VOLUME II

WALTON COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION

GENERAL INVESTIGATIONS STUDY
DRAFT FONSI AND
ENVIRONMENTAL ASSESSMENT

DECEMBER 2012

US Army Corps
of Engineers®
Mobile District

DRAFT FINDINGS OF NO SIGNIFICANT IMPACT (FONSI)
WALTON COUNTY HURRICANE AND STORM DAMAGE REDUCTION PROJECT
WALTON COUNTY, FLORIDA

Project Location: Walton County, Florida is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida to the Walton/Bay County line near Phillips Inlet. The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 15.7 miles of state-designated critically eroding areas and three State of Florida park areas.

As District Engineer, U.S. Army Corps of Engineers, Mobile District, my evaluation and findings are as follows:

1. Description of the Proposed Action and Alternatives Considered.

This investigation was conducted to analyze and formulate a hurricane and storm damage reduction project for Walton County, Florida. Since 1990, several coastal storms have eroded the coastline of Walton County resulting in recession of the protective beach and dune system. The selected plan, also known as the locally preferred plan (LPP) and addressed in the attached Environmental Assessment (EA) and in the main feasibility report, will be composed of a 50-foot berm width. The project will also feature added dune widths in all construction reaches of either 10 or 30 feet. The estimated initial fill requirement is approximately 3,900,000 cubic yards (cy).

2. Alternatives Considered.

a. No Action. A no-action scenario would not provide the needed stability and sustainability that a healthy coastal environment would provide to the area. Future conditions associated with not restoring the beach and dune system would result in the continued vulnerability of the area to future storm events and would not provide the necessary level of hurricane and storm damage reduction and lack the needed storm protection. Furthermore, absence of the dunes and associated vegetation eliminates much of the shoreline stabilization and suitable habitat required to sustain wildlife that relies on these types of habitats. The continued degradation of a valuable beach ecosystem which would remain particularly vulnerable to wave and storm activity continue to threaten valuable natural resources.

b. Structural Measures. The use of coastal structures was considered to provide storm protection throughout Walton County. However, use of coastal structures in this case would not be consistent with state policy for a shore-wide solution for Walton County, and the state does not consider it to be a permittable alternative.

c. Other Screened Alternatives. A process for initial screening of alternatives looked at historical and current dune and berm heights and widths over the study area. Various berm widths of 50 to 125 feet and dune widths of 0 to 30 feet were considered, as discussed in Section 2.1 of the EA.

d. National Economic Development (NED) Plan. As described in the main feasibility report, the NED alternative was evaluated based on economics, engineering performance characteristics, constructability and beach fill uniformity. The report and EA also addressed minimizing environmental impacts and restoration opportunities. The total reach length of the NED Plan is about 15.0 miles excluding transitions. This alternative is smaller and falls completely within the boundaries of the LPP.

e. Locally Preferred Plan (LPP). In addition to the NED, the LPP or selected plan includes an area on the western end of the project in construction reach R-1, which increases the project length by 3.8 miles to a total length of 18.8 miles. The same borrow area will be used. Environmental impacts at the borrow area are the same except that a larger volume will be removed for the selected plan.

3. Coordination. The Mobile District conducted an interagency scoping meeting in 2004 to initiate environmental compliance processes for the feasibility study. A notification to all pertinent agencies was issued by Public Notice to inform them of the availability of the Peer Review Plan for their review and comment. Public Workshops were held in 2012 to provide the Walton County Tourist Development Council with public concerns and are part of the public record. No formal public or agency comments were received.

4. Environmental Effects. This proposed action is in compliance with all relevant environmental laws, regulations, and policies. Conducting the dredging activities at the selected borrow site and placement of the material to provide the necessary level of hurricane and storm damage reduction will be accomplished in a manner that minimizes impacts to federally protected species as well as provides greater sustainability of the coastal environment in Walton County. Based on the impacts assessed in the EA that would result from the implementation of the selected plan, due to the lack of long-term adverse impacts, and because no mitigation requirements or needs have been identified, it is determined that no significant impacts to the existing beach, adjacent shorelines or proposed borrow area would occur.

In its implementation of the selected plan, the Mobile District will include four of the five Fish and Wildlife Coordination Act (FWCA) recommendations. For the recommendation which the Mobile District lacks the authority to fully implement, the Mobile District will discuss the recommendation with the Non-Federal Sponsor for its determination regarding any further implementation.

The Mobile District will comply with the Terms and Conditions of all applicable Biological Opinions in accordance with Section 7 of the Endangered Species Act. In compliance with the Coastal Barriers Resources Act (CBRA), the Corps has taken steps to ensure that any and all work within specified CBRA zones will be 100% funded by the local sponsor so that no Federal funding will be used for any construction within the CBRA areas. Dune planting as described in the EA shall contain a variety of native species of vegetation. Also, the Corps discussed with the Non-Federal Sponsor the recommended local actions that were described in the FWCA report, such as the implementation of a predator control program and creation of a pet leash law.

5. Determination. Based on the EA prepared for this project, I have determined that this action does not constitute a major federal action significantly affecting the quality of the human environment and complies with all relevant environmental laws, regulations, and policies. Therefore, the action does not require the preparation of a detailed statement under Section 102(2)(c) of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).

a. An unusual attribute of the Walton County's coastal beach and dune community is the presence of coastal dune lakes. Any berm and dune placement in the vicinity of the lakes will be conducted in a manner that will maintain the existing gaps and preserve the intermittent breaching processes as described in Section 4.4 of the EA.

b. The project will be in compliance with the CBRA. The Corps has taken steps to ensure that all work within the CBRA zones will be 100% funded by the non-Federal sponsor and no in-kind credits will be given for efforts in these areas. The USFWS has concurred that this complies with the prohibition on the use of Federal funding in CBRA zones.

6. <u>Findings and Conclusions</u>. The selected plan would result in no significant environmental impacts to the human environment. Furthermore, it is the alternative that includes sound practices and complies with all environmental requirements.

Date: ________________ ________________________________

STEVEN J. ROEMHILDT, P.E.
Colonel, Corps of Engineers
District Commander

ENVIRONMENTAL ASSESSMENT
FOR
WALTON COUNTY, FLORIDA HURRICANE AND STORM DAMAGE REDUCTION PROJECT
WALTON COUNTY, FLORIDA

Prepared by
U.S. Army Corps of Engineers, Mobile District
Planning and Environmental Division
Environmental Resources Branch
Coastal Environment Team

December 2012

ENVIRONMENTAL ASSESSMENT
WALTON COUNTY HURRICANE AND
STORM DAMAGE REDUCTION PROJECT
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1.0 INTRODUCTION

Walton County's shoreline located in Florida's Panhandle is receding; the protective dunes and high bluffs are being destroyed by hurricane and storm. The impacts of these storms to property and infrastructure are considerable and can possibly be reduced through a beach restoration and stabilization project which also includes environmental restoration opportunities associated with the beach and dune system. Behind the dune system, upland drainage feeds several freshwater lakes that intermittently breach the dune system and discharge directly into the Gulf. Primary dune elevations range from 11.5 to 44.5 feet North American Vertical Datum, 1988 (NAVD88) and average 25.5 feet National Geodetic Vertical Datum (NGVD).

During the late 1990s, the area endured several strong hurricanes resulting in extensive shoreline erosion (Taylor Engineering, Inc., 2003). In 2004 the area was affected severely by Hurricane Ivan (Sep 04) and early into the 2005 hurricane season it was impacted by Hurricanes Arlene (June 05) and Dennis (July 05).

1.1 AUTHORITY

This study was authorized both within the United States Senate and the U.S. House of Representatives. In the Senate, the Committee on Environment and Public Works adopted a committee resolution (unnumbered) on July 25, 2002, which reads as follows:

> *"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental resources on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from Federally constructed projects in the vicinity of Walton County, Florida.*
>
> In the House, the Committee on Transportation and Infrastructure adopted a resolution, Docket 2690, dated July 24, 2002, which reads as follows:
>
> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida.*

The Non-Federal Sponsor is the Walton County Board of Commissioners. Their central point of contact is the Executive Director, Walton County Tourist Development Council (TDC).

1.2 LOCATION OF STUDY AREA

Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure EA-1). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 15.7 miles of state-designated critically eroding areas and three State of Florida park areas that cover approximately six miles of the 26-mile shoreline.

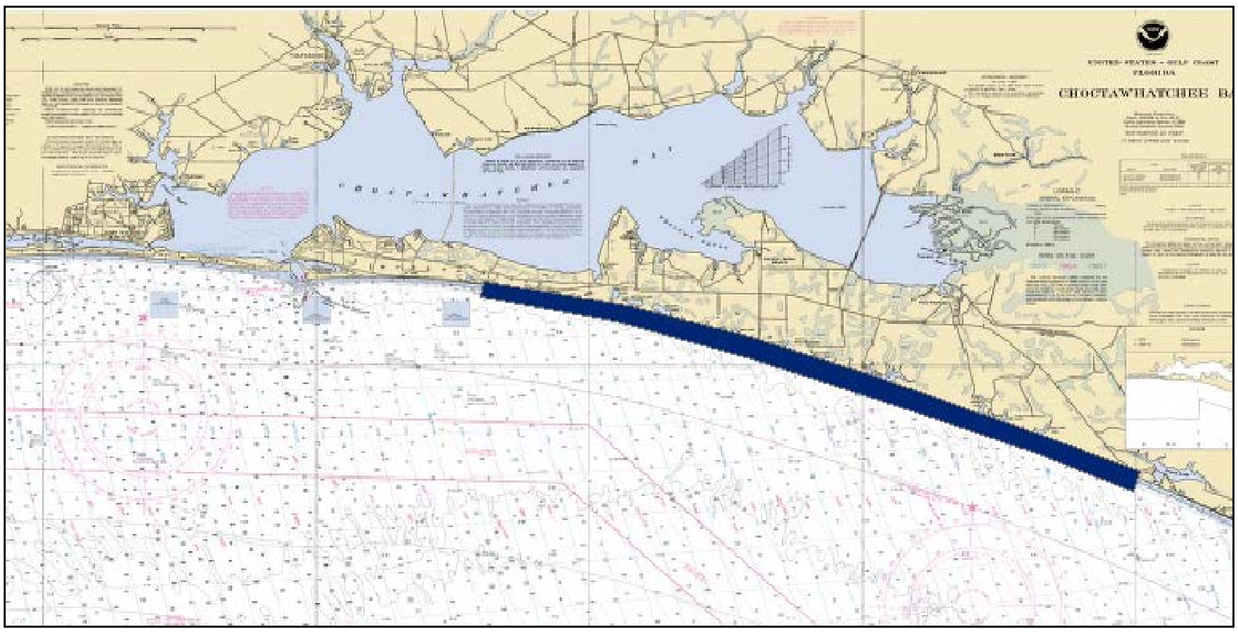

Figure EA-1. Location of Walton County Project Area

1.3 PURPOSE AND NEED

The purpose of this study is to assess the needs for hurricane and storm damage protection and opportunities for environmental restoration and protection along the Gulf Coast of Walton County, Florida. The purpose of this report is to document the environmental considerations completed to formulate a shore protection project for Walton County, Florida, which will reduce the damaging effects of hurricanes and severe storms to properties and environmental resources along the coast and stabilize or restore the shoreline by eliminating long-term erosion. The project is constructible, acceptable to the public, environmentally sustainable, and justified by an economic evaluation.

Walton County's shoreline is receding and its protective dunes and high bluffs are being adversely impacted by hurricane and coastal storm forces. The impacts of these storms to property and infrastructure have been considerable. Erosion is also having an impact on the environment due to decreased beach area and elevation. Such impact directly affects the availability of suitable nesting habitat required for nesting sea turtles and the areas needed by shorebirds to forage and rest. Damage to the previously established dune system destroyed much of the existing vegetation that provides stabilization.

In addition to storm damage protection the proposed action provides environmental restoration opportunities. A report produced by the State of Florida following Hurricane Ivan (2004) to assess damages and recovery plan as a result of the storm, the state recommends an assisted recovery plan to implement beach and dune restoration and re-vegetation for the critical areas in Walton County. Such action would restore valuable dune and beach habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat supporting various flora and fauna and general beach ecosystem functions. Restoring a beach-dune system allows greater stability and sustainability of the coastal environment once it has become established. Restoring the beach habitat that supports a variety of associated flora and fauna contribute to the success and continual survival of several threatened or endangered species. The restoration effort will also contribute to the well-being of various other flora and fauna that naturally occur in the immediate vicinity as well as providing continued sustainability to the fragile ecosystems of the dune lakes that exists in the area. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources.

1.4 SCOPE

This Environmental Assessment (EA) was prepared in accordance with Engineer Regulation (ER) 200-2-2, *Procedures for Implementing the National Environmental Policy Act (NEPA)* and the Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations (CFR) Pts. 1500-1508). The objective of the EA is to determine the magnitude of the environmental impacts of the proposed storm protection and restoration actions. If such impacts are relatively minor, a Finding of No Significant Impact (FONSI) would be issued and the Mobile District, U.S. Army Corps of Engineers (Corps) will proceed with the Federal action. If the environmental impacts are significant according to CEQ's criteria (40 CFR Section 1508.27), an Environmental Impact Statement (EIS) would be prepared before a decision is reached to implement the proposed action.

Applicable laws under which these impacts will be evaluated include the NEPA, Endangered Species Act (ESA), the Clean Water Act (CWA), the Clean Air Act, the U.S. Fish and Wildlife Coordination Act (FWCA), National Historic Preservation Act, Coastal Barrier Resources Act (CBRA), Magnuson – Stevens Fishery Conservation and

Management Act (MSFCMA), and Coastal Zone Management Act (CZMA).

1.5 ENVIRONMENTAL ASSUMPTIONS

The general environmental criteria for projects of this nature are identified in Federal environmental statutes, executive orders, planning guidelines, and the U.S. Army Corps of Engineers (Corps) Environmental Operating Principles (EOP) originally established in 2002. It is the national policy that ecosystem restoration, particularly that which results in conservation of fish and wildlife resources, be given equal consideration with other study purposes in the formulation and evaluation of alternative plans. The basic guidance during planning studies is to assure that care is taken to preserve and protect significant ecological and cultural resources, and to conserve natural resources. These efforts also should provide the means to maintain and restore, as applicable, the desirable qualities of the human and natural environment. Formulation of alternative plans should avoid damaging the environment to the extent practicable and contain measures to minimize or mitigate unavoidable environmental damages. Consistent with laws and policy, alternative plans formulated should avoid damaging the environment to the extent practicable and contain measures to minimize or mitigate unavoidable environmental impacts.

The initial concepts embedded in the Principles are vital to the success of the Corps and its missions. However, in August 2012 the Corps re-energized the EOP providing more emphasis on proactively implementing these principles and guides all Corps management initiatives and business processes and encompasses the full spectrum on Corps activities. Re-committing to these principles and environmental stewardship will lead to more efficient and effective solutions, and will enable the Corps to further leverage resources through collaboration. This is essential for successful integrated resources management, restoration of the environment and sustainable and energy efficient approaches to all Corps mission areas. It is also an essential component of the Corps of Engineers' risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure. The re-energized EOP include:

- Foster sustainability as a way of life throughout the organization;
- Proactively consider environmental consequences of all Corps activities and act accordingly;
- Create mutually supporting economic and environmentally sustainable solutions;
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments;
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs;
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner; and,

- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities

The following criteria were used to address environmental impacts during the evaluation of alternatives:

- Protection, preservation, and improvement of the existing fish and wildlife resources along with the protection and preservation of coastal and offshore habitat and water quality;
- Consideration in the project design of the least disruptive construction techniques and methods;
- Protection and preservation of endangered and/or threatened species, critical habitat, and essential fish habitat (EFH); and
- Preservation of significant historical and archeological resources through avoidance, if possible, or data recordation if destruction of the resources is necessary.

1.6 APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS

One major concern is compliance with the CWA. Potential water quality impacts associated with the borrowing and placement of fill material associated with beach nourishment operations must be considered. Such activities include evaluation of sediment from identified borrow sources for placement within the littoral zone throughout the study area. Sediment characteristics of concern are sediment grain size and color. Borrow sediments identified as suitable must match, as closely as possible, the sediment characteristics at the nourishment site. This information will been utilized in the preparation of the Section 404(b)(1) evaluation report and also in developing the management requirements to minimize impacts to threatened and/or endangered species under Section 7 of the ESA.

Additional issues to be addressed include coordination with the U.S. Fish and Wildlife Service (USFWS) on six Coastal Barrier Resource System Units. The CBRA limits the expenditure of Federal funds in designated system units so that expenditure would not enhance future/further development of the area. Therefore, no federal funds will be expended in the six CBRA Units. Furthermore, the activities proposed within designated CBRA units and completely funded by the non Federal sponsor will provide enhancement of fish and wildlife resources and habitats which may be allowable under CBRA. The MSFCMA identified habitats within the marine and estuarine areas of the U.S. that were essential to the management of certain specific fin and shellfish. Areas identified by the Gulf of Mexico Fishery Management Council as EFH include all the marine and estuarine areas of Walton County. Consultation with the NMFS focused on activities to minimize impacts to EFH. Of particular concern has been avoidance or minimization of impacts or the enhancement of EFH. Coordination with the USFWS and NMFS concerning potential impacts to listed species is required and has been initiated for the selected plan. Efforts have been made to include actions that would benefit the recovery of listed species. It should be noted that the selected plan described in this EA is the same as the Locally Preferred Plan (LPP) described in the main feasibility report.

All Federal activities affecting any land, water use, or natural resources of the coastal zone shall be carried out in a manner which is consistent, to the maximum extent practicable, with the enforceable policies of the Florida coastal management program. In addition, water quality certification (WQC) from the State of Florida is required for all actions to be implemented. A WQC/Coastal Zone Consistency (CZC) application has been submitted to the state to obtain the necessary certifications. The feasibility study of the critically eroded shoreline has been conducted and found consistent with State of Florida's beach management plan.

2.0 PROPOSED PROJECT DESCRIPTION

The Walton County shoreline is characterized by high dune elevations partly due to the presence of Pleistocene bluffs formed as a result of an exposed submarine berm formed during inundation of the Florida Peninsula during that geologic period. Primary dune elevations in Walton County range from 11.5 to 44.5 feet North American Vertical Datum, 1988 (NAVD88) and average 25.5 feet with a natural berm elevation of +5.5 feet. Along the mid-section of Walton County, bluff elevations exceed 60 feet in height. Bluff erosion and undercutting occur in this area due to the interface of relatively low flat beaches and the bluff toe. An unusual attribute of the Walton County shoreline is the presence of coastal dune lakes. These lakes are rare worldwide and are almost exclusive to the Gulf Coast within the United States. The lakes are about five feet deep and intermittently breach the dune system and discharge directly into the Gulf of Mexico.

The study region was divided into five study reaches based on structural development and state park areas as illustrated in Figure EA-2. The historical and 2004 beach surveys were used to develop 11 representative profiles which characterize the existing condition for the five study reaches. The representative profiles were identified based on similarity in shape of the upper beach profile (dune height and width, berm width, foreshore beach slope, and profile volume) and shape of the offshore profile. Because significant erosion occurred due to Hurricane Ivan in September 2004, the representative profiles were revised using the post-Ivan data to characterize the upper portion of the beach and to include the post-Ivan data in the submerged portion of the beach.

A Corps engineering-economic Monte Carlo simulation model called Beach-*fx* was used to correlate beach profile change to storms, coastal processes, and nourishment programs and simplify beach profiles representing a single trapezoidal dune, with a horizontal berm as shown in Figure EA-3. The submerged profile is represented by a series of points or an approximate functional representation. The beach variables which change with storms are dune width, dune height, berm width, and upland elevation. Constant values are upland elevation, dune slope, berm height, foreslope, and shape of the submerged profile. Thus in response to a given storm, the berm can be eroded or accreted; the dune height and/or width can change and translate landward or seaward.

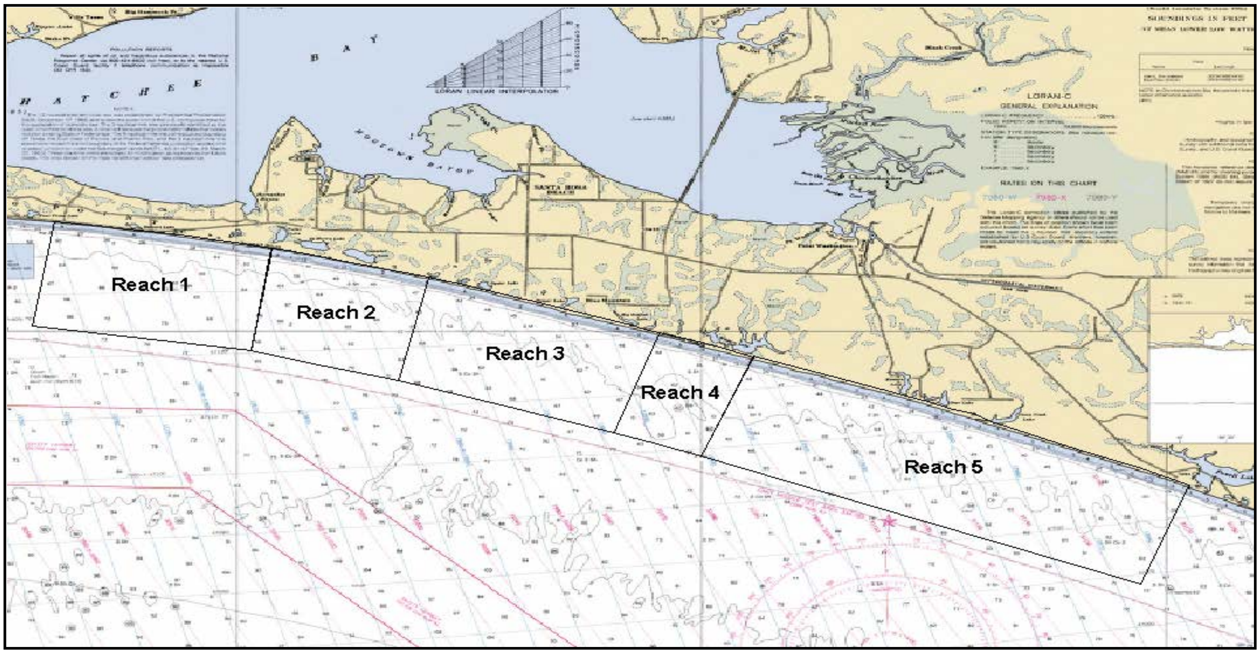

Figure EA-2. Location of the Five (5) Construction Reaches within the Project Area

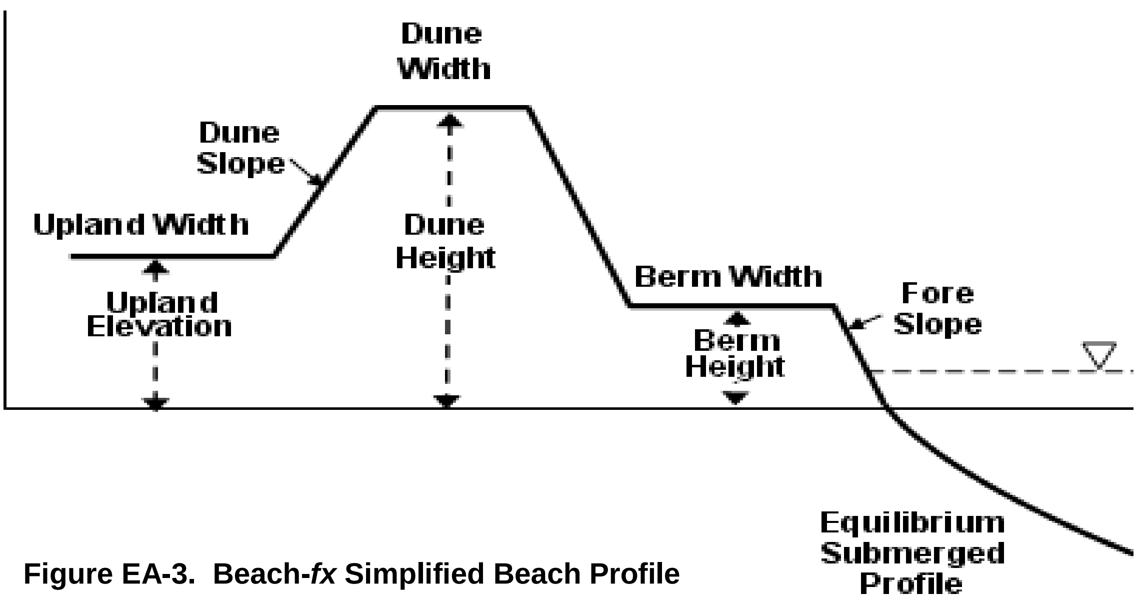

Figure EA-3. Beach-*fx* Simplified Beach Profile

Eleven simplified beach profiles were modified for various berm and dune configurations. Maximum dune and berm widths were determined based on volumes provided by the Federal Emergency Management Agency (FEMA) post-Hurricane Ivan emergency beach nourishment.

The Beach-*fx* model is an event-based, data-driven Monte Carlo simulation model. This structure has been used successfully in the past in a large number of Corps studies and Beach-fx has been certified for use on hurricane and storm damage reduction studies. Beach-*fx* represents an improvement on previous models in this arena by being strongly based on representation of the coastal and engineering processes, incorporating the impact of multiple storms, and incorporating uncertainty in damage functions, physical characteristics of structures, and economic valuations. Other modeling was conducted using the Storm-Induced Beach Change Model (SBEACH) to predict the response of each dune and berm configuration to the 552 storms developed for this study. Approximately 240,000 SBEACH simulations were conducted to develop the shoreline responses for the Beach-*fx* storm response database.

2.1 ALTERNATIVES

2.1.1 No Action.

A no-action scenario would not provide the much needed stability and sustainability that a healthy coastal environment could offer to the area. The absence of the dunes and associated vegetation eliminates much of the suitable habitat required to sustain beach mice populations and other wildlife that relies on these types of habitats for their continued survival. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits. As described in the report by Taylor Engineering (2003), the position of Walton County's shoreline demonstrating net erosion throughout the entire county is most likely a result of the increased hurricane occurrences throughout the 1990's and 2000's. Thus most of the beaches of Walton County have been designated by the State of Florida as "critically eroding." The erosional climate experienced along this area, translates to a net loss of beach habitat. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. Opportunities would be lost to implement beach and dune restoration and re-vegetation for the critical areas in Walton County. Degradation of valuable dune and beach habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat that supports various flora and fauna, and general beach ecosystem functions would persist as the area continues to be vulnerable to even minor storm activity.

2.1.2 Structural Measures

The use of coastal structures was an alternative considered to provide the much needed storm protection throughout Walton County. However, the use of coastal structures in this case would not be consistent with state policy for a shore-wide solution for Walton County and not considered as a permittable alternative by the state. It is believed that the use of hard structures would have a negative impact on listed species inhabiting the area.

When shorelines and beaches become developed, structures and buildings interfere with natural coastal processes which create a need for coastal armoring and structures such as seawalls to fortify the beach against erosion. Such structures actually accelerate erosion by intensifying wave action and currents along the shore interfering with the natural sediment transport processes (Butler, 1998). To preserve beachfront development, erosion control structures must continue to prevent continued sand loss. These practices adversely affect nesting sea turtles and their eggs as described by Butler (1998). Besides causing permanent degradation of nesting habitat through erosion, coastal armoring physically prevents females from reaching suitable nesting sites. Structures not only cause the loss of suitable nesting habitat, but can result in the disruption of coastal processes accelerating erosion and interrupting the natural shoreline migration. Since the effects on sea turtle nesting habitat are known to be caused by coastal structures, the continued vulnerability of remaining nesting habitat to frequent or successive severe weather events, may impact ability of sea turtle populations to survive and recover (Butler 1998).

In response to periodic storms, the beach itself moves landward, construction or persistence of structures at their pre-storm locations can result in a major loss of nesting habitat. In addition, the presence of hard coastal structures may interfere with nesting turtle access to the beach, result in a change in beach profile and width (downdrift erosion, loss of sandy berms, and escarpment formation), trap hatchlings, and concentrate predatory fishes, resulting in higher probabilities of hatchling predation. The combination of habitat loss and nesting opportunities resulting from beachfront development and subsequent use of coastal structures such as seawalls, bulkheads, and groins is believed to be a threat to sea turtle survival and recovery and should be avoided were possible.

Coastal structures are known to have a similar affect on beach mouse habitat and various shorebirds known to exist along the project area. The use of seawalls, bulkheads, and groins disrupt the natural dune and beach building processes that are critical to the survival of endangered beach mouse populations and shorebirds. Because of the limited remaining habitat such structures could compromise the ability of certain populations to survive and recover. As with sea turtles, the combination of habitat loss to beachfront development and subsequent use of persistent coastal structures to stabilize the shorelines at their pre-storm locations has resulted in an increased threat to species survival and recovery. In order to preserve the survival and recovery of these species, it is recommended that the use of such coastal structures be avoided.

2.1.3 Beach Restoration Alternatives

A process, as described in the main feasibility report, for initial screening of alternatives resulted in the recommendation of a set of preliminary alternatives to be further evaluated. The screening process looked at both historical and current dune heights and dune widths and berm heights and berm widths over the study area as defined in each representative profile. In Reaches 1, 3, and 5 the dune height is preserved as a result of the emergency nourishment action. The non-Federal sponsor has recently completed an emergency dune restoration project to partially replace the erosion losses due to Hurricane Ivan to provide storm protection for existing infrastructure.

Since emergency nourishment is only applied to the dune, the erosion is most significant at the berm. It was then determined that the project alternatives for evaluation generally would vary among the berm widths in 50-, 75-, 100-, and 125-foot increments except in reach one of profile one (R1P1) whose alternative berm width was 25 feet smaller. The optimized section was found to be a 50-foot berm with a set dune height and width against the existing dune. Added dune width alternatives of 0, 10, 20 and 30 feet were run with the optimized berm width alternative of 25 feet (Optimized berm template of 50 feet, 25 berm width plus 25 feet of advanced nourishment). Table EA-1 below summarizes the optimum added dune width within the five construction reaches by representative profile. The necessary beach fill requirements have been shown to be 3,000,000 cubic yards (cy) and 3,350,000 cy. Renourishments will be on a 10-year cycle, but the renourishment volumes will increase to approximately 2,000,000 cy.

