 whichever is later. Nesting surveys shall continue through the end of the project or through November 30 whichever is earlier. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in 5a through 5c below.

   5a. Nesting surveys and egg relocations will only be conducted by persons with prior experience and training in these activities and who are duly authorized to conduct such activities through a valid permit issued by FWC, pursuant to F.A.C 68E-1. Please contact FWC's Marine Turtle Management Program in Tequesta at (561) 575-5408 for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (in all time zones). The contractor shall not extend the beach fill more than 500 feet along the shoreline between dusk and the following day until a daily nesting survey has been completed and the beach cleared for fill advancement. This measure will ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

   5b. Only those nests that may be affected by sand placement activities will be relocated. Nest relocation shall not occur upon completion of the project. Nests requiring relocation shall be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Relocated nests shall not be placed in organized groupings. Relocated nests shall be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, or subject to artificial lighting. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests.

   5c. Nests deposited within areas where construction activities have ceased or will not occur for 65 days or nests laid in the nourished berm prior to tilling shall be marked and left in place unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and/or a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. No activity will occur within this area nor will any activities occur which could result in impacts to the nest. Nest sites shall be inspected

daily to assure nest markers remain in place and the nest has not been disturbed by the project activity.

6. Sand compaction shall be monitored in the area of sand placement immediately after completion of the project and prior to April 15 for 3 subsequent years.

   Sand compaction shall be monitored in accordance with a protocol agreed to by the Service, FWC, and the applicant or local sponsor. At a minimum, the protocol provided under 6a and 6b below shall be followed. If tilling is required, the area shall be tilled to a depth of 36 inches. All tilling activity shall be completed prior to those dates listed above.

   Each pass of the tilling equipment shall be overlapped to allow thorough and even tilling. If the project is completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. (NOTE: The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.) A report on the results of the compaction monitoring shall be submitted to the Service's field office prior to any tilling actions being taken.

   6a. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station shall be midway between the dune line and the high water line (normal wrack line).

   6b. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final 6 averaged compaction values.

   6c. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area shall be tilled immediately prior to the following dates listed above.

   6d. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

   6e. Tilling shall occur landward of the wrack line and avoid all vegetated areas 3 square feet or greater with a 3 square foot buffer around the vegetated areas.

7. Visual surveys for escarpments along the project area shall be made immediately after completion of the sand placement project and March 15 to April 15 for 3 subsequent years if sand from the project area still remains on the beach.

   Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of at least 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation by April 15. Any escarpment removal shall be reported by location. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service shall be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service or FWC will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted to the Service's North Florida Field Office.(NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the dry beach).

8. Staging areas for construction equipment shall be located off the beach, if off-beach staging areas are available, during the sea turtle nesting season. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities.

9. Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area during the sea turtle nesting season and shall comply with safety requirements.

   Lighting on offshore or onshore equipment shall be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the water's surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and Occupational Safety and Health Administration (OSHA) requirements. Light intensity of lighting equipment shall be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields shall be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (**Figure 3**).

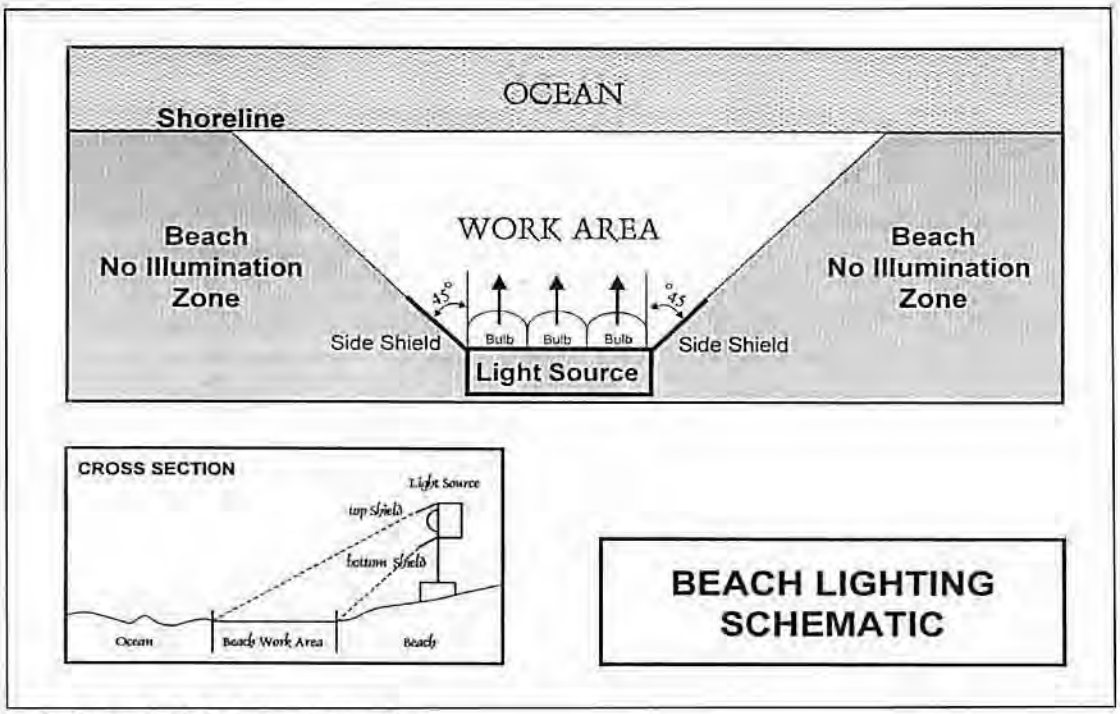


Figure 3. Beach lighting schematic.

10. During the sea turtle nesting season, the contractor shall not extend the beach fill more than 500 feet along the shoreline between dusk and the following day until the daily nesting survey has been completed and the beach cleared for fill advancement. An exception to this may occur if there is permitted sea turtle surveyor present on-site to ensure no nesting and hatching sea turtles are present within the extended work area. If the 500 feet is not feasible for the project, an agreed upon distance will be decided on during the preconstruction meeting. Once the beach has been cleared and the necessary nest relocations have been completed, the contractor will be allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length limitation shall apply.

Protection of Beach Mice

11. Beach mouse habitat shall be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent practicable. Suitable beach mouse habitat constitutes the primary dunes (characterized by sea and other grasses), secondary dunes (similar to primary dunes, but also frequently includes such plants as woody goldenrod, false rosemary), and interior or scrub dunes.

12. All construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Pipes placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune. Temporary storage of pipes shall be off the beach to the maximum extent possible. If the pipes shall be on the beach, they shall be placed in a manner that will minimize the impact to nesting habitat and shall not compromise the integrity of the dune systems. Equipment placement or storage shall be excluded in the area between 5 to 10 feet seaward of the existing dune toe or 10 percent of the beach width (for projects occurring on narrow eroded

beach segments) seaward of the dune toe in areas of occupied beach mouse habitat (**Figure 4**). The toe of the dune is where the slope breaks at the seaward foot of the dune.

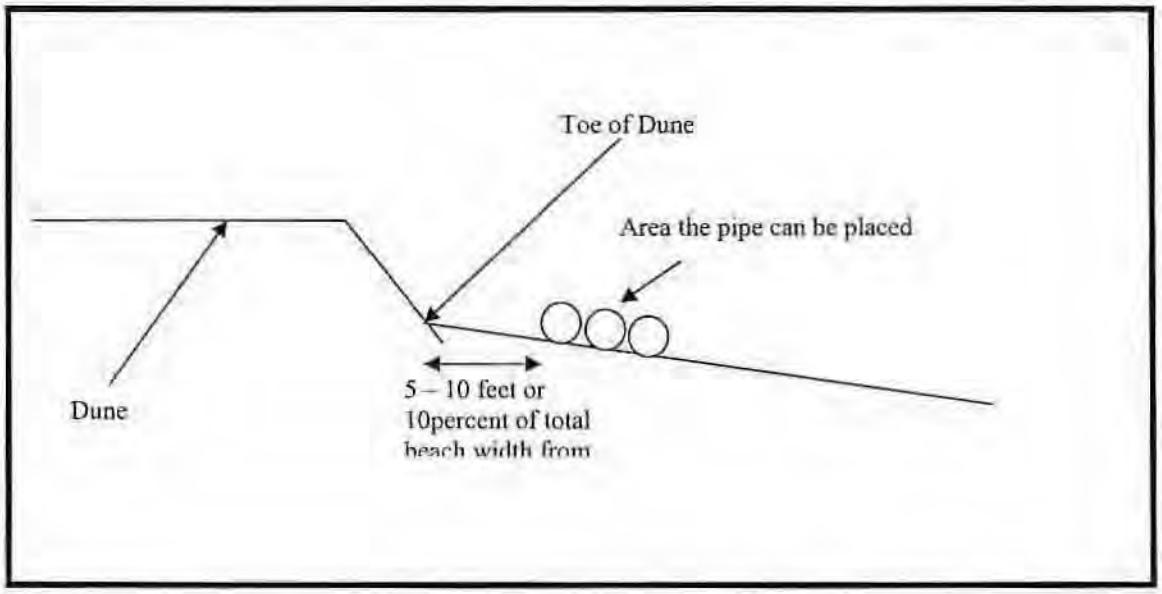


Figure 4. Equipment placement for projects occurring in beach mouse occupied habitat.

13. Existing or previously used beach access points must be used for vehicle and equipment beach access. These accesses must be delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The topography at the accesses must be fully restored to pre-project work configuration following project completion. Equipment and material staging/storage areas for the project must be located outside of vegetated dune habitat. Parking areas for construction crews must be located as close as possible to the work sites, but outside of vegetated dunes to minimize impacts to existing habitat and the need to transport workers along the beachfront.

14. Beach accesses that impact vegetated dunes must be replanted within 3 months following project completion. The habitat restoration must consist of restoring the dune topography and planting with at least three species of appropriate native dune vegetation (i.e., native to coastal dunes in the respective county and grown from plant stock from that region of Florida). In order for the restoration to be considered successful 80 percent of the total planted vegetation must be documented to survive six months following planting of vegetation. If the habitat restoration is unsuccessful, the area must be replanted following coordination with the Service.

15. The AISRA biologists will trap (using the trapping protocol prepared by the Service) the access areas five days prior to the pipeline placement and removal. All the captured mice will be tagged and relocated using a "hard release" technique. The mice will be placed in areas of suitable beach mouse habitat at least 1000 feet from the action area.

16. All truck haul construction shall be conducted during the day during sea turtle nesting season.

Dune Planting

17. All vegetation planting shall be designed and conducted to minimize impacts to sea turtles and beach mice. Dune vegetation planting may occur during the sea turtle nesting season under the following conditions.

    a. Daily early morning sea turtle nesting surveys (before 9 a.m.) shall be conducted during the period from May 1 through October 31 for all counties in Florida where sea turtle nesting occurs. If the planting is conducted in Brevard, Indian River, St. Lucie, Martin, Palm Beach, or Broward Counties, daily early morning surveys shall be extended to include March 1 through April 30 and November 1 through November 30. Nesting surveys shall only be conducted by personnel with prior experience and training in nesting surveys. Surveyors shall have a valid FWC permit. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (all times). No dune planting activity shall occur until after the daily turtle survey and nest conservation and protection efforts have been completed. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys;

    b. Any nests deposited in the dune planting area not requiring relocation for conservation purposes shall be left in place. The turtle permit holder shall install an on-beach marker at the nest site or a secondary marker at a point as far landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 3-foot radius around the nest. No planting or other activity shall occur within this area nor will any activities be allowed which could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the planting activity;

    c. If a nest is disturbed or uncovered during planting activity, the contractor, Applicant or the Applicant's contractors shall cease all work and immediately contact the project turtle permit holder. If a nest(s) cannot be safely avoided during planting, all activity within 10 feet of a nest shall be delayed until hatching and emerging success monitoring of the nest is completed;

    d. All dune planting activities shall be conducted by hand and only during daylight hours;

    e. All dune vegetation shall consist of coastal dune species native to the local area; (*i.e.*, native to coastal dunes in the respective county and grown from plant stock from that region of Florida). Vegetation shall be planted with an appropriate amount of fertilizer and antidesiccant material for the plant size;

f. No use of heavy equipment shall occur on the dunes or seaward for planting purposes. A lightweight (all-terrain type) vehicle, with tire pressures of 10 psi or less may be used for this purpose; and

g. Irrigation equipment, if needed, shall be authorized under a FDEP permit.