Table EA-1. Optimum Added Dune Width – Representative Profile

Construction Reach	Representative Profile	Existing Dune Width	Optimum Added Dune Width
CR1	R1P1	55	+10
	R1P2	100	+30
CR2	R3P1	76	+10 & +30
	R3P2	45	+10
CR3	R4P1	50	+10
	R4P2	85	+10
CR4	R5P1	185	+10
	R5P2	65	+10
	R5P3	50	+10
CR5	R5P1	185	+10
	R5P2	65	+10
	R5P3	50	+10

2.1.4 National Economic Development (NED) Plan

The NED Plan is a robust design that was considered based on economics, engineering performance characteristics, constructability and beach fill uniformity. The reach length of the NED Plan is 79,280 feet, about 15.0 miles without transitions, with transitions it is 84,280 feet about 16.0 miles. The results of the modeling conducted for this alternative revealed that there would be four renourishments. The initial fill and four renourishments make for 5 nourishments in 50 years, therefore a 10-year nourishment cycle. The initial fill is estimated to require on average 3,273,000 cy and each of the four renourishments averaging 1,585,000 cy each. This alternative is slightly smaller and completely falls within the boundaries of the selected plan. The effects of the selected plan represents the worst case scenario since it a little larger that the NED Plan. The NED alternative as compared to the selected plan will exhibit the same environmental impacts (and benefits) except that the selected plan will affect a slightly longer reach of shoreline than the NED. The same borrow area will be used for either, so the environmental impacts at the borrow area are the same except that a larger volume will be removed for the selected plan covering a slightly larger area. Considering this information, the EA will concentrate on addressing the effects of the selected plan as described below.

2.1.5 Selected Plan

The plan recommended for construction is the selected plan identified in the feasibility report which consists of five of the construction reaches shown in Figure EA-2. Table EA-2 below specifies the length within each of the construction reaches. The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches.

Table EA-2. Walton County Construction Reaches For the Selected Plan

Construction Reach	Beginning Model Reach	Ending Model Reach	Model Reach Length in Feet	Length in Miles	Construction Length with transitions	Length in Miles
1	R1-1	R1-24	25,002	4.7	26,002	4.9
2	R3-2	R3-23	22,980	4.4	23,980	4.5
3	R4-1	R4-6	6,101	1.2	7,101	1.3
4	R5-1	R5-21	21,688	4.1	22,688	4.3
5	R5-30	R5-51	22,319	4.2	23,319	4.4
Total Selected Plan Length			**98,091**	**18.6**	**103,091**	**19.5**

The project will also feature added dune widths in all construction reaches of either 10 or 30 feet. The modeling efforts have predicted fill requirements of 2,400,000 cy. This plan extends the coverage area to the westernmost limits of the county where the National Economic Development (NED) Plan could not justify the coverage. The model assumes an annual erosion rate of 100,000 cy annually lost to the system, thereby creating a renourishment cycle every 10 years requiring 1,200,000 cy of placement; however, recent surveys have shown that the erosion during a non-storm event has produced an initial placement of 2,980,000 cy. If this condition can be extrapolated to the predicted construction timeframe in the near future, then the necessary beach fill requirements will be 3,350,000 cy. Renourishments will still be on a 10-year cycle, but the renourishment volumes will increase to approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters and are described in Section 2.2. The typical cross sections for the selected plan are illustrated in Figure EA-4. When dune construction is completed, the dune will be planted with at least three species of dune vegetation as described under Section 2.3.

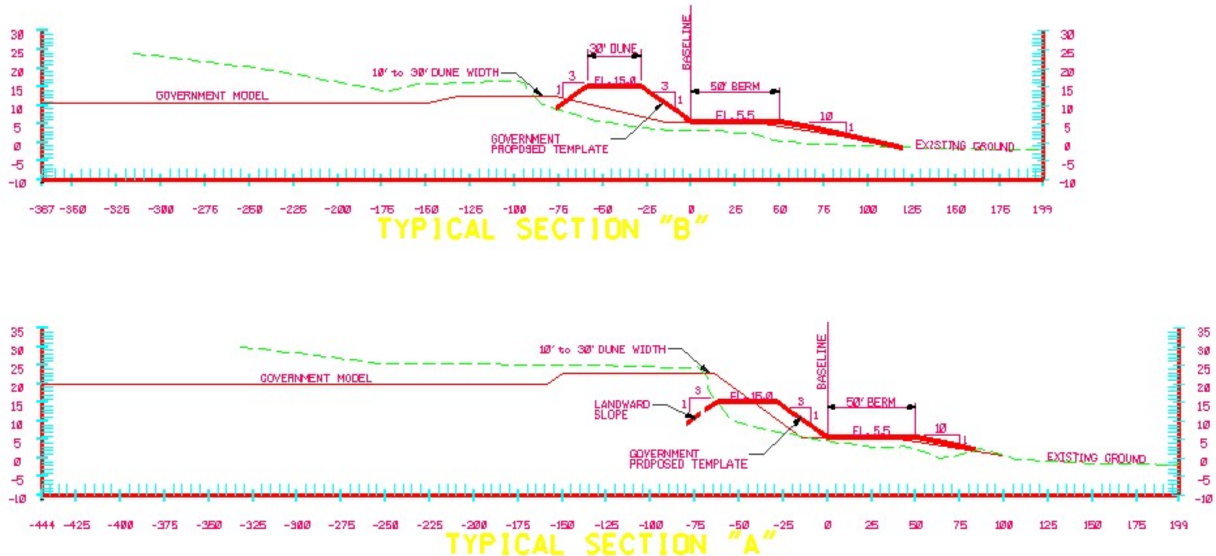

Figure EA-4. Selected Plan Typical Cross Sections to be Constructed

2.1.6 Local Plan

It should be recognized that the non-Federal sponsor proceeded with pursuing a beach restoration plan of their own. Their local project area extends the length of Walton County and is composed of two separate segments. The first segment is a 6.9-mile reach at the western end of the county where an emergency nourishment action was conducted. The second segment is 13.5 miles continuing to the east, for a total length of 20.4 miles. The overall proposed local plan includes a berm design that has a 207-foot wide berm measured from the existing 9.5 feet NAVD contour with a10-foot wide dune crest. Their proposed plan view and profiles totally envelopes the selected plan and uses the same borrow site. Subsequently, the non-Federal sponsor has already completed the process of applying for the state WQC/CZC. They have also completed coordination for threatened and endangered species as required by the ESA, initiated coordination on EFH, completed cultural resources coordination, and prepared a draft EA. Since their initial efforts did not involve any Federal funding, the CBRA did not apply. The non-Federal sponsor has requested that their efforts be considered as in-kind services toward their cost share requirement. This request was denied. For the Federal action, the Corps as the lead agency under NEPA is required to and has conducted independent environmental coordinations and consultations for the selected plan.

2.2 BORROW AREAS

There have been recent offshore studies conducted to include geological and geophysical interpretation and to identify a suitable offshore borrow area. These studies have been conducted by Taylor Engineering, Inc. (2003) for the Walton County Destin Beach Management Feasibility Study Final Report. The 2003 report conducted under contract to the non-Federal sponsor, evaluated the entire coastline to assess locations with sufficient quantities for borrow development for the initial beach placement and future renourishments.

Additional geotechnical and geophysical work was conducted in these areas, further offshore and within the eastern end of Walton County to assess borrow sources for the entire beach nourishment project. The initial data indicated pockets of viable sand bodies along the study site. The west flank of the study area in Okaloosa County has high quality sand associated with the eastern part of the Destin East Pass ebb-tide delta. Alternate sites that deserved additional reconnaissance were located offshore in approximately 65 to 70 feet of water, but were not further considered for this action.

A large scale reconnaissance level geophysical, lithological, and granulomteric (grain size) investigation was undertaken off Walton County, Florida. Sub-bottom profiles were used initially to locate prospective core locations to identify high quality sand sources for beach nourishment. Vibracores and selected seismic records were interpreted in an attempt to confirm the presence and quality of sand off Walton County. The borrow area investigation locations are shown in Figure EA-5.

The proposed borrow area sediments are typically well sorted medium sand (1-2 phi). Monitoring of the borrow area discharges will be a constant requirement for compliance with color and grain size criteria. Borrow area B-4, as shown on Figure EA-5, is the most promising site with some 10,000,000 cy proven by these initial investigations. This volume covers the recommended locally preferred placement plan and the four planned subsequent renourishments for the next 50 years. The B-4 borrow area is centrally located and offers the best source for now and in the future. Based on the extensive geotechnical investigations, this borrow site has been demonstrated to be the most suitable source, and has sand color, size, and composition generally similar to that of the native beach. All sand used for beach nourishment will be excavated by a hopper dredge, transported to the placement area offshore and pumped into the beach template. Small bulldozers will be used on land to shape the material to the prescribed template.

2.3 ENVIRONMENTAL RESTORATION OPPORTUNITIES

Coastal ecological resources throughout Walton County have consistently been diminished due to the high shoreline recession rates exhibited in this region. The result has been the loss of valuable habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat supporting various flora and fauna, and general beach ecosystem functions. Restoring a beach-dune system allows greater stability and sustainability of the coastal environment once it has become established. Restoring the beach habitat that supports a variety of associated flora and fauna contribute to the success and continual survival of several threatened or endangered species. The restoration effort will also contribute to the well-being of various other flora and fauna that naturally occur along the northern Gulf beaches.

There is currently little beach within the project area which reduces the availability of this area to support sea turtle nesting activities. The State of Florida has described most of the beaches within Walton County as “critically eroding.” A critically eroded area is a segment of 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. As defined by the Statewide Programmatic Biological Opinion for Shore Protection Activities along the Coast of Florida (2011), critical erosion along Florida’s beaches has a damaging impact on sea turtle nesting habitat. Restoring the berm width will increase opportunities to protect and enhance sea turtle nesting habitat. The enhanced berm creates additional habitat beneficial to a variety of shore birds as well as other inhabitants of the coastal environment. Wider beaches augment natural dune creation and maintenance, which will be beneficial for dune dwelling organisms and threatened and endangered species such as the Choctawhatchee beach mouse and the Gulf coast lupine.

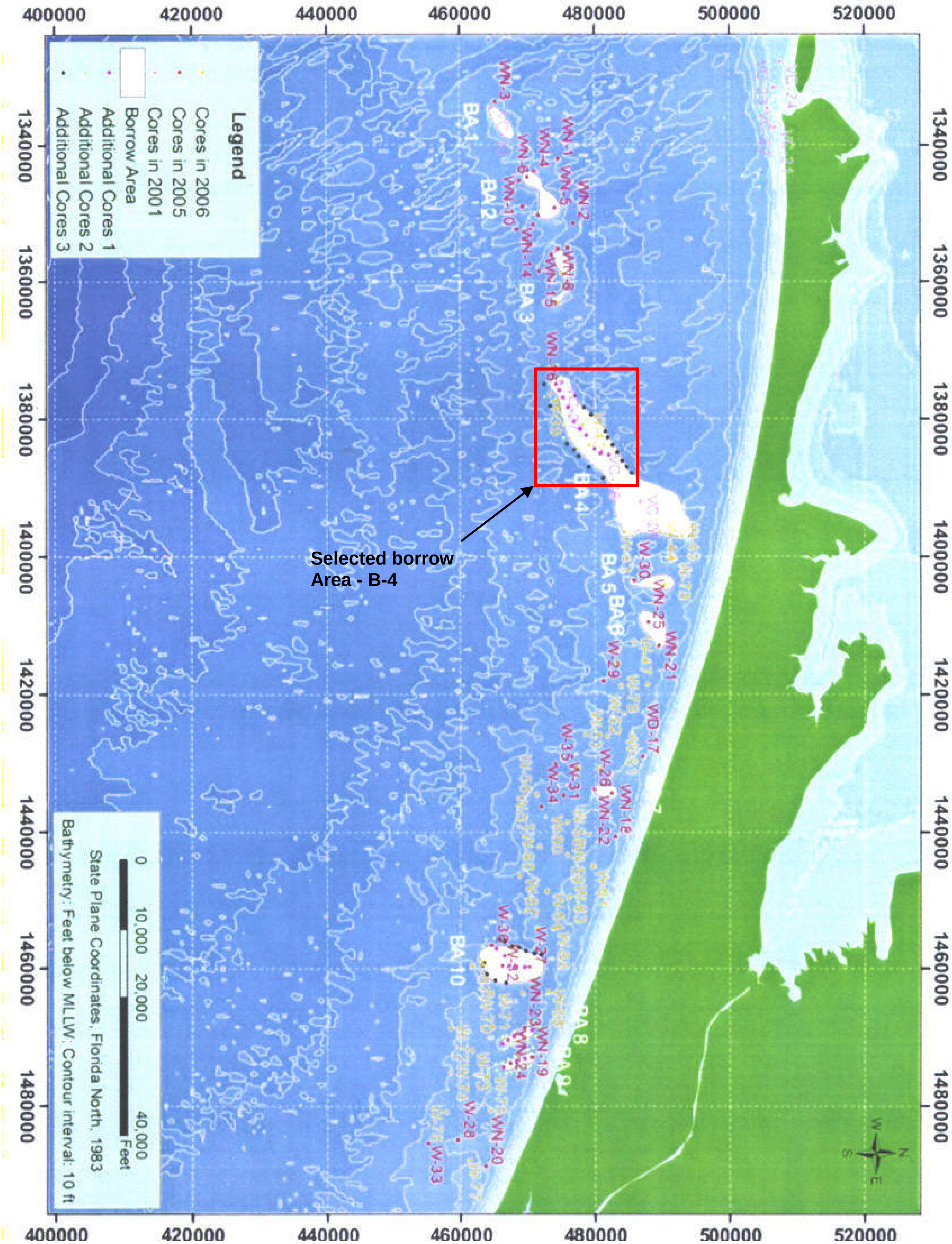

Figure EA-5. Borrow Area Investigation Locations and Selected Borrow Site

The storm activities of recent years have left the fragile coastal dune lakes found throughout Walton County vulnerable to future damages and catastrophic breaching. The lakes support a variety of coastal wildlife with natural communities unique to this region. Coastal dune lakes are important breeding areas for insects and crustaceans. Many birds and mammals also utilize coastal dune lakes for food and habitat. Restoring a beach-dune system in the areas adjacent to the dune lake resources will provide for continued sustainability to the fragile ecosystems of the lakes.

When dune construction is complete, the dune will be planted with at least three species of dune vegetation. Sand dunes are dynamic coastal features, which are formed and maintained by the accumulation of wind-blown sand. The dune restoration activities will be designed to create a dune that matches the surrounding natural dune patterns in the area. Upon reconstruction, immediate steps will be taken to plant and stabilize the dune for rapid stabilization. This will be accomplished through the use of sand fences and dune plants. The dune plants will be planted to cover 60-80 percent of the total area. Plantings will occur across the entire dune on approximate two-foot spacing. The vegetation will consist of local dominant species that populate nearby natural dune systems. The selection of the dune vegetation will consist of species that are most widely used for dune restoration and are readily available from local nurseries and suppliers. The selection will be coordinated with local environmental experts familiar with dune ecosystems in the immediate area. Dune plant species being considered are:

- sea oats *(Uniola paniculata)*
- bitter panic grass *(Panicum ararum)*
- sea rocket *(Cakile constricta)*
- beach morning glory *(Ipomoea imperati)*
- railroad vine *(Ipmea pes-caprae)*
- blue stem *(Schizachyrium scoparium)*
- blanket flower *(Gaillardi pulchella)*

3.0 AFFECTED ENVIRONMENT

3.1 GENERAL ENVIRONMENTAL SETTING

Coastal Walton County consists of approximately 26 miles of both developed and undeveloped beach and dune systems including six miles of state parks and nine miles of state-designated critical eroding areas. The county’s coastline also supports a number of coastal dune lakes considered rare worldwide and unique to the northern Gulf of Mexico and the United States. The existing coastal resources within the study area range from natural pristine systems found within state park recreational areas to severely disturbed systems found within the more developed areas. The dune systems fronting developed areas range from little or no dune to larger relatively healthy dune systems. North of the county’s coastal areas lies Choctawhatchee Bay. The ecosystem associated with Choctawhatchee Bay is typical of northern Gulf coast estuaries including wetlands consistent with adjacent estuaries and submerged aquatic vegetation. It is not expected that the Bay will be affected by the proposed beach restoration and will not be considered further in this evaluation.

The project area has been further characterized by a previous study conducted by Taylor Engineering, Inc. (2003), under contract to the non-Federal sponsor, as a coastal peninsula extending west from the mainland defining the western two-thirds of the coastline and mainland beaches characterizing the eastern third. Behind the county dune system, upland drainage feeds the coastal dune lakes that intermittently breach the dune system and discharge directly into the Gulf of Mexico. The area supports a variety of coastal wildlife with natural communities consistent with that of the northern Gulf of Mexico. The proposed beach restoration effort may potentially affect three beach zones which define the natural communities within the placement and borrow areas. These zones, addressed in this evaluation, are classified as coastal beach and dune, intertidal swash, and nearshore.

The study conducted by Taylor Engineering, Inc. (2003) evaluated the native beach characteristics of Walton County and found that the sand in the beach system was fairly uniform throughout the study area. The beach system sediments consist of medium-grained sand with minor amounts of carbonate material. A color analysis determined the Munsell color classification of the native beach sand. Generally, the native sand is described as white with slight variations in localized areas.

3.2 PHYSICAL CHARACTERISTICS

3.2.1 Tides. Taylor Engineering, Inc. (2003) determined single values for mean high water (MHW) and mean low water (MLW) representative of the entire project area by averaging the tidal datum elevations at several representative locations. The studies have determined that MHW is located at +0.65 ft NAVD and MLW at -0.62 ft NAVD in Walton County.

3.2.2 Waves. Waves provide important sediment transport mechanisms along the open coast of Walton County. Waves are primarily driven by local wind patterns, transport sand cross-shore (approximately north-south) and longshore (approximately east-west) within the subaqueous regions. Independent of wave direction, wave heights and periods of one-foot and three seconds characterize the predominant waves, occurring nearly 30 percent of the time. Locally generated waves or sea conditions characterize the local wave climate. Swell waves of higher wave height and wave period occur less frequently. On average, higher wave heights occur during the winter months and smaller wave heights occur during the summer months. Absolute maximum wave heights indicate that extreme wave heights, associated with hurricanes and tropical storms, can occur during the summer months.

3.2.3 Littoral Transport. Littoral transport analyses indicate primarily westerly net longshore transport along the project area. Net longshore transport rates, reaching 63,000 cubic yards per year (cy/yr) and 58,000 cy/yr reveal an accretive trend; however, Taylor Engineering, Inc. (2003) has shown that the Walton County beaches have had insufficient recovery times between storms resulting in the present unhealthy beach conditions.

3.2.4 Winds. Winds provide the primary wave-generating mechanism and directly transport sand on and off the dry beach. Winds blow from a wide variety of directions with the highest percentage of time (10.4 percent) from the east. Overall, winds blow less than 25 miles per hour (mph) 90 – 95 percent of the time (Taylor Engineering, Inc., 2003).

3.2.5 Aeolian (wind) Sand Transport. Aeolian transport can remove and redistribute sand within the littoral zone. Onshore winds can carry sand from the beach and deposit it behind dunes (essentially removing it from the littoral system) and offshore winds can carry sand into the ocean (redistributing it within the littoral system). Taylor Engineering, Inc. (2003) reports that onshore aeolian transport rates range from 0.1 – 2.2 cy/yr per linear foot of beach. These rates translate into approximately 6,300 cy/yr of sand lost from the littoral sediment via aeolian transport over the project area.

3.2.6 Native Beach Sediment. An average grain size, derived from 34 samples in the project area, of 0.30 millimeters (mm) characterizes the native beach sediments. The Unified Soils and Wentworth Classifications classify the Walton County beach sand as fine and medium-to-fine sand with less than one percent shell content. An analysis of the native beach sand samples as described by Taylor Engineering, Inc (2003) were used to determine the grain size distributions at representative locations. Shore-perpendicular transects spaced approximately one mile apart were established and samples collected at each transect represented the sand at the dune vegetation, dune toe, mid-berm, MHW shoreline, and MLW shoreline positions. Laboratory tests determined the grain size distributions and sand color. Taylor Engineering (2003) identified the color of 313 native beach samples in moist condition to be Munsell color 5Y 8/1 (white). These samples are considered representative of the majority of Walton County beach and dune sand. A copy of the Taylor Engineering report is included in the Geotechnical Section of Appendix A in the Main Feasibility Report.

3.2.7 Offshore Borrow Area Sediment. An analysis of the borrow area sand characteristics was conducted and described by Taylor Engineering, Inc (2003). The proposed 1,558-acre borrow area consists of several cells with different excavation depths. Analysis of sediment data obtained from 51, 20-foot vibracores defined the horizontal and vertical boundaries which determined the limits of beach compatible sand according to color, composition, and grain size compared to the native beach sand. The average grain size and composition of the borrow area consists of sand 0.30 (mm) and classified as medium grained marine sand. The color of the borrow area is described as Munsell color 5Y 7/2 or lighter for moist material which meets the compatibility criteria for this project.

3.3 ENVIRONMENTAL CHARACTERISITICS

3.3.1 Beach and Dune Areas. A prominent feature characterizing portions of the Walton County shoreline is the high dune elevations. This is partly attributed to the presence of Pleistocene bluffs formed as a result of an exposed submarine berm formed during inundation of the Florida Panhandle during that period; however, natural dunes occur in isolated pockets with some of the dunes occurring at beachfront development. In some developed areas, the dunes exhibit little relief and limited habitat value. In these areas, dune enhancements are common and typically contain planted vegetation such as sea oats (*Uniola paniculata*) to promote stabilization and growth. Some pioneer vegetation such as beach morning glory (*Ipomoea imperati*), railroad vine (*Ipomoea pes-caprae*), beach grass (*Ammophila breviligulata*) and sea rocket (*Cakile edentula*) have become established within the enhanced dune areas.

Topsail Hill Preserve State Park, Grayton Beach State Park, and Deer Lake State Park all feature relatively unaltered beach and dune ecosystems. In some instances the primary dune crests reach over 30 feet in height. Pioneer species including sea oats, beach morning glory, railroad vine, sea rocket, beach elder (*Iva imbricata*), camphor weed (*Heterotheca subaxillaris*), and bitter panicum (*Panicum amarum*) grow on the low primary dunes facing the ocean while Gulf bluestem (*Schizachyrium maritimum*), Cruise's golden aster (*Chrysopsis gossypina*), annual jointweed (*Polygonella articulata*), and the endangered Gulf coast lupine (*Lupinus westianus*) are found on the more stabilized dunes.

The existing dunes and associated vegetation provide optimal habitat for the Choctawhatchee beach mouse throughout the dune systems in the project area. This nocturnal species feeds primarily on the seeds and fruits of dune vegetation such as bluestem, sea oats, and evening primrose (*Oenothera humifusa*). The decline of the populations results from five key factors: habitat loss and fragmentation primarily due to beachfront development, disease, predation, competition from exotic species, and loss of genetic diversity (USFWS, 1987).

The beaches (sub-aerial portions of the beaches above the water) are typical of beaches throughout the northern Gulf of Mexico. Beaches are a dynamic environment that changes drastically as a function of weather and wave conditions. The direction of the net longshore transport along this region is from east to west. The constantly shifting sand does not allow vegetation to become established in the unconsolidated sandy substrate. The dynamic nature of the beach is generally a harsh unstable environment providing low animal and plant densities. The wildlife that does inhabit the beaches and dunes include sea turtles (for nesting), shorebirds (for foraging and resting), crustaceans such as ghost crabs (*Ocypode quadrata*), reptiles such as six-lined racerunners (*Cnemidophorus sexlineatus*), and various predators such as raccoons (*Procyon lotor*) and snakes. Beaches are important wintering areas for shorebirds such as sanderling (*Calidria alba*), dunlin (*Calidris alpine*), short and long-billed dowitchers (*Limnodromus griseus and Limnodromus scolopaceus)*), plovers (*Charadrius spp*. and *Pluvialis spp*.), and willet (*Catoptrophorus semipalmatus*). Beaches and dunes are also important nesting sites for birds including terns (*Sterna spp.*), black skimmer (*Rhynchops niger*), and plovers.

3.3.2 Intertidal/Swash Zone. The sandy substrate of the intertidal swash zone as defined by the Florida Natural Area Inventory (1990) defines the unconsolidated substrate community in this zone as expansive, relatively open areas of subtidal, intertidal, and supertidal zones which lack dense populations of sessile plant and animal species. This area of the beach provides habitat for benthic and infaunal communities characterized by low species diversity. Saloman and Naughton (1978 and 1984) investigated benthic macroinvertebrate assemblages inhabiting the swash zone at Panama City Beach, Florida. Sampling data showed four dominant species representing four families: *Donax texasianus*, a burrowing bivalve; *Scolelepis squamata*, a polychaete worm; *Haustorius sp*., an amphipod; and *Emerita talpoida*, an anomuran crab. The studies conducted by Saloman and Naughton (1984) concluded that benthic communities inhabiting the swash zone of Panama City Beach were typical of other sandy Gulf of Mexico beaches. Cutler and Mahadevan (1982) conducted a similar study with comparable results and also found the previous species dominant in the subtidal zone. Similar benthic communities in this zone should exist along the beaches of Walton County. This portion of the beach also provides foraging and resting habitat for numerous seabirds and shorebirds such as terns, gulls (*Larus spp.*), sandpipers (*Tringa*, *Calidris*, and *Actitis spp*.), plovers, skimmers, and oystercatchers (*Haematopus spp.*). Fish and invertebrates within the intertidal zone are the staple diet for these avian species.

3.3.3 Nearshore. As typical of the sandy panhandle coastline, the nearshore zone along Walton County consists of two distinct longshore sandbars. For Florida Panhandle shorelines, the first and second sandbars are typically located approximately 50 to 80 feet and 425 to 460 feet offshore (Wolfe et al., 1988). These sandbars and associated troughs provide habitat for a diverse benthic community. Saloman (1976) investigated benthic faunal populations inhabiting the nearshore zone off Panama City Beach, Florida. A variety of crabs, marine worms, clams, cumaceas, and sand hoppers dominate the nearshore zone. *Donax texasianus,* a burrowing bivalve*,* commonly occurred on both sandbars and troughs in between. Saloman and Naughton (1984) in a similar study found other dominant species found on the first offshore bar include *Haustorius sp*. (an amphipod), *Mancocuma sp*. (a cumacea), and *Scolelepis squamata* (a polychaete worm). Additional dominant species found on the second sandbar and adjacent landward trough includes the haustoriid amphipods *Acanthohaustorius n*. *sp*., *Protohaustorius n. sp*., and *Pseudohaustorius n. sp*. Dial Cordy and Associates Inc. (2002) found that mollusks and annelids predominant the infaunal taxa up to 3.5 miles offshore of Pensacola Beach. Overall, mollusca and annelida represented a majority of the taxa in this region. The assumption that similar benthic communities exist in the nearshore marine zone off Walton County is reasonable. A study conducted by Byrnes et al. (2004) evaluating the effects of borrow areas offshore of Alabama concluded that infaunal assemblages within the sand resource areas examined included common taxa expected for similar sedimentary environments and water depths in the northern Gulf of Mexico, which is also indicative of the selected Walton County borrow area.

Many commercially, recreationally, and ecologically important fish species are known to inhabit the nearshore and offshore areas of Florida's northern gulf coast. Table EA-3 lists abundant fish species likely to occur in the nearshore marine waters of Walton County.

3.3.4 Dune Lakes. An unusual attribute of the Walton County's coastal beach and dune community is the presence of coastal dune lakes. There are a number of dune lakes throughout the Walton County coast as shown in Figure EA-6. Coastal dune lakes are relatively small bodies of water that occur in coastal communities along the northern Gulf of Mexico. The lakes are typically separated from the Gulf by a barrier beach and dune system which may be intermittent with or without a meandering tidal outlet and example of which is shown in Figure EA-7. Some of the coastal dune lakes have dune systems 500 feet wide and ridges extending 10-30 feet high. The intermittent connection to the Gulf is what distinguishes these lakes as rare. The Florida Natural Areas Inventory designates the coastal dune lakes as "critically impaired in Florida because of extreme rarity." Coastal dune lakes are important breeding areas for insects and crustaceans. Many birds and mammals also utilize coastal dune lakes for food and habitat. The rapid rise of development in the South Walton area, including around the coastal dune lakes, raises the concern that nutrient runoff and sedimentation may impact the fragile ecosystems of the lakes.

Table EA-3. Common Nearshore Fish Species Found in Walton County

Common and Scientific Name	Common and Scientific Name
Bull shark *Carcharhinus leucas*	Bonnethead *Sphyrna tiburo*
Bluntnose stingray *Dasyatis sayi*	Ladyfish *Elops saurus*
Speckled worm eel *Myrophis punctatus*	Scaled sardine *Harengula pensacolae*
Striped anchovy *Anchoa hepsetus*	Bay anchovy *Anchoa mitchilli*
Dusky anchovy *Anchoa lyolepis*	Silver anchovy *Engraulis eurystole*
Scaled sardine *Harengula jaguana*	Sea catfish *Arius felis*
Gulf toadfish *Opsanus beta*	Halfbeak *Hyporhamphus unifasciatus*
Atlantic needlefish *Strongylura marina*	Redfin needlefish *Strongylura notata*
Sheepshead minnow *Cyprinodon variegates*	Longnose killifish *Fundulus grandis*
Roush silverside *Membras martinica*	Tidewater silverside *Menidia beryllina*
Gulf pipefish *Syngnathus scovelli*	Bluefish *Pomatomus saltatrix*
Cobia *Rachycentron canadum*	Northern sennet *Sphyraena borealis*
Crevalle jack *Caranx hippos*	Yellow jack *Caranx bartholomaei*
Atlantic bumper *Chloroscombrus chrysurus*	Leatherjacket *Oligoplites saurus*
Florida pompano *Trachinotus carolinus*	Spotfin mojarra *Eucinostomus argenteus*
Silver jenny *Eucinostomus gula*	Pigfish *Orthopristis chrysoptera*
Sheepshead *Archosargus probatocephalus*	Pinfish *Lagodon rhomboides*
Silver perch *Bairdiella chrysura*	Spotted seatrout *Cynoscion nebulosus*
Sand seatrout *Cynoscion arenarius*	Silver seatrout *Cynoscion nothus*
Spot *Leiostomus xanthurus*	Atlantic croaker *Micropogon undulates*
Southern kingfish *Menticirrhus americanus*	Gulf kingfish *Menticirrhus littoralis*
Minkfish *Menticirrhus focaliger*	Black drum *Pogonius cromis*
Atlantic spadefish *Chaetodipterus faber*	Striped mullet *Mugil cephalus*
White mullet *Mugil curema*	Atlantic threadfin *Polydactylus octonemus*
Southern stargazer *Astroscopus y-graecum*	Leopard searobin *Prionotus scitulus*
Spotted whiff *Citharichthys macrops*	Gulf flounder *Paralichthys albigutta*
Planehead filefish *Monacanthus ciliatus*	Striped burrfish *Chilomycterus schoepfi*
Permit *Trachinotus falcatus*	Lizardfish *Synodus foetens*
Bull shark *Carcharhinus leucas*	Bonnethead *Sphyrna tiburo*
Bluntnose stingray *Dasyatis sayi*	Ladyfish *Elops saurus*
Speckled worm eel *Myrophis punctatus*	Scaled sardine *Harengula pensacolae*
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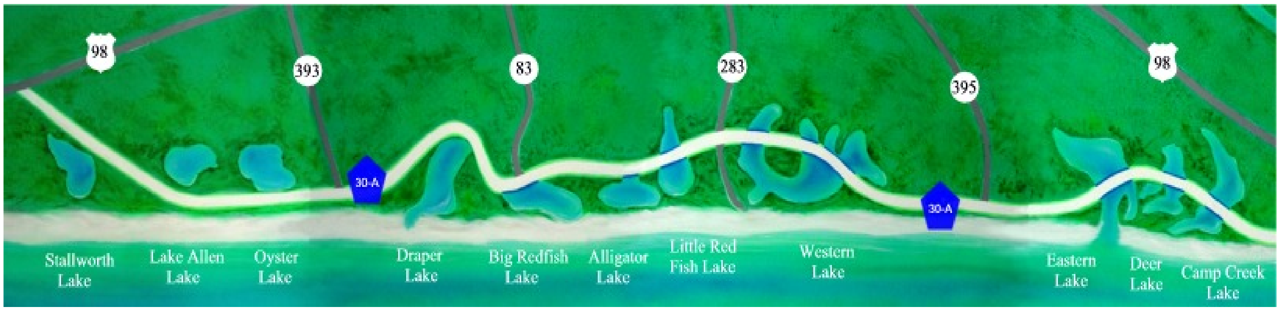

Figure EA-6. Approximate Locations of Coastal Dune Lakes throughout Walton County

The lakes generally acquire water through lateral groundwater seepage and are shallow with depths typically around five feet. The most distinct characteristic of these lakes is their intermittent connection with the Gulf of Mexico. During periods of high water, caused by rainfall, runoff, groundwater seepage, or other inflow, water levels will sometimes reach a critical height causing a lake to “blow out” and connect with the gulf allowing for the exchange of fresh and salt water. The result is an unusual brackish environment that hosts a very diverse biological community.

Figure EA-7. Example of the Coastal Dune Lakes in Walton County

Vegetation may be largely restricted to a narrow band along the shore, composed of various grasses and herbs or a dense shrub thicket, depending on fire frequency and/or water fluctuations. Shallow, gradually sloping shorelines may have much broader bands of emergent vegetation with submersed aquatic plants occasionally dominating much of the surface. Typical plants include rushes, sedges, marsh pennywort, cattail, sawgrass, water lilies, water shield, royal fern, marsh fleabane, marsh elder, salt myrtle, and black willow. Typical animals associated with this community include mosquitofish,
sailfin molly, American alligator, mud turtle, saltmarsh snake, little blue heron, coot, and otter.

The substrate of the coastal dune lakes is primarily composed of sands with organic deposits increasing with water depth. Coastal dune Lakes characteristically have slightly acidic, hard water with high mineral content, predominately sodium and chloride. Salinity levels often vary greatly, depending on local rainfall and storms. Storms occasionally provide large inputs of salt water and salinities vary dramatically over the long-term.

3.3.5 Protected and Endangered Species. This section addresses listed species know to exist in the project areas. The presence of these species necessitates coordination with appropriate agencies as required by the ESA. Table EA-4 contains a more comprehensive list of State and Federal Protected Species in the Walton County area.

Florida's Panhandle beaches provide nesting grounds for federally listed (threatened and endangered) sea turtles. Sea turtle nesting season in this area spans from May 1 through October 31. The threatened Atlantic loggerhead turtle (*Caretta caretta*) and the endangered green turtle (*Chelonia mydas mydas*) frequently nest on the beaches of Walton County and Destin. The endangered leatherback (*Dermochelys coriacea*), Kemp's ridley (*Lepidochelys kempi*), and hawksbill (*Eretmochelys imbricata*) sea turtles may also occasionally nest on northwest Florida's beaches.

The swash and nearshore zone is host to the endangered Gulf sturgeon *(Acipenser oxyrinchus*) during certain times of the year and has been determined as sturgeon wintering feeding ground from the Yellow River, Choctawhatchee River, and Apalachicola River subpopulations. The project areas from the MHW line of the mainland shoreline extending seaward one nautical mile is designated as Gulf sturgeon critical habitat. The Choctawhatchee beach mouse, a Federally listed endangered species, inhabits the coastal dune communities along portions of the northern Gulf Coast. This endemic subspecies once had a historic range from East Pass in Okaloosa County to Shell Island in Bay County. Today, only three main populations exist in Topsail Hill Preserve State Park, Grayton Beach State Park in Walton County, and Shell Island in Bay County. The USFWS designated all three areas as critical habitat for the Choctawhatchee beach mouse. In Walton County, Topsail Hill Preserve State Park comprises about 200 acres of critical habitat along 2.7 miles of coastline. Critical habitat within Grayton Beach State Park consists of 67 acres along 1.7 miles of coastline.

The Florida Department of Environmental Protection (FDEP) manages these areas. The population at Grayton Beach State Park exists only as a result of a translocation program in cooperation with the Florida Fish and Wildlife Conservation Commission (FWCC) and the FDEP.

Several protected bird species use beach habitat for foraging, resting, or nesting. The black skimmer, least tern (*Sterna antillarum*), and southeastern snowy plover (*Charadrius alexandrinustenuirostris*) have all used portions of the beach within Walton County. In Florida, migratory bird nesting season spans from April 1 through August 31.

The piping plover (*Charadrius melodus*) nests well to the north, but winters in different areas of Florida including the Gulf coast. The State of Florida designates the black skimmer as a species of special concern, and the southeastern snowy plover and least tern as threatened species. Both Federal and State entities consider the piping plover a threatened species.

The endangered Gulf coast lupine *(Lupinus westianus)* is a plant that inhabits the coastal dunes of Walton County. This species is specific to the coastal areas of the eastern and northern Gulf of Mexico. Coastal development and storm induced dune erosion has a direct impact towards sustaining suitable habitat for this species.

Table EA-4. List of Protected Species in the Walton County Area

Common Name	***Scientific Name***	***State***	***Federal***
Fish			
Gulf Sturgeon	*Acipenser oxyrinchus desotoi*	SSC	T
Reptiles			
American alligator	*Alligator mississippiensis*	SSC	T (s/a)
Eastern indigo snake	*Drymarchon corais couperi*	T	T
Atlantic loggerhead turtle	*Caretta caretta*	T	T
leatherback turtle	*Dermochelys coriacea*	E	E
Kemp's ridley	*Lepidochelys kempi*	E	E
Green sea turtle	*Chelonia mydas mydas*	E	E
Hawksbill turtle	*Eretmochelys imbricata imbricata*	E	E
Birds			
Arctic peregrine falcon	*Falco peregrinus tundrius*	CE	CE
Wakulla seaside sparrow	*Ammodramus maritimus juncicolus*	SSC	n/a
bald eagle	*Haliaeetus leucocephalus*	**	**
brown pelican	*Pelecanus occidentalis*	SSC	n/a
least tern	*Sterna antillarum*	T	n/a
Southeastern American kestrel	*Falco sparverius paulus*	T	n/a
black skimmer	*Rynchops niger*	SSC	n/a
Southeastern snowy plover	*Charadrius alexandrinus tenuirostris*	T	n/a
snowy egret	*Egretta thula*	SSC	n/a
reddish egret	*Egretta rufescens*	SSC	SSC
tricolored heron	*Egretta tricolor*	SSC	n/a
little blue heron	*Egretta caerulea*	SSC	n/a
piping plover	*Charadrius melodus*	T	T
American oystercatcher	*Haematopus palliatus*	SSC	n/a
white ibis	*Eudocimus albus*	SSC	n/a
seaside sparrow	*Ammodramus maritimus*	SSC	n/a
grasshopper sparrow	*Ammodramous savannarum*	E	E
Florida sandhill crane	*Grus canadensis pratensis*	T	n/a
marsh wren	*Cistothorus palustris*	SSC	n/a
Mammals			
West Indian manatee	*Trichechus manatus floridanus*	E	E
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	E	E
Plants			
Gulf coast lupine	*Lupinus westianus*	T	n/a

E = Endangered. T = Threatened. T (s/a) = Threatened due to similarity in appearance. SSC= Species of Special Concern. UR = Under review. CE = Consideration Encouraged, n/a = information not available or no designation listed.
** Protected under the Bald and Golden Eagle Protection Act.

3.3.6 Essential Fish Habitat (EFH). EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity and include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate. The near and offshore areas of the Walton County project reaches supports a variety of fish species, primarily small species and juveniles of larger fish species. EFH for many of these species occurs within the project area and include such species managed under the purview of the NMFS and identified in Table EA-5.

The MSFCMA require that Federal agencies assess potential impacts to EFH for NMFS managed commercial fisheries. In accordance with the MSFCMA, any Federal action that has the potential to adversely affect EFH requires consultation with the NMFS. As defined by the MSFCMA, fish includes finfish, mollusks, crustaceans, and all other forms of marine animal and plant life. EFH communities range from naturally occurring hard-bottom areas and artificial reefs to floating mats of *Sargassum sp.* (brown- algae). Fish habitat utilized by a species can change with life history stage, abundance of the species and competition from other species, and environmental variability in time and space. The type of habitat available, its attributes, and its functions are important to species productivity and societal benefits. Some potential threats to habitat include certain fishing practices, marina construction, navigation projects, dredging, alteration of freshwater input into estuaries, and runoff.

Table EA-5. Essential Fish Habitat for Managed Species within the Project Area

Species	Life Stage	Habitat
Brown Shrimp	Adult	Soft bottom; estuarine dependent
Cobia	Adult, juveniles/subadults, larvae, eggs	Pelagic; drifting or stationary floating objects
Dolphin (Mahi)	Adult, juveniles/subadults, larvae, eggs	Pelagic; floating objects
Greater Amberjack	Adult, juveniles/subadults, larvae, eggs	Pelagic and epibenthic; reefs and wrecks; to 400m
Gray Snapper	Adult	All bottom types; 0 to 130m
King Mackerel	Adult	Pelagic
Lesser Amberjack	Adult, juveniles/subadults, larvae, eggs	Pelagic
Lane Snapper	Adult, juveniles/subadults, larvae, eggs	Soft and hard bottom; 0 to 130m
Little Tunny	Adult, juveniles/subadults, larvae, eggs	Pelagic
Pink Shrimp	Adult	Soft, hard bottom; inshore to 65m
Brown Shrimp	Adults (year-round)	Year-round in water depth >14 m; soft bottom
Red Drum	Adult	Soft bottom, oyster reefs, estuarine to 40 m
Stone Crab	Adult	Soft, hard, or vegetated bottom
Spanish Mackerel	Adult, juveniles/subadults, larvae, eggs	Pelagic; inshore to 200 m
Tilefish	Adult	Soft bottom, steep slopes; 80 to 540m
White Shrimp	Adult juveniles/subadults, larvae, eggs	Soft bottom; inshore to 40m

3.3.7 Sea Level Rise (SLR). Florida is one of the most vulnerable areas in the world to the consequences of climate change. One of the most serious threats to Florida's coasts comes from the combination of elevated sea levels and intense hurricanes. Florida has over 1,350 miles of coastline, low-lying topography, and proximity to the hurricane-prone subtropical mid-Atlantic Ocean and Gulf of Mexico. As a result, barrier islands and low lying areas of Florida will be more susceptible to the effects of storm surge. Rising sea levels will result in pushing the high-water mark landward, causing beaches to migrate slowly inland. The primary result especially where development exists is increased erosion rates. This could particularly impact areas with low-lying beaches where sand depth is a limiting factor, (Daniels et al. 1993, Fish et al. 2005, Baker et al. 2006). These losses could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006, Baker et al. 2006) which could translate into continued loss of valuable habitat along Walton County, including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat supporting various flora and fauna, and general beach ecosystem functions. Florida experiences more landings of tropical storms and hurricanes than any other state in the U.S. Storm surges due to hurricanes will be on top of elevated sea levels, tides, and wave action. An important element of adaptation strategy is how to protect beaches, buildings and infrastructure against the effects of rising seas and wind, wave action and storm surge due to hurricanes. Beach restoration or nourishment is one such alternative.

The project was evaluated for the entire range of possible future SLR as required by EC 1165-2-212 and represented by three scenarios of "low," "intermediate," and "high" sea-level change. This is documented in detail in Appendix A-1 of the main feasibility report. The potential impacts of a given a SLR representing the highest sea-level change curve to be considered in accordance with EC 1165-2-212, was considered since this is the largest potential impact assessed with and/or without the proposed action. For Walton County, the increase in shoreline recession would directly impact the beach and dune habitat available to the terrestrial wildlife (i.e. shorebirds, beach mice, sea turtles, etc.) that utilizes the coastline of Walton County. The pressure to protect properties and the fronting dune/bluff would likely result in a reduction of available habitat. Under the projected SLR scenarios and associated recession rates of 0.4 to 2.4 feet per year as much approximately 270 acres of habitat under the future without project could be impacted by SLR.

3.4 WATER QUALITY

The FDEP classifies the coastal water in the project area as Class III, defined as waters suitable for recreation and propagation of fish and wildlife. The FDEP sets water quality standards and requires monitoring of water quality during sand excavation and beach placement operations. A WQC must be obtained for the activities with the borrow area and beach placement areas associated with this project.

3.5 SEDIMENT QUALITY

A compatibility analysis was conducted by Taylor Engineering, Inc. (2003). Borrow area and beach samples were taken to compare and provide a comparison between the beach and proposed borrow area. Walton County beaches as well as in the submerged active profile. The sediment characteristics of both the beach and borrow area are presented in sections 3.2.6 and 3.2.7 respectively. The proposed borrow area contains sediments that have been approved by the State of Florida as being similar and compatible to the existing beach sands in both grain size and color characteristics.

3.6 HAZARDOUS, TOXIC, AND RADIO ACTIVE WASTE

The project area lies primarily in residential and recreational areas. The Corps knows of no sources of hazardous, toxic and radioactive waste (HTRW) in the project area. However, on April 20, 2010, the floating semi-submersible mobile offshore drilling unit Deepwater Horizon experienced an explosion and fire. The rig began leaking into the Gulf of Mexico. The total amount of oil and natural gas that has escaped into the Gulf of Mexico is unknown, but is currently believed to be approximate 4.9 million barrels. The spill has been known to cause extensive damage to marine and wildlife habitats as well as the Gulf's fishing and tourism industries.

As a result of the oil and to assure that the material in the selected borrow area is clear of contaminants, sampling of the borrow area was conducted by E-Tech Environmental Consulting (2012) in January of 2012. The goal of the sampling effort was to collect sediment samples from numerous locations throughout the borrow area in search of polycyclic aromatic hydrocarbons (PAH’s) that would originate from the oil spill. Chemical analyses of the collected sampled was conducted by Pace Analytical Services, Inc which is National Environmental Laboratory Accreditation Conference (NELAC) certified laboratory. Results of the analyses showed undetectable limits of the targeted analytes within the borrow area.

3.7 AIR QUALITY

The FDEP operates air quality monitors in various counties throughout the state (FDEP, 2003). Although there are no ambient monitors in Okaloosa County, there are monitors in neighboring Santa Rosa and Bay Counties. U.S. Environmental Protection Agency (EPA) has classified all counties within the state of Florida as “attainment” for criteria pollutants per FDEP. Non-point sources such as vehicular traffic exist within the area; however, air quality along the Walton County beaches is good due to the presence of either on or offshore breezes that readily disperse airborne pollutants. Walton County is classified as an attainment area for all Federal Air Quality Standards.

The Air Quality Index (AQI) is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. AQI ratings for the areas throughout the Florida Panhandle fall consistently within the highest quality rating of “good” for all the pollutants regulated by EPA.

3.8 NOISE

Noise is sound that interferes with normal activities or that otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive, stationary or transient. Stationary sources are normally related to specific land uses (for example, a factory). Transient noise sources move through the environment, either along relatively established paths (for example, highways and railroads), or randomly. There is wide diversity in responses to noise that not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity of the receptor (a person or animal), the time of day, and the distance between the noise source and the receptor.

Ambient noise levels in the project area are low to moderate. As a result of the urbanization near the beaches and the popularity of the beach environment, elevated noise levels, primarily from vehicles, may occur during weekends and summer months. The major noise producing source of the area year round is breaking surf adjacent to residential and resort areas.

3.9 AESTHETICS

The signature white sandy beaches and the relatively low wave energy of the Gulf of Mexico provide a visually-pleasing environment along the beaches of Walton County.

3.10 RECREATION

Locals and tourists spend much time sunbathing, sailing, fishing, walking and engaging in other active and passive activities near the beach. Beach usage peaks during the summer and subsides during the winter.

3.11 HISTORIC AND CULTURAL RESOURCES

The Walton County shoreline has been the site of numerous cultural resources investigations since the 1940s. Over forty (40) archaeological and historical sites are known to exist within one mile inland of the current beachfront with at least two of those sites considered potentially eligible or eligible for the National Register of Historic Places. Known archaeological sites suggest that humans have occupied the area as far back as 8500 BC, beginning with the Archaic period. The Walton County coast has been continually, although sparsely, inhabited up to the present.

In order to fully assess the study area for cultural resources that may be impacted by the proposed beach renourishment project, a more defined area of potential effect was established. The area of potential effect was defined by the property, both terrestrial and submerged, that is directly impacted by project activities including access roads, staging areas, borrow areas, and temporary dikes that might be constructed to contain sand. Once clearly defined, the Florida State Site Files and other appropriate background records were consulted regarding the locations of known archaeological sites within the impact area. Areas found to possess a medium or high potential for intact resources have been systematically investigated in a cultural resource survey. The locations of offshore impact areas have been investigated for the presence of submerged cultural resources through systematic remote sensing surveys.

In accordance with Section 106 of the National Historic Preservation Act and other relevant cultural resource laws, recommendations and actions have been coordinated with the Florida State Historic Preservation Officer (FLSHPO). Corps cultural resources staff has provided the appropriate narratives for the NEPA documentation summarizing the results of the cultural resources investigations and coordination. No significant cultural resources have been identified. More detailed information pertaining the cultural resources survey and Section 106 coordination is presented in Sections 4.17 and 5.6.

3.12 SOCIO-ECONOMIC CONSIDERATIONS

3.12.1 Demographics. Walton County is located in the State of Florida. Today the county incorporates 1,058 square miles and the 2009 estimated population is 55,105 persons, a 35.7 percent increase over the base population estimate of 40,601 in 2000 making it one of the fastest growing counties in Florida. The estimated number of housing units in 2008 was 41,859 and 52 persons per square mile. The median household income was $43,779. 14.9 percent of Walton County's population was living below the poverty level. The median value of owner-occupied housing was $96,400. The makeup of the county in 2008 was estimated at 88.8 percent white, 7.6 percent African American 1.1 percent American Indian and Alaska Native, 0.7 percent Asian, 1.8 percent reported two or more races and there were 3.8 percent of Hispanic or Latino origin. Because the Gulf of Mexico borders Walton County to the south, the county, along with neighboring counties, comprise a total shoreline of over 200 miles of beaches.

3.12.2 Population. All five counties experienced population growth from 1980 to 2009. Combined, the counties grew by about 91 percent, equaling the growth rate of Florida for that same time frame. Out of the five counties, Okaloosa County has the highest population, 178,473 and Gulf County the lowest 15,755. Most of the growth took place in Santa Rosa and Walton Counties. Santa Rosa County led in growth from 1980 to 2009 by increasing over 171 percent followed by Walton County growth of 159 percent.

3.12.3 Employment. The number of persons in the labor force increased for all counties from 1990 to 2000. Total civilian labor force for the five counties out grew Florida civilian labor force in percentage terms. With an increase of over 42 percent, Santa Rosa County saw the biggest increase in the number of civil persons in the labor force; however, despite out growing Florida civilian labor force, in 2000, the counties had a higher unemployment rate than Florida. Gulf County had the highest rate of unemployment at 7.3 percent, while Walton County had the lowest at 3.2 percent.

3.12.4 Industry Employment. Selected employment characteristics by place of work for the state and counties for 2007 are shown in Table B-3 of the Economic Appendix in the main report. Florida had 10,679,883 non-farm workers employed in 2007. The Finance and Service trade industry leads all industries by having 6,080,653 workers within the state. Similarly, the greatest numbers of non-farm workers for the five counties combined are employed in the Finance and Service trade industry also. Okaloosa County had the highest numbers of non-farm workers employed with 130,560 and Gulf County with least amount with 6,118 non-farm workers employed.

3.12.5 Households. All five counties experienced a significant increase in the number of households from 1990 to 2000. With increases of over 46 percent, Santa Rosa and Walton Counties had the greatest growth in the number of households. Of the five counties, Okaloosa led with 66,269 households in 2000. The median household income also increased from 1989 to 2007 for the five counties. Of the five counties, Okaloosa County had the highest median household income in 2008, but Walton County had the greatest percentage increase from 1989 to 2008, 105.6 percent. The median household income for Santa Rosa and Okaloosa Counties both were higher than that of the State of Florida in 2008.

3.12.6 Per Capita Income. In 2007, Okaloosa had the highest per capita income out of the five counties and, except for Okaloosa, the remaining counties had a lower per capita income compared to the State of Florida. Florida per capita income was $38,417 in 2007 and Okaloosa County per capita income was $39,158 for that same year. Gulf and Walton Counties had higher percentages of persons living below the poverty level when compared to the State of Florida.

3.12.7 Transportation and Utilities. Walton County is services by one Federal interstate, I-10, three U.S. highways; US90, US98 and US331 and four state highways; SR-20, SR81, SR83 and SR-85. One railroad provides rail service, the CSX Main Line. The nearest airport with scheduled commercial airline service is in neighboring Okaloosa Regional Airport. A general aviation airport is located at the DeFuniak Springs Municipal Airport. The local deep water port is 45 miles to the east in neighboring Bay County, the Panama City Port Authority.

There are two natural gas companies providing service, City of DeFuniak Springs and Okaloosa County Gas District. One telephone company, Sprint, provides residential and business services. Five water and sewer companies, City of DeFuniak Springs, City of Freeport, Regional Utilities, South Walton Utilities and Mossy Head Water Works compete in the area.

There are five elementary and five secondary public schools with a current enrollment of 6,522 students served by 323 educators for the county. Okaloosa-Walton Community College and the Walton County Vocational Technical School provide for education beyond the secondary level.

Walton County has three local radio stations two locally printed newspapers 12 banks, three credit unions and two hospitals, Health Mark Regional Medical Center and Sacred Heart Hospital on the Emerald Coast.

4.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

4.1 NO ACTION

In general, future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits. As described by Taylor Engineering (2003) the trend of the MHW position in the period of the 1990’s and 2000’s eroded throughout the entire county, most likely a result of back-to-back hurricanes (Hurricanes Opal, Earl, and Georges). During this period, overall shoreline measurements indicate an average 2.4 feet per year of erosion for Walton County resulting from storm activities. Most recent storm events occurring since 2000, notably Hurricanes Ivan, Dennis, and Katrina, indicate that this trend will continue (Taylor Engineering, 2003).

The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. Opportunities would be lost to implement beach and dune restoration and re-vegetation for the critical areas in Walton County. Degradation of valuable dune and beach habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat that supports various flora and fauna, and general beach ecosystem functions would persist as the area continues to be vulnerable to even minor storm activity. A no-action scenario would not provide the much needed stability and sustainability that a healthy coastal environment could offer to the area.

4.2 BEACH RESOURCES

The proposed work would create disturbance to fauna species; such as crabs and shorebirds utilizing the terrestrial habitats within the project limits. This would mainly involve short-term disturbance from equipment, vehicles and personnel movements for the duration of work; however, these species are mobile and would generally avoid the site during construction. Some loss of beach flora may occur during nourishment; however this is expected to be minimal. Based on previous coordination with the State and USFWS, a number of conservation measures associated with the protection of shorebirds will be incorporated into the project. These include: shorebird and shorebird nesting surveys for construction work conducted between February and September and buffer zones around identified shorebird courtship or nesting behavior within the project area.

Placement of material within the intertidal/swash and nearshore zones would result in significant mortality of non-motile benthic organisms; however, these organisms typically adapt well to the dynamic coastal environment. With their high fecundity and recruitment potential, it is believed that they will repopulate the affected areas in a relative short time. Several past studies have shown no significant long-term effects on benthic communities from beach restoration. Saloman and Naughton (1984) studied the effect of beach restoration with offshore excavated sand on the nearshore macorinfauana at Panama City Beach, Florida. They concluded that restoration had minor, short-term effects on benthic macroinvertebrates, noting that populations appeared to stabilize within five to six weeks after restoration. As noted in previous studies, intertidal benthic assemblages declined in abundance and diversity immediately following restoration, but recovered within several weeks.

The material to be utilized during restoration of the beach meets the criteria set forth in 20 CFR 230.60(b). The material is characterized as clean sand which is sufficiently removed from sources of pollution and is located in areas of high current velocities to provide reasonable assurance that the placement areas would not be contaminated by such pollution. In addition, the material originates in the near vicinity of the placement activity and is similar to the substrate of the placement site, and receives the same overlying waters as the placement site.

4.2.1 No Action. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits. The already damaged beach and dune system would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. A no-action scenario would not provide the much needed stability and sustainability that a healthy coastal environment could offer to the area.

4.3 OFFSHORE RESOURCES (Borrow Site)

It is expected that the dredging action would have some impacts on the infaunal assemblages within the borrow area. Monitoring the effects of dredging of borrow areas along coastal New Jersey was conducted by Burlas et al. (2001). Their study indicated obvious impacts on the infaunal assemblage including decreases in abundance, biomass, taxa richness and the average size of the dominant biomass species. There were also changes in both species and biomass composition. However, abundance, biomass, and taxa richness recovered quickly after dredging operations with no detectable difference between dredged and undisturbed areas by the following spring. Taxonomic composition of the finfish assemblage present at the borrow areas was similar for inshore areas in the general region around the borrow areas. There was no substantive difference in species composition or catch-per-unit-effort among areas within any given collection period. Likewise, no dramatic change in assemblage structure or catch after dredging at any of the sites was observed.

Another consideration in benthic recovery is the topographic features created by the offshore dredging process (Byrnes et al., 2004). Reworking of exposed sediments is an important process in benthic recovery after dredging because it promotes diffusion of dissolved oxygen into soft substrata exposed during dredging. Byrnes at al. (2004) also found that offshore sediments along coastal Alabama are continually being reworked to depths up to 60 meters. This process is likely due to storms and sediment influxes of material associated with river discharges. The recovery and reestablishment of impacted communities would not necessarily return to pre-dredged species composition. While levels of diversity and abundance may be reached or exceeded within a relatively short time after dredging, the pertinent goal of recovery success is for infaunal assemblages to become equivalent to nearby non-dredged areas within a relatively brief interval after dredging (Byrnes et al., 2004).

Offshore equipment employed for borrow area excavation typically consists of a hopper dredge and possibly pipelines, equipment barges, marker buoys, and small tugs. Dredging would temporarily affect water quality by increasing local turbidity levels around the dredging sites. Increased water column turbidity during sand excavation would be temporary and localized. The spatial extent of elevated turbidity is expected to be within 1,000 meters of the operation, with turbidity levels returning to ambient conditions within a few hours after completion of the dredging activities. Therefore, no significant long-term impacts to water quality are expected to occur. Elevated turbidity levels resulting from construction should not have a significant negative effect on organisms inhabiting the area.

Given the naturally dynamic waters and unconsolidated sandy nature of the local Gulf of Mexico coast, organisms inhabiting the offshore areas adapt well to reasonable environmental changes such as moderate increases in turbidity. Fish and other mobile species may temporarily leave the dredging site if turbidity becomes too great. Dredging activities would result in significant mortality of non-motile benthic organisms. However, as described by Byrnes et al. (2004) in their investigations along coastal

Alabama, impacts to the benthic community are expected from physical removal of sediments and infauna, however, assuming that dredging does not produce deep pits causing very fine sediment deposition or hypoxic or anoxic conditions, levels of infaunal abundance and diversity generally recover within 1 to 3 years, but recovery of species composition may take longer. Some offshore areas may recover more quickly due to opportunistic life history characteristics of dominant infauna.

Detailed investigations were conducted by Taylor Engineering (2003) to define the tentatively selected borrow area which included the collection and analysis of extensive bathymetric data, vibracores, and sub-bottom seismic surveys. Their comprehensive investigations of the borrow area did not detect the presence of any hard bottom structure or associated communities. Therefore, a determination has been made that dredging activities within the tentatively selected borrow area will have no impacts to hard bottom environments.

4.3.1 No Action. The future conditions resulting by not constructing this project would result in no impact to the offshore borrow areas and associated resources.

4.4 COASTAL DUNE LAKES

These lakes are positioned behind the dune systems throughout the county. Upland drainage feeds the coastal dune lakes that intermittently breach the dune system and discharge directly into the Gulf of Mexico. Their characteristic and sustenance is dependent upon the periodic breaching process. The lakes support a variety of coastal wildlife with natural communities unique to this region. Engineering design for the shoreline restoration must be cognizant of the dune lake processes. Breaching conditions are dependent upon fronting beach elevation rather than beach width. Any berm and dune placement in the vicinity of the lakes must be conducted in a manner that will preserve the intermittent breaching processes. Beach placement design will be such as to not increase berm elevations in the immediate vicinity of the dune lake outfalls.

To avoid impacts to the natural dune lake breaching process, construction of the selected plan does not include placement of dunes or berm in front of the coastal lake outfalls. The proposed beach fill design for the selected plan discussed in Section 2.1.4 includes maintaining the natural berm elevations and providing a 100-foot buffer east and west of the existing outfall channel banks. The tapered ends of the fill will be constructed with a slope of 1V:15H to provide a smooth transition into the buffer zone. This same design criterion for avoiding impacts to the lake outfalls was also proposed by the non-Federal sponsor during their independent coordinations and was determined as acceptable by the FDEP and other supporting agencies and therefore will be adopted for the selected plan and will be included in Federal Joint Coastal Permit (JCP) application. This avoidance criterion has also been included in the Federal coordinations and consultations with the other support agencies.

4.4.1 No Action. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of the protection that these resources provide to the dune lakes. By not providing such protection, the already damaged habitats allow the dune lakes to be particularly vulnerable to wave and storm activity that continually threaten these resources. A no-action scenario would not provide the much needed stability and sustainability that a healthy coastal environment could offer to the area.

4.5 SEDIMENT COMPATIBILITY

Shoreline storm protection and restoration activities that artificially place sand on the beach from remote sources must use sand similar to the native beach sand in order to preserve the beach's natural characteristics to the maximum extent practicable. The physical characteristics of the borrowed material including mineral composition, grain size, and color must be matched as closely as possible with the native beach sand. Geotechnical investigations have been conducted to identify and select a suitable borrow site that contains the necessary volumes and exhibit the required characteristics of the Walton County beach systems. Analysis of native beach sand samples were used to determine the grain size distributions, composition, and compaction characteristics at representative locations. Such beach sand characteristics have been identified as important turtle-nesting parameters.