Sand Fencing

18. All sand fencing shall be designed and conducted to minimize impacts to sea turtles and beach mice.

    a. If the sand fence installations are conducted during the period of April 15 through November 30, daily early morning surveys for sea turtle nests must be conducted until completion of the project. To the maximum extent possible, nests must be marked and avoided with a 10-foot buffer. If nests are laid in areas where they may be affected by the sand fencing placement, eggs shall be relocated per the requirements listed in 5a through 5c listed above.

    b. Sand fencing located seaward of the crest of the primary dune must be designed and installed with a maximum of ten (10) foot long spurs of sand fencing spaced at a minimum of seven (7) feet on a diagonal alignment (facing the predominate wind direction) for the shore parallel coverage of the subject property (**Figure 5**).

    c. Once a sand fence becomes buried it must be removed and repositioned prior to the fence becoming 50% buried to maximize sand buildup.

    d. The sand fencing must be maintained by the ASP, if upon site inspection by the Service, FDEP's Bureau of Beaches and Coastal Systems, or the FWC, Bureau of Imperiled Species Management, if it is determined that the fence adversely impacts nesting or hatchling turtles, the fence must be removed or repositioned, as appropriate.

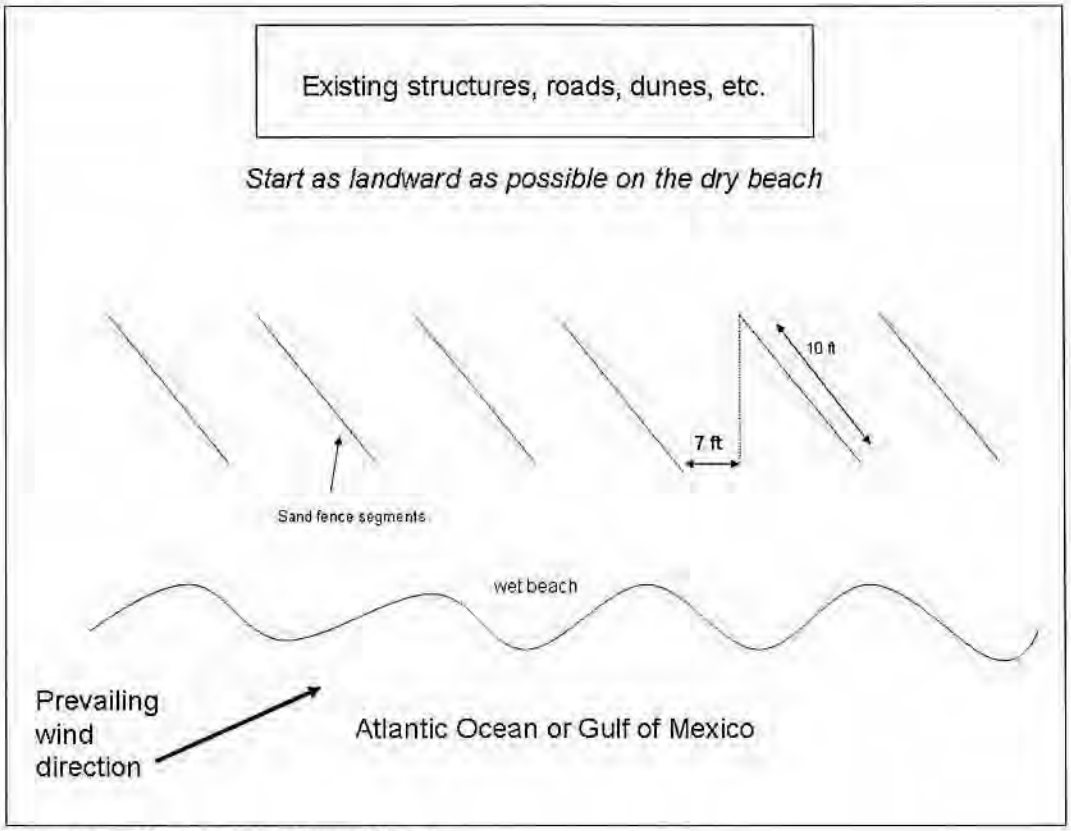


Figure 5. Placement of sand fence.

Reporting

19. A report describing the projects conducted during the year and actions taken to implement the reasonable and prudent measures and terms and conditions of this incidental take statement shall be submitted to the Service by March 1 of the following year of completing the proposed work for each year when the activity has occurred. This report will include the following information:

Table 3. Information to include in the report following the project completion.

All projects	Project location (include Florida DEP R-Monuments)
	Project description
	Dates of actual construction activities
	Names and qualifications of personnel involved in sea turtle nesting surveys and relocation activities (separate the nests surveys for nourished and non-nourished areas)
	Descriptions and locations of self-release beach sites
Added reporting for beach mice	Acreage of new or widened access areas affected in beach mouse habitat

	Vegetation completed for new or widened access areas
	Success rate of vegetation of restoration

20. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project shall be notified immediately so the eggs can be moved to a suitable relocation site.

    Upon locating a dead or injured sea turtle adult, hatchling, egg, or beach mouse that may have been harmed or destroyed as a direct or indirect result of the project, the Corps, permittee, and/or local sponsor shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the Service North Florida Field Office at 904-731-3336 immediately.

    Care shall be taken in handling injured sea turtles, eggs or beach mice to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

The Service believes that incidental take will be limited to no more than 20,000 linear feet of beach that have been identified for sand placement, no more than 5,000 linear feet for near shore placement, and no more than 60 linear feet of occupied AIBM vegetated dune habitat within the pipeline corridor. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The terms and conditions associated with a final statewide programmatic BO will supersede any terms and conditions applied to this individual consultation. The Service believes that no more than the following types of incidental take will result from the proposed action: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service. The amount or extent of incidental take for sea turtles and AIBM will be considered exceeded if the project results in more than 20,000 linear feet of beach that have been identified for sand placement, more than 5,000 linear feet for near shore placement, and more than 60 linear feet of occupied AIBM vegetated dune habitat within the pipeline corridor. The terms and conditions associated with a final statewide programmatic BO will supersede any terms and conditions applied to this individual consultation. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation

of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

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

1. All created dunes should be planted with at least three species of appropriate native salt-resistant dune vegetation. Examples along the Atlantic coast include: *Panicum amarum* (panic grass), *Uniola paniculata* (sea oats must be grown from local genetic stock), *Ipomoea stolonifera* (beach morning glory) or *Ipomea pes-caprae* (railroad vine).

2. Construction activities for this project and similar future projects should be planned to take place outside the main part of the sea turtle nesting and hatching season.

3. Surveys for nesting success of sea turtles should be continued for a minimum of 3 years following beach nourishment to determine whether sea turtle nesting success has been adversely impacted.

4. Educational signs should be placed where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this BO, please contact Ann Marie Lauritsen of this office at (904) 525-0661.

Sincerely,

for David L. Hankla
Field Supervisor

cc:
Robbin Trindell, FWC, Office of Protected Species Management, Tallahassee, FL
Ken Graham, FWS, Ecological Services, Atlanta, GA (electronic version)

LITERATURE CITED

Ackerman, R.A. 1980. Physiological and ecological aspects of gas exchange by sea turtle eggs. American Zoologist 20:575-583.

Baldwin, R., G.R. Hughes, and R.I.T. Prince. 2003. Loggerhead turtles in the Indian Ocean. Pages 218-232 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Bernardo, J. and P.T. Plotkin, 2007. An evolutionary perspective on the arribada phenomenon and reproductive behavior polymorphism of olive ridley sea turtles (*Lepidochelys olivacea*). Pages 59-87 *in* Plotkin, P.T. (editor). Biology and Conservation of Ridley Sea Turtles. John Hopkins University Press, Baltimore, Maryland.

Bigler, W.J. and J.H. Jenkins. 1975. Population characteristics of *Peromyscus gossypinus* and *Sigmodon hispidus* in tropical hammocks of South Florida. Journal of Mammalogy 56:633-644.

Bird, B.L. 2002. Effects of predatory risk, vegetation structure, and artificial lighting on the foraging behavior of beach mice. Unpublished M.S. thesis. University of Florida, Gainesville, Florida.

Bjorndal, K.A., A.B. Meylan, and B.J. Turner. 1983. Sea turtles nesting at Melbourne Beach, Florida, I. Size, growth and reproductive biology. Biological Conservation 26:65-77.

Blair, W.F. 1951. Population structure, social behavior and environmental relations in a natural population of the beach mouse (*Peromyscus polionotus leucocephalus*). Contributions Laboratory Vertebrate Zoology, University of Michigan 48:1-47.

Bolten, A.B. 2003. Active swimmers - passive drifters: the oceanic juvenile stage of loggerheads in the Atlantic system. Pages 63-78 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Bowen, W.W. 1968. Variation and evolution of Gulf coast populations of beach mice (*Peromyscus polionotus*). Bulletin Florida State Museum of Biological Science 12:1-91.

Bowen, B.W. 1994. Letter dated November 17, 1994, to Sandy MacPherson, National Sea Turtle Coordinator, Service, Jacksonville, Florida. University of Florida. Gainesville, Florida.

Bowen, B.W. 1995. Letter dated October 26, 1995, to Sandy MacPherson, National Sea Turtle Coordinator, Service, Jacksonville, Florida. University of Florida. Gainesville, Florida.

Bowen, B., J.C. Avise, J. I. Richardson, A.B. Meylan, D. Margaritoulis, and S.R. Hopkins-Murphy. 1993. Population structure of loggerhead turtles (*Caretta caretta*) in the northwestern Atlantic Ocean and Mediterranean Sea. Conservation Biology 7(4):834-844.

Caldwell, D.K. 1962. Comments on the nesting behavior of Atlantic loggerhead sea turtles, based primarily on tagging returns. Quarterly Journal of the Florida Academy of Sciences 25(4):287-302.

Carr, A. and L. Ogren. 1960. The ecology and migrations of sea turtles, 4. The green turtle in the Caribbean Sea. Bulletin of the American Museum of Natural History 121(1):1-48.

Carthy, R.R., A.M. Foley, and Y. Matsuzawa. 2003. Incubation environment of loggerhead turtle nests: effects on hatching success and hatchling characteristics. Pages 144-153 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Caughley, G. and A. Gunn. 1996. Conservation biology in theory and practice. Blackwell Science, Oxford.

Chaloupka, M. 2001. Historical trends, seasonality and spatial synchrony in green sea turtle egg production. Biological Conservation 101:263-279.

Christens, E. 1990. Nest emergence lag in loggerhead sea turtles. Journal of Herpetology 24(4):400-402.

Coastal Engineering Research Center. 1984. Shore protection manual, volumes I and II. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Coastal Tech. 1999. St. Andrews Bay entrance. Inlet management - feasibility and design investigation. Preliminary draft 9/23/99 to FDEP, Bureau of Beaches and Coastal Systems.

Congdon, J.D., A.E. Dunham, and R.C. van Loben Sels. 1993. Delayed sexual maturity and demographics of Blanding's turtles (*Emydoidea blandingii*): implications for conservation and management of long-lived organisms. Conservation Biology 7(4):826-833.

Corliss, L.A., J.I. Richardson, C. Ryder, and R. Bell. 1989. The hawksbills of Jumby Bay, Antigua, West Indies. Pages 33-35 *in* Eckert, S.A., K.L. Eckert, and T.H. Richardson (compilers). Proceedings of the Ninth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFC-232.

Crouse, D.T., L.B. Crowder, and H. Caswell. 1987. A stage-based population model for loggerhead sea turtles and implications for conservation. Ecology 68:1412-1423.

Crouse, D. 1999. Population modeling and implications for Caribbean hawksbill sea turtle management. Chelonian Conservation and Biology 3(2):185-188.

Dahlen, M.K., R. Bell, J.I. Richardson, and T.H. Richardson. 2000. Beyond D-0004: Thirtyfour years of loggerhead (*Caretta caretta*) research on Little Cumberland Island, Georgia, 1964-1997. Pages 60-62 *in* Abreu-Grobois, F.A., R. Briseno-Duenas, R. Marquez, and L.

Sarti (compilers). Proceedings of the Eighteenth International Sea Turtle Symposium. NOAA Technical Memorandum NMFS-SEFSC-436.

Daniel, R.S. and K.U. Smith. 1947. The sea-approach behavior of the neonate loggerhead turtle (*Caretta caretta*). Journal of Comparative and Physiological Psychology 40(6):413-420.

Danielson, B.J. 2005. Importance of multiple independent populations of Alabama beach mice. Issue paper and presentation to Alabama beach mouse recovery team. May 16, 2005.

Davis, G.E. and M.C. Whiting. 1977. Loggerhead sea turtle nesting in Everglades National Park, Florida, U.S.A. Herpetologica 33:18-28.

Dean, C. 1999. Against the tide: the battle for America's beaches. Columbia University Press; New York, New York.