The geotechnical investigations also involve a two-phased sand source investigation, which explored the offshore sediments and identified the borrow area for use by both the local and selected plan. The first phase, reconnaissance level, searched three areas that included region-wide offshore areas, an offshore sand ridge, and a potential source in a nearby ebb tidal shoal. The results of these investigations were used to define selected borrow areas for the Walton County beach restoration activities.

Compatibility of the sand is expressed quantitatively in terms of size and composition of the borrow area sediments with the native beach sediments in terms of an adjustment or overfill factor which is defined as the volume of material required to produce a unit volume of stable beach with the same grain size distribution as the native beach. The method developed by Dean (2002), which applies the concept of equilibrium beach profiles, computed an overfill ratio of 1.0. The overfill ratio between the borrowed and beach sand indicates that the borrow material and the native beach have very similar characteristics in composition and mean grain size, which is about 0.30 mm (Taylor Engineering, Inc., 2003). Because the same borrow site investigated for the local plan is being used for the selected plan and placement areas are essentially the same, this analysis directly applies and has been used for the compatibility determination for the selected plan and will be included in the Federal JCP application package.

As discussed in Section 4.2, the material to be utilized during restoration of the beach meets the criteria set forth in 40 CFR 230.60(b) as clean sand which is sufficiently removed from sources of pollution and is located in areas of high current velocities to provide reasonable assurance that the material would not be contaminated by such pollution. Hence, no further physical, biological, or chemical testing is required pursuant to the 404(b)(1) Guidelines. Based on the information presented, no mitigation requirements have been identified. More specific details pertaining to sediment quality is included in the 404(b)(1) Evaluation Report included in EA-APPENDIX A.

It must be considered that any proposed borrow areas located within the outer continental shelf (i.e., 3 miles offshore) will require authorization from the Department of

Interior, Minerals Management Service (MMS); however, no borrow areas are being considered that fall under MMS jurisdiction. Results of the geotechnical investigations are presented in Appendix A, Engineering Design, Section 2, Geotechnical Considerations.

4.5.1 No Action. The future conditions resulting by not constructing this project would result in no impact to the native beach sediment that currently exists on Walton County's beaches.

4.6 THREATENED AND ENDANGERED SPECIES

Coordination with the USFWS has been initiated in accordance with the ESA. Species of concern within the project area include sea turtles, Gulf sturgeon, Florida manatee, Choctawhatchee beach mouse, and piping plover (as well as other avian species).

As mentioned earlier in Section 2.1.5 the non-Federal sponsor for this project has proceeded with pursuing beach restoration on their own with a local plan that totally envelopes the selected plan. Subsequently, the non-Federal sponsor has already completed the processes of coordinating for threatened and endangered species. As a result of their formal consultation, a biological opinion (BO) has been issued from the USFWS in accordance with Section 7 of the ESA for their local plan. The determination and conditions specified in the BO are consistent with and typical of other beach restoration projects in the area. This existing BO for the local plan has made the following determinations that the proposed local plan is not likely to:

- jeopardize the continued existence of sea turtle
- jeopardize the continued existence of the Choctawhatchee beach mouse
- destroy or adversely modify Choctawhatchee beach mouse critical habitat
- jeopardize the continued existence of non-breeding piping plover

The non-Federal sponsor also completed formal Section 7 consultation with the NMFS and has received a letter of concurrence which states that the proposed local plan:

- Should observe and adhere to the terms and conditions of the RBO for hopper dredging
- Is not likely to adversely affect sea turtles and Gulf sturgeon
- Is not likely to adversely affect modify Gulf sturgeon critical habitat
- In not likely to adversely affect any other listed species under the NMFS purview

Although the sponsor coordinated and consulted regarding the local plan, the Corps has, in addition and independently conducted formal Section 7 consultation with the USFWS and NMFS for the selected plan. Biological assessments (BA) have been prepared addressing the potential impacts to the listed species and/or critical habitats within the selected plan. It is expected that the same activities will be required to avoid or minimize impacts to these species or where possible to provide activities that may enhance the species continued survival or critical habitat.

In response to BA's submitted to the USFWS and NMFS, both agencies have determined that the actions associated with this project are covered under existing regional programmatic biological opinions. With construction of the project likely being conducted using hopper dredging equipment and/or hydraulic pipeline equipment the dredging activities at the offshore borrow site has already been analyzed and coordinated under the November 19, 2003 Regional Biological Opinion (RBO) entitled “Dredging of the Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges (Consultation Number F/SER/2000/01287). The activities associated with placement of the sand on the Walton County beaches have been analyzed and coordinated under the August 2011 PBO for Shoreline Protection Activities along the Coast of Florida. This PBO, however, due to issues that could not be resolved, does not include a determination for the piping plover which required additional coordination resulting in a separate BO, which was completed in October 2012. Dredging and placement activities associated with the selected plan will be conducted in accordance with these BO’s.

In addition to the formal ESA consultations being conducted, the Fish and Wildlife Coordination Act (FWCA) requires that Federal agencies consult with the USFWS regarding fish and wildlife resources in the project area. Such coordination resulted in a FWCA Report. This coordination was completed for the selected plan.

4.6.1 Sea Turtles. The effects of beach disposal and impacts on nesting sea turtles has been extensively documented and indicate that, in nesting success rates may decrease the year following beach placement as a result of escarpments, altered beach profiles, and sand compaction. All efforts will be made to conduct the proposed dredging and placement activities outside of the sea turtle nesting window. Additionally, the conservation measures and recommendations specified in the RBO for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges and PBO for Shoreline Protection Activities along the State of Florida will be followed to the maximum extent practicable; however, it is inevitable that some of the placed sand will remain on the beach during subsequent nesting seasons. Given these considerations it is determined that the proposed action may adversely affect sea turtles and the PBO for sand placement on Florida beaches or other resulting BOs will be observed for the selected plan.

4.6.1.1 No Action. The future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss sea turtle nesting habitat. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources critical towards maintaining sea turtle nesting areas. Degradation of valuable dune and beach habitat including sea turtle nesting habitat would persist as the area continues to be vulnerable to even minor storm activity.

4.6.2 Gulf Sturgeon. Effects to Gulf sturgeon resulting from the proposed dredging and disposal activities would be confined to direct impacts associated with the dredge equipment at the offshore borrow site. Effects resulting from the use of hopper dredges were considered in the RBO. Mobile District will abide by the reasonable and prudent measures set forth in that opinion. No effects to Gulf sturgeon are anticipated with the use of a hydraulic cutter-head dredge, as they are not known to impact Gulf sturgeon. By email dated March 1, 2010, the NMFS has indicated that the

Walton County Federal project would not result in additional impacts already covered under the RBO. The PBO for Shoreline Protection Measures along the State of Florida or other resulting BOs will be observed for the selected plan coordinated for the non-Federal sponsor.

4.6.2.1 No Action. The future conditions resulting by not constructing this project would result in no impact to the Gulf sturgeon that may utilize the area.

4.6.3 West Indian Manatee. Manatees may be occasionally found in the shallow waters of the project area during the warmer months of the year. Given their slow-movement and low visibility, it is possible that manatees could wander into close proximity of the dredging and placement operations. To minimize contact and potential injury to manatees, the Manatee Construction Conservation Measures as specified by the USFWS will be strictly observed. In addition, there will be NMFS approved observers on board all hopper dredge operations. The PBO or other resulting BOs will be observed for the selected plan.

4.6.3.1 No Action. The future conditions resulting by not constructing this project would result in no impact to the West Indian Manatee that may utilize the project area.

4.6.4 Piping Plover. The beach placement proposed during this action may actually enhance beach habitat and even potentially restore lost habitat in the long term; however, short-term impacts to foraging and roosting habitat may occur during beach construction operations. Since piping plovers do not nest in Florida, construction activities will not impact breeding and nesting activities. Wintering habitat for roosting and foraging may be impacted; however, project construction limits will avoid areas designated as critical habitat area to the maximum extent practicable. Direct short-term foraging habitat losses may occur during the placement of sediment on the beach and associated construction operations. Since only a small portion of the foraging habitat is directly affected at and around the discharge site, adjacent habitat is still available and the overall direct loss of foraging habitat will be minimal and short-term; however, the placement of sediment on the beach may temporarily impact foraging, sheltering, and roosting habitat. The terms and conditions resulting from formal consultation and resulting BO for the selected plan will be observed.

4.6.4.1 No Action. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of habitats utilized by shorebirds such as the piping plover. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. Degradation of valuable dune and beach habitat including shorebird foraging and roosting areas and general beach ecosystem functions would persist as the area continues to be vulnerable to even minor storm activity.

4.6.5 Choctawhatchee Beach Mouse. Direct beach placement of compatible sand may enhance existing habitat or establish new habitat for beach mice. Recent hurricane activity has eroded a significant portion of the primary dune and bluff systems throughout Walton County. With these considerations in mind and the uncertainties associated with the direct beach and dune placement there may be some impacts to the Choctawhatchee beach mouse during project construction. The terms and conditions as stated in the PBO for Shoreline Protection Measures along the State of Florida will be observed.

4.6.5.1 No Action. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of habitats utilized by the Choctawhatchee beach mouse. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. Degradation of valuable dune and beach habitat including the habitat valuable towards the continued existence of the beach mouse and general beach ecosystem functions would persist as the area continues to be vulnerable to even minor storm activity.

4.7 CRITICAL HABITATS

4.7.1 Gulf Sturgeon. The proposed beach restoration area falls within the designated Gulf sturgeon Florida Nearshore Gulf of Mexico critical habitat. This area falls under the jurisdiction of the NMFS. Consultation with NMFS regarding the effects of the proposed action on Gulf sturgeon and subsequent potential modification to Gulf sturgeon critical habitat has been initiated for the selected plan. Direct placement of beach material will increase shoreline width and extend into the critical habitat area. The increased width is intended to restore the shoreline position to pre-hurricane positions and believed not to have an effect on critical habitat areas. The PBO for sand placement on Florida beaches or other resulting BOs will be observed for the selected plan. By email dated March 1, 2010, the NMFS has indicated that the Walton County Federal project would not result in additional impacts already coordinated for the non-Federal sponsor.

4.7.1.1 No Action. The future conditions resulting by not constructing this project would result in no impact to the critical habitat areas utilizes by the Gulf sturgeon.

4.7.2 Choctawhatchee Beach Mouse. The direct dune and beach placement is adjacent to designated critical habitat for the Choctawhatchee beach mouse. The placement of sediment directly on the beach and seaward of the toe of the existing primary dune line would not generally impact existing habitat. Pipeline routes for beach construction will typically avoid identified primary constituent elements for critical habitat. Considering that much of the mature coastal barrier sand dunes and scrub dune habitat on the Gulf and Atlantic Coasts of Florida have been lost and populations of beach mice have declined as a result, the development of new habitat or enhancement of existing habitat is beneficial to the recovery goals of beach mice. Dune restoration activities allow for the availability of materials for the natural formation and growth of primary and secondary dunes. Such processes would help in the development of new beach mouse habitat and may aid in the enhancement and expansion of existing populations by stabilizing and enhancing existing dune communities with available sand and associated aeolian transport processes. This in turn promotes natural recruitment of native dune vegetation that contributes to the primary constituent elements for critical habitat by providing food resources for beach mice. Consultation with USFWS regarding the effects of the selected plan on Choctawhatchee beach mouse critical habitat has been completed and covered under the PBO for Shoreline Protection Measures along the State of Florida.

4.7.2.1 No Action. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of critical habitat utilized by the Choctawhatchee beach mouse. The already damaged habitat would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. Degradation of valuable dune and beach habitat, including habitat valuable towards the continued existence of the beach mouse and general beach ecosystem functions, would persist as the area continues to be vulnerable to even minor storm activity.

4.8 ESSENTIAL FISH HABITAT

As discussed in Section 3.3.6, the proposed borrow and placement areas serve as habitat various species identified in Table EA-3. It is believed that the proposed action will not fill or destroy habitat considered necessary to sustain these species. Coordination with the NMFS, Habitat Conservation Division in accordance with the MSFCMA has been completed involving the dredging and placement activities for the selected plan. Activities have been undertaken to assure that plans identified for this study are not in conflict with existing Federal fishery management plans or do not result in unacceptable impacts to the habitats of managed species.

As discussed in Sections 3.3.2 and 3.3.3, the intertidal swash zone and nearshore areas along the northern Gulf of Mexico is defined by the Florida Natural Area Inventory (1990) as consisting of expansive unconsolidated substrate which lack dense populations characterized by sea grasses, oyster reefs, coral reefs, or other hard-bottom structures. This area of the beach provides habitat for benthic and infaunal communities characterized by low species diversity. The studies by Cutler and Mahadevan (1982), Saloman and Naughton (1984), and Dial Cordy and Associates Inc. (2002) concluded that benthic communities inhabiting the swash and nearshore zones of Panama City Beach and Pensacola Beach were typical of the sandy panhandle Gulf of Mexico coastline. Therefore, a similar nearshore configuration should exist along the beaches of Walton County.

Material will be removed from the selected borrow area via hopper dredge and pumped onto the beach to create the desired template. This method is preferable in terms of turbidity reduction and minimizing the potential impact to fish and wildlife. Most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should able to avoid the disturbed area and should recover shortly after the activity is completed. The selected borrow area is characterized as sandy bottom and does not contain any hard-bottoms, coral reefs, oyster beds, or seagrass as indicated by extensive geotechnical offshore investigations performed to identify suitable offshore borrow areas as discussed in Section 2.2. No hard-bottom structures were identified in and around the proposed borrow area during these investigations.

No long-term direct impacts to managed species are anticipated; however, it is reasonable to anticipate some non-motile and motile invertebrate species will be physically affected through the dredging and placement operations. These species would recover rapidly following construction activities (Cutler and Mahadevan, 1982).

4.8.1 No Action. The future conditions resulting by not constructing this project would result in no EFH impacts.

4.9 COASTAL BARRIER RESOURCES

The Coastal Barrier Resources Act of 1982 (PL 97-348) restricts Federal expenditures and financial assistance within designated CBRA zones in the Gulf and Atlantic Coasts. Several CBRA units are located within the project area. Coordination with the USFWS concerning the consistency of the selected plan in accordance with the requirements of CBRA for the six system units has been completed to ensure that the expenditure of Federal funds does not enhance the potential for development within these units. Those CBRA units that fall within the projects limits include FL-94, FL-96, FL-95P, FL-93P, P32, and P31A as illustrated in Figure EA-8. Below is a description of each CBRA Unit and how it relates to the project:

Unit P32 - This unit is located at the western-most end of the project area and corresponds with project segments R1-1 thru R1-4 which lies within a reach (segments R1-1 thru R1-10) that is not justifiable for Federal funding. Therefore, this reach is considered as part of the Locally Preferred Plan (LLP) and will be 100 percent funded by the non-Federal sponsor. Since no Federal funding will be used in the construction of this segment of the project, the CBRA is not applicable with this reach of the project.

Unit P31A - Located in the western one third of the project, this unit for the most part, is located in an area that is not within the construction area except for the eastern-most boundary of the unit, which contains an approximate 400-foot portion of the berm and dune transition. This unit corresponds to the Topsail Hill Preserve State Park. Even though the construction reach is small, it is believed that establishing the proposed beach-dune system will contribute to the overall sustainability of the fish and wildlife and various other natural resources including the dune lakes. Work conducted within this unit will be 100 percent funded by the non-Federal sponsor.

Unit FL-96 - This CBRA unit is associated with Draper Lake, one of the many coastal dune lakes in the county. The construction of the berm-dune system tapers to an end on each side (approximately 500 feet on the west side and 200 feet on the east side) of the lake outfall in order to preserve the natural breaching capabilities. The restoration of the beach-dune system adjacent to the dune lake will provide valuable shoreline stability towards preventing catastrophic breaching of the already vulnerable ecosystems supported by the dune lake.

A healthy and stable beach-dune system will contribute to the protection and overall sustainability of the fish and wildlife and various other natural resources which includes the dune lakes. Work conducted within this unit will be 100 percent funded by the non-Federal sponsor.

Unit FL-95P - This unit is considered an Otherwise Protected Area (OPA) and only applies for Federal flood insurance which is not applicable to this project.

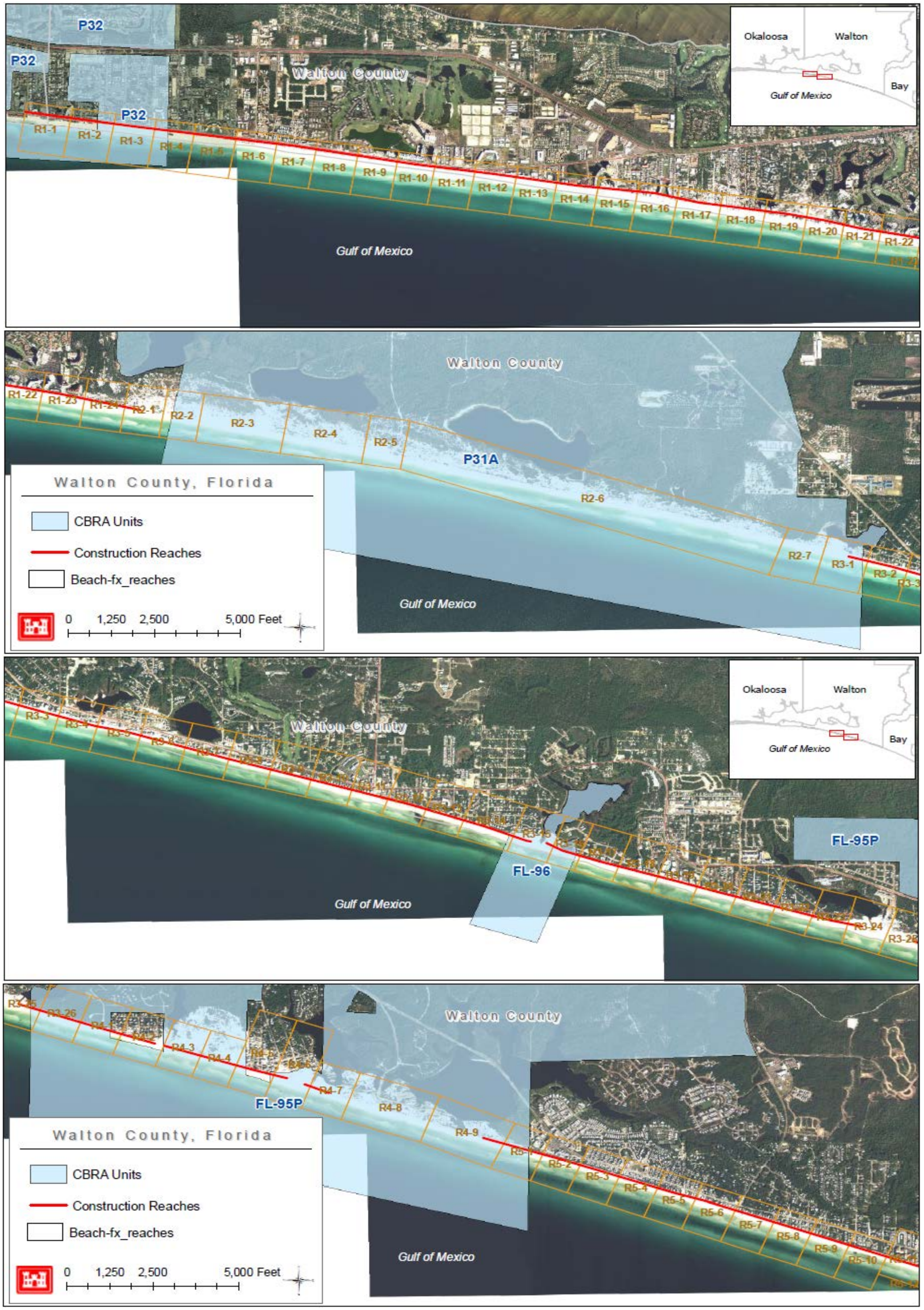

Figure EA-8. Locations of CBRA Units P32, P31A, FL-96 and FL-95P in Relation to the Project Area

Figure EA-8 (continued) - Locations of CBRA Units FL-94 and FL-93P in Relation to the Project Area

Unit FL- 94 - This unit is associated with the Deer Lake State Park. The bulk of the unit is excluded from the construction reaches except for the ends on either side (approximately 600 feet on the west side and 1,000 feet on the east side). The construction of the berm-dune system tapers to an end on each side of the lake outfall in order to preserve the natural breaching capabilities. The restoration of the beach-dune system adjacent to the dune lake complex will provide valuable shoreline stability towards preventing catastrophic breaching of the already vulnerable ecosystems supported by the dune lakes. A healthy and stable beach-dune system will contribute to the overall sustainability and protection of the fish and wildlife and various other natural resources including the dune lakes. Work conducted within this unit will be 100 percent funded by the non-Federal sponsor.

Unit FL-93P - This unit is considered an OPA and only applies for Federal flood insurance which is not applicable to this project.

Based on the above criteria, the Corps has made the determination that this project would qualify for an exemption under Section 6 Exemptions for CBRA units P31A, FL-96, and FL-94. 16 U.S.C. § 3505 (a)(6)(A) identifies projects relating to the study, management, protection, and enhancement of fish and wildlife resources and habitats, including acquisition of fish and wildlife habitats and related lands, stabilization projects for fish and wildlife habitats, and recreational projects. 16 U.S.C § 3505 (a)(6)(G) also exempts nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore natural stabilization systems; however, upon completion of the CBRA consultation, the USFWS did not agree with this determination and made their determination that this project is not consistent with the purpose of CBRA. To resolve this issue, the Corps has taken steps to ensure that any and all work within the concerned CBRA zones will be 100% funded by the local sponsor so that no federal funding will be used towards construction within the CBRA areas. Additionally, the local sponsor will not receive any in-kind credits for their efforts that fall within these CBRA areas.

4.9.1 No Action. The future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits within the CBRA areas. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources. Opportunities would be lost to implement beach and dune restoration and re-vegetation for the critical areas in Walton County. Degradation of valuable dune and beach habitat that provide protection to the valuable natural resources contained within the CBRA areas would persist as the area continues to be vulnerable to even minor storm activity. A no-action scenario would not provide the much needed stability and sustainability that a healthy coastal environment could offer to the area.

4.10 WATER QUALITY

Some silty material will be associated with the dredging and placement operations and its suspension may result in a slight localized increase in turbidity at the dredging and disposal sites. The direct placement of material on the beach will consist of beach quality sandy material and no significant long-term elevation of turbidity is expected. The State of Florida’s water quality standards would not be significantly affected and water clarity would return to ambient conditions shortly after sediment placement at the dredge and disposal sites. As required by the CWA, a Section 404 (b)(1) evaluation report for the borrow and placement of sediment at the proposed beach placement areas has been prepared and can be found in EA-Appendix A.

The sandy dredged material designated for beach and nearshore placement consists of medium-grained marine sand. Section 404 of the CWA [230.60(b)] states that because the dredged material is sufficiently removed from pollution sources no testing is required. Furthermore, the CWA states that material primarily composed of sand, gravel, or other inert material found in areas of high current and wave energy conditions are most likely free of contaminants in accordance with the CWA. The sandy material being dredged and placed on the designated beach areas is littoral sand from the same source as the sand found within these proposed disposal sites. Previous operations and water quality certifications have found that the material dredged from the site is free of contaminants.

On April 20, 2010, while working on an exploratory well approximately 50 miles offshore of Louisiana, the floating semi-submersible mobile offshore drilling unit Deepwater Horizon experienced an explosion and fire. The rig subsequently sank and oil and natural gas began leaking into the Gulf of Mexico. The total amount of oil and natural gas that has escaped into the Gulf of Mexico is unknown, but is currently believed to be between 35,000 and 65,000 barrels per day for an approximate total of 4.9 million barrels. On September 19, 2010, the relief well process was successfully completed and the federal government declared the well permanently capped. The spill has caused extensive damage to marine and wildlife habitats as well as the Gulf's fishing and tourism industries.

This spill has created uncertainty on whether future dredging operations will meet environmental compliance criteria and requirements for ocean disposal. The long term impacts of the oil spill on coastal Florida are uncertain at this time. This spill could potentially adversely impact Corps' water resources projects and studies within the coastal area. Potential impacts could include factors such as changes to existing or baseline conditions, as well as changes to future-without and future with project conditions. The Corps will continue to monitor and closely coordinate with other Federal and state resource agencies and local sponsors in determining how to best address any potential problems associated with the oil spill that may adversely impact Corps water resources development projects/studies. This could include revisions to proposed actions as well as the generation of supplemental environmental analysis and documentation for specific projects/studies as warranted by changing conditions.

As a result of the oil spill and to assure that the material in the selected borrow area is clear of contaminants, sampling of the borrow area was conducted by E-Tech Environmental Consulting (2012) in January of 2012. The goal of the sampling effort was to collect sediment samples from numerous locations throughout the borrow area in search of PAH's that would originate from the oil spill. Chemical analyses of the collected sampled was conducted by Pace Analytical Services, Inc., a NELAC certified laboratory. Results of the analyses showed undetectable limits of the targeted analytes within the borrow area. Should evidence of oil be detected during project construction, dredging and placement activities will be suspended and steps taken to initiate clean-up efforts.

4.10.1 No Action. The future conditions resulting by not constructing this project would result in no water quality impacts.

4.11 SEDIMENT QUALITY

As discussed in Section 4.2, the material to be utilized during restoration of the beach meets the criteria set forth in 20 CFR 230.60(b) as clean sand which is sufficiently removed from sources of pollution and is located in areas of high current velocities to provide reasonable assurance that the material would not be contaminated by such pollution. Hence, no further physical, biological, or chemical testing is required pursuant to the 404(b)(1) Guidelines. More specific details pertaining to sediment quality is included in the 404(b)(1) Evaluation Report included in EA-Appendix A.

As stated in Section 3.5, a compatibility analysis was conducted by Taylor Engineering, Inc. (2003). Borrow area and beach samples were taken to provide a comparison between the beach and proposed borrow area. Compatibility is expressed by the quantitative characteristics (size and composition) of the borrow area sediments with the native beach sediments in terms of an adjustment or overfill factor. This overfill factor is defined as the volume of material required to produce a unit volume of stable beach with the same grain size distribution as the native beach. The method developed by Dean (2002), which applies the concept of equilibrium beach profiles, computed an overfill ratio of 1.0. The analysis indicates that the borrow material and the native beach have equal mean grain sizes (0.30 mm).

4.11.1 No Action. The future conditions resulting by not constructing this project would result in no sediment quality impacts.

4.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

No known HTRW concerns were known to exist within the confines of the project area prior to the Deepwater Horizon oil spill. Nor would any be added as a result of the proposed activities. The material to be excavated are naturally occurring marine sands in areas of high current activity and far removed from sources of pollution, thus providing reasonable assurance that the material is not contaminated. The material to be utilized during restoration of the beach meets the criteria set forth in 20 CFR 230.60(b) as clean sand which is sufficiently removed from sources of pollution and is located in areas of high current velocities to provide reasonable assurance that the material would not be contaminated by such pollution. Hence, no further physical, biological, or chemical testing is required pursuant to the 404(b)(1) Guidelines. More specific details pertaining to sediment quality is included in the 404(b)(1) Evaluation Report and is included in EA-Appendix A.

As a result of the oil spill, sampling and testing of the borrow area was conducted by E-Tech Environmental Consulting (2012). The goal of the sampling and testing effort was to search for PAH’s in the borrow area that would originate from the oil spill. Results of the analyses showed undetectable limits of the targeted analytes.

4.12.1 No Action. The future conditions resulting by not constructing this project would cause no impacts resulting from HTRW.

4.13 AIR QUALITY

Air quality would be temporarily and insignificantly affected by the proposed action in Walton County. Emissions are expected to occur and would result from the operation of the dredge, land-based equipment, and any other support equipment which may be on or adjacent to the construction areas. The project area in Walton County is currently in attainment with National Ambient Air Quality Standards parameters. The proposed action would not affect the attainment status of the project area or region. A State Implementation Plan conformity determination (42 United States Code 7506 (c) is not required since the project area is in attainment for all criteria pollutants.

4.13.1 No Action. The future conditions resulting by not constructing this project would result in no air quality impacts.

4.14 NOISE

Noise from the dredge and other associated support equipment would be evident in the project area. Noise levels would be typical of what is already commonly accepted and occurring at the Corps' dredging operation sites. While this noise would be evident to those workers on the job, residents, and by-standers in close proximity of the project, it would be short-term and insignificant. No long-term increase in noise would occur in or around the project area. Normal noise levels would be achieved at the end of the construction period.

4.14.1 No Action. The future conditions resulting by not constructing this project would result in no noise impacts.

4.15 AESTHETICS

Aesthetics would be degraded in the project area during the dredging and disposal operations, due to the physical presence of the dredge and pipeline used to transport the dredged material as well as the presence of other land-based equipment. Some minor increases in turbidity may be noted in the immediate vicinity of excavation and placement activities but these increases would be minor and short term in nature. Some discoloration of the sand would occur following placement due to the fact that the sands to be placed on the beach are coming from anaerobic environment. Natural bleaching of the sand should occur within one to two months. Rainfall and wave action would act to filter out the fine grained materials from the restored beaches and increase the compatibility of the nourishment sands with those presently on the beach. These impacts will be temporary and insignificant in nature.

4.15.1 No Action. The future conditions resulting by not constructing this project would remain the same resulting in no aesthetic impacts.

4.16 RECREATION

For a short time, the construction process would limit the recreational activities, especially near the dredge pipe and equipment staging areas. Once completed, the project would provide aesthetically pleasing larger beaches and vegetated dunes which would supply more area for active and passive recreational activities as well as attracting coastal wildlife.

4.16.1 No Action. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources that are used for recreation. Opportunities would be lost to implement beach and dune restoration and re-vegetation for the critical areas in Walton County. Degradation of valuable dune and beach habitat including areas used for recreation would persist as the area continues to be vulnerable to even minor storm activity.

4.17 HISTORIC AND CULTURAL RESOURCES

In accordance with Section 106 of the National Historic Preservation Act and other relevant cultural resource laws, recommendations and actions have been coordinated with the FLSHPO and Federally recognized Native American Tribes. A cultural resource survey was conducted by Baer (2008) of Sonographics, Inc. under contract with Taylor Engineering, Inc., which is the non-federal sponsor's coastal consultant. Remote sensing surveys were performed for the selected placement and borrow areas. The remote sensing survey consisted of a magnetometer survey, side-scan sonar survey, and a sub-bottom profile survey. In the course of the survey, thirty-nine (39) magnetic anomalies, and two (2) side-scan sonar targets were recorded. The magnetic anomalies and side-scan sonar targets were widely distributed over the bottom area. No concentrated pattern or scatter pattern of magnetic anomalies and side scan sonar targets were recorded that suggested the presence of shipwreck resources in the borrow area, nor did the sub-bottom profiler data indicate the presence of areas that would indicate prehistoric midden sites or other inundated habitation sites. Based on the analysis of the remote sensing data, it was the conclusion of the principal investigator that there are no sunken shipwreck resources, or other sunken cultural sites within the proposed borrow area.

Based on the remote sensing analysis, the county initiated coordination with the Florida Historic Preservation Officer (SHPO) presenting this determination. In a letter dated December 11, 2008, concurrence was issued by the Florida Division of Historic Resources for the local project. It should be understood that this determination was issued for the local plan that covers the same areas as the selected plan. Based on the previous coordination for the local plan, the SHPO concurred that the proposed project will have no effort on any cultural resources associated with the selected plan. The letter of concurrence from the SHPO and the cultural resources survey report is included in Appendix B of the EA.

4.17.1 No Action. The future conditions resulting by not constructing this project would result in no impacts to any historic and cultural resources.

4.18 SOCIO-ECONOMIC IMPACTS

The selected plan would not require business or residential relocations. The proposed action would likely have a negligible effect on population growth trends within Walton County. As a result the proposed action is not expected to increase demands for community facilities, services, and housing other what would be expected as consistent with the projected population growth for Walton County and would not result in potentially significant impacts.

4.18.1 No Action. The future conditions resulting by not constructing this project would remain the same resulting in socio-economic impacts.

4.19 CUMULATIVE EFFECTS SUMMARY

Cumulative impacts are those impacts on the environment that result from the incremental impacts 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. This section analyzes the proposed action as well as any connected, cumulative, and similar existing and potential actions occurring in the area surrounding the site.

No projects are known to be interdependent upon this project. It is likely that renourishment events in the action area would occur in the future to maintain the beach design profile and additional sand sources would be used. Renourishment is expected to occur at regular intervals with increasing occurrence if the area is impacted by tropical storm events. Several other known beach renourishments are occurring, have recently occurred or are expected to occur within the Florida Panhandle. These include: Pensacola Beach Restoration (8.2 miles of shoreline), Navarre Beach and Dune (3.6 miles of shoreline), and City of Destin Beach renourishment (6.9 miles of shoreline and a 210-acre borrow area). In addition there is a proposed sand bypassing unit for the Mexico Beach Canal which is currently within the FDEP permitting process. This project, if approved, would consist of annual bypassing of sand via a hydraulic dredge from a 1.6-acre beach site west of the pass to a 4,500-foot stretch of beach to the east. The combined footprint is approximately 514 acres of seafloor and 37 miles of the shoreline. Not all of these projects are expected to occur within the same renourishment cycle (year), thus providing time for the natural system to recover. Cumulative impacts that would arise from renourishment efforts are anticipated to be remote due to the conservation measures typically incorporated into beach nourishment projects and the dynamic nature of the nearshore zone and the rapid recovery time of the benthic assemblages.

5.0 STATUS OF ENVIRONMENTAL COMPLIANCE

This section identifies and indicates the status of the determinations, coordination, and consultations pertaining to the environmental compliance laws and regulations for this project. At the end of this section, Table EA-6 summarizes the status of the applicable coordination and consultations with the support agencies.

5.1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) OF 1969

Environmental information on the selected plan has been compiled and this EA has been prepared in accordance with the NEPA. Upon finalization of this EA a determination has been made as to the significance of the impacts resulting from this project. It is found that the total impacts are not considered significant and a FONSI has been prepared. Based on the findings of the EA, it has been determined that the preparation of an Environmental Impact Statement is not required.

As required by NEPA, a public notice for this project has been issued on May 2, 2012 in accordance with rules and regulations published in the Federal Register on 26 April 1988. These laws are applied whenever dredged or fill materials may enter waters of the United States, or for the transportation of dredged material for the purpose of placement into ocean waters.

5.2 ENDANGERED SPECIES ACT OF 1973

The selected plan as described in Section 2.1.4 is in the process of formal consultation in accordance with the USFWS and NMFS as required under Section 7 of the ESA. Although there have been coordination efforts already conducted by the non-Federal sponsor for the local plan that totally encompasses the selected plan, as described previously in Section 2.1.5, the Corps has, in addition, completed formal Section 7 consultation with the USFWS and NMFS. A BA was been prepared for consultation with both the USFWS and NMFS using much of the same information generated by the non-Federal sponsor addressing the potential impacts to the listed species and/or critical habitats within the selected plan. A copy of the BA's is included in EA-Appendix B. It was expected that the same activities will be required to avoid or minimize impacts to these species or where possible to provide activities that may enhance the species continued survival or critical habitat.

Based on the evaluation for species and critical habitats under the purview of the USFWS for the selected plan described in the BA, it is the Corps' assessment that the actions may have an adverse affect on sea turtles, piping plovers, and Choctawhatchee beach mouse. Upon further consideration of the previous BO's issued for the local Walton County Beach Nourishment Project, it is the USFWS's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of these species and not likely to destroy or adversely modify designated critical habitat for the Choctawhatchee beach mouse. Given the results of the coordinations by the non-Federal sponsor, no additional issues are expected with the selected plan.

Based on the evaluation for species and critical habitats under the purview of the NMFS for the selected plan described in the BA, it is the Corps' assessment that the actions may have an adverse affect on sea turtles and Gulf sturgeon but not likely to jeopardize their continued existence and is not likely to adversely modify Gulf sturgeon critical habitat. This determination is consistent with the completed consultation conducted for the local plan in which NMFS has concurred by letters dated August 13, 2008 and August 13, 2008. Copies of these letters are included in EA-Appendix B. The Corps is therefore requesting that consideration be given to applying that coordination to the selected plan. Given the results of the coordinations already completed by the non-Federal sponsor, no additional issues are expected with the selected plan. By email dated March 1, 2010, the NMFS has indicated that the Walton County Federal project would not result in additional impacts already coordinated for the local plan (EA-Appendix B). In addition to the coordinations described above, hopper dredging operations have already been analyzed in the RBO and amendments.

In August 2011, the USFWS finalized the PBO for Shore Protection Activities along the Coast of Florida. The PBO indicates that for sand placement actions such as this in the State of Florida, the USFWS has determined that the proposed action would not jeopardize the continued existence of nesting sea turtles. However, there is still a potential for incidental takes in the form of long-term and short-term impacts on sea turtles. The USFWS has therefore imposed terms and conditions to be implemented that would minimize the potential for incidental takes. The USFWS also agrees with the Corps' determination that the proposed action may adversely affect non-breeding piping plover. Due to issues regarding piping plover that could not be resolved, the PBO does not address this species. Consultation for the piping plover has subsequently been completed under a separate BO and was received from the USFWS in October 2012 and concludes that the selected plan is not likely to jeopardize the continued existence of non-breeding piping plover or adversely modify its critical habitat. Copies of these BO's are included in EA-Appendix B. Based on the formal consultations regarding threatened and endangered species and associated designated critical habitats, no mitigation requirements have been identified.

5.3 COASTAL ZONE MANAGEMENT ACT (CZMA) OF 1972

As previously stated, the non-Federal sponsor proceeded with pursuing the beach restoration and has selected a local plan that totally envelops the selected plan. The county has applied for the state WQC/CZC in which the FDEP has deemed their application complete but the final permit has not been issued. The state has indicated that since the local plan is larger than and totally encompasses the selected plan that the Corps could simply transfer that information in a new JCP application. The only thing that would be necessary is to replace the project description for the local plan with the selected plan.

The Corps determined that the proposed action is consistent with the Florida Coastal Management Program to the maximum extent practicable. The effect of this project on the coastal zone would be to enhance the zone's appearance and suitability for beach-type recreation and to restore some of the coastal zone's ability to provide protection against storms and flooding. Restoration of the state's beaches is a policy statement with the state Coastal Zone Management Plan Chapter 161 (Coastal Construction). A CZC determination request will be included in the Federal JCP application package that will be prepared and issued along with the JCP permit. The Corps will be submitting an independent JCP permit application once the selected plan is approved.

5.4 CLEAN AIR ACT OF 1972

No air quality permits are required for this project.

5.5 CLEAN WATER ACT (CWA) OF 1972

The CWA states that it is unlawful to discharge any pollutant from a point source into navigable waters, unless appropriate permits have been obtained through the Section 401 water quality certification process. Dredging material from the selected borrow site and placement of the material as described for the selected plan requires that a Section 401 WQC be obtained. A Section 401 WQC application has been prepared for submittal to FDEP for the selected plan. A Section 404 (b)(1) evaluation report is included in this EA under EA-Appendix A. The report indicates no further physical, biological, or chemical testing is required pursuant to the 404(b)(1) Guidelines. Based on the information presented, no mitigation requirements have been identified.

As already discussed, the non-Federal sponsor proceeded with pursuing the beach restoration and has selected a local plan that totally envelops the selected plan. The state has indicated that since the local plan is larger than and totally encompasses the selected plan that the same information can be used by the Corps in preparation of the WQC/CZC application. The Corps is currently coordinating this effort with the FDEP and non-Federal sponsor and a WQC/CZC application is being prepared for submittal to FDEP upon approval of the selected plan.

In reference to the Deepwater Horizon oil spill, the borrow site was inspected in January 2012 by a local sub-consultant (E-Tech Environmental Consulting, 2012). Surface grab samples were obtained at 57 locations along the border and within the approved borrow site. The samples were visually inspected and analyzed for PAHs. No oil products were visually identified and the majority of samples came back undetectable for PAHs (a few came back detectable, but below PQL limits or thresholds for cleanup). From the report, it was determined the borrow site was free and clear of oil products. The report was technically reviewed by FDEP and determined to be reimbursable by Natural Resource Damage Assessment (NRDA) program should any damages be identified or cleanup efforts required. A copy of the sampling and testing is available upon request.

5.6 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (PL 89-665, THE ARCHEOLOGY AND HISTORIC PRESERVATION ACT (PL 93-291), AND EXECUTIVE ORDER 11593)

Archival research and field work has been initiated by the non-Federal sponsor. Sonographics, Inc. conducted a cultural resource survey and detail phase sub-bottom seismic survey in June 2007. Potential identified cultural resources were investigated using qualitative visual observations. It was determined that none of the anomalies detected appeared to represent any type of cultural resources and a determination was made that the activities associated with this project are unlikely to affect any historic or cultural resources. The county subsequently initiated coordination with the Florida Division of Historic Resources presenting this determination. In a letter dated December 11, 2008, concurrence was issued by the Florida Division of Historic Resources for the project. This determination covers the same areas as the selected plan. Section 106 consultation has been initiated for the selected plan using this existing information.

In accordance with Section 106 of the National Historic Preservation Act and other relevant cultural resource laws, recommendations and actions have been coordinated with the FLSHPO. The Mobile District's cultural resources staff has composed a letter indicating that the Mobile District has reviewed the aforementioned cultural resources survey and review by the FLSHPO. Based on this information, and the nature of the project, the Corps, as lead Federal agency, has determined that the selected plan will have no effect on historic properties as per 36 CFR 800.4(d)(1). By letter dated March 11, 2010 the FLSHPO provided their concurrence that the Federal action will have no effect on historic properties. A copy of this coordination is included in EA-Appendix B. Based on the consultation regarding cultural resources, no mitigation requirements have been identified.

5.7 MIGRATORY BIRD TREATY ACT

No migratory birds would be adversely affected by project activities.

5.8 COASTAL BARRIER RESOURCES ACT (CBRA) AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

The CBRA Units that are within the project limits include FL-94, FL-96, FL-95P, FL-93P, P32, and P31A. Coordination with the USFWS concerning the consistency of the selected plan in accordance with the requirements of CBRA for the six system units has been completed in an effort to ensure that the expenditure of Federal funds does not enhance the potential for development within these units. A copy of the coordination document in included in EA-Appendix B.

CBRA units 95P and FL-93P are considered as OPA's and only applies to Federal flood insurance which does not apply to this project. CBRA unit P32 falls within a segment of the project that cannot be justified for Federal funding and will be 100 percent locally funded, which is exempt from CBRA requirements. The Corps has made the initial determination that the selected plan qualifies for an exemption under Section 6 Exemptions for CBRA units P31A, FL-96, and FL-94. Section 6(a)(6)(A) identifies projects relating to the study, management, protection, or enhancement of fish and wildlife resources and habitats, including recreational projects. Section 6(a)(6)(G) also exempts nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore natural stabilization systems.

As discussed in the Section 4.9, upon completion of the CBRA consultation, the USFWS does not agree with the Corps' determination for the CBRA exemptions for units P31A, FL-96, and FL-94. By letter dated February 22, 2010 the USFWS issued their determination that this project is not consistent with the purpose of CBRA. It should be recognized that CBRA units P31A, FL-96, and FL-94 are the only units that were determined to fall within the Federal cost-shared project reaches. These reaches are for the most part at the tapered ends of those reaches. To resolve this issue, the Corps has taken steps to ensure that any and all work within the concerned CBRA zones will be 100% funded by the local sponsor so that no federal funding will be used towards construction within the CBRA areas. Additionally, the local sponsor will not receive any in-kind credits for their efforts that fall within these CBRA areas. Since no Federal funding will be used in the construction of these segments of the project, the CBRA will no longer be applicable. By email April 18, 2012 the USFWS was made aware and agrees on the Corps' position and actions taken on how to proceed regarding this issue.

5.9 MAGNUSON – STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (MSFCMA)

Coordination with the NMFS, Habitat Conservation Division in accordance with the MSFCMA has been initiated involving the dredging and placement activities for the selected plan. Activities have been undertaken to assure that plans identified for this study are not in conflict with existing Federal fishery management plans or do not result in unacceptable impacts to the habitats of managed species.

The Corps will be adhering to water quality requirements under the conditions specified by the FDEP to further reduce impacts to EFH. Consultation with the NMFS, Habitat Conservation Division concerning EFH has been initiated for the selected plan pursuant to the MSFCMA (PL 94-265). A copy of the coordination documentation is included in EA-Appendix B. Based on the Corps' assessment of the project in relation to impacts to fisheries resources, the overall impact to identified species is considered negligible given the relatively small area and will not result in significant impacts to EFH.

By letter dated October 6, 2010 the NMFS, Habitat Conservation Division has stated that they have reviewed the Corps' EFH assessment and subsequent information for the proposed selected plan and determined that the NMFS does not have any EFH consultation recommendations to offer. A copy of this letter of determination in included in EA-Appendix B. Based on the formal consultations regarding EFH, no mitigation requirements have been identified.

5.10 FISH AND WILDLIFE COORDINATION ACT OF 1958, AS AMENDED

Although the non-Federal sponsor has conducted the coordination required by the ESA and Section 7 coordination has been conducted pertaining to the local plan, the FWCA requires that Federal agencies consult with the USFWS regarding fish and wildlife resources in the project area. Such coordination will result in a FWCAR. This coordination has been conducted with the USFWS for the selected plan in accordance with the FWCA of 1958 regarding impacts to significant fish and wildlife resources and impacts to Federally listed or proposed species or their designated or proposed critical habitat, which is in accordance with Section 7 of the Endangered Species Act of 1973. A copy of the coordination letter requesting is included in EA-Appendix B. A scope of work and transfer of funds to the USFWS has been completed for the preparation of this report. The USFWS provided the final FWCAR in October 2012. A copy of the report is included in EA-Appendix B.

5.11 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. 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 CWA.

5.12 EXECUTIVE ORDER (E.O.) 13045, PROTECTION OF CHILDREN

The proposed storm damage protection project which includes the placement of the identified borrow material on the beaches of Walton County complies with Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks", and does not represent disproportionally high and adverse environmental health impact or safety risks to children in the United States. The proposed site is not used disproportionally by children.

5.13 E.O. 12898, ENVIRONMENTAL JUSTICE

The proposed action complies with Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations”, and does not represent disproportionally high and adverse human health or environmental effects on minority populations and low-income populations in the United States. The proposed site is not used disproportionally by these populations.

5.14 E.O. 13186, PROTECTION OF MIGRATORY BIRDS

These migratory bird conventions impose substantive obligations on the United States for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act (Act), the United States has implemented these migratory bird conventions with respect to the United States. This Executive Order directs executive departments and agencies to take certain actions to further implement the Act. The proposed action will have no affects on migratory birds.

5.15 E.O. 11990, PROTECTION OF WETLANDS

The E.O. requires Federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. No wetlands will be impacted by this action.

5.16 E.O. 11988, FLOODPLAIN MANAGEMENT

E.O.11988 requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with occupancy and modification of floodplains. It further directs Federal agencies to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. The project is located in a highly developed area subject to inundation by the one-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. The purpose of the project is to reduce damage to existing landward structures as a result of storm waves and storm-induced erosion, two major categories of storm damage. The project will not increase flooding along the landward structures or increase or prevent any damage from bay side flooding from saltwater that will flow into Choctawhatchee Bay through East Pass Inlet. The action has been evaluated and found to be in compliance with this E.O. as it will not adversely affect the floodplain based on the above findings.

6.0 PREVIOUS COORDINATIONS

6.1 Public Stakeholder Coordinations. Public support for this project is especially important considering the cost sharing requirements. The sponsor has been very proactive in insuring that the public has been informed of the process as well as status of the feasibility study. The designated point of contact is Walton County’s consultant for the TDC which the Corps provides monthly study updates. Information briefed to the TDC and non-Federal sponsor leadership is a matter of public record. In the last two years the non-Federal sponsor conducted two workshops regarding this Hurricane and Storm Damage Reduction (HSDR) project. Most recently, the draft

Table EA-6. Status of Agency Coordinations and Consultations

APPLICABLE LAW/REGUALTION	AGENCY	COORDINATION/CONSULTATION INITIATED	STATUS
National Environmental Policy Act (NEPA)		Public Notice Issued April 27,2010	No objection comments received.
Endangered Species Act (ESA)	U.S. Fish and Wildlife Service	Consulted initiated January 15, 2010	In August, 2011, the USFWS finalized the Statewide Programmatic Biological Opinion (PBO) for Shore Protection Activities along the coast of Florida. The PBO indicates that for actions such as this in Florida, the USFWS has determined that the proposed action would not jeopardize the continued existence of nesting sea turtles. The final PBO required separate coordination for the piping plover which was completed in October 2012.
	NOAA-National Marine Fisheries Service, Office of Protected Resources	Consultation initiated January 15, 2010	Email dated March1, 2010, concurring that project would not result in additional impacts already coordinated for the non-Federal sponsor
Fish and Wildlife Coordination Act (FWCA)	U.S. Fish and Wildlife Service	Request for Fish and Wildlife Coordination Act Report (FWCAR) initiated January 8, 2010	Draft report received October 7, 2010. The final report was received in October 2012.
Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) – Essential Fish Habitat (EFH)	NOAA-National Marine Fisheries Service, Habitat Conservation Division	EFH consultation initiated January 8, 2010	Letter received October 6, 2010, NMFS, Habitat Conservation Division determined that they do not have any EFH additional consultation recommendations to offer.
Coastal Barrier Resources Act (CBRA)	U.S. Fish and Wildlife Service	CBRA consultation initiated January 13, 2010	Letter received February 22, 20210 indicating USFWS's determination that project is not consistent with the purpose of CBRA. Areas within CBRA will be constructed using non-Federal funds
National Historic Preservation Act (NHPA)	Florida Division of Historic Resources	Cultural resources consultation initiated January 8, 2010	Letter received March 11, 2010 that FLSHPO concurred the action will have no effect on historic properties.
Clean Water Act (CWA)	Florida Department and Environmental Protection (FDEP)	The water quality certification application is being prepared for submittal to FDEP upon approval of the selected plan.	404(b)(1) Evaluation Report prepared. Currently coordinating with the FDEP and non-Federal sponsor for final preparation.
Coastal Zone Management Act (CZMA)	Florida Department and Environmental Protection (FDEP)	The water quality certification application is being prepared which also includes the Coastal Zone Consistency (CZC) determination	Currently coordinating with the FDEP and non-Federal sponsor for final preparation.

report was made available to the public for their review and comment per announcement in the local newspaper and through mail-outs to interested individuals and agencies. For the purpose of funding a HSDR project, the sponsor enacted a bed tax for the area several years ago. That tax continues in place to fund the local share for this project.

6.2 Agency Coordinations. On 29 June 2004, an interagency scoping meeting was held at the Walton County, TDC facility in Santa Rosa Beach, Florida. The purpose of the meeting was to initiate environmental coordination with the interagency team involved in the permitting and environmental compliance processes for the Walton County Shore Protection Feasibility Study. The meeting's primary objects were to identify and discuss environmental issues and opportunities, permitting issues, and environmental compliance requirements associated with the proposed Walton County project. In attendance were representatives from the Corps, Walton County, USFWS, FDEP, and FWCC. It should be noted that representatives from the NMFS were invited to participate. Communications with the NMFS, Habitat Conservation Division expressed that the project did not raise issues that would require their representation. Representatives from the NMFS, Protected Resources Division did not respond. A Memorandum for Record (MFR) summarizing the meeting was prepared and distributed. A copy of the MFR is included in EA-Appendix B.

An important topic of discussion at the interagency meeting dealt with the NEPA process that should be conducted for the Walton County project, specifically whether the project would require an EA or EIS. The USFWS representatives expressed that their agency is not viewing this project as one that would require an EIS. Although the project area encompasses some 26 miles of shoreline, the activities will be comprised of segmented beach nourishment and/or dune restoration. The group in attendance felt that given the project characteristics, low level of controversy, and precedent set by other local beach projects that an EA would be the appropriate level of environmental documentation for the Walton County project; however, an EA must adequately address the cumulative impacts of the entire project and may be subject to future change into an EIS should any major issues and controversy arise. If the finding of the EA is that the major Federal undertaking will not significantly affect the environment then a FONSI will be prepared.

The Corps has reopened communications with the interagency team to reaffirm this determination. Reaffirmation has been received from the team that their position is that an EA would still be the appropriate level of NEPA documentation. The USFWS, in an email dated December 9, 2009 concurs that with the information available an EA is still the appropriate level of NEPA documentation. Also in an email dated December 9, 2009, FDEP has indicated that they feel the determination as to the appropriate level of NEPA documentation is the Corps' decision as long as it adequately addresses the information outlined in the JCP application package. A conference call was held on December 16, 2009 between Corps representatives and representatives from EPA Region IV. After describing the project and answering several questions the EPA representatives felt that the Corps was justified in the determination to generate an EA.

They also confirmed that this decision is the responsibility of the Corps; however, the information contained in the EA must support the determination for the FONSI. If the EA reveals significant impacts, then an EIS must be initiated.

The Corps maintains the position that based on project characteristics, low level of controversy, absence of chemical contamination, and precedent set by other local beach projects that an EA would be the appropriate level of NEPA documentation for the Walton County project. It should also be considered that all of the required formal consultations have been completed and no mitigation requirements have been identified for the proposed selected project.

7.0 CONCLUSIONS

All reports, documents, and coordination efforts to date have been reviewed by the Mobile District to ensure that they are in total compliance with Federal requirements including the guidelines set forth under the EOP and the processes in ER 110502-100. Upon verification that all requirements are met and a determination has been made that the project will not result in significant environmental impacts, a FONSI was prepared by the Corps for inclusion in the final feasibility report.

Based on the above discussion of the minor impacts, which would result from the implementation of the proposed action and due to the lack of long-term adverse impacts and that no mitigation requirements have been identified, it is believed that no significant cumulative impacts for the proposed beach restoration disposal sites, adjacent shorelines, and proposed borrow area would occur.

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EA-APPENDIX A

404(b)(1) EVALUATION REPORT
FOR
WALTON COUNTY, FLORIDA HURRICANE AND STORM DAMAGE REDUCTION PROJECT
WALTON COUNTY, FLORIDA

404(b)(1) EVALUATION REPORT
FOR
WALTON COUNTY, FLORIDA HURRICANE AND STORM DAMAGE REDUCTION PROJECT
WALTON COUNTY, FLORIDA

I. PROJECT DESCRIPTION

Please refer to the figures included in the Environmental Assessment (EA) to which this evaluation is appended.

a. Location. Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1 in EA). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 15.7 miles of state-designated critically eroding areas and three Florida State Park areas that cover approximately six miles of the 26-mile shoreline.

b. General Description of Proposed Preferred Plan. The Walton County upland cross section is defined by dune elevations ranging from +9.5 to + 33 feet NAVD88 and a natural berm elevation of +5.5 feet NAVD88. The study region was divided into five study reaches based on structural development and state park areas as illustrated in Figure 2 in the EA. The historical and 2004 beach surveys were used to develop 11 representative profiles, which characterize the existing condition for the five study reaches. The representative profiles were identified based on similarity in shape of the upper beach profile (dune height and width, berm width, foreshore beach slope, and profile volume) and shape of the offshore profile. Because significant erosion occurred due to Hurricane Ivan in September 2004, the representative profiles were revised using the post-Ivan data to characterize the upper portion of the beach and to include the post-Ivan data in the submerged portion of the beach.

Modeling using a model called Beach-*fx* was used to simplify beach profiles representing a single trapezoidal dune, with a horizontal berm as shown in Figure 3 in the EA. The submerged profile is represented by a series of points or an approximate functional representation. The beach variables which change with storms are dune width, dune height, berm width, and upland elevation. Constant values are upland elevation, dune slope, berm height, foreslope, and shape of the submerged profile. Thus, in response to a given storm, the berm can be eroded or accreted; the dune height and/or width can change and translate landward or seaward.

Eleven simplified beach profiles were modified for various berm and dune configurations. Maximum dune and berm widths were determined based on volumes provided by the FEMA post-Hurricane Ivan emergency beach nourishment. Other modeling was conducted using SBEACH to predict the response of each dune and berm configuration to the 552 storms developed for this study. Approximately 240,000 SBEACH simulations were conducted to develop the shoreline responses for the Beach-*fx* storm response database.

c. Authority and Purpose. This study was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

> *"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida.*

Resolution Adopted July 24, 2002, by The United States House of Representatives:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida.*

The Non-Federal Sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County TDC.

The purpose of this study is to assess the needs for hurricane and storm damage protection and opportunities for environmental restoration and protection along the Gulf Coast of Walton County, Florida. The purpose of this report is to document the economic investigations, engineering analyses, and environmental considerations completed to formulate a shore protection project for Walton County, Florida, which will reduce the damaging effects of hurricanes and severe storms to properties along the coast and stabilize or restore the shoreline by eliminating long-term erosion. The project will be constructible, acceptable to the public, environmentally sustainable and justified by an economic evaluation.

In addition to storm damage protection the proposed action provides environmental restoration opportunities. A report produced by the State of Florida following Hurricane Ivan (2004) to assess damages and recovery plan as a result of the storm, the state recommends an assisted recovery plan to implement beach and dune restoration and re-vegetation for the critical areas in Walton County. Such action would restore valuable dune and beach habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat supporting various flora and fauna and general beach ecosystem functions. Restoring a beach-dune system allows greater stability and sustainability of the coastal environment once it has become established. Restoring the beach habitat that supports a variety of associated flora and fauna contribute to the success and continual survival of several threatened or endangered species. The restoration effort will also contribute to the well-being of various other flora and fauna that naturally occur in the immediate vicinity. Future conditions associated with not restoring the beach and dune system would result in the continued degradation of a valuable beach ecosystem and loss of these types of habitats and associated benefits. The already damaged habitats would remain particularly vulnerable to wave and storm activity that continually threaten and prevent the re-establishment of valuable natural resources.

d. General Description of Borrow Material.

(1) General Characteristics of Material. The proposed borrow area sediments are typically well sorted medium sand (0.25 - 0.50 mm). The borrow area is centrally located and offers the best source for now and in the future. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and pumped into the beach template.

(2) Quantity of Material. The proposed borrow area is believed to contain approximately 10,000,000 cubic yards proven by the initial investigations. This volume covers the initial locally preferred plan placement and the four planned subsequent renourishments for the next 50 years.

(3) Source of Material. Borrow area B-4 shown on Figure 5 in the EA is the most promising site.

e. General Description of Discharge Sites.

(1) Location. The proposed Walton County placement sites are located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1 in EA).

(2) Type of Site. The beach placement sites are typical of Florida Panhandle coastal beaches and the nearshore Gulf of Mexico with predominately marine sand substrate.

(3) Types of Habitat. The beach and nearshore area at the proposed Walton County project site support a highly variable marine environment that is typical of the nearshore zones of the northwest Florida Gulf of Mexico as described in the EA. These areas are characterized by clean white sands and clear blue-green ocean waters.

(4) Timing and Duration of Discharge. Timing of project construction is not known at this time. Once constructed, renourishment activities are expected to be conducted at predefined intervals or as necessary depending upon storm activity. Renourishment activities would be scheduled as much as possible to coincide with

environmental windows to avoid conflicts with sea turtles, shorebirds, and other protected species and critical habitats.

f. Description of Discharge Methods. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and hydraulically pumped into the beach template. Heavy earth moving equipment such as bulldozers would be utilized to achieve the final design template. The use of hopper dredge equipment will adhere to the terms and conditions set forth within the BO's on hopper dredging in the U.S. South Atlantic and Gulf of Mexico waters (most recently, January 9, 2007, RBO to the Corps' four Gulf of Mexico districts) would be implemented to minimize the potential of sea turtles and Gulf sturgeon take as a result of entrainment in the dredge. Placement of material on the proposed beach sites will adhere to the negotiated terms and conditions BO's resulting from the formal consultation processes and negotiated conditions specified under the PBO for Beach Placement and Shore Protection for the State of Florida.

II. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The placement of material on the beach and in the nearshore areas would be accomplished in such a manner as to replicate the existing beach elevation/slope but at a distance seaward of the existing mean high water elevation as specified by the approved preferred plan. After placement, the beach fill would be subject to modifying effects of the natural wave climate of the Gulf of Mexico and within six months should reach equilibrium. This short-term change in natural elevation and slope would not pose a significant impact to the resources of the area or circulation in the nearshore Gulf of Mexico.

(2) Sediment Type. The material to be utilized in the beach renourishment project is predominantly medium sized sand (0.25 - .50 mm) with some shell hash and less than 10 percent fine grained material. This material is compatible with the sand on the Walton County beaches and nearshore littoral zone. Mineral composition and particle size of the substrate would not be significantly altered.

(3) Dredged/Fill Material Movement. Some of the fill material is expected to be transported westward along the shoreface in the littoral drift system. This movement would not have any adverse impact on the area as the littoral drift is a natural occurrence and the quantity of material expected to be lost to this system is minimal compared to that which is currently in circulation.

(4) Physical Effects on Benthos. The placement of the fill material would bury the benthos of the shoreface and to some extent that of the nearshore area. These communities are well adapted to this type of phenomena and should reestablish within 6 to 12 months after placement.

(5) Other effects. No other effects are anticipated.

(6) Actions Taken to Minimize Impacts (Subpart H**)**. Since the material to be placed is naturally occurring sand similar to the substrate of the beach nourishment site, no further actions are deemed necessary.

b. Water Column Determinations

(1) Salinity. There would be no changes in gradients or patterns.

(2) Water Chemistry (pH, etc.). The material proposed for placement is medium grained marine sand as described in the EA. These areas are far removed from any known sources of contaminants. Also, the material is primarily composed of unconsolidated quartz sand which is considered inert and in areas of high current and wave energy conditions. Such materials under high energy conditions are considered most likely free of contaminants. Based on 40 CFR 230.60, no testing for contaminants will be necessary. This sandy material in relict beach sand, and is similar to the sand found on the proposed beach disposal site.