Dickerson, D.D. and D.A. Nelson. 1989. Recent results on hatchling orientation responses to light wavelengths and intensities. Pages 41-43 *in* Eckert, S.A., K.L. Eckert, and T.H. Richardson (compilers). Proceedings of the 9th Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFC-232.

Dodd, C.K., Jr. 1988. Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). Service, Biological Report 88(14).

Dodd, M.G. and A.H. Mackinnon. 1999. Loggerhead turtle (*Caretta caretta*) nesting in Georgia, 1999: implications for management. Georgia Department of Natural Resources unpublished report. 41 pp.

Dodd, M.G. and A.H. Mackinnon. 2000. Loggerhead turtle (*Caretta caretta*) nesting in Georgia, 2000: implications for management. Georgia Department of Natural Resources unpublished report. 47 pp.

Dodd, M.G. and A.H. Mackinnon. 2001. Loggerhead turtle (*Caretta caretta*) nesting in Georgia, 2001. Georgia Department of Natural Resources unpublished report submitted to the U.S. Fish and Wildlife Service for grant E-5-1 "Coastal Endangered Species Management." 46 pp.

Dodd, M.G. and A.H. Mackinnon. 2002. Loggerhead turtle (*Caretta caretta*) nesting in Georgia, 2002. Georgia Department of Natural Resources unpublished report submitted to the U.S. Fish and Wildlife Service for grant E-5-2 "Coastal Endangered Species Management." 46 pp.

Dodd, M.G. and A.H. Mackinnon. 2003. Loggerhead turtle (*Caretta caretta*) nesting in Georgia, 2003. Georgia Department of Natural Resources unpublished report submitted to the U.S. Fish and Wildlife Service for grant E-5-3 "Coastal Endangered Species Management." 46 pp.

Dodd, M.G. and A.H. Mackinnon. 2004. Loggerhead turtle (*Caretta caretta*) nesting in Georgia, 2004. Georgia Department of Natural Resources unpublished report submitted to the U.S.

Fish and Wildlife Service for grant E-5-4 "Coastal Endangered Species Management." 44 pp.

Dodd, M. 2006. Personal communication to Sandy MacPherson, Service. Georgia Department of Natural Resources.

Douglas, B. 1997. Global Sea Rise: A Redetermination. Surveys in Geophysics Vol 18 (2, 3) pp. 279-292.

Ehrhart, L.M. 1978. Choctawhatchee beach mouse. Pages 18-19 *in* Layne, J.N. (editor), Rare and endangered biota of Florida, Volume I, Mammals. University Presses of Florida, Gainsville, Florida.

Ehrhart, L.M. 1989. Status report of the loggerhead turtle. Pages 122-139 *in* Ogren, L., F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham (editors). Proceedings of the 2nd Western Atlantic Turtle Symposium. NOAA Technical Memorandum NMFS-SEFC-226.

Ehrhart, L.M., D.A. Bagley, and W.E. Redfoot. 2003. Loggerhead turtles in the Atlantic Ocean: geographic distribution, abundance, and population status. Pages 157-174 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Ehrlich, P.R. 1988. The loss of diversity: causes and consequences. Pages 21-27 *in* Wilson, E.O. (editor). Biodiversity. National Academy Press, Washington, D.C.

Emanuel, K. 2005. Increasing Destructiveness of Tropical Cyclones Over the Past 30 Years, Nature Vol 436 (4) pp. 686-688.

Encalada, S.E., K.A. Bjorndal, A.B. Bolten, J.C. Zurita, B. Schroeder, E. Possardt, C.J. Sears, and B.W. Bowen. 1998. Population structure of loggerhead turtle (*Caretta caretta*) nesting colonies in the Atlantic and Mediterranean as inferred from mitochondrial DNA control region sequences. Marine Biology 130:567-575.

Ernest, R.G. and R.E. Martin. 1993. Sea turtle protection program performed in support of velocity cap repairs, Florida Power & Light Company St. Lucie Plant. Applied Biology, Inc., Jensen Beach, Florida. 51 pp.

Ernest, R.G. and R.E. Martin. 1999. Martin County beach nourishment project: sea turtle monitoring and studies. 1997 annual report and final assessment. Unpublished report prepared for the Florida Department of Environmental Protection.

Extine, D.D. 1980. Population ecology of the beach mouse, *Peromyscus polionotus niveiventris*. Unpublished M.S. thesis. Department of Natural Sciences, University of Central Florida, Orlando, Florida.

Extine, D.D. and I.J. Stout. 1987. Dispersion and habitat occupancy of the beach mouse *Peromyscus polionotus niveiventris*. Journal of Mammalogy 68:297-304.

Fletemeyer, J. 1980. Sea turtle monitoring project. Unpublished report prepared for the Broward County Environmental Quality Control Board, Florida.

FDEP. 2000. Topsail Hill State Preserve unit management plan. Division of Recreation and Parks.

FDEP. 2005. Critically eroded beaches in Florida. Bureau of Beaches and Coastal Systems. 76 pp.

Fleming, K.L. and N.R. Holler. 1990. Reproduction in captive Santa Rosa beach mice (*Peromyscus polionotus leucocephalus*) and Choctawhatchee beach mice (*Peromyscus polionotus allophrys*). Journal of the Alabama Academy of Science 61:143

FWC. 2007a. Reported nesting activity of the Kemps Ridley (*Lepidochelys kempii*), in Florida, 1979-2007. Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. Data Summary Date: 1 July 2008. http://research.myfwc.com/images/articles/2377/sea_turtle_nesting_on_florida_bchs_93-07.pdf

FWC. 2007b. Sea turtle protection ordinance adopted by counties and municipalities (as of 01/02/2008). http://myfwc.com/seaturtle/Lighting/Light_Ordinance.htm

Foley, A. 2005. Personal communication to Loggerhead Recovery Team. Florida Fish and Wildlife Research Institute.

Foley, A., B. Schroeder, and S. MacPherson. In press. Post-nesting migrations and resident areas of Florida loggerheads. *In* Proceedings of the Twenty-fifth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum.

Foltz, D.W. 1981. Genetic evidence for the long-term monogamy in a small rodent, Peromyscus polionotus. American Naturalist 117:665-675.

Frair, W., R.G. Ackerman, and N. Mrosovsky. 1972. Body temperature of *Dermochelys coriacea:* warm water turtle from cold water. Science 177:791-793.

Frank, P.A. and S.R. Humphrey. 1992. Populations, habitat requirements, and management of the endemic Anastasia island beach mouse (*Peromyscus polionotus phasma*), emphasizing the potential threat of exotic house mice (*Mus musculus*). Final Rep. No. NG88-006 to Florida Game and Fresh Water Fish Commission. 70 pp.

Frazer, N.B. and J.I. Richardson. 1985. Annual variation in clutch size and frequency for loggerhead turtles, *Caretta-caretta*, nesting at Little Cumberland Island, Georgia, USA. Herpetologica 41(3):246-251.

Galindo-Leal, C. and C.J. Krebs. 1998. Effects of food abundance on individuals and populations of the rock mouse (*Peromyscus difficilis*). Journal of Mammology 79(4):1131-1142.

Garten, C.T., Jr. 1976. Relationships between aggressive behavior and genetic heterozygosity in the oldfield mouse, *Peromyscus polionotus*. Evolution 30:59-72.

Georges, A., C. Limpus, and R. Stoutjesdijk. 1994. Hatchling sex in the marine turtle *Caretta caretta* is determined by proportion of development at a temperature, not daily duration of exposure. Journal of Experimental Zoology 200:432-444.

Gerrodette, T. and J. Brandon. 2000. Designing a monitoring program to detect trends. Pages 36-39 *in* Bjorndal, K.A. and A.B. Bolten (editors). Proceedings of a Workshop on Assessing Abundance and Trends for In-water Sea Turtle Populations. NOAA Technical Memorandum NMFS-SEFSC-445.

Glenn, L. 1998. The consequences of human manipulation of the coastal environment on hatchling loggerhead sea turtles (*Caretta caretta*, L.). Pages 58-59 *in* Byles, R., and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

Godfrey, P.J., S.P. Leatherman, and P.A. Buckley. 1978. Impact of off-road vehicles on coastal ecosystems. Pages 581-599 *in* Coastal Zone '78 Symposium on Technical, Environmental Socioeconomic and Regulatory Aspects of Coastal Zone Management. Vol. II, San Francisco, California.

Godfrey, M.H. and N. Mrosovsky. 1997. Estimating the time between hatching of sea turtles and their emergence from the nest. Chelonian Conservation and Biology 2(4):581-585.

Gore, J. Florida Game and Fresh Water Fish Commission. 1994. Letter to John Milio. 5 pp.

Greer, A.E., J.D. Lazell, Jr., and R.M. Wright. 1973. Anatomical evidence for counter-current heat exchanger in the leatherback turtle (*Dermochelys coriacea*). Nature 244:181.

Groom, M.J. and M. A. Pascual. 1997. The analysis of population persistence: an outlook on the practice of viability analysis. Pages 1-27 *in* Fiedler, P.L. and P.M. Karieva (editors). Conservation Biology for the Coming Decade. Chapman and Hall, New York.

Hall, E.R. 1981. The mammals of North America, second edition. John Wiley and Sons; New York, New York.

Hailman, J.P. and A.M. Elowson. 1992. Ethogram of the nesting female loggerhead (*Caretta caretta*). Herpetologica 48:1-30.

Hays, G.C. 2000. The implications of variable remigration intervals for the assessment of population size in marine turtles. Journal of Theoretical Biology 206:221-227.

Hendrickson, J.R. 1958. The green sea turtle *Chelonia mydas* (Linn.) in Malaya and Sarawak. Proceedings of the Zoological Society of London 130:455-535.

Hendrickson, J.R. 1980. The ecological strategies of sea turtles. American Zoologist 20:597-608.

Henwood, T.A. and L.H. Ogren. 1987. Distribution and migration of immature Kemp's ridley turtles (*Lepidochelys kempi*) and green turtles (*Chelonia mydas*) off Florida, Georgia, and South Carolina. Northeast Gulf Science 9(2):153-159.

Heppell, S.S. 1998. Application of life-history theory and population model analysis to turtle conservation. Copeia 1998(2):367-375.

Heppell, S.S., L.B. Crowder, and T.R. Menzel. 1999. Life table analysis of long-lived marine species with implications for conservation and management. Pages 137-148 *in* Musick, J.A. (editor). Life in the Slow Lane: Ecology and Conservation of Long-lived Marine Animals. American Fisheries Society Symposium 23, Bethesda, Maryland.

Heppell, S.S., M.L. Snover, and L.B. Crowder. 2003. Sea turtle population ecology. Pages 275-306 *in* Lutz, P.L., J.A. Musick, and J. Wyneken (editors). The Biology of Sea Turtles, Volume II. CRC Press. Boca Raton, Florida.

Hildebrand, H.H. 1963. Hallazgo del área de anidación de la tortuga marina "lora" *Lepidochelys kempi* (Garman), en la coasta occidental del Golfo de México. Sobretiro de Ciencia, México 22:105-112.

Hill, E.A. 1989. Population dynamics, habitat, and distribution of the Alabama beach mouse. Unpublished M.S. thesis. Auburn University, Auburn, Alabama.

Hirth, H.F. 1997. Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). Service, Biological Report 97(1).

Holler, N.R. 1992a. Choctawhatchee beach mouse. Pages 76-86 *in* Humphrey, S.R. (editor). Rare and Endangered Biota of Florida, Volume 1. Mammals. University Presses Florida, Tallahassee, Florida.

Holler, N.R. 1992b. Perdido Key beach mouse. Pages 102-109 *in* Humphrey, S.R. (editor). Rare and Endangered Biota of Florida, Volume 1. Mammals. University Presses of Florida, Tallahassee.

Holler, N.R., M.C. Wooten, and C.L. Hawcroft. 1997. Population biology of endangered Gulf coast beach mice (*Peromyscus polionotus*): conservation implication. Technical Report. Alabama Cooperative Fish and Wildlife Research Unit.

Holliman, D.C. 1983. Status and habitat of Alabama gulf coast beach mice *Peromyscus polionotus ammobates* and *P. p. trissyllepsis*. Northeast Gulf Science 6:121-129.

Hopkins, S.R. and T.M. Murphy. 1980. Reproductive ecology of *Caretta caretta* in South Carolina. South Carolina Wildlife Marine Resources Department Completion Report. 97 pp.

Hosier, P.E., M. Kochhar, and V. Thayer. 1981. Off-road vehicle and pedestrian track effects on the sea –approach of hatchling loggerhead turtles. Environmental Conservation 8:158-161.