(3) Clarity. The discharging of effluent is expected to create some degree of construction-related turbidity in excess of the natural condition in the proximity of the placement site and the borrow area. These impacts are expected to be temporary, with suspended particles settling out within a short time without measurable effects on water quality. During construction, turbidity levels would be monitored at the dredge and the beach sites, to ensure compliance with FDEP's WQC.

(4) Color. The color of the proposed borrow sand matches that of the beach sand to the extent acceptable by the State of Florida's Sand Quality Control (QC) and Quality Assurance (QA) required by paragraph 62B-41.008 (1) (k) (4b) F.A.C.

(5) Odor. No effect.

(6) Taste. No effect.

(7) Dissolved Gas Levels. No significant effect.

(8) Nutrients. No significant effect.

(9) Eutrophication. No effects.

c. Water Circulation, Fluctuation, and Salinity Determinations

(1) Current Patterns and Circulation.

(a) Current Patterns and Flow. Neither the placement of material on the beach nor the proposed excavation is expected to result in significant changes in current patterns or circulations. In the area of proposed excavation currents would be slightly modified due to the increase depth.

(b) Velocity. No significant effects.

(2) Stratification. No significant effects.

(3) Hydrologic Regime. See (a) and (b) above. No significant effects.

(4) Normal Water Level Fluctuations. No effects.

(5) Salinity Gradient. No significant effects.

d. Suspended Particulate/Turbidity Determination.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Placement Site. The discharging of effluent is expected to create some degree of construction-related turbidity in excess of the natural condition in the proximity of the placement site and the borrow area. These impacts are expected to be temporary, with suspended particles settling out within a short time without measurable effects on water quality. During construction, turbidity levels would be monitored at the dredge and the beach sites, to ensure compliance with FDEP's WQC.

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

(a) Light Penetration. Slight decreases in the degree of light penetration may occur during placement activities. These impacts would be temporary in nature and restricted to the immediate area of placement.

(b) Dissolved Oxygen. No significant effects.

(c) Toxic Metals and Organics. No effects.

(d) Pathogens. No effects.

(e) Aesthetics. Only temporary degradation to the aesthetic environment would occur as a result of excavation and placement operations. Impacts would primarily occur as a result of the physical presence of heavy equipment. Some minor increases in turbidity may be observed in the immediate vicinity of excavation and placement activities but these increases would be minor and short-term in nature.

(3) Effects on Biota.

(a) Primary Production Photosynthesis. No long-term significant impacts are expected to occur due to the physical nature of the material to be excavated. No submerged aquatic vegetation is located within the area of dredging or sand placement.

(b) Suspension/Filter Feeders. No significant effects. No oyster reefs, worm reefs, significant clam communities are known to be prominent within the vicinity of the project.

(c) Sight Feeders. No significant effects.

(4) Actions Taken to Minimize Impacts (Subpart H). No further actions are deemed appropriate.

e. Contaminant Determinations. The material to be utilized during restoration of the beach meets the criteria set forth in 20 CFR 230.60(b). The material is characterized as clean sand which is sufficiently removed from sources of pollution and is located in areas of high current velocities to provide reasonable assurance that the material would not be contaminated by such pollution. In addition, the material originates in the near vicinity of the placement activity and is similar to the substrate of the placement site, and receives the same overlying waters as the placement site. Hence, no further physical, biological, or chemical testing is required pursuant to the 404(b)(1) Guidelines. However, on April 20, 2010, the floating semi-submersible mobile offshore drilling unit Deepwater Horizon experienced an explosion and fire. The rig began leaking into the Gulf of Mexico. The total amount of oil and natural gas that has escaped into the Gulf of Mexico is unknown, but is currently believed to be approximate 4.9 million barrels. The spill has been known to cause extensive damage to marine and wildlife habitats as well as the Gulf's fishing and tourism industries.

As a result of the oil spill and to assure that the material in the selected borrow area is clear of contaminants, sampling of the borrow area was conducted by E-Tech Environmental Consulting in January of 2012. The goal of the sampling effort was to collect sediment samples from numerous locations throughout the borrow area in search of PAH’s that would originate from the oil spill. Chemical analyses of the collected sampled was conducted by Pace Analytical Services, Inc., aNELAC certified laboratory. Results of the analyses showed undetectable limits of the targeted analytes within the borrow area.

f. Aquatic Ecosystem and Organism Determinations. No significant effects.

(1) Effects on Plankton. Placement of nourishment material on the Walton County beaches and the nearshore area would destroy some phytoplankton and zooplankton, and could reduce light penetration which may tend to have an effect on the primary production by the phytoplankton. Due to the nature of the materials to be placed and the duration of the placement operations, these impacts would be short-term in nature and restricted to the general vicinity of the construction activity. Total impacts to the planktonic community would not be significant.

(2) Effects on Benthos. Temporary disruption of the aquatic community is anticipated by the excavation and placement activities. The excavation and direct placement of sands from the borrow sites would result in the mortality of some percentage of the existing benthic assemblages. Non-motile benthic fauna within the area may be destroyed by the proposed work, but should repopulate within several months after completion. Some of the motile benthic and pelagic fauna, such as crabs, shrimp, and fishes, are able to avoid the disturbed area and should return shortly after the activity is completed. Larval and juvenile stages of these forms may not be able to avoid the activity due to limited mobility.

(3) Effects on Nekton. Some fish within and in close proximity of the excavation and placement area would likely leave the area until condition return to be more favorable; however, it is not anticipated that all such organisms would vacate the area. It is logical to speculate that many organisms would avoid an area of disruption such as that associated with the placement of fill material. Some nektonic filter feeders may be killed as a result of being in the affected area and other organisms less capable of movement, such as larval forms, may be physically stressed by the placement of sand. Generally, most organisms would avoid the area and later return to the area. Total

impacts to the nektonic community would quickly recover are not considered significant.

(4) Effects on Aquatic Food Web. No significant effects.

(5) Effects on Special Aquatic Sites. No significant effects.

(a) Sanctuaries and Refuges. Not applicable.

(b) Wetlands. Not applicable.

(c) Mud Flats. Not applicable.

(d) Vegetated Shallows. Not applicable.

(e) Coral Reefs. Not applicable.

(f) Riffle and Pool Complexes. Not applicable.

(6) Effects on Threatened and Endangered Species. Pursuant to Section 7 of the Endangered Species Act, the proposed Federal action is being coordinated with the USFWS and the NMFS. Coordination with the agencies indicates that the proposed action would not jeopardize the continued existence of nesting sea turtles or Choctawhatchee beach mouse or result in adverse modification of the Choctawhatchee beach mouse critical habitat. The USFWS has, imposed terms and conditions to be implemented that would minimize the potential for incidental takes. It has also been determined that the proposed action may adversely affect non-breeding piping plover. Consultation regarding impacts to piping plover has been completed. The USFWS also agrees with the Corps' determination that the selected plan would not likely adversely affect designated critical habitat for non-breeding piping plover and the West Indian manatee. Based on the formal consultations regarding threatened and endangered species and associated designated critical habitats, no mitigation requirements have been identified.

The Corps would use Standard Manatee Protection Conditions during construction and surveys for Piping plover would occur. To minimize the potential of sea turtles and Gulf sturgeon take during construction the Corps would continue to abide by the terms and conditions of the following: (1) RBO for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts, dated November 19, 2003, as amended; PBOfor Beach Placement and Shore Protection for the State of Florida; and to the negotiated terms and conditions BO's resulting from the formal consultation processes and conditions specified under the PBO for Beach Placement and Shore Protection for the State of Florida.

(7) Effects on Other Wildlife. No significant effect.

(8) Actions to Minimize Impacts. All reasonable and prudent measures recommended by the USFWS and NMFS would be initiated during excavation and placement activities.

g. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. The proposed action would comply with the zone of mixing as determined by the State of Florida. In the case of placement of material on the beach and a variance from the state mixing zone to cover specific climatic instances when the turbidity standard might be violated and will be incorporated into the WQC permit. A variance from the state mixing zone at the placement sites may be requested as part of the permitting process.

(2) Determination of Compliance with Applicable Water Quality Standards. As a result of previous WQC application activities, it is believed that the proposed Federal action would comply with applicable water quality standards. WQC and CZC with the state coastal management plan was requested from FDEP for the larger local plan. The state has deemed that all requirements pertaining to the application is complete and that turbidity requirements would meet the State's WQC standards

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. No impacts would occur to any water supply.

(b) Recreational and Commercial Fisheries. Minor impacts to recreational and commercial fisheries could occur during the construction period. These impacts would be short-term and restricted to the immediate area of construction activities.

(c) Water Related Recreation. Restoration of the beach would increase the area available for beach related water recreation. Restrictions of water-related recreational activities in the immediate areas of construction and dredging would result in short term losses of such opportunities. It has been determined that the benefits associated with the restoration of the beach outweigh these losses.

(d) Aesthetics. Only temporary degradation to the aesthetic environment would occur as a result of the proposed action. Impacts would primarily be a result of the physical presence of heavy equipment. Conducting work in late fall and early spring would miss the peak recreational season; however, it is impossible to completely avoid all impacts to the aesthetic appeal of the area. The presence of the dredge, dredge pipe, and associated water and land based equipment would be evident and would temporarily degrade aesthetic quantities of the area. Some discoloration of the sand would occur following placement due to the fact that the sands to be placed on the beach are coming from anaerobic environment. Bleaching of the sand should occur within one to two months. Rainfall and wave action would act to filter out the fine grained materials from the restored beaches and increase the compatibility of the nourishment sands with those presently on the beach.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. No adverse impacts are expected to occur and any of these resources.

(f) Other Effects. No effect.

h. Determination of Cumulative Effects on the Aquatic Ecosystem. The proposed action is not expected to have significant cumulative adverse impacts. The action would have cumulative beneficial impacts due to erosion attenuation.

i**. Determination of Secondary Effects of the Aquatic Ecosystem**. The proposed action is not expected to have any significant secondary adverse effects on the aquatic ecosystem.

III. FINDING OF COMPLIANCE

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

b. No practicable alternative exists which meet the study objectives that does not involve discharge of fill into the waters of the United States.

c. After consideration of placement site dilution and dispersion, the placement fill material along the beach and nearshore zone would not cause or contribute to, violations of any applicable State water quality standards for Class III waters. A variance for an expanded mixing zone has been requested for the local project during the JCP application process. It is expected that information generated for the local plan will be used to request a variance for the proposed Federal project.

d. As required by the CZMA, the proposed action is consistent with the Florida Coastal Zone Management Program to the maximum extent practicable.

e. The proposed excavation and beach restoration 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.

f. The proposed excavation and beach restoration would not result in significant adverse effects on human health and welfare, including municipal and private water supplies; recreation and commercial fishing; life stages of organisms dependent upon the aquatic ecosystem; ecosystem diversity, productivity and stability; or recreational, aesthetic or economic values.

g. Appropriate and practicable steps to minimize potential adverse impacts on the aquatic ecosystem have been included in this evaluation.

h. On the basis of the guidelines, the proposed site for placement of fill materials is specified as complying with the requirements of these guidelines with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

DATE______________________

____
Steven J. Roemhildt, P.E.
Colonel, Corps of Engineers
District Commander

EA-APPENDIX B

SECTION I

Previous Coordination Documents by Local Sponsor

C2007-009

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

Mr. Michael Trudnak
Taylor Engineering, Inc.
10151 Deerwood Park Blvd., Bldg. 300, Suite 300
Jacksonville, Florida 32256

December 11, 2008

Re: DHR Project File No.: 2008-02705-B / Received by DHR: April 28, 2008
Additional Information Received: October 30, 2008
1A-32 Permit No.: 0607.006
A Submerged Cultural Resource Remote Sensing Survey of a Borrow Area Proposed for Beach Renourishment Offshore of Walton County, Florida

Dear Mr. Trudnak:

We note that in May and June 2007, Sonographics, Inc. (SI) conducted the above referenced survey for Taylor Engineering, Inc. in anticipation of a request by the Florida Division of Historical Resources (DHR) for a cultural resource assessment survey. Our office proceeded to review this report with the expectation that Taylor Engineering, Inc. will be engaging in permitting processes that will require this office to comment on possible adverse impacts tot cultural resources listed or eligible for listing in the National Register of Historic Places, or otherwise of historical, architectural, or archaeological significance. We recommend at the time such actions are taken, a copy of this letter be forwarded to the permitting agency(ies) with the application. This may eliminate the permitting agency(ies) from having to submit an application to the Division of Historical Resources for review, or, if applications are forwarded to the Division with this letter, it would facilitate our review.

SI identified thirty-nine magnetic anomalies and two side-scan sonar targets within the surveyed area during the investigation. SI determined that none of the anomalies within the proposed borrow area appears to represent significant cultural resources.

SI determined that the proposed sand borrow activities are unlikely to affect cultural resources. SI recommends no further investigation of the project area.

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

For any questions concerning our comments, please contact April Westerman, Historic Preservationist, by electronic mail at amwesterman@dos.state.fl.us, or by phone at (850) 245-6333. We appreciate your continued interest in protecting Florida's historic properties.

Sincerely,

Frederick P. Gaske

Frederick P. Gaske, Director, and
State Historic Preservation Officer

XC: Louis Tesar, Bureau of Archaeological Research

A Submerged Cultural Resource Remote Sensing Survey

Of A

Borrow Area

Proposed For Beach Restoration

Offshore Of

Walton County, Florida

By

Robert H. Baer
Registered Professional Archaeologist

DHR Permit No. 0607.76

Report Prepared For

Mr. Michael Trudnak, P.E.
Taylor Engineering, Inc.
9000 Cypress Green Drive, Suite 200
Jacksonville, Florida, 32256

Revised October 2008

Table of Contents

Abstract
*
Executive Summary

During the permit period 5/30/2007 - 6/30/2007 a remote sensing survey was performed of a single borrow area designated for shoreline nourishment offshore of Walton County, Florida (Figure 1). The remote sensing survey consisted of a magnetometer survey, side-scan sonar survey and a sub-bottom profile survey. The survey was performed by Sonographics, Inc. under contract with Taylor Engineering, Inc.

In the course of the survey, thirty - nine (39) magnetic anomalies, and two (2) side-scan sonar targets were recorded. The thirty - nine magnetic anomalies and two side-scan sonar targets were widely distributed over the bottom area. No concentrated pattern or scatter pattern of magnetic anomalies and side scan sonar targets were recorded that suggested the presence of shipwreck resources in the borrow area, nor did the sub-bottom profiler data indicate the presence of areas that would indicate prehistoric midden sites or other inundated habitation sites.

Based on the analysis of the remote sensing data it was the conclusion of the principal investigator that there are no sunken shipwreck resources, or other sunken cultural sites within the proposed borrow area. Based on this analysis it is the recommended that the Walton County shoreline nourishment project be authorized to proceed.

A Submerged Cultural Resource Remote Sensing Survey of a Borrow Area

Proposed for Beach Restoration

Offshore of Walton County, Florida

Introduction

Walton County has requested a State of Florida Joint Coastal Permit and Sovereign Submerged Lands Authorization for an offshore borrow area to serve future beach nourishment operations within the county. The proposed borrow area lies in the Gulf of Mexico approximately 5.8 miles south of the Walton County shoreline and 1.3 miles east of the Walton/Okaloosa County border (Figure 1). Walton County's borrow area evaluation process included a cultural resource remote sensing survey to identify and determine if any objects within the borrow area are eligible for listing on the National Register of Historic Places (NRHP). This report presents the results of the remote sensing survey.

The remote sensing survey consisted of combined magnetometer, side-scan sonar, and sub-bottom profile surveys. The remote sensing survey complies with the National Historic Preservation Act of 1966, as amended (PL 89-665); the Archeological and Historic Preservation Act, as amended (PL 93-291); the Abandoned Shipwreck Act of 1987; the Advisory Council on Historic Preservation revised 36 CFR Part 800 Regulations; and Section 276.12, *Florida Statutes*, Chapter 1A-32 and 46 of the *Florida Administrative Code*. The State of Florida Division of Historical Resources approved the scope of work for the remote sensing survey as submitted in a Florida Bureau of Archaeological Research Permit (Chapter 1A-32) application prior to field operations; Appendix A contains Permit No. 0607.06. Field operations occurred between 5/30/2007 and 6/30/2007. The project staff, subcontracted by Taylor Engineering, Inc., included Robert H. Baer, RPA as project principal investigator and Rick Horgan as remote sensing specialist. Mr. Horgan owns and operates Sonographics Inc., Marine Geophysical Services, Wilton Manors, Florida.

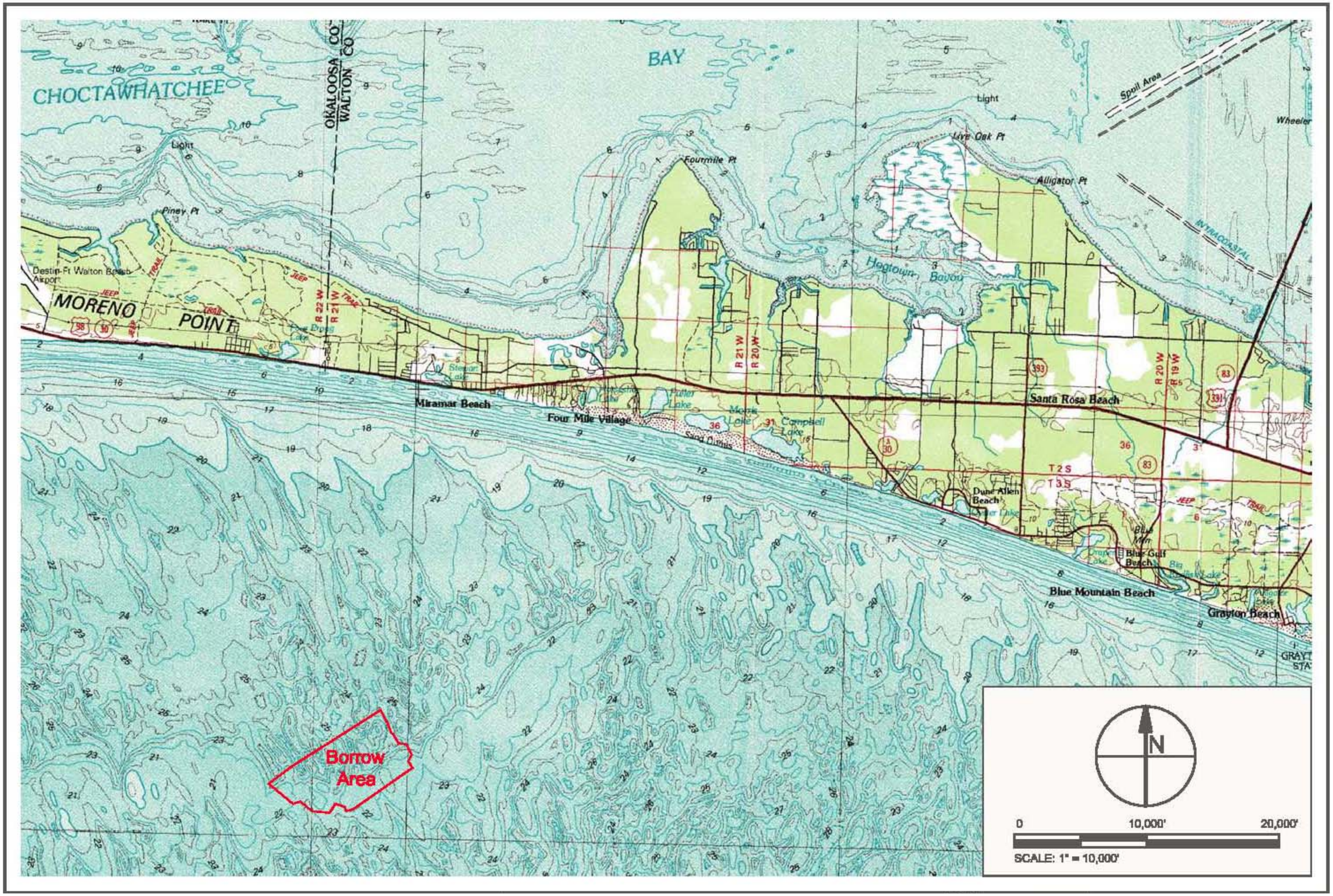

Figure 1 Proposed Borrow Area Location Map

Project Location

The center of the proposed borrow area lies approximately 5.8 miles offshore Walton County and 1.3 miles east of the Walton/Okaloosa County border. Walton County lies on the northwest coast of Florida approximately 60 miles east of Pensacola, 100 miles west of Apalachicola and 115 miles southwest of Tallahassee. The county seat is De Funiak Springs. Walton County adjoins Okaloosa County to the west and Bay, Holmes and Washington Counties to the east. Figure 1 shows the position of the proposed borrow area in relation to the Walton County shoreline.

Project Research Objectives

The Submerged Cultural Resources survey aimed to identify and determine if any objects within the borrow area are eligible for listing on the National Register of Historic Places (NRHP). The survey utilized instruments specifically designed to identify shipwrecks, ferrous material, and geological anomalies such as submerged river beds and former terrestrial sites, both prehistoric and historic.

Potential for Cultural Resources in the Survey Area

The northwest Florida Gulf Coast has been settled since the middle of the seventeenth century. Pensacola, the oldest city on the northwest Florida Gulf coast, has had strategic importance since the Spanish first settled there in 1698. Pensacola and Apalachicola Bays and the barrier island estuary system that separates the Gulf of Mexico from the Florida peninsula have formed an essential commercial transit route for the Spanish, English, and later the citizens of the United States following the admittance of Florida to the Federal Union in 1845.

Over the long period of recorded history numerous ships have sunk in the waters of the northwest Florida Gulf Coast. The historic importance of the northwest Florida coastal zone is well documented. Early exploration, trade, commerce, warfare vicissitudes of weather and navigation error has generated numerous recorded shipwrecks. Due to sea level rise and the associated coastal erosion, the coastal waters also contain sites of both prehistoric and historic settlement. Based on three centuries of coastal navigation and settlement of the northwest Florida coastal zone the potential exists for the discovery of cultural materials in the proposed project area. To better understand the potential for the discovery of sunken cultural resources in the survey area a short review of northwest Florida geology, weather, and history follows. This review intends to document the importance of the Walton County coastal zone within the wider context of the northwest Florida Gulf Coast.

Archaeological Sites – Walton County Coastal Zone

Florida Master Site File Information

The State of Florida Division of Historical Resources has identified a number of archaeological master sites in the Walton County upland area and the coastal zone, including some dating between 7000 BC and 1500 AD. Older sites are found particularly along the Choctawhatchee River, its primary tributary creeks, and the littoral zone of Choctawhatchee Bay. Listed sites include Point Washington, Four Mile Point, Alaqua Bayou, Horseshoe Bayou, and Hogtown Bayou. These have occupation ranges from the Prehistoric Period to the Historic Period of settlement. Many of the Walton Coastal Zone archaeological sites in the south portion of the county contain shell middens, including the Destin Midden near the towns of Destin and Sandestin.

Environmental Background

The project area lies in the temperate region of Florida, characterized by mild winters and warm to hot summers. Associated seasonal temperatures average 54°F in winter and 81°F in summer. Walton County contains Florida's highest elevation: it rises to 345 ft near Lakewood in the northwest sector of the county. The county experiences a storm season between the months of June and October and experiences its highest annual rainfall in this period. Conversely, the months between December and February usually experience little rain. The annual average rainfall equals 57 inches. The growing season in north Florida averages 200 days as compared with 300 days in south Florida. Tidal fluctuations are moderate and average between 1.5 and 2 ft. According to a 1998 soil survey, the county has a total area of 1,338 square miles, including 90 square miles of water and 1,045 square miles of land. South Walton County has approximately 26 miles of sand beaches and associated dune systems. Approximately half of the beach and dune system lie between Choctawhatchee Bay and the Gulf of Mexico (Continental data base – facts on File 2007; Winsberg 2003:66, KH & Associates 2003).

Historic Weather Dynamics

The northwest Florida Gulf Coast is susceptible to the power of hurricanes and lesser tropical storms. Tropical storm activity in the Gulf of Mexico normally occurs during the period from June through October, reaching maximum frequency during the month of September. These common weather anomalies have affected shipping patterns in the vicinity of the survey area throughout recorded history. Thus, this study benefits from a brief summary of historic weather dynamics, including the depth and temperature of the Gulf of Mexico, the flow of the Loop Current, and the wind conditions within the unique hydrographic constraints of the wider Gulf of Mexico.

Hurricanes passing through the Gulf of Mexico generally originate in the southern Caribbean or off the west coast of Africa. The rotation of the earth sets these warm weather systems spinning counter clockwise and they create their own powerful micro weather systems. These circular rotating storms typically move across the Atlantic (west to east) or north through the Caribbean traveling along the routes of natural wind patterns. Two principal wind regimes prevail along the northwest Florida coast: southerly winds with an average annual velocity for the Walton County coastal zone of 16 – 17 kph and short lived but often strong northerly winds generally associated with winter weather conditions which may occasionally reach velocities of 38 to 40 kph. In the late winter and spring months, strong southerly winds emanate from low-pressure systems in east Texas and the plains states, often generating tornados. Wind velocities along the northwest Florida Gulf coast are generally constant throughout the year, ranging from a monthly average of 14.5 kph in September to 22.2 kph in April (Gore 1994: 102-107).

The northwest Florida Gulf coast has experienced hurricanes originating in the Atlantic and Caribbean. Hurricane Ivan, which made landfall north of Pensacola on September 16, 2004, was a serious Caribbean and Gulf Hurricane. Hurricane Katrina (2005) was the most devastating hurricane to reach the Gulf coast of the United States since the Galveston Hurricane of 1929. Katrina was an Atlantic hurricane that crossed Florida as a category 1 storm on August 25 and 26, then picked up speed and force in the warm shallow waters of the Gulf of Mexico before making landfall on the Gulf coast of Mississippi and striking New Orleans as a category 5 hurricane on August 29, 2005. In 2004, two hurricanes passed within fifty miles of the survey area; these included Hurricanes Jeanne and Francis (United States Weather Bureau Data Base 2007).

Little is known about the pattern of storms and hurricanes during the Colonial Era. However, in 1559 six vessels of the De Luna expedition to North Florida were lost in a storm in Pensacola Bay (Singer 1992: 22). Since the middle of the 19th Century at least 23 hurricanes and 28 tropical disturbances have passed within 100 miles of the survey area. Since 1990 at least one severe tropical storm or depression has crossed the northwest Florida coastal zone every five years (USWB 2006). Any serious anomaly of weather could prove fatal to a sailing vessel navigating within the confines of the Gulf of Mexico.

Geology & Barrier Island Development

Coastal geologists have classified barrier islands and coastal shorelines into a number of different categories based on their structure, geological attributes, and method of formation. Generally, all coastal barriers lie parallel to the shores that they protect. When they trend into or away from the shoreline, barrier islands may eventually develop into headlands that may form capes or gradually coalesce with the shore. The south Walton County shoreline of approximately 26 miles has a unique geological formation and ecosystem. Approximately 13 miles of the shoreline is located between Choctawhatchee Bay and the Gulf of Mexico, and the remainder consists of dunes with a lake system that is found only in Walton County, Florida (Walton County Board of County Commissioners Report 2003).

The northwest Gulf coast and barrier island systems consist of a drowned delta that Paleo-Indians inhabited 12,000 years ago before they gradually migrated into the Florida peninsula and continental southeast. At that time, the present barrier island systems were upland regions, and the Gulf of Mexico shoreline west of the Florida peninsula extended approximately 75-100 miles seaward of the present shoreline (Milanich 1995: 17). As sea levels rose and shorelines assumed their present configuration, these prehistoric peoples withdrew to the upland regions. However, the Gulf coast shoreline continues to naturally erode, fragment, and prograde. Core analysis suggests that the northwest Florida to Texas Gulf coast was unbarred during the Middle to Late Holocene Transgression and that the present barrier island system did not originate seaward of their present locations. In other words, although the shoreline was substantially lower during the last Ice Age and inhabited during the latter stages of that period, the coastline as found today emerged from the shoals practically in place and has migrated shoreward and seaward as the result of coastal currents and other natural dynamics (Leatherman 1979: 315-16). During the Holocene Period, the late Archaic and Formative periods, native cultures of the northwest Florida and Gulf region developed and ninety percent of the archaeological sites in the present (upland) coastal zone were inhabited (Gagliano in Davis 1984: 17).

Survey Area History

The northwest Gulf coast and particularly the estuary areas and embayment areas from Apalachicola Bay to Pensacola Bay have a varied prehistoric and historic past. The native peoples who inhabited this coastal area exhibited a pattern of cultural continuity that evolved slowly over the past 10,000 years; then in the period 3000 BC, the culture of these peoples experienced a period of elaboration and diversification. This period of cultural development continued until the 16th century with the arrival of European explorers and settlers who established a permanent presence on the Gulf coast at Pensacola Bay in 1698.

The 160 miles of coastal zone between Pensacola Bay and Apalachicola Bay consist of a mixed bay and estuary system fed by rivers that flow to the southwest through the Florida peninsula. During the prehistoric period the native people that live in the Pensacola Bay-Apalachicola Bay drainage maintained contact with the cultures that lived in the lower Mississippi Valley and Central and South Georgia, most notably the people that lived in the Kolomoki Mound complex in southwest Georgia near present Blakely, Georgia. At the time of the European exploration and during the contact period the natives of the northwest gulf were encountered by Tristan de Luna in 1559 - 60 who sailed the northwest coast before landing in Pensacola Bay (Milanich 1994: 180 – 185).

At the beginning of the European Contact period, in the 16th Century, the native populations of Florida extending north and west around the littoral of the Gulf of Mexico exhibited little cultural uniformity. According to anthropologist Vernon Knight, the native peoples of the pre-contact period exhibited a mixture of social and economic traits, from the stratified, but non agricultural Calusa of the southwest Florida coast to the partially agricultural chiefdoms of the Fort Walton and Weeden Island cultures of the northern Gulf, to the egalitarian hunter-gatherers of the Texas coast. The chiefdoms from Pensacola Bay (the Penzacola) to Apalachicola Bay (the Apalachee) became distinguished by the integration of their specialized delta horticulture into a traditional estuary oriented hunter-gatherer mixed economy. This led to a more balanced intake of nutrients and the possibility of higher and healthier population levels (Knight in Davis 1984: 199).

Spanish Colonial Period

In the early 16th Century, Spanish explorers began to investigate the northwest Florida coast. Pre-1520 voyages along the central coast of Florida include those of Diego Miruelo (1616) and Francis Hernandez de Cordova (1517). In 1519 Alonzo Alvarez de Pineda is believed to have sailed the entire coast of northwest Florida and landed in what was either Pensacola or Apalachicola Bay. Later in 1528 Panfilo de Narvaez and Alvar Nunez de Vaca entered the area in an unsuccessful attempt to trade with the natives. In 1528 Narvaez landed at what is believed to be Tampa Bay. After landing, Narvaez and a force of Spaniards marched north along the Gulf coast crossing the Withlacoochee and Suwannee rivers. After reaching an Apalachee village named Aute, Narvaez sent a lieutenant, Cabeza de Vaca, and a force of soldiers to locate the coast and the expedition ships that had been sent north from Tampa Bay. It has been suggested that Aute was near the Wakulla River which flows into the St. Marks River that in turn flows into Apalachee Bay. From the village of Aute, de Vaca and a force of soldiers were sent to locate the Gulf of Mexico, which they located a day’s march to the west. Shortly thereafter Narvaez, along with de Vaca and the troops, constructed rafts at a location they named the ‘Bay of Horses’ and began to travel along the coast in an attempt to reach Mexico. The Spanish crossed Apalachee Bay and continued west along the littoral zone of northwest Florida. After an arduous journey in which the Spanish lost most of their party through hunger, disease and hostile Indians they eventually arrived in Vera Cruz. (Lopez – Morillas 1993: 12).

In 1559 the Tristan de Luna expedition sailed the coast of northwest Florida seeking to establish a base from which to explore a route across the southeast from the Gulf of Mexico to the Atlantic. Sailing east along the northern gulf coast the expedition apparently missed the entrance to Mobile and Pensacola Bays then made landfall west of Apalachee Bay between Cape San Blas and present Walton County. Eventually they retraced their course to Pensacola Bay; while anchored in the bay the fleet was struck by a hurricane and nine ships were lost. The de Luna expedition failed in the attempt to traverse the southeast (Lopez – Morillas: 1993: 12).

In 1698, Andreas de Arriola was appointed the Governor of West Florida. With the establishment of the town of Pensacola, west Florida became connected by a series of missions to St. Augustine on the Atlantic coast – the Capitol of East Florida.

Walton County History

Documented European and American settlement in what is now Walton County began in the early 19th Century in the area known as the Euchee Valley generally located between present U.S. Highway 90 (Rock Hill Road), U.S. Highway 331, and the Choctawhatchee River. Another area of pioneer settlement was the Alaqua Creek basin that is now primarily located on the Eglin Air Force Reservation. Since the arrival of the Spanish in the 16th Century the rich natural resources of Choctawhatchee Bay and the Gulf of Mexico were harvested by Spanish fisherman that traveled the littoral zone of the Gulf of Mexico from Havana, Cuba, occasionally establishing fishing camps on the barrier system and in the bays and estuaries.

The first fully documented settlers of what is now Walton County were the McLendon brothers, who migrated to the area from North Carolina and settled along Bruce Creek near present Eucheeanna. The McLendons' successful homesteading influenced other North Carolinians to settle in the area. Walton County was created in 1824, shortly after the United States acquired West Florida from the Spanish. Originally Walton County consisted of 2,900 square miles, however the county lost a large portion of territory when Washington, Holmes, and Okaloosa counties were formed; the county now consists of 1,338 square miles. The first county census was carried out in 1830 and a population of 1,207 was recorded (Kimley Horn Inc., 2003).

The first settlers engaged in farming and fishing the rich natural resources of Choctawhatchee Bay. During the period of pioneer settlement the residents of the area navigated in short draft vessels out of what is now East Pass at Destin, to the port of Pensacola Bay and Escambia Bay 60 miles to the west and Apalachicola Bay 100 miles to the east. However, Pensacola became the primary port of coastal trade up to and through the era of the Civil War. Later, after the Civil War, Walton County became a prime timber growing area which supplied the timber and turpentine (naval stores) industries in Florida and the wider southeast through a widely expanding coastal trade (Walton County Historical Society).

Steamboat and barge landings on the Choctawhatchee River that included Moss Bend (Story's Landing) and Millers Ferry provided interior settlements with access to Choctawhatchee Bay and Gulf of Mexico shipping lanes. The upriver landings were often closed through low water and silting, thus Mallet's Landing and LaGrange, now Freeport were the first towns along the bay to develop as successful port communities. Present Portland where Alaqua Creek enters Choctawhatchee Bay, a few miles west of Freeport, became the site of a thriving sawmill that operated prior to and after the Civil War and was a major source of lumber production in northwest Florida (Walton County Historical Society).

During the period of the Civil War in Florida, 1861 – 1865, Walton County and the Choctawhatchee Bay area was affected by the Federal Blockade. For all practical purposes, this closed ports in the Gulf of Mexico to the normal commerce and trade that had grown over the first half of the 19th Century. There were no recorded engagements in Walton County during the five years of the Civil War, however, the Federal invasion of Pensacola in 1864 and the burning of the Port of Pensacola negatively influenced the economy of the entire northwest Gulf Region (Walton County Library Resources).

Walton County experienced an economic boom in 1884 with the completion of the Louisville & Nashville Railway line from Tallahassee to Pensacola with a link to DeFuniak Springs located in north central Walton County. This railway line opened the interior of the county to additional logging and then to the agriculture that began to flourish in the previously forested areas. The arrival of the railway decreased the amount of river traffic on the Choctawhatchee River, except for Freeport that continued to thrive as a port (Walton County Historical Society).

The beginning of what would become a flourishing tourism industry in Walton County began during the Civil War Reconstruction Era when the Florida Chautauqua opened in February of 1885 in DeFuniak Springs. The Florida Chautauqua consisted of educational and entertainment activities with a religious theme presented in a 'camp meeting' atmosphere. The Florida Chautauqua continued until the turn of the century and is credited with the bringing of the first motion pictures to Florida audiences. This advent of mass entertainment brought the end to Chautauqua in 1920 when radio and the widening Florida highway system offered other cultural opportunities for citizens and tourists alike (Walton County Historical Society).

After the Spanish American War of 1898 – 1899 additional settlers arrived in the area and the Walton County coastal zone became the site of towns that now line the 26 miles of Walton County coastline; these towns include from west to east – Destin, Sandestin, Santa Rosa Beach, Grayton Beach, Seagrove Beach and the unique architectural municipality that was incorporated as Seaside.

Historic Period Currents and Navigation

Geographically situated on the northwest Florida coast, the Walton County shoreline is strategically located at about the mid-point along the historic route of vessels departing the Mexico port of Vera Cruz for ports along the southeastern Gulf Coast or Havana, Cuba. A review of standard shipwreck resources (see below) confirms that at least a dozen vessels may have been lost in the waters offshore of Walton County or in Choctawhatchee Bay. The standard shipwreck lists document far more shipwreck sites in Apalachicola Bay to the east and Pensacola Bay to the west. However, the narrow entrance to Choctawhatchee Bay was known to be hazardous to coastal trading vessels. Due to the shallow waters in the area of the bay, navigation into the estuary was limited to shallow draft fishing vessels and coastal trading vessels. This section of the Cultural Resources Management report describes prevailing gulf currents, hazards to navigation, and a shipwreck history of the Walton County area.

The Loop Current is the primary current system in the Gulf of Mexico, utilized by Historic Era sailing vessels. This is the physical product of two major trans-Atlantic currents: the Equatorial Current and the Guiana Current. These combine and enter the Gulf of Mexico through the Yucatan Channel, north of the Yucatan Peninsula. The constriction of this narrow channel pushes masses of water into the gulf. Seasonal water mass velocities may exceed four nautical miles per hour in the summer, although they fall to a low speed of one mile per hour in the winter (Gore 1994: 67).

Once in the Gulf of Mexico the Loop Current divides into two components: a Gulf Basin component and a northern component. The Gulf Basin component arcs to the west, passing the Campeche banks, in a broad band of water 56 – 93 miles wide. This segment of the current did not provide easy navigation for sailing vessels and threatened to drive them onto the reefs and submerged rocks along the northern shoreline of the Yucatan peninsula. The northern half of the current is not of great importance to gulf shipping until a vessel attempts passage out of the gulf proper into the Straits of Florida. This segment of the Loop Current flows eastward along the northern coastline of Cuba that empties into the Florida Current separating the eastern seaboard of the Florida peninsula and the Bahamas Banks (Steinmiller 1984: 26).

The Loop Current is not a predictable physical system like the Florida Current (Gulf Stream), flowing northward in relatively the same position and at the same speed. The Loop Current is not so much a clearly defined unchangeable hydrographic entity, but rather the sum total of all the highly variable current patterns occurring offshore in the northern Gulf over a given period. Physical factors affecting the current are variations of wind, wave, and tide, along with the continual outflow of water from the Mississippi and other rivers that empty into the Gulf. Gyres may form anywhere at any time, but only those forming in the northeastern Gulf east of the Mississippi Delta and the west coast of Florida are pertinent to this investigation. These anomalies in the current affect short term weather patterns because they transport fresh supplies of warm Gulf water into cooler, faster moving coastal currents. Such anomalies often produce storms that form and dissipate quickly, and together with high seas and darkened shorelines often proved hazardous to vessels under sail (Gore 1994:89).

Navigators in the historic period followed the Loop Current when sailing from Mexican Ports and other Gulf Ports in North America to Havana in the first leg of their return voyage to Spain. A number of such voyages have ended in shipwreck. Most notable are the Padre Island shipwrecks of 1554, located near the mouth of present Port Mansfield Channel that leads into contemporary Galveston Bay, Texas. Another representative Gulf Coast shipwreck is the *El Nuevo Constante* that foundered in shallow water off the coast of Louisiana in September, 1766. In 1980 the shipwreck site was discovered by commercial fisherman working in the offshore area (Pearson & Hoffman 1995: 1 – 7).

Area Shipwreck Research

The location of the borrow area offshore of Walton County, Florida and the long history of exploration and navigation along the northwest Florida coastal zone support the potential that historic shipwreck sites may exist in its coastal waters. Pursuant to this study, the principal investigator conducted a literature and records search to identify known shipwrecks and other historic data pertinent to the wider survey area.

The archival survey included communication with individuals and agencies at the state, county and local levels of government. The survey analyzed databases of prehistoric and historic archaeological sites that have been identified in the vicinity of the survey area. The survey focused on the documentation of activities that might have been contributing factors in the loss of vessels; such activities included exploration, colonization, agriculture, industry, trade, ship-building, commerce, warfare, transportation, and fishing.

The literature survey included the following sources: *The Encyclopedia of American Shipwrecks* (Berman 1972); *Merchant Steam Vessels of the United States 1909 – 1865* (Lyle and Holdcamper 1952); *Disasters of American Vessels, Sail and Steam 1841 – 1846* (Lockhead 1954); *Shipwrecks of the American Civil War, The Encyclopedia of Union and Confederate Naval Losses* (Schomette 1973); *Shipwrecks of the Western Hemisphere* (Marx 1971); *The Treasure Hunters Guide* (Potter 1972); *Shipwrecks of Florida* (Singer 1998); *Shipwrecks in Florida Waters* (Marx 1985). Other reference sources included the National Oceanic and Atmospheric Administration (NOAA) Historic Chart Database; The Florida State University Shipwreck Database, as well as The United States Coast Guard and recreational boating charts of the waters of northwest Florida. Other archival charts utilized in a review of coastal waters were the Bernard Romans charts of 1775, and the Romans, *Natural History of Florida*. According to the Florida Master Site File, a number of Paleo-Indian terrestrial sites existed along the coastal zone northeast of the survey area.

Shipwrecks in the NW Florida – Walton County Coastal Waters

Shipwrecks represent the primary motivation for undertaking remote sensing surveys as part of the cultural resource assessment process. The location of some shipwrecks on the northwest Florida coast are known and documented such as the ‘Six Ships of the De Luna expedition lost in a storm in Pensacola Bay in 1559 and an ‘American Schooner’ lost off the mouth of the Suwannee River in 1820. Potter refers to the ‘The American Gulf Coast Wrecks’, however, no specific locations are given. Potter does write that, “at least a dozen treasure laden vessels have been reported and rumored sunk along the American Gulf Coast” (Potter 1960: 167).

Vessels Lost Near Choctawhatchee Bay

* 1875: The *Three Sisters*, a 154 ton schooner bound from Pensacola to Apalachicola foundered in a storm before reaching port.

* 1892: The *J.P. Allen* – a schooner from Pensacola, 27 tons sand in a storm 60 miles east of Pensacola in the Gulf of Mexico.

* 1906: The *Gus Schammel*, a schooner of 42 tons, built in 1904, lost near Choctawhatchee Bay.

* 1909: The *James C. Clifford* a schooner of 377 tons abandoned 60 miles southwest of Pensacola Bay.

* 1911: The *Belle*, a side wheel schooner of 74 tons built in 1904 at Vernon, Florida was burned at pass into Choctawhatchee Bay.

* 1922: The Rollo a side-wheel schooner of 33 tons built in 1908 at Pinewood, Florida, sank in Choctawhatchee bay on March 30, 1922.

* The Miss. Becky, a 26 ton steel vessel lost in a collision off of Destin in the Gulf of Mexico.

Archival Research Summary

The above review of some credible and thorough archaeological reports indicates that the waters offshore Walton County contain very few of the known shipwreck sites off the Gulf Coast of Florida. None of the wrecks listed in the above references are found within the borrow area vicinity. Given the comprehensive nature of the above references, it is highly unlikely that the researchers overlooked any wreck sites in the study area; thus, the current study did not conduct additional interviews. Information gained from this archival review will aid the understanding of the remote sensing survey results and will help the principal investigator determine the existence of any significant cultural resources within the study area.

Field Investigations
Magnetometer, Side-scan Sonar, Seismic Survey
Methodology

The Florida Division of Historical Resources approved the methodology and equipment for the remote sensing survey before it began. The remote sensing, magnetometer, side-scan sonar, and sub-bottom surveys of the borrow area were conducted between 5/30/2007 and 6/30/2007. The purpose of these surveys was to ascertain if any submerged cultural resources were located within the borrow area.

Magnetometer

The magnetometer survey utilized a Geometrics Model G-882 Digital Cesium System with a built in depth sensor and altimeter. The G-882 sampled the earth's magnetic field at the rate of 10 samples per second. The magnetometer delivered total field, depth, and altimeter data to a Hypack Navigation Computer. The Hypack software recorded the magnetometer tow-fish position with each incoming magnetometer reading. The surveyors monitored the display of the magnetometer throughout the survey to ensure that the equipment remained at the proper elevation. The survey collected data along straight lines spaced at 100 foot intervals.

Side-scan Sonar

The side-scan sonar survey utilized an Edge Tech Model 4200-FS digital CHIRP system. Once again, the side-scan sonar delivered imagery to the Hypack Navigation Computer, which geo-encoded it using the tow-fish position and stored it in the Edge Tech native (jsf) format. The survey followed the same tracklines as the magnetometer survey and occurred simultaneously. It collected dual frequency data at 120 kHz and 400 kHz and used a range scale of 50 m per side for a total swath of 100 m and 250% coverage.

Sub-Bottom Profiler

The sub-bottom survey utilized an Edge-Tech SB 424, which emits a high frequency CHIRP pulse. This X-Star Full Spectrum Sonar has a versatile wide-ban FM profiler that generates cross-sectional images of the seabed and collects digital normal incidence reflection data over many frequency ranges. The tapered wave form spectrum results in images that have virtually constant resolution with depth.

Electronic Navigation

Throughout the survey, a Trimble DSM 232-L – Real Time Differential Global Positioning System (GPS) fed navigation data into the Coastal Oceanographic (Hypack) Hydrographic Data Collection and Processing System. The DSM 212-L has a differential (GPS) beacon receiver which uses the U.S. Coast Guard Differential Correction Signal to send accurate differential GPS corrections to the onboard GPS receiver. The U.S. Coast Guard Pensacola Beacon provided the differential correction signal for this survey.

The DSM-232 provides moderate precision static and dynamic position and velocity data at a rate of one reading per second. Accounting for the differential correction, it has an accuracy of approximately 1 meter. All data references the Florida State Plane Traverse Mercator – Projection Coordinate System, North Zone (NAD 83).

Survey Area Parameters

Figure 1 shows the position of the borrow area, centered approximately 5.8 miles offshore Walton County. The borrow area has a roughly rectangular shape and measures approximately 10,200 ft (1.9 miles) by 5,300 ft (1.0 miles). The average water depth in the borrow area equals 70 ft.

Figure 2 shows the remote sensing tracklines and the positions of the 39 magnetic anomalies and 2 side-scan sonar targets. Side-scan target S1 corresponds to magnetometer anomaly M5 and side-scan target S2 corresponds to magnetometer anomaly M39. Table 1 presents pertinent data associated with each magnetometer anomaly. The table includes latitude, longitude, easting, and northing data, along with the intensity of each anomaly and an estimated ferrous weight. Estimated weights were computed using formula and techniques from the *Geometrics Applications Manual for Portable Magnetometers* by Sheldon Brenier (1973). Figures 3 – 5 show images of side-scan sonar target S1, and Figures 6 – 8 show images of S2.

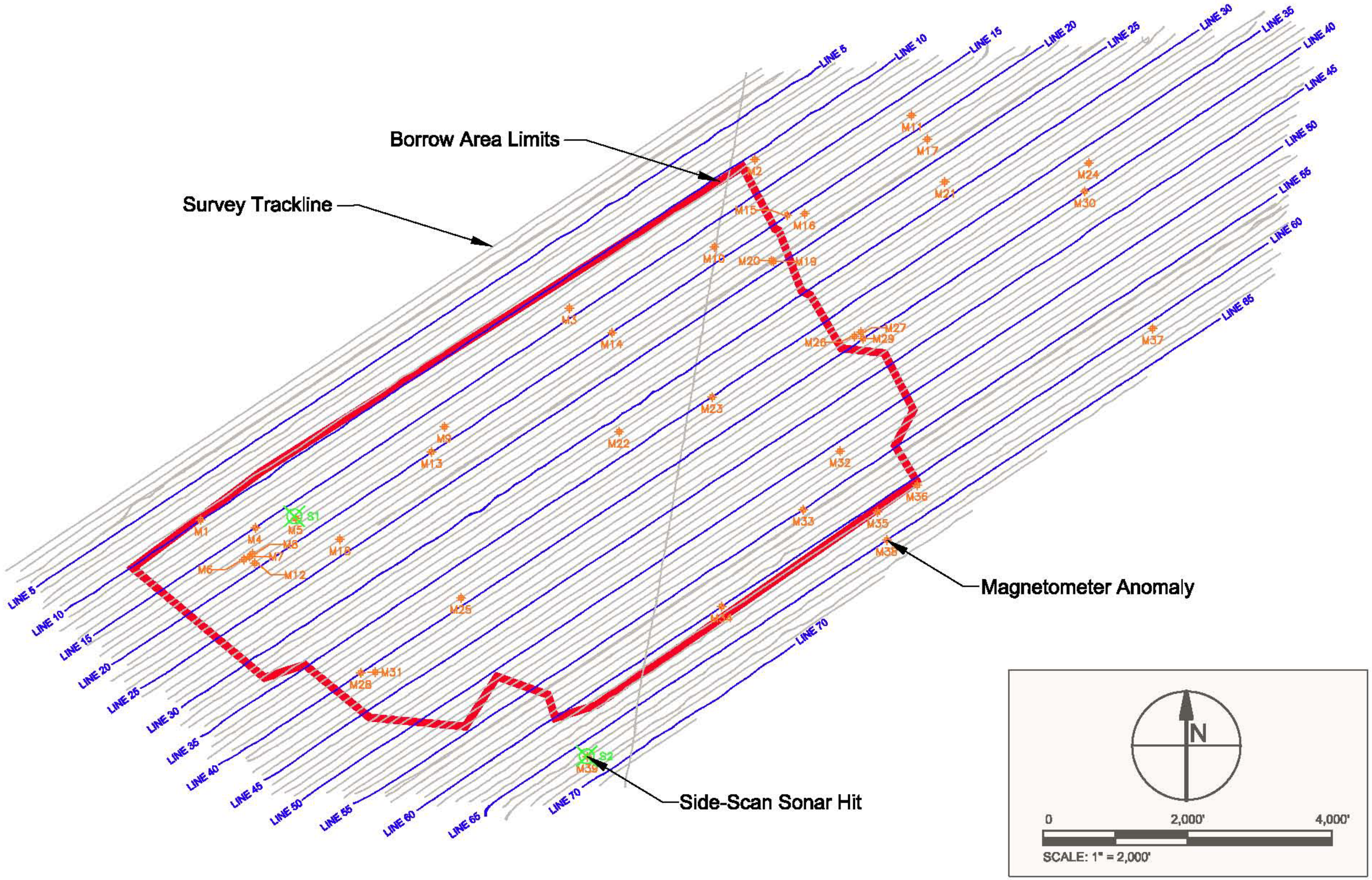

Figure 2 Seismic Tracklines with Magnetometer and Side-Scan Sonar Hits

Table 1 Magnetometer Survey Results

Number	Location (ft-NAD83, FL-N)		Survey Line No.	Intensity (gammas)	Range (ft)	Horizontal Range (ft)	Estimated Mass (lb)
	Easting	Northing					
M1	1371724.120	475229.610	10	13.0	28	13	250
M2	1379397.450	480217.850	11	23.0	26	9	350
M3	1376827.890	478156.820	14	16.0	31	23	400
M4	1372475.520	475122.080	15	7.4	15	0	24
M5, S1	1373035.190	475251.600	17	25.1	35	32	500
M6	1372324.000	474681.600	18	1.1	18	0	5
M7	1372394.500	474724.900	18	1.1	19	0	9
M8	1372444.300	474761.000	18	0.2	14	18	0
M9	1375092.700	476516.330	18	1.5	30	22	42
M10	1378831.820	479006.050	18	1.3	16	0	10
M11	1381567.590	480829.520	18	1.1	23	0	14
M12	1372467.860	474635.210	19	1.0	14	0	3
M13	1374918.530	476170.220	20	2.0	21	0	19
M14	1377418.640	477825.400	20	1.0	24	10	12
M15	1379842.650	479443.980	20	0.1	25	14	23
M16	1380085.530	479465.370	21	1.0	21	0	10
M17	1381788.350	480499.520	22	1.0	13	0	2
M18	1373651.390	474961.920	23	1.2	15	0	5
M19	1379651.540	478807.810	24	0.2	17	0	10
M20	1379622.550	478815.690	24	3.0	22	0	28
M21	1382025.100	479905.930	28	1.0	19	0	8
M22	1377515.530	476447.230	32	2.0	30	11	55
M23	1378802.230	476930.560	35	0.1	23	20	14
M24	1384019.470	480173.670	37	2.0	16	0	9
M25	1375325.700	474149.060	39	1.0	24	0	12
M26	1380776.830	477771.410	39	1.1	16	0	6
M27	1380865.480	477829.810	39	1.1	10	0	8
M28	1373939.230	473112.100	40	2.2	29	15	46
M29	1380893.830	477737.390	40	3.1	11	0	4
M30	1383967.320	479775.770	40	0.3	35	26	109
M31	1374136.850	473123.070	41	2.0	11	0	2
M32	1380577.750	476184.750	51	1.0	17	0	7
M33	1380068.420	475371.510	55	0.2	25	0	22
M34	1378938.070	474031.320	60	0.2	26	0	27
M35	1381097.910	475343.880	61	3.0	32	16	87
M36	1381644.310	475714.210	61	2.2	26	0	29
M37	1384907.870	477876.720	61	1.0	16	0	27
M38	1381224.030	474951.970	65	3.3	11	0	5
M39, S2	1377074.960	471949.970	67	4.0	31	12	119

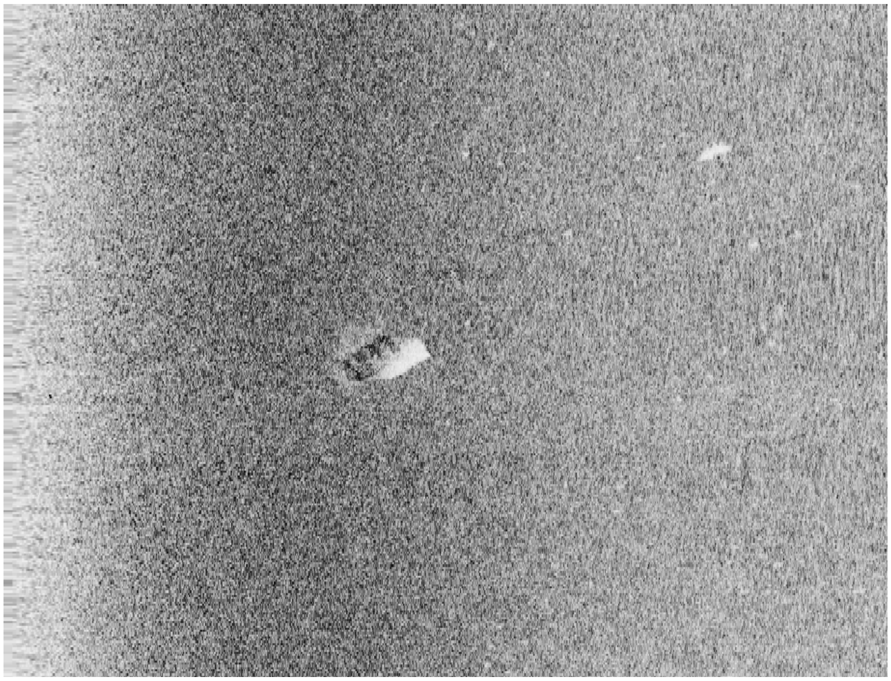

Figure 3 Sonar Target S1 at Range 62 ft on Survey Line 16NE, Heading 054T, Sweeping Left to Right

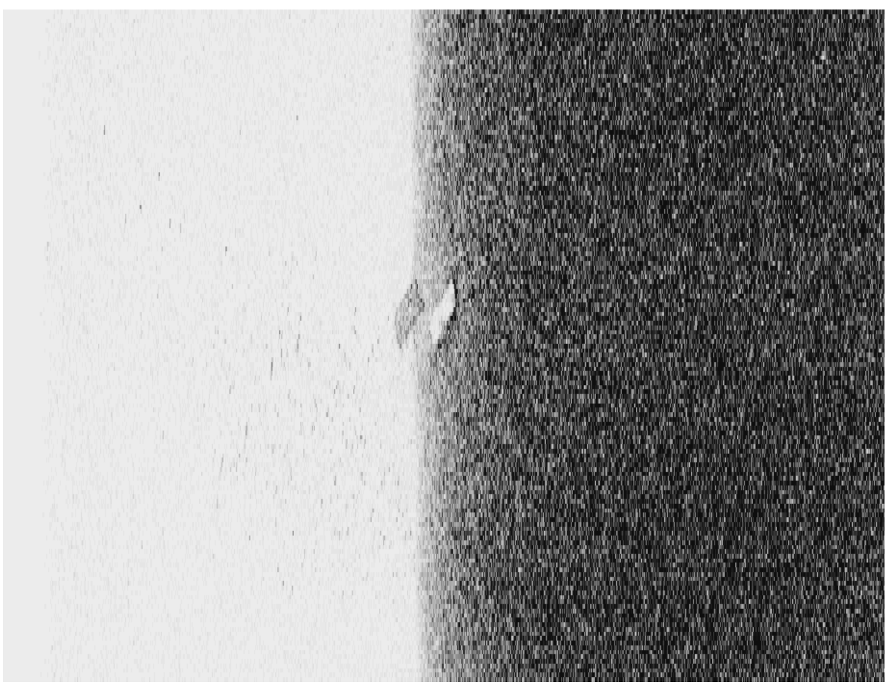

Figure 4 Sonar Target S1 at Range 16 ft on Survey Line 17SW, Heading 234T, Sweeping Left to Right. Image is zoomed with water column not removed as target was almost under the towfish. The top of the target appears suspended. However, very faint supports are visible on two corners. Small fish are visible in the water column, apparently attracted to this target.

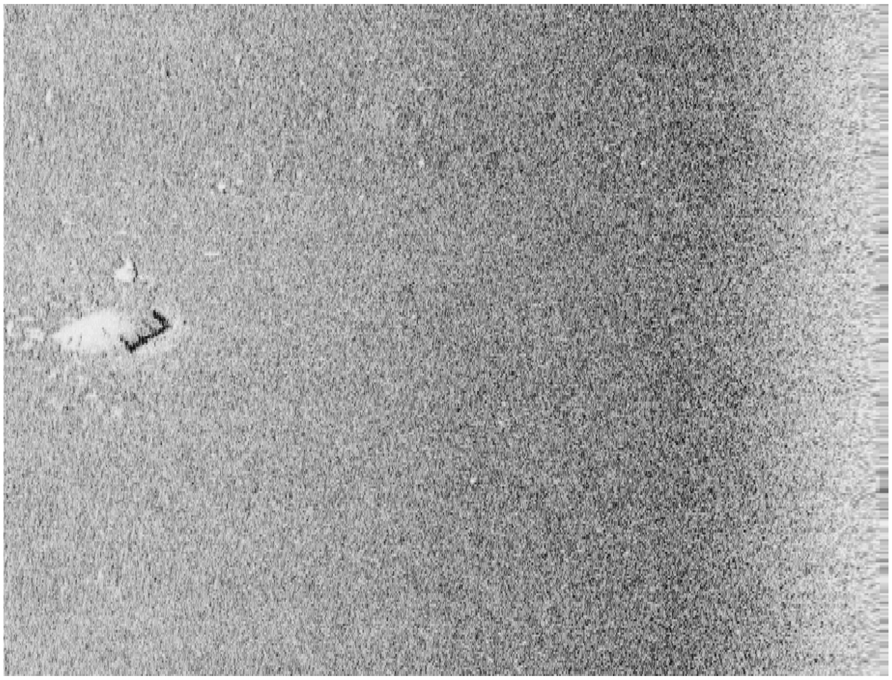

Figure 5 Sonar Target S1 at Range 127 ft on Survey Line 18NE, Heading 054T, Sweeping Right to Left

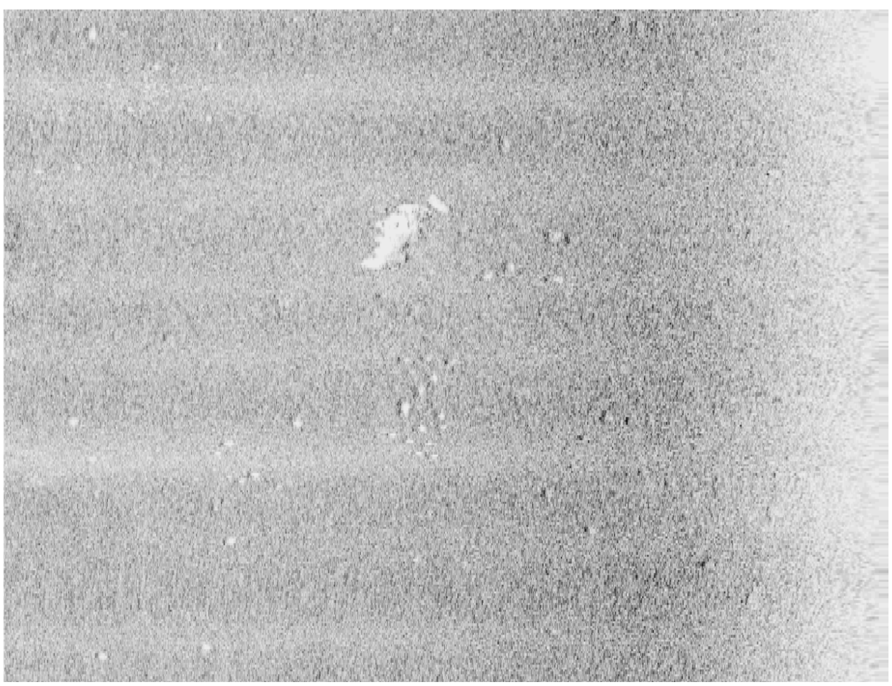

Figure 6 Sonar Target S2 at Range 80 ft on Survey Line 66SW, Heading 251T, Sweeping Left to Right. Note holes (targets with white in front) in the seafloor. These are unique to the area surrounding this target. They likely are habitat for creatures attracted to this target.