Howard, B. and P. Davis. 1999. Sea turtle nesting activity at Ocean Ridge in Palm Beach County, Florida 1999. Palm Beach County Dept. of Environmental Resources Management, West Palm Beach, Florida. 10 pp.

Howell, A.H. 1909. Notes on the distribution of certain mammals in the southeastern United States. Proceedings of the Biological Society of Washington 22:55-68.

Howell, A.H. 1921. A biological survey of Alabama. North American Fauna 49:1-88.

Howell, A.H. 1939. Description of five new mammals from Florida. Journal of Mammalogy 20:363-365.

Hughes, A.L. and E.A. Caine. 1994. The effects of beach features on hatchling loggerhead sea turtles. in: Proceedings of the 14th Annual Symposium on Sea turtle biology and conservation, March 1-5, 1994, Hilton Head, South Carolina. NOAA, Tech. Memo. NMFS-SEFSC-351.

Humphrey, S.R. and D.B. Barbour. 1981. Status and habitat of three subspecies of *Peromyscus polionotus* in Florida. Journal of Mammalogy 62:840-844.

Humphrey, S.R. and P.A. Frank. 1992a. Anastasia Island Beach Mouse. Pages 94-101 *in* Humphrey, S.R. (editor). Rare and endangered biota of Florida Volume 1 Mammals.

Humphrey, S.R., W.H. Kern, Jr., and M.S. Ludlow. 1987. Status survey of seven Florida mammals. Florida Cooperative Fish and Wildlife Research Unit technical report no. 25. Gainesville, Florida.

Humphrey, S.R. and P.A. Frank. 1992a. Anastasia Island Beach Mouse. Pages 94-101 *in* Humphrey, S.R. (editor). Rare and endangered biota of Florida Volume 1 Mammals.

Ivey, R.D. 1949. Life history notes on three mice from the Florida east coast. Journal of Mammalogy 30:157-162.

James, F.C. 1992. St. Andrews beach mouse. Pages 87-93 *in* Humphrey, S.R. (editor). Rare and Endangered Biota of Florida, Volume 1. Mammals. University Presses of Florida, Tallahassee.

Kamezaki, N., Y. Matsuzawa, O. Abe, H. Asakawa, T. Fujii, K. Goto, S. Hagino, M. Hayami, M. Ishii, T. Iwamoto, T. Kamata, H. Kato, J. Kodama, Y. Kondo, I. Miyawaki, K. Mizobuchi, Y. Nakamura, Y. Nakashima, H. Naruse, K. Omuta, M. Samejima, H. Suganuma, H. Takeshita, T. Tanaka, T. Toji, M. Uematsu, A. Yamamoto, T. Yamato, and I. Wakabayashi. 2003. Loggerhead turtles nesting in Japan. Pages 210-217 *in* Bolten,

A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Kautz, R.S. and J.A. Cox. 2001. Strategic habitats for biodiversity conservation in Florida. Conservation Biology 15:55-77.

Labisky, R.F., M.A. Mercadante, and W.L. Finger. 1986. Factors affecting reproductive success of sea turtles on Cape Canaveral Air Force Station, Florida, 1985. Final report to the United States Air Force. United States Fish and Wildlife Service Cooperative Fish and Wildlife Research Unit, Agreement Number 14-16-0009-1544, Research Work Order Number 25. 18 pp.

Lacy, R. C. 1993. Impact of Inbreeding in Natural and Captive Populations of Vertebrates: Implications for Conservation. The University of Chicago.

Lacy, R.C., G. Alaks, A. Walsh. 1995. Hierarchical analysis of inbreeding depression in *Peromyscus polionotus*. Evolution 50:2187-2200.

LeBuff, C.R., Jr. 1990. The loggerhead turtle in the eastern Gulf of Mexico. Caretta Research, Inc.; Sanibel Island, Florida.

Limpus, C.J. 1971. Sea turtle ocean finding behaviour. Search 2(10):385-387.

Limpus, C.J., V. Baker, and J.D. Miller. 1979. Movement induced mortality of loggerhead eggs. Herpetologica 35(4):335-338.

Limpus, C.J., P. Reed, and J.D. Miller. 1983. Islands and turtles: the influence of choice of nesting beach on sex ratio. Pages 397-402 *in* Baker, J.T., R.M. Carter, P.W. Sammarco, and K.P. Stark (editors). Proceedings of the Inaugural Great Barrier Reef Conference, James Cook University Press, Townsville, Queensland, Australia.

Limpus, C., J.D. Miller, and C.J. Parmenter. 1993. The northern Great Barrier Reef green turtle *Chelonia mydas* breeding population. Pages 47-50 *in* Smith, A.K. (compiler), K.H. Zevering and C.E. Zevering (editors). Raine Island and Environs Great Barrier Reef: Quest to Preserve a Fragile Outpost of Nature. Raine Island Corporation and Great Barrier Reef Marine Park Authority, Townsville, Queensland, Australia.

Limpus, C.J. and D.J. Limpus. 2003. Loggerhead turtles in the equatorial and southern Pacific Ocean: a species in decline. Pages 199-209 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Linzey, D.W. 1978. Perdido Bay beach mouse. Pages 19-20 *in* Layne, J.N. (editor). Rare and Endangered Biota of Florida, Volume 1. Mammals. University Presses of Florida, Gainesville, Florida.

Loggins, R. 2006. Post-Hurricane Dennis trapping surveys at Perdido Key State Park and Gulf Islands National Seashore. Trapping data provided to Sandra Sneckenberger, U. S. Fish

and Wildlife Service. Florida Fish and wildlife Conservation Commission. Panama City, Florida.

Lohmann, K.J. and C.M.F. Lohmann. 2003. Orientation mechanisms of hatchling loggerheads. Pages 44-62 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Lomascolo, T. and T.M. Aide. 2001. Seed and seedling bank dynamics in secondary forests following hurricane Georges in Puerto Rico. Caribbean Journal of Science 37:259-270.

Lynn, W.J. 2000. Social organization and burrow-site selection of the Alabama Beach Mouse *Peromyscus polionotus ammobates*). Unpublished M.S. thesis. Auburn University. Auburn, Alabama.

Mann, T.M. 1977. Impact of developed coastline on nesting and hatchling sea turtles in southeastern Florida. Unpublished M.S. thesis. Florida Atlantic University, Boca Raton, Florida.

Marcovaldi, M.A., H. Godfrey, and N. Mrosovsky. 1997. Estimating sex ratios of loggerhead turtles in Brazil from pivotal incubation durations. Canadian Journal of Zoology 75:755-770.

Margaritoulis, D., R. Argano, I. Baran, F. Bentivegna, M.N. Bradai, J.A. Camiñas, P. Casale, G. De Metrio, A. Demetropoulos, G. Gerosa, B.J. Godley, D.A. Haddoud, J. Houghton, L. Laurent, and B. Lazar. 2003. Loggerhead turtles in the Mediterranean Sea: present knowledge and conservation perspectives. Pages 175-198 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Marquez-Millan, R. 1994. Synopsis of biological data on the Kemp's ridley sea turtle, Lepidochelys kempi (Garman, 1880). NOAA Tech. Memo. NMFS-SEFC-343. 91 pp.

Marquez-Millan, R., A. Villanueva O., and P.M. Burchfield. 1989. Nesting population and production of hatchlings of Kemp's ridley sea turtle at Rancho Nuevo, Tamaulipas, Mexico. Pages 16-19 *in* Caillouet, Jr., C.W. and A.M. Landry, Jr. (editors). Proceedings of the First international Symposium on Kemp's Ridley Sea Turtle Biology, Conservation, and Management.

McDonald, D.L. and P.H. Dutton. 1996. Use of PIT tags and photoidentification to revise remigration estimates of leatherback turtles (*Dermochelys coriacea*) nesting in St. Croix, U.S. Virgin Islands, 1979-1995. Chelonian Conservation and Biology 2(2):148-152.

McGehee, M.A. 1990. Effects of moisture on eggs and hatchlings of loggerhead sea turtles (*Caretta caretta*). Herpetologica 46(3):251-258.

Meylan, A. 1982. Estimation of population size in sea turtles. Pages 135-138 *in* Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington, D.C.

Meylan, A. 1992. Hawksbill turtle *Eretmochelys imbricata*. Pages 95-99 *in* Moler, P.E. (editor). Rare and Endangered Biota of Florida, Volume III. University Press of Florida, Gainesville, Florida.

Meylan, A.B. 1999. Status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean region. Chelonian Conservation and Biology 3(2):177-184.

Meylan, A.B. and M. Donnelly. 1999. Status justification for listing the hawksbill turtle (*Eretmochelys imbricata*) as critically endangered on the 1996 IUCN *Red List of Threatened Animals*. Chelonian Conservation and Biology 3(2):200-224.

Meylan, A., B. Schroeder, and A. Mosier. 1995. Sea turtle nesting activity in the State of Florida 1979-1992. Florida Marine Research Publications Number 52, St. Petersburg, Florida.

Middlemas, K. 1999. Flow going. Article on the closure of East Pass. News Herald. Waterfront Section. Page 1. October 31, 1999.

Miller, J.D. 1997. Reproduction in sea turtles. Pages 51-81 *in* Lutz, P.L. and J.A. Musick (editors). The Biology of Sea Turtles. CRC Press. Boca Raton, Florida.

Miller, J.D., C.J. Limpus, and M.H. Godfrey. 2003. Nest site selection, oviposition, eggs, development, hatching, and emergence of loggerhead turtles. Pages 125-143 *in* Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Miller, K., G.C. Packard, and M.J. Packard. 1987. Hydric conditions during incubation influence locomotor performance of hatchling snapping turtles. Journal of Experimental Biology 127:401-412.

Moody, K. 1998. The effects of nest relocation on hatching success and emergence success of the loggerhead turtle (*Caretta caretta*) in Florida. Pages 107-108 *in* Byles, R. and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

Moore, L. 2007. Experts say U.S. Barrier Islands Could Disappear, Reuters AlertNet, accessed from website on January 26, 2007. http://www.alertnet.org/thenews/newsdesk/N12369516.htm.

Moran, K.L., K.A. Bjorndal, and A.B. Bolten. 1999. Effects of the thermal environment on the temporal pattern of emergence of hatchling loggerhead turtles *Caretta caretta*. Marine Ecology Progress Series 189:251-261.

Moyers, J.E. 1996. Food habits of Gulf coast subspecies of beach mice *Peromyscus polionotus* spp.). Unpublished M.S. thesis. Auburn University, Auburn, Alabama. 84 pp.

Moyers, J.E., N.R. Holler, and M.C. Wooten. 1999. Species status report, current distribution and status of the Perdido Key, Choctawhatchee and St. Andrew Beach Mouse. U.S. Fish and Wildlife Service. Grant Agreement no. 1448-0004-94-9174. July. 43 pp.

Moyers, J.E. 2007. Annual wildlife biologists report to USFWS; 2005. January 31, 2006.

Mrosovsky, N. and A. Carr. 1967. Preference for light of short wavelengths in hatchling green sea turtles (*Chelonia mydas*), tested on their natural nesting beaches. Behavior 28:217-231.

Mrosovsky, N. 1968. Nocturnal emergence of hatchling sea turtles: control by thermal inhibition of activity. Nature 220(5174):1338-1339.

Mrosovsky, N. and S.J. Shettleworth. 1968. Wavelength preferences and brightness cues in water finding behavior of sea turtles. Behavior 32:211-257.

Mrosovsky, N. 1980. Thermal biology of sea turtles. American Zoologist 20:531-547.

Mrosovsky, N. and C.L. Yntema. 1980. Temperature dependence of sexual differentiation in sea turtles: implications for conservation practices. Biological Conservation 18:271-280.

Mrosovsky, N. 1988. Pivotal temperatures for loggerhead turtles from northern and southern nesting beaches. Canadian Journal of Zoology 66:661-669.

Murphy, T.M. and S.R. Hopkins. 1984. Aerial and ground surveys of marine turtle nesting beaches in the southeast region. Unpublished report prepared for the National Marine Fisheries Service.

National Marine Fisheries Service and U. S. Fish and Wildlife Service. 2007a. Loggerhead sea turtle (*Caretta caretta*) 5-year review: Summary and evaluation. August. 65 pp.

National Marine Fisheries Service and U. S. Fish and Wildlife Service. 2007b. Green sea turtle (*Chelonia mydas*) 5-year review: Summary and evaluation. August. 102 pp.

National Marine Fisheries Service and U. S. Fish and Wildlife Service. 2007c. Leatherback sea turtle (*Dermochelys coriacea*) 5-year review: Summary and evaluation. August. 79 pp.

National Marine Fisheries Service and U. S. Fish and Wildlife Service. 2007d. Kemp's ridley sea turtle (*Lepidochelys kempii*) 5-year review: Summary and evaluation. August. 50 pp.

National Marine Fisheries Service. 2001. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-455.

National Marine Fisheries Service. May 17, 2002a. Office of Protected Resources: Loggerhead Sea Turtles (*Caretta caretta*).

National Marine Fisheries Service. May 17, 2002b. Office of Protected Resources: Green Sea Turtles (*Chelonia mydas*).

National Marine Fisheries Service. May 17, 2002c. Office of Protected Resources: Leatherback Sea Turtles (*Dermochelys coriacea*).

National Marine Fisheries Service. May 17, 2002d. Office of Protected Resources: Hawksbill Turtles (*Eretmochelys imbricate*).

National Marine Fisheries Service and the U. S. Fish and Wildlife Service 1998a. Recovery plan for U.S. Pacific populations of the green turtle (*Chelonia mydas*). National Marine Fisheries Service, Silver Spring, MD. 84 pp.

National Marine Fisheries Service and the U. S. Fish and Wildlife Service. 1998b. Recovery plan for U.S. Pacific populations of the hawksbill turtle (*Eretmochelys imbricata*). National Marine Fisheries Service, Silver Spring, Maryland. 82 pp.

National Marine Fisheries Service and the U. S. Fish and Wildlife Service. 1991a. Recovery plan for U.S. population of Atlantic green turtle (*Chelonia mydas*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and the U. S. Fish and Wildlife Service. 1991b. Recovery plan for U.S. population of loggerhead turtle (*Caretta caretta*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and the U. S. Fish and Wildlife Service. 1992. Recovery plan for leatherback turtles (*Dermochelys coriacea*) in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and the U. S. Fish and Wildlife Service. 1993. Recovery plan for hawksbill turtle (*Eretmochelys imbricata*) in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, St. Petersburg, Florida.

National Research Council. 1990a. Decline of the sea turtles: causes and prevention. National Academy Press; Washington, D.C.

National Research Council. 1990b. Managing coastal erosion. National Academy Press; Washington, D.C.

National Research Council. 1995. Beach nourishment and protection. National Academy Press; Washington, D.C.

Nelson, D.A. 1987. The use of tilling to soften nourished beach sand consistency for nesting sea turtles. Unpublished report of the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Nelson, D.A. and D.D. Dickerson. 1987. Correlation of loggerhead turtle nest digging times with beach sand consistency. Abstract of the 7th Annual Workshop on Sea Turtle Conservation and Biology.

Nelson, D.A. 1988. Life history and environmental requirements of loggerhead turtles. U.S. Fish and Wildlife Service Biological Report 88(23). U.S. Army Corps of Engineers TR EL-86-2 (Rev.).

Nelson, D.A. and B. Blihovde. 1998. Nesting sea turtle response to beach scarps. Page 113 *in* Byles, R., and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

Nelson, D.A. and D.D. Dickerson. 1987. Correlation of loggerhead turtle nest digging times with beach sand consistency. Abstract of the 7th Annual Workshop on Sea Turtle Conservation and Biology.

Nelson, D.A. and D.D. Dickerson. 1988a. Effects of beach nourishment on sea turtles. *In* Tait, L.S. (editor). Proceedings of the Beach Preservation Technology Conference '88. Florida Shore & Beach Preservation Association, Inc., Tallahassee, Florida.

Nelson, D.A. and D.D. Dickerson. 1988b. Hardness of nourished and natural sea turtle nesting beaches on the east coast of Florida. Unpublished report of the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Nelson, D.A. and D.D. Dickerson. 1988c. Response of nesting sea turtles to tilling of compacted beaches, Jupiter Island, Florida. Unpublished report of the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Nelson, D.A., K. Mauck, and J. Fletemeyer. 1987. Physical effects of beach nourishment on sea turtle nesting, Delray Beach, Florida. Technical Report EL-87-15. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Noss, R.F. and B. Csuti. 1997. Habitat fragmentation. Pages 269–304 *in* Meffe, G.K. and R.C. Carroll (editors). Principles of Conservation Biology, Second Edition, Sinauer Associates, Sunderland, Massachusetts.

Novak, J.A. 1997. Home range and habitat use of Choctawhatchee beach mice. Unpublished M.S. thesis. Auburn University, Auburn, Alabama. 113 pp.

Ogren, L.H. 1989. Distribution of juvenile and subadult Kemp's ridley turtles: preliminary results from the 1984-1987 surveys. Pages 116-123 *in* Caillouet, C.W., Jr., and A.M. Landry, Jr. (eds.). Proceedings of the First International Symposium on Kemp's Ridley Sea Turtle Biology, Conservation and Management. Texas A&M University Sea Grant College Program TAMU-SG-89-105.

Otis, D.L., K.P. Burnham, G.C. White, and D.R. Anderson. 1978. Statistical inference from capture data on closed animal populations. Wildlife Monograph. 62:1-135.

Packard, M.J. and G.C. Packard. 1986. Effect of water balance on growth and calcium mobilization of embryonic painted turtles (*Chrysemys picta*). Physiological Zoology 59(4):398-405.

Packard, G.C., M.J. Packard, and T.J. Boardman. 1984. Influence of hydration of the environment on the pattern of nitrogen excretion by embryonic snapping turtles (*Chelydra serpentina*). Journal of Experimental Biology 108:195-204.

Packard, G.C., M.J. Packard, and W.H.N. Gutzke. 1985. Influence of hydration of the environment on eggs and embryos of the terrestrial turtle *Terrapene ornata*. Physiological Zoology 58(5):564-575.

Packard,G.C., M.J. Packard, T.J. Boardman, and M.D. Ashen. 1981. Possible adaptive value of water exchange in flexible-shelled eggs of turtles. Science 213:471-473.

Packard G.C., M.J. Packard, K. Miller, and T.J. Boardman. 1988. Effects of temperature and moisture during incubation on carcass composition of hatchling snapping turtles (*Chelydra serpentina*). Journal of Comparative Physiology B 158:117-125.

Parmenter, C.J. 1980. Incubation of the eggs of the green sea turtle, *Chelonia mydas*, in Torres Strait, Australia: the effect of movement on hatchability. Australian Wildlife Research 7:487-491.

Pearce, A.F. 2001. Contrasting population structure of the loggerhead turtle (*Caretta caretta*) using mitochondrial and nuclear DNA markers. Unpublished M.S. thesis. University of Florida, Gainesville, Florida.

Pendleton, E., Hammer-Klose, E. Thieler, and S. Williams. 2004. Coastal Vulnerability Assessment of Gulf Islands National Seashore (GUIS) to Sea Level Rise, U.S. Geological Survey Open-File Report 03-108, 18 pp. http://pubs.usgs.gov/of/2003/of03-108/.

Philibosian, R. 1976. Disorientation of hawksbill turtle hatchlings (*Eretmochelys imbricata*) by stadium lights. Copeia 1976:824.

Pilkey, O.H. and K.L. Dixon. 1996. The Corps and the shore. Island Press; Washington, D.C. Plant, N.G. and G.B. Griggs. 1992. Interactions between nearshore processes and beach morphology near a seawall. Journal of Coastal Research 8(1):183-200.

Pollock, K.H., J.D. Nichols, C. Brownie, and J.E. Hines. 1990. Statistical inference for capture-recapture experiments. Wildlife Monographs. 107:1-97.

Possardt, E. 2005. Personal communication to Sandy MacPherson, Service.

Pournelle, G.H. and B.A. Barrington. 1953. Notes on the mammals of Anastasia Island, St. Johns County, Florida. Journal of Mammalogy 34:133-135

Pritchard, P.C.H. 1982. Nesting of the leatherback turtle, Dermochelys coriacea in Pacific Mexico, with a new estimate of the world population status. Copeia 1982(4):741-747.

Pritchard, P.C.H. 1992. Leatherback turtle *Dermochelys coriacea*. Pages 214-218 *in* Moler, P.E. (editor). Rare and Endangered Biota of Florida, Volume III. University Press of Florida; Gainesville, Florida.

Provancha, J.A. and L.M. Ehrhart. 1987. Sea turtle nesting trends at Kennedy Space Center and Cape Canaveral Air Force Station, Florida, and relationships with factors influencing nest site selection. Pages 33-44 *in* Witzell, W.N. (editor). Ecology of East Florida Sea Turtles: Proceedings of the Cape Canaveral, Florida Sea Turtle Workshop. NOAA Technical Report NMFS-53.

Rave, E.H. and N.R. Holler. 1992. Population dynamics of Alabama beach mice (*Peromyscus polionotus ammobates*) in south Alabama. Journal of Mammalogy 73(2):347-355.

Raymond, P.W. 1984. The effects of beach restoration on marine turtles nesting in south Brevard County, Florida. Unpublished M.S. thesis. University of Central Florida, Orlando, Florida.

Reina, R.D., P.A. Mayor, J.R. Spotila, R. Piedra, and F.V. Paladino. 2002. Nesting ecology of the leatherback turtle, *Dermochelys coriacea*, at Parque Nacional Marino Las Baulas, Costa Rica: 1988-1989 to 1999-2000. Copeia 2002(3):653-664.

Richardson, T.H., J.I. Richardson, C. Ruckdeschel, and M.W. Dix. 1978. Remigration patterns of loggerhead sea turtles (*Caretta caretta*) nesting on Little Cumberland Island and Cumberland Island, Georgia. Pages 39-44 *in* Henderson, G.E. (editor). Proceedings of the Florida and Interregional Conference on Sea Turtles. Florida Marine Research Publications Number 33.

Ross, J.P. 1979. Sea turtles in the Sultanate of Oman. World Wildlife Fund Project 1320. May 1979 report. 53 pp.

Ross, J.P. 1982. Historical decline of loggerhead, ridley, and leatherback sea turtles. Pages 189-195 *in* Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles. Smithsonian Institution Press; Washington, D.C.

Ross, J.P. and M.A. Barwani. 1995. Review of sea turtles in the Arabian area. Pages 373-383 *in* Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles, Revised Edition. Smithsonian Institution Press, Washington, D.C. 615 pp.

Rostal, D.C. 2007. Reproductive physiology of the ridley sea turtle. Pages 151-165 *in* Plotkin P.T. (editor). Biology and Conservation of Ridley Sea Turtles. Johns Hopkins University Press, Baltimore, Maryland.

Rostal, D.C., J.S. Grumbles, R.A. Byles, R. Marquez-M., and D.W. Owens. 2007. Nesting physiology of Kemp's ridley sea turtles, *Lepidochelys kempi*, at Rancho Nuevo,

Tamaulipas, Mexico, with observations on population estimates. Chelonian Conservation and Biology 2(4):538-547.

Routa, R.A. 1968. Sea turtle nest survey of Hutchinson Island, Florida. Quarterly Journal of the Florida Academy of Sciences 30(4):287-294.

Salmon, M., J. Wyneken, E. Fritz, and M. Lucas. 1992. Seafinding by hatchling sea turtles: role of brightness, silhouette and beach slope as orientation cues. Behaviour 122 (1-2):56-77.

Schroeder, B.A. 1981. Predation and nest success in two species of marine turtles (*Caretta caretta* and *Chelonia mydas*) at Merritt Island, Florida. Florida Scientist 44(1):35.

Schroeder, B.A. 1994. Florida index nesting beach surveys: are we on the right track? Pages 132-133 *in* Bjorndal, K.A., A.B. Bolten, D.A. Johnson, and P.J. Eliazar (compilers). Proceedings of the 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-351.

Schroeder, B.A., A.M. Foley, and D.A. Bagley. 2003. Nesting patterns, reproductive migrations, and adult foraging areas of loggerhead turtles. Pages 114-124 in Bolten, A.B. and B.E. Witherington (editors). Loggerhead Sea Turtles. Smithsonian Books, Washington D.C.

Schmid, J.R. and W.N. Witzell. 1997. Age and growth of wild Kemp's ridley turtles (Lepidochelys kempi): cumulative results of tagging studies in Florida. Chelonian Conservation and Biology 2(4):532-537.

Schmid, J.R. 1998. Marine turtle populations on the west central coast of Florida: results of tagging studies at the Cedar Keys, Florida, 1986-1995. Fishery Bulletin 96:589-602.

St. Joe/Arvida. 2003. ITP annual report reporting year 2002. Watercolor and Watersound. TE020830-1. Jacksonville, Florida.

St. Joe Company. 1999. ITP annual report reporting year 1998. Watercolor The Villages at Seagrove and Camp Creek d/b/a Watersound. TE020830-1. Seagrove Beach, Florida.

St. Joe Company. 2004. ITP annual report reporting year 2003. Watercolor and Watersound. TE020830-1. Jacksonville, FL.

St. Joe Company. 2005. ITP annual report reporting year 2004. Watercolor and Watersound. TE020830-1. Jacksonville, FL.

St. Joe Company. 2006. ITP annual report reporting year 2005. Watercolor and Watersound. TE020830-1. Jacksonville, FL.

Selander, R.K., M.H. Smith, S.Y. Yang, W.E. Johnson, and J.B. Gentry. 1971. Biochemical polymorphism and systematics in the genus *Peromyscus*. I. Variation in the old-field mouse (*Peromyscus polionotus*). University of Texas Studies in Genetics 6:49-90.

Shaffer, M. and B.A. Stein. 2000. Safeguarding our Precious Heritage. Chapter 11 in Stein, B.A., L.S. Kutner, J.S. Adams (eds). Precious Heritage: The Status of Biodiversity in the United States. Oxford University Press. New York. 399 pp.

Slaby, L. Florida Game and Fresh Water Fish Commission. 2005. Letter to Paul A. Lang. 1 p.

Smith, M.H. 1966. The evolutionary significance of certain behavioral, physiological, and morphological adaptations of the old-field mouse, *Peromyscus polionotus*. Ph.D. dissertation, University of Florida, Gainesville, Florida. 187 pp.

Smith, M.H. 1971. Food as a limiting factor in the population ecology of Peromyscus polionotus group from Florida and Alabama. Journal of Mammalogy 7:149-184.

Smith, K.E.L. 2003. Movements and habitat use of the Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*) in a successional dune mosaic. Unpublished M.S. thesis. University of Florida, Gainesville, Florida.

Sneckenberger, S.I. 2001. Factors influencing habitat use by the Alabama beach mouse (*Peromyscus polionotus ammobates*). Unpublished M.S. thesis. Auburn University, Auburn, Alabama.

Snover, M.L., A.A. Hohn, L.B. Crowder, and S.S. Heppell. 2007. Age and growth in Kemp's ridley sea turtles: evidence from mark-recapture and skeletochronology. Pages 89-106 *in* Plotkin P.T. (editor). Biology and Conservation of Ridley Sea Turtles. John Hopkins University Press, Baltimore, Maryland.

Snover, M. 2005. Personal communication to the Loggerhead Sea Turtle Recovery Team. National Marine Fisheries Service.

Solow, A.R., K.A. Bjorndal, and A.B. Bolten. 2002. Annual variation in nesting numbers of marine turtles: the effect of sea surface temperature on re-migration intervals. Ecology Letters 5:742-746.

Soulé, M.E. and D. Simberloff. 1986. What do genetics and ecology tell us about the design of nature reserves? Biological Conservation 35:19-40.

Soulé, M.E. and B.A. Wilcox. 1980. Conservation biology: an evolutionary-ecological perspective. Sinauer Associates, Inc. Sunderland, Massachusetts.

Spotila, J.R., E.A. Standora, S.J. Morreale, G.J. Ruiz, and C. Puccia. 1983. Methodology for the study of temperature related phenomena affecting sea turtle eggs. Service Endangered Species Report 11.

Spotila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: are leatherback turtles going extinct? Chelonian Conservation and Biology 2(2):290-222.

Spotila, J.R. R.D. Reina, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 2000. Pacific leatherback turtles face extinction. Nature 405:529-530.

Stancyk, S.E. 1995. Non-human predators of sea turtles and their control. Pages 139-152 *in* Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles, Revised Edition. Smithsonian Institution Press. Washington, D.C.

Stancyk, S.E., O.R. Talbert, and J.M. Dean. 1980. Nesting activity of the loggerhead turtle *Caretta caretta* in South Carolina, II: protection of nests from raccoon predation by transplantation. Biological Conservation 18:289-298.

Stout, I.J. 1992. Southeastern beach mouse. Pages 242-249 *in* Humphrey, S.R. (editor). Rare and Endangered Biota of Florida, Volume 1. Mammals. University Press of Florida, Tallahassee, Florida. 392 pp.

Sumner, F.B. 1926. An Analysis of geographic variation in mice of the *Peromyscus polinoyus* group from Florida and Alabama. Journal of Mammalogy 7:149-184.

Swilling, W.R. Jr., M.C. Wooten, N.R. Holler, and W.J. Lynn. 1998. Population dynamics of Alabama beach mice (*Peromyscus polionotus ammobates*) following Hurricane Opal. American Midland Naturalist 140:287-298.

Swilling, W.R. 2000. Ecological dynamics of the endangered Alabama beach mouse (*Peromyscus polionotus ammobates*). Unpublished M.S. thesis. Auburn University, Auburn, Alabama.

Talbert, O.R., Jr., S.E. Stancyk, J.M. Dean, and J.M. Will. 1980. Nesting activity of the loggerhead turtle (*Caretta caretta*) in South Carolina I: a rookery in transition. Copeia 1980(4):709-718.

Teska, W.R., M.H. Smith, and J.M. Novak. 1990. Food quality, heterozygosity, and fitness correlated in *Peromyscus polionotus*. Evolution 44:1318-1325.

Traylor-Holzer, K. 2005. Revised Population Viability Analysis for the Alabama Beach Mouse: Report to the U.S. Fish and Wildlife Service, IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, New Mexico.

Trindell, R., Conti, M., Gallagher, D. and B. Witherington. 2005. Turtles and lights on Florida's nesting beaches. Poster paper presented at the 25th Annual Symposium on Sea Turtle Biology and Conservation.

Trindell, R. 2005. Sea turtles and beach nourishment. Florida Fish and Wildlife Conservation Commission, Imperiled Species Management Section. Invited Instructor, CLE Conference.

Trindell, R. 2007. Personal communication from Robbin Trindell, PhD., Florida Fish and Wildlife Conservation Commission summary of lighting impacts on Brevard County

beaches after beach nourishment. Imperiled Species Management Section, Tallahassee, FL. to Lorna Patrick, U. S. Fish and Wildlife Service, Panama City, Florida.

Turtle Expert Working Group. 1998. An assessment of the Kemp's ridley (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409.

Turtle Expert Working Group. 2007. An assessment of the leatherback turtle population in the Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-555. 116 pp.

U.S. Fish and Wildife Service.2007c. Final report on the Mexico/United States of America population restoration project for the Kemp's ridley sea turtle, *Lepidochelys kempii*, on the coasts of Tamaulipas and Veracruz, Mexico. 10 pp.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1992. Recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*). National Marine Fisheries Service, St. Petersburg, FL. 40 pp.

U.S. Fish and Wildlife Service. 1993. Recovery plan for the Anastasia Island and southeastern beach mouse. Atlanta, Georgia. 30 pp.

Van Zant, J.L. and M.C. Wooten. 2006. Personal communication about beach mouse genetic research ongoing at Auburn University to Sandra Sneckenberger, Service, Panama City, Florida.

Wanless, H.R. and K.L Maier. 2007. An evaluation of beach renourishment sands adjacent to reefal settings, southeast Florida. Southeastern Geology 45(1):25-42.

Webster, P., G. Holland, J. Curry, and H. Chang. 2005. Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment, Science Vol. 309 (5742): pp. 1844-1846.

Weston, J. 2007. Captive breeding of beach mich. Peromyscus Genetic Stock Center, University of South Carolina, Columbia, South Carolina.

Wiens, J.A. 1996. Wildlife in patchy environments: metapopulations, mosaics, and management. Pages 53-84 *in* McCullough, D.R. (editor). Metapopulations and Wildlife Conservation. Island Press. Washington D.C.

With, K.A., and T.O. Crist. 1995. Critical thresholds in species responses to landscape structure. Ecology 76:2446-2459.

Witherington, B.E. 1986. Human and natural causes of marine turtle clutch and hatchling mortality and their relationship to hatching production on an important Florida nesting beach. Unpublished M.S. thesis. University of Central Florida, Orlando, Florida.

Witherington, B.E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. Herpetologica 48:31-39.

Witherington, B.E. and L.M. Ehrhart. 1989. Status and reproductive characteristics of green turtles (*Chelonia mydas*) nesting in Florida. Pages 351-352 *in* Ogren, L., F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham (editors). Proceedings of the Second Western Atlantic Turtle Symposium. NOAA Technical Memorandum NMFS-SEFC-226.

Witherington, B.E., K.A. Bjorndal, and C.M. McCabe. 1990. Temporal pattern of nocturnal emergence of loggerhead turtle hatchlings from natural nests. Copeia 1990(4):1165-1168.

Witherington, B.E. and K.A. Bjorndal. 1991. Influences of artificial lighting on the seaward orientation of hatchling loggerhead turtles (*Caretta caretta*). Biological Conservation 55:139-149.

Witherington, B.E. and R.E. Martin. 1996. Understanding, assessing, and resolving light pollution problems on sea turtle nesting beaches. Florida Marine Research Institute Technical Report TR-2. 73 pp.

Witherington, B.E. 1997. The problem of photopollution for sea turtles and other nocturnal animals. Pages 303-328 *in* Clemmons, J.R. and R. Buchholz (editors). Behavioral Approaches to Conservation in the Wild. Cambridge University Press, Cambridge, United Kingdom.

Witherington, B.E. 2006. Personal communication to Loggerhead Recovery Team on nest monitoring in Florida during 2005. Florida Fish and Wildlife Research Institute.

Witherington, B.E. 2007. Personal communication Loggerhead Recovery Team. Florida Fish and Wildlife Research Institute.

Witzell, W.N. 1998. Long-term tag returns from juvenile Kemp's ridley turtles. Marine Turtle Newsletter 79:20.

Wood, D.W. and K.A. Bjorndal. 2000. Relation of temperature, moisture, salinity, and slope to nest site selection in loggerhead sea turtles. Copeia 2000(1):119-128.

Wyneken, J., L. DeCarlo, L. Glenn, M. Salmon, D. Davidson, S. Weege., and L. Fisher. 1998. On the consequences of timing, location and fish for hatchlings leaving open beach hatcheries. Pages 155-156 *in* Byles, R. and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

Young, R.S., PH.d. 2007. Director, Program for the Study of Developed Shorelines, Western Carolina University, Cullowhee, NC 28723. (828)-227-7393. ryoung@wcu.edu. Personal communication with Mary Mittiga and Patty Kelly, January 22, 2007.

Zug, G.R. and J.F. Parham. 1996. Age and growth in leatherback turtles, *Dermochelys coriacea* (Testidines: Dermochelyidae): a skeletochronological analysis. Chelonian Conservation and Biology 2(2):244-249.

Zurita, J.C., R. Herrera, A. Arenas, M.E. Torres, C. Calderón, L. Gómez, J.C. Alvarado, and R. Villavicencio. 2003. Nesting loggerhead and green sea turtles in Quintana Roo, Mexico. Pages 125-127 *in* Seminoff, J.A. (compiler). Proceedings of the Twenty-second Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-503.

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

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAY 10 2010

Mr. Miles M. Croom
NOAA National Marine Fisheries
Assistant Regional Administrator,
Habitat Conservation Division
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505

Dear Mr. Croom:

This letter is provided in reference to your letter dated March 2, 2010 (F/SER4:GG/pw), that commented on the operations and maintenance dredging with beach placement proposed for the St. Augustine sector of the Intracoastal Waterway (IWW), Inlet, and Vilano Point, in St. Augustine, St. Johns County, Florida. The Agency's comments were also discussed in a teleconference on March 18, 2010, with members' of our respective staff. The U.S. Army Corps of Engineers (Corps) response addresses the concerns as presented in the March 2, 2010 letter, and summarizes where appropriate, discussion of the teleconference on March 18, 2010.

National Marine Fisheries Service (NMFS) has specifically communicated concerns for impacts that would result to Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) from sedimentation and turbidity that would be generated from nearshore disposal of dredged material and the cumulative impacts from beach placement of material. At issue also is the timing of the proposed activity and post-disposal recovery of the benthic communities. The Corps determined in the Draft Environmental Assessment (DEA) forwarded in November 2009, minimal impacts to the existing benthic communities. Our decision is based on prior findings and review of the available research data on benthic recolonization when exposed to sedimentation during beach protection activities.

The Corps acknowledges that our DEA as related to EFH and HAPC's did not fully discuss impacts as outline in the NMFS March 2, 2010 letter. These areas will receive additional input in the final Environmental Assessment (EA) as recommended.

Discussion was given in the teleconference on March 18, 2010, to optimizing the timing of beach or nearshore placement of dredged material to reduce benthic biological impacts and optimize population recovery following beach placement. As you are aware, the timing of channel operations and maintenance actions are often dictated by several species environmental windows (i.e., nesting shorebirds and nesting sea turtles), with the exception being emergency navigation needs.

Currently, information is not available that allows a better understanding of the biological consequences of burial of the natural substrate that may lead to project scale or timing options that could reduce impacts associated with material placement during maintenance operations. Scientific information is currently available that studied and monitors impacts to the infaunal benthic communities from mining of offshore borrow areas and the receiving fill area during beach nourishment activities.

Information obtained from a 2004 EA for the Duval County, Beach Control Project presented the findings of survey monitoring analyses conducted by Lotspeich (1997), Florida studies Marsh et al.((1980); Marsh and Turbeville (1981); Culter and Mahadevan (1982), Gorzelany (1983); Saloman et al. (1982), Nelson (1985), Continental Shelf Associates, Inc. (1987b), Gorzelany and Nelson (1987), and Bodge and Shaul (1994). These studies investigated the impact of dredging and/or filling on benthic communities in borrow and fill areas. The studies suggest that site physical and chemical conditions after borrow activities should match previous site conditions as nearly as possible for successful biological community recovery. Marsh et al. (1980), found no continuing impacts at the borrow site seven years after a beach restoration project. Marsh and Turbeville (1981) found no long-term effects on many benthic community parameters in a borrow area off Hillsboro Beach, Broward County, Florida, five years after use of the site. However, qualitative changes in species composition in the community were noted. Culter and Mahadevan (1982) found similar results off Panama City Beach, Bay County, Florida, three to four years after a restoration project. Saloman et al (1982) found that dredging done at a Panama City Beach borrow area had no adverse long-term effect on bottom dwelling invertebrates, sediments, or water quality along shore or in offshore borrow areas. Short-term ecological consequences of dredging lasted about 1 year and included minor sedimentary and benthic invertebrate population changes.

Gorzelany and Nelson (1987) monitored the impacts of a former beach restoration project that took place in Brevard County, between November 1980 and February 1981. A 3.4 km shoreline extending from Indialantic to Melbourne beach, received approximately 413,000 m^3 of sand. That study investigated the impact of beach nourishment based on comparison of communities a week before, just after completion, and every four months up to one year after the project. There were no major changes in the total species composition in the distribution and density of individuals observed following nourishment.

Prior to the undertaking of a major shoreline restoration project, the U.S. Army Corps of Engineers, New York District, the U.S. Army Engineer Research and Development Center, and Waterways Experiment Station (WES), conducted a pilot study of the borrow and beach areas to analyze impacts to the benthic communities that existed offshore at the borrow site and beach fill areas. Over a course of 6 years, monitoring was performed on the infaunal and macroinvertebrate communities to establish baseline data, prior to shoreline nourishment. A total of 19.39 million m3 of sand was placed in three locations over three nourishment cycles (1997, 1999, and 2000). A berm was constructed 30 m wide and 3 m above MLW along a high energy beach that encompasses 47 m, extending northward from Manasquan Inlet to Highland Beach, in New Jersey. Wave heights in the vicinity average 0.3-0.7 m with wave periods of 5.6–9.0 seconds.

This study concluded that beach nourishment may result in short-term declines in abundance, biomass, and taxa richness. Intertidal assemblages recovery was complete within 2-6.5 months of the conclusion of filling. Recovery was the quickest when filling was completed before the low point in the seasonal cycle of infaunal abundance. Taylor Engineering (2009) in a Martin County Shore Protection study literature review concluded that beach nourishment may result in short-term impacts to benthic habitat. Impacts may be short-term due to most organisms having the ability to adapt in areas of considerable substrate movement. A list of references is enclosed.

The referenced studies also assessed impacts on *Emerita* and *Donax* spp. populations pre- and post-nourishment. These filter-feeding invertebrates migrate up and down the beach face with each tide, and their abundance is thought to be determined by physical factors such as grain size. This fauna provides a sensitive index of the suitability of the beach for other invertebrates and are an important food source for local fish, ghost crabs, and shore birds.

NMFS has recommended the following EFH Conservation measures:

EFH #1. Best management practices, such as restricting the time of year the dredging is done, shall be included to reduce impacts to EFH and vulnerable life stages of federally managed fishery species.

Response: Imposing an environmental window from spring to late summer to allow maximum colonization of infaunal organisms would substantially reduce the available time wherein channel maintenance dredging could be performed. Such a restriction could interfere with the Corps' Congressional mandate of providing safe and unobstructed navigation of Federal channels. The Corps is committed to avoiding or minimizing to the fullest extent practicable impacts to infaunal benthic communities. If navigation circumstances allow, dredging with beach or nearshore placement of material at this location would take place during the period from August to March.

EFH #2. A scientifically supported rationale shall be provided for concluding impacts to benthic communities at the nearshore disposal area would be minimal. Alternatively, best management practices shall be included in the design of the nearshore disposal area and a monitoring program shall be in place to evaluate the effectiveness of those best management practices.

Response: The Corps believes the references as attached and outlined in this response fully addresses the Agency's concerns. The EA will be modified to include the EFH and HAPC inclusions as recommended.

EFH #3. A scientifically supported rationale shall be provided for concluding impacts benthic communities at the beach disposal area would be minimal that considers the multiple uses of the beach disposal area. Alternatively, best management practices shall be included in the design of the beach disposal area and a monitoring program shall be in place to evaluate the effectiveness of those best management practices.

Response: The EA will be modified to include the scientific rational for the Corps' minimal impact determination. The Corps believes that adverse environmental impacts would be either avoided or minimized, through the Contractor's use of quality assurance measures and contract imposed environmental requirements. Turbidity is monitored and State turbidity thresholds must be maintained throughout construction. Violation of these standards could result in shut down of operations, or result in a penalty, or both. A Contracting officer is routinely onsite to ensure that best management practices and quality controls are in place and employed.

It is the Corps' position that the proposed impacts are unavoidable and present no long-term adverse or cumulative impacts, as supported by the attached references. The material is clean beach compatible sand and sediment suspension would be of a short duration. Use of the outlined quality assurances and active construction monitoring ensure minimal project related impacts.

If you have any questions, please contact Mr. Paul DeMarco at telephone number 904-232-1897, or email address Paul.M.Demarco@usace.army.mil.

Sincerely,

Kenneth R Smith

Eric P. Summa
Chief, Environmental Branch

Enclosure

Copy Furnished:

Mr. George Getsinger, NOAA-National Marine Fisheries Service, Northeast Florida Field Office, 9741 Ocean Shore Drive, St. Augustine, Florida 32080

References

Bonsdorff, E. and Nelson, W.G. (1992). The ecology of coquina clams *Donax variabilis* Say, 1822, and *Donax parvula*, Philippi, 1849, on the east coast of Florida. *The Veliger*, 35(4), 358-365.

Bowman, M. L. and Dolan, R., (1985). The relationship of *Emerita talpoida* to Beach Characteristics. *Journal of Coastal Research*, 1(2), 151-163.

Burlas, M., Ray. G. L. & Clarke, D. (2001). The New York District's Biological Monitoring Program for the Atlantic Coast of New Jersey, Asbury Park to Manasquan Section Beach Erosion Control Project. Final Report. U.S. Army Engineer District, New York and U.S. Army Engineer Research and Development Center, Waterways Experiment Station.

Cutler, J.K., and Mahadevas, S., (1982). *Long-term effect of beach nourishment on the benthic fauna of Panama City beach, Florida*. US Army Corps of Engineers, Coastal Engineering Research Center, Miscellaneous Report No. 82-2, 81p.

Delancey, L.B., (1989). Trophic relationships in the surf zone during the summer at folly beach, South Carolina. *Journal of Coastal Research*, 5, 477-488.

Gorzelany, J. and Nelson, W.G., (1987). The effect of beach replenishment on the benthos of a sub-tropical Florida beach. *Marine Environmental Research* 21, 75-94.

Johnson, S.A.; Bjorndal, K.A., and Bolten, A.B., (1996). Effects of organized turtle watches on loggerhead (*Caretta caretta*) nesting behavior and hatchling production in Florida. *Conservation Biology*, 10, 570-577.

Leber, K.M., (1982). Seasonality of macro invertebrates on a temperate, high wave energy sandy beach. *Bulletin of Marine Science*, 32(1), 86-98.

Lacharmoise, F., Barrailler, V., and Horwell, T. (2009). Draft Beach nourishment on invertebrate population densities.

Nel, R.; McLachan, A., and Winter, D.P.E., (2001). The effect of grain size on the burrowing of two *Donax* species. *Journal of Experimental Marine Biology and Ecology*, 265, 219-238.

Nelson, W.G., (1986). Predation and prey population variation in a high energy sand beach macrofaunal community. *Ophelia*, 26, 305-316.

Nelson, W.G., (1993). Beach Restoration in the Southeastern US: Environmental Effects and Biological Monitoring. *Ocean and Coastal Management*, 19, 157-182.

Nelson, W.G., and Bonsdorff E., (1993). Ecological, morphological, and genetic differences between the sympatric bivalves *Donax variabilis* Say, 1822, and *Donax parvula* Philippi, 1849. *The Veliger*, 36(4), 317-322.

Peterson, C.H.; Hickerson, D.H.M. and Johnson, G.G., (2000). Short-term consequences of nourishment and bulldozing on the dominant large invertebrates of a sandy beach. *Journal of Coastal Research*, 16, 368-378.

Pilkey, O.H. Jr.; Sharma, D.C.; Wanless, H.R.; Doyle, L.J.; Pilkey, O.H. Sr.; Neal, W.J., and Gruver, B.L., (1984). How the shoreline works. *In*: Pilkey, and Neal (eds.), *Living with the East Florida shore.* Durham, North Carolina: Duke University Press, pp. 12-34.

Pilkey, O.H. and Wright, H.L., (1988). Seawalls versus beaches. *In*: KRAUSS, N.C., and PILKEY, O.H. (eds.), The effect of seawalls on beaches. *Journal of Coastal Research* Special Issue No. 4, pp. 41-64.

Pullen, E.J. and Naqvi, S.M., (1983). Biological Impacts on beach replenishment and borrowing. *Shore and Beach*, 51(2), 27-31.

Rakocinski, C.F.; Heard, R.W.; Lecroy, S.E.; McLelland, J.A., and Simons, T., (1996). Responses by macrobenthic assemblages to extensive beach restoration at Perdido Key, Florida, USA. *Journal of Coastal Research*, 12(1), 326-353.

Ray, G.L.; Clarke, D.G.; Wilber, M.H., and Burlas, M.H., (2002). Monitoring Biological Impacts of Beach Nourishment Projects: Implications of a Major Monitoring Program in Northern New Jersey, USA. *Annals of the FBSPA Conference*, pp. 225-234.

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

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5317; FAX (727) 824-5300
http://sero.nmfs.noaa.gov/

March 2, 2010 F/SER4:GG/pw

(Sent via Electronic Mail)

Mr. Eric Summa
Chief, Environmental Branch
Jacksonville District, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attention: Catherine Brooks

Dear Mr. Summa:

NOAA's National Marine Fisheries Service (NMFS) reviewed the *Draft Environmental Assessment, St. Augustine Inlet and Atlantic Intracoastal Waterway, Maintenance Dredging with Beach Placement, St. Johns County, Florida*, (DEA) dated October 2009, and your letter, dated November 18, 2009. The Jacksonville District proposes to maintenance dredge St. Augustine segment of the Intracoastal Waterway (IWW), which includes the federal portion of the St. Augustine Harbor and Inlet, in addition to dredging of the shoal along Vilano Point. Approximately 400,000 cubic yards of material, which includes advance maintenance of shoals from the Vilano Point area, needs to be dredged to provide safe navigation of the waterway at Congressionally authorized depths. The Jacksonville District expects future dredging events would be 250,000 cubic yards every 3 or 4 years. Dredged material that meets Florida's standards for beach compatibility (essentially no more than 10 percent fine material) would be placed in eroding areas along the shoreline at Anastasia Island State Park and St. Augustine Beach between Florida Department of Environmental Protection (FDEP) Monuments R-132 to R-152. Dredged material with more than 10 percent fine material but less than 20 percent would be placed in a nearshore disposal area between FDEP Monuments R-141 to R-146. Dredged material with a fines content exceeding 20 percent is not anticipated and, accordingly, not discussed in the DEA. While the timeperiod of the assessment is not explicitly addressed in the DEA, subsequent correspondences with your staff indicate the Final EA is designed to be applicable for 10 years. The Jacksonville District's initial determination is the proposed action would not have a substantial adverse impact on essential fish habitat (EFH) or federally managed fisheries along the eastern coast of Florida. As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the following comments are provided pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

EFH within the Project Area
Section 3.3.2.1.6 of the DEA describes EFH within the project area, and the discussion focuses on estuarine and marine unconsolidated substrates and high salinity surf zone. Salt marsh, mangroves, and

oyster aggregations are also mentioned because these habitats occur in the project vicinity. Tidal inlets (including their ebb and flood tide shoals), which the South Atlantic Fishery Management Council designates has as Habitat Areas of Particular Concern (HAPC) for penaeid shrimp and species within the snapper-grouper complex as well as EFH for coastal migratory pelagic species does not receive a focused discussion. Also not discussed are species managed by the Mid-Atlantic Fishery Management Council and NMFS that occur in the project area and have EFH designations that extend into Florida waters. The Final EA should include these discussions.

Impacts to EFH

Our primary concerns with the proposed action are the impacts from dredging the inlet and use of the nearshore disposal area. Secondarily, we are concerned about the frequent uses of the beach disposal area from the proposed work in concert with other projects discussed in the section on cumulative impacts (section 4.0 and Table 15) and the St. Johns County Shore Protection Project.

Dredging St. Augustine Inlet: Inlets serve as migratory corridors for larvae entering nursery areas and for sub-adults leaving nursery areas for further maturation and spawning; there is no alternative location for this ingress and egress. Systematic dredging of the inlet may result in unanticipated changes in habitat quality, including increasing the concentration of suspended sediments that can clog gills in young, less mobile fish and invertebrates and thereby increase their mortality rate. The extent of negative effects is dependent on the life history stages of the species present and duration of exposure to high concentrations of suspended sediments. In open areas, adherence to the State Water Quality Criteria for turbidity at the edge of a 150-meter mixing zone is normally sufficiently protective of fishery resources; however it is not clear if this is the case in the confined area of an inlet. We request the Jacksonville District evaluate in the Final EA whether a seasonal restriction on dredging would be a practicable way to minimize impacts to larvae entering the estuary areas and for juveniles leaving the estuary. If a seasonal restriction is not practicable, an evaluation of the duration that larvae and young juvenile fish would be exposed to high levels of suspended sediments should be provided along with a discussion of how operation of the dredge (e.g., in the case of a cutterhead dredge, the swing speed of the ladder arm supporting the cutterhead, the rotational speed of the cutterhead blades, and the intake suction velocity at the cutterhead) can be used to minimize suspension of material.

Disposing Sediments in Nearshore Areas: Sandy shoals within nearshore areas provide feeding, resting, and staging habitat for a variety of commercially, recreationally, or ecologically important fish species. These shoals are established seascape features that provide valuable habitat for fishery resources that migrate between estuaries and offshore waters as a part of their life cycle. We note that the shoals offshore of Anastasia Island State Park and St. Augustine Beach are likely reconfigured on a regular basis by natural process. However, reconfiguring on tidal, seasonal, and annual scales does not diminish habitat value.

Since the nearshore disposal area is designed to erode and for the suspended material to disperse to the nearby shoreline, our concerns about suspended sediments and their effects on larvae and juvenile fish also apply here. We request the Jacksonville District evaluate in the Final EA whether a seasonal restriction on dredging would be a practicable way to minimize impacts to larvae and juveniles migrating along the shoreline. If a seasonal restriction is not practicable, an evaluation of the duration that larvae and young juvenile fish would be exposed to high levels of suspended sediments should be provided.

Benthic infaunal communities within the nearshore areas are composed of populations of opportunistic invertebrates that may repopulate after disposal of dredged material if certain biotic and abiotic conditions exist. At issue is what constitutes recovery for this community and the amount of time it takes for recovery to occur. Given the planned iterations of maintenance dredging, benthic communities within the nearshore disposal area may not have sufficient time to recover to pre-project levels; this would result in

long-term degradation of benthic habitats within the project area. While the DEA indicates that benthic organisms (i.e., prey) would be impacted by disposal of the dredged material, the DEA states that recolonization to pre-construction levels would occur rapidly. The DEA does not adequately describe how this conclusion was derived. Results from site-specific studies are not provided nor is there a review of results from studies done from other areas that might be applicable to the site of the proposed project. The DEA also does not discuss the degree of similarity between the *in situ* sediments of those that would be placed in the nearshore disposal area or the thickness of the dredged material layers and how that thickness and placement pattern could be managed to promote recovery of the infaunal communities. Without this information, it is not be possible to determine whether an acceptable level of avoidance and minimization of impacts to EFH is planned. An additional avoidance and minimization measure that may be worth considering is stockpiling the dredged material in the hole created to obtain sand for the beach nourishment project during 2005.

Beach Disposal: While it is reasonable to expect the infaunal communities of the beach disposal area to become reestablished provided the sediment characteristics are not changed appreciably, rates of recovery are also affected by the frequency of disturbance. The DEA does not include a 10-year plan that shows how often sediments will be disposed at the beach from the various projects approved or being considered. The DEA also does not characterize the compatibility of the beach and disposal sands. Consequently, the DEA does not evaluate the degree to which recovery of the benthic communities is likely to occur or the measures, such spatial or temporal interruptions in material placement, might minimize impacts to the beach communities.

Lastly, page 25 of the DEA states "[t]he 2010 project proposes beach placement above mean high water." Please clarify this statement and how it applies to the planned dredged event.

EFH Conservation Recommendations

NMFS concludes that the proposed project may adversely impact EFH. Section 305(b)(4)(A) of the Magnuson-Stevens Act requires NMFS to provide EFH conservation recommendations when an activity is expected to adversely impact EFH. In consideration of this requirement, NMFS recommends that the Department of the Army not comments with this project unless the project is modified according to the following:

EFH Conservation Recommendations

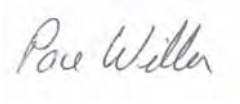
- Best management practices, such as restricting the time of year the dredging is done, shall be included to reduce impacts to EFH and vulnerable life stages of federally managed fishery species.
- A scientifically supported rationale shall be provided for concluding impacts to benthic communities at the nearshore disposal area would be minimal. Alternatively, best management practices shall be included in the design of the nearshore disposal area and a monitoring program shall be in place to evaluate the effectiveness of those best management practices.
- A scientifically supported rationale shall be provided for concluding impacts to benthic communities at the beach disposal area would be minimal that considers the multiple uses of the beach diposal area. Alternatively, best management practices shall be included in the design of the beach disposal area and a monitoring program shall be in place to evaluate the effectiveness of those best management practices.

Consistent with Section 305(b)(4)(B) of the Magnuson-Stevens Act and implementing regulations at 50 CFR 600.920(k), your office is required to provide a written response to our EFH recommendation within 30 days of receipt. Your response must include a description of measures to be required to avoid, mitigate, or offset the adverse impacts of the proposed activity. If your response is inconsistent with our EFH conservation recommendation, you must provide a substantive discussion justifying the reasons for not implementing the recommendation. If it is not possible to provide a substantive response within 30

days, the Corps of Engineers should provide an interim response to NMFS, to be followed by the detailed response. The detailed response should be provided in a manner to ensure that it is received by NMFS at least ten days prior to final approval of the action.

We appreciate the opportunity to provide these comments. Please direct related questions to the attention of Mr. George Getsinger at our Northeast Florida field office. He may be reached at 9741 Ocean Shore Drive, St. Augustine, Florida, 32080; by telephone at (904) 461-8674; or by email at George.Getsinger@noaa.gov.

Sincerely,



/ for

Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc:

COE, Catherine.l.Brooks@usace.army.mil
EPA, Eric.H.Hughes@usace.army.mil
FWS, Jay_Harrington@fws.gov
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FLORIDA DEPARTMENT OF STATE
Dawn K. Roberts
Interim Secretary of State
DIVISION OF HISTORICAL RESOURCES

November 3, 2010

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

Re: SHPO/DHR Project File No.: 2010-04838-B / Additional Information Received and Discussed by DHR: November 1, 2010
St. Augustine Entrance and Inlet Dredging Activities
St. Johns County

Dear Mr. Summa:

Our office was contacted by Dan Hughes of your agency to discuss our request for a resurvey of the St. Augustine inlet channel and other areas of the proposed maintenance/nourishment project. Upon further review, considering that the inlet is a relatively recent land cut constructed by the U.S. Army Corps of Engineers (Corps) and that the sub-bottom profile data is problematic in east coast sand cuts anyway, we can suggested an alternative to resurvey of these areas.

It our opinion that Corps archaeologists or a professional consultant should monitor the dredge spoil during the periods the dredge is close to the entrance channel buffer zones for the previously identified anomalies. Anastasia State Park which will benefit from the sand removed from the area in question, may likely have someone certified by the Division of Historical Resources' Archaeological Resource Monitor (ARM) training class that could do the monitoring on the few days required. Therefore, conditioned up agreement from the Corps that an archaeologist or park personnel ARM certified will be on site to monitor when the dredge is near the St. Augustine entrance channel anomalies to identify cultural material in the spoil, the concerns of this office would be addressed and historic properties will not be adversely affected.

Please provide your written concurrence with this proposed plan; and at such time as the plan is finalized it should be submitted for final approval by this office. If you have any questions, please contact Laura Kammerer, Deputy State Historic Preservation Officer for Review and Compliance, at 850.245.6333 or lkammerer@dos.state.fl.us. Thank you for your interest in protecting Florida's historic properties.

Sincerely,

Laura A. Kammerer

for Scott M. Stroh III, Director, and
State Historic Preservation Officer

Pc: Jason Burns, Southeastern Archaeological Research, Inc.
Robin Moore, St. Johns County
Phillip Werndli, FDEP – Bureau of Natural & Cultural Resources
Daniel McClarnon, FDOS - Bureau of Archaeological Research

FLORIDA DEPARTMENT OF STATE
Dawn K. Roberts
Interim Secretary of State
DIVISION OF HISTORICAL RESOURCES

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

October 27, 2010

Re: DHR Project File No.: 2010-03936 / Received by DHR: August 26, 2010
Draft Report: *Phase I Cultural Resources Survey as Part of the St. Johns County Shoreline Protection Feasibility Study, St. Johns County, Florida*

Dear Mr. Summa:

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

In November and December 2009, Brockington and Associates, Inc. (BAI) conducted an archaeological and historical Phase I survey of the area of potential effect for the St. Johns County shoreline protection project on behalf of the US Army Corps of Engineers. BAI identified thirty-five (35) previously recorded historic buildings, two previously recorded resource groups, and fifteen (15) previously unrecorded historic buildings. BAI found that fourteen previously recorded historic buildings are no longer extant (8SJ2987, 8SJ3902, 8SJ3908, 8SJ3912, 8SJ3913, 8SJ3921, 8SJ3923, 8SJ3924, 8SJ3925, 8SJ3926, 8SJ3935, 8SJ3951, 8SJ4793, and 8SJ4752). BAI determined that previously recorded structure (8SJ4880) is not yet fifty years old.

Before this office can process this report and associated documentation to the Florida Master Site File (FMSF), the following information must be forwarded to make it *Complete*:

- **Final Report Submitted to the State Historic Preservation Office**: If there is a Final report, that it is submitted in a timely manner; or notification that there is no Final report.

- **Florida Master Site File Resource Group Forms:** FMSF Resource Group forms need to be updated for the Summer Haven District (8SJ3247) and the 3080 Coastal Highway District (8SJ3904). Please forward the completed forms, tabulations of resources (if applicable), and archival photos or digital images meeting required standards.

- **Historic Structure Update Forms:** Please forward completed FMSF Historical Structure forms for 8SJ4794 and 8SJ4795.

- **Florida Master Site File Forms:** The Final report submittal needs to include unbound FMSF forms, since they are filed in separate folders from the report.

The US Army Corps of Engineers determined that no historic properties will be affected by conducting shoreline protection activities and dredge spoil placement within the project area. Based on the information provided, our office concurs with this determination.

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

Sincerely,

Laura A. Kammerer

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

Pc: Jeff Gardner, Brockington and Associates, Inc. – Norcross, Georgia
Dan Hughes, USACE – Jacksonville, Florida

Florida Department of Environmental Protection

Anastasia State Park
1340A A1A S.
St. Augustine, FL 32080

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

March 4, 2010

Mr. Eric P. Summa
Chief, Environmental Branch
701 San Marco Blvd.
Jacksonville, FL 32232

Dear Mr. Summa:

We have reviewed the proposal to haul beach material utilizing trucks to the north end of the beach. We do not feel there would be any disturbance of cultural resources resulting from this action. The activity will certainly be monitored closely by my staff.

Sincerely,

Paul E. Crawford
Park Manager III

PEC/md

Cc: Larry Fooks, District 3 Bureau Chief
Clif Maxwell, Assistant Bureau Chief
Alice Bard, Environmental Specialist II
Paul DeMarco