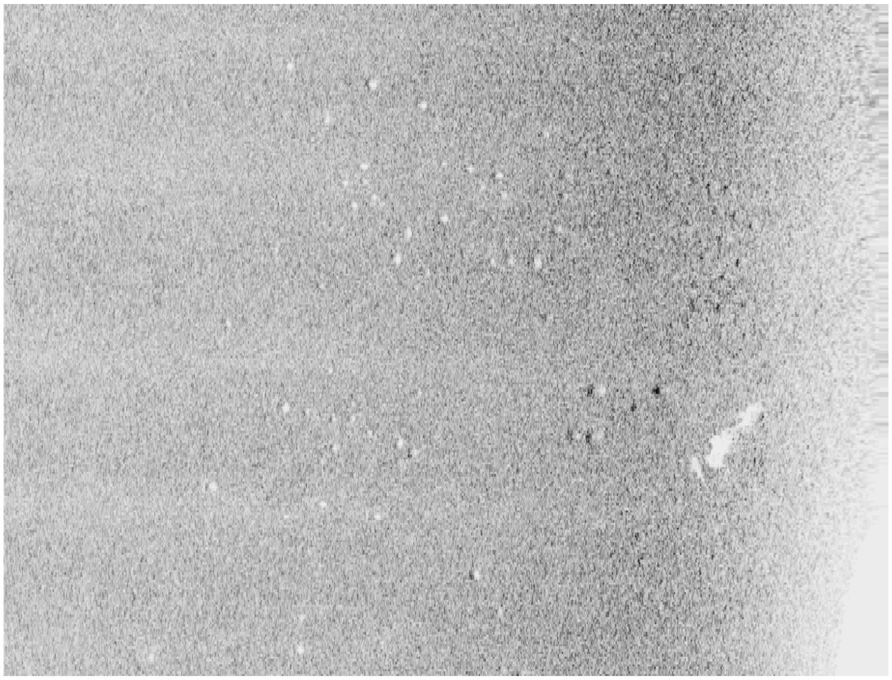

Figure 7 Sonar Target S2 at Range 24 ft on Survey Line 67NE, Heading 049T, Sweeping Left to Right.

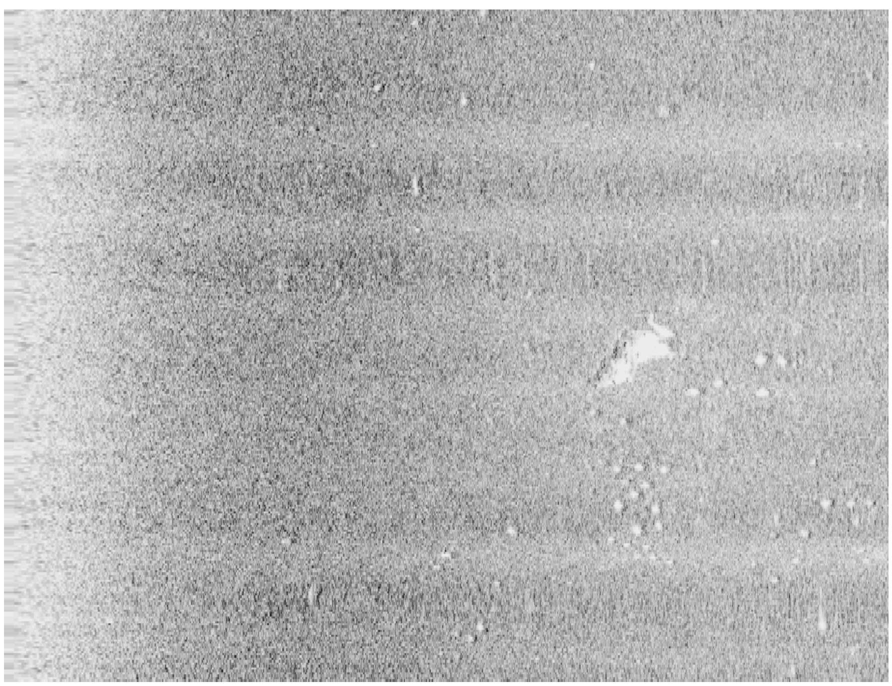

Figure 8 Sonar Target S2 at Range 105 ft on Survey Line 68SW, Heading 250T, Sweeping Right to Left.

Data Analysis

Following the investigation in the field, the survey team conducted initial data analysis of the recorded magnetometer data, side-scan sonar data, and sub-bottom profile data, and then submitted everything to the principal investigator. The role of the principal investigator was to determine the absence or presence of anomaly patterns and side-scan sonar images that would indicate the possibility of sunken cultural resources in the borrow area.

Sub-Bottom Profile Data

The principal investigator reviewed all of the sub-bottom profile data for geologic structures such as prehistoric creek and river beds that might include features that suggest aboriginal habitation sites. The data revealed no evidence of any such sites and no indication of shell midden material on the seabed. The side-scan sonar data, which would have registered such material, confirmed its absence in the project area.

Survey Results

Magnetometer and Side-Scan Sonar Survey

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Discussion

The remote sensing survey identified 39 magnetic anomalies and 2 side-scan sonar targets within the survey area. The anomalies primarily lie isolated from other anomalies, have low intensity and weight, and do not suggest the existence of any object of significance. Two exceptions warrant further analysis; the side-scan sonar target S1 and the cluster of anomalies including M4 – M8 and M-12 in the southwest corner of the proposed borrow area and the cluster of anomalies including M26, M27, and M29 just outside the borrow area boundary to the northeast suggest the possibility of submerged cultural resources. Note that side-scan sonar target S2 and the associated magnetic anomaly M39 lie approximately 600 ft outside of the borrow area and, thus, were excluded from further analysis.

Analysis

The first of the two areas identified for further analysis lies in the southwest corner of the proposed borrow area and contains magnetometer anomalies M4, M5, M6, M7, M8, M12, and side-scan sonar target S1. Although located in close proximity to one another, anomalies M6, M7, M8, and M12 each have very low intensity suggesting a submerged mass of no more than 9 ferrous pounds. However, magnetometer anomaly M5 recorded high intensity and has a computed mass of approximately 500 ferrous pounds. Figures 3 – 5 contain images from the associated side-scan sonar target S1. The article in these figures exhibits low relief and modest weight. It measures approximately 8 ft by 5 ft and appears to be acoustically transparent except for its rectangular top and bottom surfaces. It likely derives from local fishing activity and conforms to a ferrous object such as a steel fish trap.

The second of the two areas identified for further analysis lies just outside the proposed borrow area to the northeast but close enough to the boundary to potentially affect dredging activities. The cluster contains magnetic anomalies M26, M27, and M29. Each of these has very low intensity suggesting a submerged mass of no more than 8 ferrous pounds. Since the borrow area lies in a well populated coastal zone near a well used pass (East Pass), the low weight and low intensity ferrous anomalies are likely related to modern fishing and boating activities and have no historical significance.

Conclusions and Recommendations

The principal investigator concludes after an analysis of the remote sensing data that no shipwreck resources exist in the survey area. This conclusion is supported by the relatively few clusters of anomalies in the borrow area and the widely dispersed pattern of the remaining anomalies. Further, the lack of side-scan images does not suggest the presence of any raised area that would indicate inundated midden sites from a prehistoric terrestrial environment. The principal investigator recommends that the borrow area be utilized for the proposed beach re-nourishment project.

While this study did not identify any significant cultural resources, significant shipwrecks can go unrecognized even with the application of modern remote sensing methods. If any project activities encounter significant cultural resources, all work should cease at the site and the project state and/or federal agencies should be contacted.

Project Curation

All project records will be maintained by Taylor Engineering Inc, Jacksonville, Florida as well as in the archives of the Florida Division of Historical Resources, Tallahassee, Florida.

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Pearson, Charles & Hoffman, Paul (1995) *The Last Voyage of the El Nuevo Constante*. Baton Rouge: Louisiana State University Press.

Potter, John S. (1988) *The Treasure Hunters Guide*. Port Salerno FL: Florida Classics Press.

Singer, Stephen (1992) *Shipwrecks of Florida*. Sarasota: Pineapple Press.

Winsberg, Morton D. (2003) Florida Weather. Gainesville: University of Florida Press.

Reports

Kimley Horn Assoc., Evaluation Appraisal report, Walton County, Florida.

Other Sources

Continental data Base – Facts on File

United States Weather Bureau

Walton County Florida Chamber of Commerce

Walton County Florida Historical Society

Appendix – A

Permit: 1-A-32 Correspondence

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

June 05, 2007

Robert H. Baer
Taylor Engineering, Inc.
9000 Cypress Green Drive, Ste. 200
Jacksonville, Florida, 32256

Re: 1A-32 Archaeological Research Permit Number 0607.76
Walton County Sand Survey

Dear Mr. Baer:

Please find the enclosed 1A-32 Archaeological Research permit. In an effort to streamline the permitting process, the permit format and conditions have changed, so please read the document carefully. In particular, please note that there are six lines for your initials under General Condition 3 and that there is a line for the land manager's (if applicable) signature.

To execute this permit, please send the signed permit to the Bureau of Archaeological Research, Permit Administrator, at the address below. If you have any questions about the permit process or about requirements, please contact me at (850) 245-6301 or via email at rjwheeler@dos.state.fl.us. Please refer to the permit number in all such contacts.

Sincerely,

RJ. Wheeler

Ryan J. Wheeler, Ph.D.
Chief, Bureau of Archaeological Research

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

ARCHAEOLOGICAL RESEARCH PERMIT

Permit No. 0607.76   Field Begin Date: 5/30/2007   Field End Date: 6/30/2007

PERMITTEE/AUTHORIZED ENTITY:
Taylor Engineering, Inc.
c/o Robert H. Baer
9000 Cypress Green Drive, Ste. 200
Jacksonville, Florida 32256

Report/Artifact Due Date: 6/30/2007
Project: Walton County Sand Survey

This permit is issued under the authority of Chapters 267.031 (1) and 267.12, Florida Statutes (F.S.) and Rule 1A-32, Florida Administrative Code (F.A.C.), and is administered by the Florida Bureau of Archaeological Research (BAR), Florida Division of Historical Resources (DHR).

ACTIVITY DESCRIPTION:
Submerged remote sensing survey for archaeological resources, pursuant to Rule 1A-46, F.A.C.

LOCATION DESCRIPTION:
offshore Walton County, FL
DEP, Sovereignty Submerged Lands

GENERAL CONDITIONS:
1. The Principal Investigator listed above or another qualified archaeologist designated by the applicant shall be responsible for all archaeological investigations, production of a final report, and be on site during all fieldwork.

2. A copy of this permit shall be provided to the land managing agency (when applicable) and field personnel shall carry a copy during fieldwork.

3. The permittee shall (initial each item as indicated):
   a. prepare a final report that meets standards and guidelines required by Rule 1A-46, F.A.C., including the necessary Florida Master Site File forms; RHB
   b. inform the BAR permit administrator that a report has been completed and submitted to the Division of Historical Resources; or submit a copy of the final report to the BAR permit administrator; ________
   c. provide proper curation and conservation of recovered artifacts and other recovered site materials until such time as those artifacts and other site materials are conveyed to the BAR for curation; ________
   d. convey all artifacts and related materials obtained from state-owned or controlled land to the BAR permit administrator for permanent curation or processing for loan; RHB

e. convey copies of all notes, maps, photographs, videotapes, and other field records pertaining to research conducted under this permit to the BAR permit administrator following completion of the project OHB ;

f. and not remove from a stable environment artifacts and materials which the permit recipient is unable to properly curate and conserve before conveying to BAR. OHB

4. The effective field investigation dates are subject to receipt of permission from the land management agency and, in some instances, State/Federal dredge-and-fill permitting programs. Those agencies may also require work performance conditions relevant to their natural resource management and permitting responsibilities. A representative of the land managing agency (if one exists) will need to sign this permit document prior to BAR executing this permit (see page 3).

5. Unless approved in writing by BAR, no work beyond that described in the "ACTIVITY DESCRIPTION" and attached to your application shall be performed.

6. This permit is valid for up to one year following the requested report due date. Requests for approval for amendments to fieldwork, fieldwork end date and report/artifact due date are required during this time. Such requests may be made and approved by phone, email, or in writing during this time and do not require amendments to this document.

7. In any release of information, including public presentations, media contacts, and the final written report, there shall be acknowledgement that the portion of the project involving state-owned and controlled land was conducted under the terms of an archaeological research permit issued by the Florida Department of State, Division of Historical Resources, Bureau of Archaeological Research.

8. If Unmarked Human Burials are discovered, permit recipient shall comply with the provisions of 872.05, F.S., and when appropriate, Rule 1A-44, F.A.C. Specifically, upon discovery of unmarked human remains, all activities that might further affect those remains shall be halted and the remains protected from further disturbance until an appropriate course of action has been determined by the local medical examiner or by the State Archaeologist, as appropriate.

9. In issuing this permit, the State assumes no liability for the acts, omissions to act or negligence of the permittee, its agents, servants or employees; nor shall this permittee exclude liability for its own acts, omissions to act or negligence to the State.

10. The permittee, unless the permittee is an agency of the State, agrees to assume all responsibility for, indemnify, defend and hold harmless the Division of Historical Resources from and against any and all claims, demands, or liabilities, or suits of any nature whatsoever arising out of, because of, or due to any act or occurrence of omission or commission arising out of the permittee's operations pursuant to this permit and shall investigate all claims at its own expense. In addition, the permittee hereby agrees to be responsible for any injury or property damage resulting from any activities conducted by the permittee.

11. The parties hereto agree that the permittee, its officers, agents and employees, in performance of this permit, shall act in the capacity of an independent contractor and not as an officer, employee, or agent of the State.

The undersigned, as representative of the Permittee/Authorized Entity, understands and accepts the terms of this 1A-32 Archaeological Research Permit.

Robert H Bag Date: 6/14/2007

Signature

The undersigned, as representative of the land managing agency for the managed area/state property described in the "LOCATION DESCRIPTION" section of this document, hereby permits the activity described above.

_______________________ Date:__________

n/a

Title: _______________________

This permit will not become effective until it has been executed by the Chief of BAR. Before BAR can execute this permit, the Permittee must have a land management representative (if applicable) sign in the space provided above. Please send the signed permit to the Permit Administrator at the address above.

A copy of the executed permit will be sent to you prior to commencing fieldwork.

Executed in Tallahassee, Florida

STATE OF FLORIDA
DEPARTMENT OF STATE

____

RJW/apw

Ryan J. Wheeler, Ph.D.
Chief, Bureau of Archaeological Research

Date of Issue__________

Enclosures:
Rule 1A-46, F.A.C.
BAR Collections and Curation Guidelines
How to Package Documents, Florida Master Site File

Copies furnished to:

Appendix – B

Master Site File Form

Ent D (FMSF only)___/___/___

Survey Log Sheet

Florida Master Site File
Version 4.1 1/07

Survey # (FMSF only)__________

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Identification and Bibliographic Information

Survey Project (name and project phase) **Walton County Sand Survey**

Report Title (exactly as on title page) **A Submerged Cultural Resource Remote Sensing Survey of a Borrow Area Proposed For Beach Restoration Offshore of Walton County, Florida**

Report Author(s) (as on title page— individual or corporate; last names first) **Robert H. Baer, Registered Professional Archaeologist**

Publication Date (year) _4/20/08__ Total Number of Pages in Report (count text, figures, tables, not site forms) **28 pages**

Publication Information (Give series and no. in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)
N/A

Supervisor(s) of Fieldwork (whether or not the same as author(s); last name first) **Robert Baer, RPA**

Affiliation of Fieldworkers (organization, city) **Taylor Engineering, Jacksonville, FL, 32256**

Key Words/Phrases (Don't use the county, or common words like *archaeology, structure, survey, architecture*. Limit each word or phrase to 25 haracters.)
Choctawhatchee Bay, Choctawhatchee River, Freeport, McLendon Brothers

Survey Sponsors (corporation, government unit, or person who is directly paying for fieldwork)
Name **Mr. Michael Trudnak, P.E.**
Address/Phone **Taylor Engineering 9000, Cypress Creek Drive, Jacksonville, Fl, 32256 (904) 256 - 1342**

Recorder of *Log Sheet* **Robert H. Baer, RPA** Date *Log Sheet* Completed **04/20/08**

Is this survey or project a continuation of a previous project? **X No** ☐ Yes: Previous survey #(s) (FMSF only)__________

Mapping

Counties (List each one in which field survey was done - do not abbreviate; use supplement sheet if necessary) **Walton County, Florida**

USGS 1:24,000 Map(s) : Map Name/Date of Latest Revision (use supplement sheet if necessary): **N/A**

Description of Survey Area

Dates for Fieldwork: **Start 5/30/0 End 6/30/07** Total Area Surveyed (fill in one) 640 hectares 1585 acres
Number of Distinct Tracts or Areas Surveyed 1

If Corridor (fill in one for each): **N/A**
Width ______ meters ______ feet Length __________ kilometers __________ miles

Survey Log Sheet

Survey # __________

Research and Field Methods

Types of Survey (check all that apply): **X archaeological** ❑ architectural ❑ historical/archival **X underwater** ❑ other: __________

Preliminary Methods (✓ Check as many as apply to the project as a whole.)

❑ Florida Archives (Gray Building)
❑ Florida Photo Archives (Gray Building)
❑ Site File property search
❑ Site File survey search
❑ other (describe) __________
X library research- *local public*
❑ library-special collection - *nonlocal*
❑ Public Lands Survey (maps at DEP)
X local informant(s)
❑ local property or tax records
❑ newspaper files
❑ literature search
❑ Sanborn Insurance maps
X other historic maps
❑ soils maps or data
❑ windshield survey
❑ aerial photography

Archaeological Methods (✓ Check as many as apply to the project as a whole.)

❑ Check here if **NO** archaeological methods were used.

❑ surface collection, controlled
❑ surface collection, uncontrolled
❑ shovel test-1/4"screen
❑ shovel test-1/8" screen
❑ shovel test 1/16"screen
❑ shovel test-unscreened
❑ other (describe): __________
❑ other screen shovel test (size: ____)
❑ water screen (finest size: ____)
❑ posthole tests
❑ auger (size: ____)
❑ coring
❑ test excavation (at least 1x2 M)
❑ block excavation (at least 2x2 M)
❑ soil resistivity
X magnetometer
X side scan sonar
X sub-bottom profiler

Historical/Architectural Methods (✓ Check as many as apply to the project as a whole.)

X Check here if **NO** historical/architectural methods were used.

❑ building permits
❑ commercial permits
❑ interior documentation
❑ other (describe): __________
❑ demolition permits
❑ exposed ground inspected
❑ local property records
❑ neighbor interview
❑ occupant interview
❑ occupation permits
❑ subdivision maps
❑ tax records
❑ unknown

Scope/Intensity/Procedures **N/A** __________

Survey Results (cultural resources recorded)

Site Significance Evaluated? ❑ Yes **X No** If *Yes*, circle NR-eligible/significant site numbers below.

Site Counts: Previously Recorded Sites **N/A** __________ Newly Recorded Sites **N/A** __________

Previously Recorded Site #'s with Site File Update Forms (List site #'s without "8." Attach supplementary pages if necessary) **N/A** __________

Newly Recorded Site #'s (Are you sure all are originals and not updates? Identify methods used to check for updates, i.e., researched Site File records. List site #'s without "8." Attach supplementary pages if necessary.) **N/A** __________

Site Form Used: ❑ Site File Paper Form **X Smart Form II Electronic Recording Form**

REQUIRED: ATTACH PLOT OF SURVEY AREA ON PHOTOCOPIES OF USGS 1:24,000 MAP(S)

DO NOT USE SITE FILE USE ONLY DO NOT USE

Appendix – C

Figure B - Fold Out

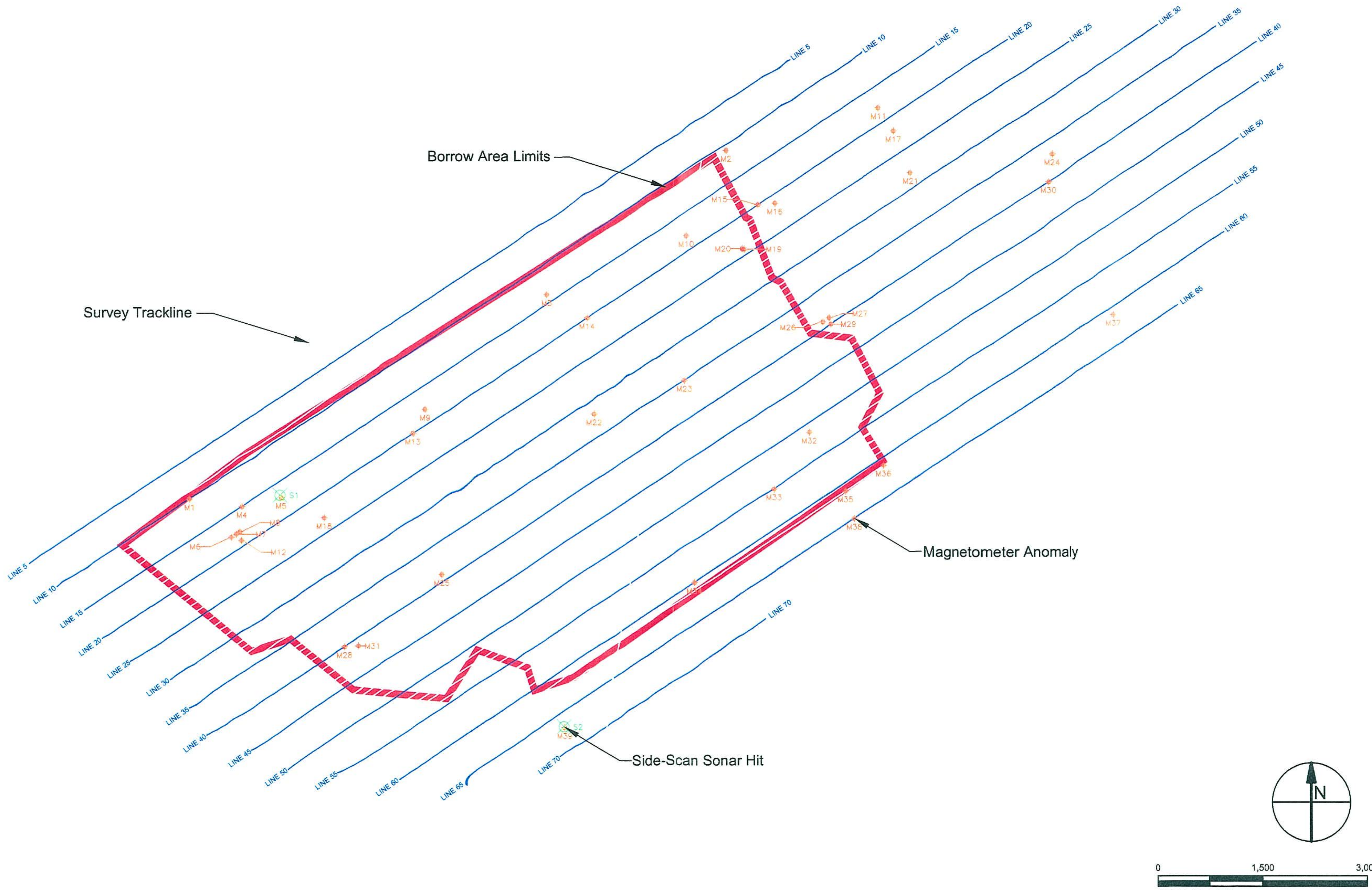

Figure 2
Seismic Tracklines with Magnetometer & Side-scan Hits
Walton County, Florida

PROJECT	C2005-085
DRAWN BY	JCH
SHEET	1 of 1
DATE	OCT 2008

TAYLOR ENGINEERING INC.
10151 Deerwood Park Blvd., Bldg. 300, Suite 300
Jacksonville, Florida 32256
CERTIFICATE OF AUTHORIZATION # 4815

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
(727) 824-5317 FAX 824-5309
http://sero.nmfs.noaa.gov

AUG 13 2008

F/SER31:DK

Mr. Osvaldo Collazo
Panama City Regulatory Office
Jacksonville District Corps of Engineers
1002 West 23rd Street, Suite 350
Panama City, FL 32405

Re: SAJ-2007-5152 (IP-DEB)

Dear Mr. Collazo:

This responds to your letter dated October 15, 2007, regarding the referenced U.S. Army Corps of Engineers' (COE) permit application submitted by the Walton County Board of County Commissioners. The applicant proposes to nourish 13.5 miles of beach and restore dunes along the Gulf of Mexico. The project is located in Walton County, Florida, and includes four reaches: from the Florida Department of Environmental Protection (FDEP) survey monument R-41 to R-64, from R-67 to R-72, from R-78 to R-98, and from R-105.5 to R-127. The central coordinates for the proposed fill area are latitude 30.31629°N, longitude 86.12845°W. You requested concurrence from the National Marine Fisheries Service (NMFS), pursuant to section 7 of the Endangered Species Act (ESA), with your determination that the proposed project may affect the federally-listed loggerhead, leatherback, hawksbill, Kemp's ridley, and green sea turtles, and Gulf sturgeon. You also determined that the proposed project, portions of which will occur in designated Gulf sturgeon critical habitat Unit 11 (nearshore Gulf of Mexico in Florida), may adversely modify sturgeon critical habitat. NMFS' determinations regarding the effects of the proposed action are based on the description of the action in this informal consultation. You are reminded that any changes to the proposed action may negate the findings of the present consultation and may require reinitiation of consultation with NMFS.

The intent of the Walton County beach nourishment and dune management project is to increase the storm protection function and restore the recreational capacity of the beach. The proposed project includes renourishing approximately 13.5 miles of beach over a span of four segments as described above. The total volume of sand to be placed along the beach is approximately 5,682,000 cubic yards (cy), with an average volume density of 79 cy/ft. The material will be obtained from a proposed borrow area located approximately 5 miles offshore western Walton County within a northeast/southwest-oriented ridge with water depths ranging from 70-80 ft below NAVD. The COE and applicant have not specified the dredge type to be used at this time. If a hopper dredge is to be used, the potential impacts from the hopper dredging portion of the project are covered by the incidental take statement of the regional biological opinion on hopper dredging for the Gulf of Mexico, dated November 19, 2003, and the reasonable and prudent measures and terms and conditions of that opinion would be required to be followed for this action. The other possible dredge type to be used is a hydraulic cutterhead/pipeline dredge, the potential impacts of which will be addressed below. The borrow area contains fine- to medium-to-fine sand with less than 1 percent shell content. The grain size and composition is similar to the native beach sediment. Much of the sand placement will take place above the water level, using a berm design. A typical section will include sand placement for the dune crest, back berm, mid berm, and fore berm, all above the MHW level. The foreshore slope will be constructed from the fore berm seaward out to the existing bottom, extending a couple of hundred feet past the MHW mark. This slope is steeper than the natural slope and, between berm erosion and equilibration, is expected to adjust rapidly until it approaches a more natural slope. The bottom areas below MHW that will be covered by the initial placement and later equilibration consist of sediments similar to those on the beach, with no hardbottom habitat, corals, or seagrasses. This project is a one-time restoration that is expected, in the absence of large storm events, to maintain as much as 60 percent of the fill for a 10 year period.

Conservation measures that have been incorporated into the project description include:

1. As required by the FDEP, a minimum of a 1-foot buffer will be maintained between sediments consistent with the type removed from the borrow area and any underlying materials (e.g., mud, dark sands, or rock). This ensures that the surface sediments in the borrow area will be the same post-construction as they were pre-construction.

2. Sand dikes for purposes of turbidity control will be utilized as needed to maintain state water quality standards, as indicated by the FDEP's Bureau of Beaches and Coastal Systems.

3. Turbidity levels will be monitored twice daily at both the borrow area and the beach; if turbidity values exceed values permitted by the state, all dredging and deposition activities will be suspended until water quality meets state standards.

4. The applicant has agreed to utilize NMFS' Sea Turtle and Smalltooth Sawfish Construction Conditions to reduce the potential for impacts to listed species.

NMFS believes the following listed species may be present and affected by the proposed beach renourishment project: loggerhead, leatherback, Kemp's ridley, hawksbill, and green sea turtles, and Gulf sturgeon. NMFS has previously determined that non-hopper-type dredging activities, including hydraulic-type dredges, are not likely to adversely affect sea turtles and Gulf sturgeon. These species will likely temporarily avoid the immediate project vicinity during construction (i.e., dredging and sand pumping) due to vessel and machinery noise; however, this avoidance will not affect migration and foraging behaviors. If sea turtles or Gulf sturgeon do enter the project site during dredging activities, they are unlikely to be harmed by the hydraulic dredge. Listed species may also be affected if they were to be struck by the dredge as it transits the site or by the pipeline as it is being positioned or moved to place sand on the beach; however, due to their mobility, the likelihood of this occurring is discountable. The likelihood of creating an obstacle for turtles approaching and exiting the beach during nesting season is minimized by the perpendicular placement of the sand discharge pipe on the seafloor from the dredge to the beach, which reduces the length of pipe necessary for renourishment. Seaward bound sea turtle hatchlings could be affected by project activities. However, this is unlikely because daily sea turtle nest surveys will be completed during nesting season and construction will not occur on any segment of the beach with active nests. In summary, NMFS believes that listed species under its purview will not be adversely affected by the proposed action. Note that this consultation does not cover onshore impacts, such as to nesting sea turtles on the beach, or sea turtle nests or hatchlings on the beach. A consultation with the U.S. Fish and Wildlife Service is required to ensure ESA compliance for onshore impacts to sea turtles.

Gulf sturgeon critical habitat was designated in 2003 (50 CFR 226.214). The portion of the beach renourishment area below MHW is located within critical habitat Unit 11. The primary constituent elements (PCEs) present in Unit 11 and essential for the conservation of Gulf sturgeon include abundant prey items, water quality, sediment quality, and safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats. Of these PCEs, NMFS believes only prey abundance and water quality may be affected. No impacts to sediment quality are expected as sediment composition at the borrow sites and on the beach are expected to be the same pre- and post-construction, and all sediments are free of contaminants. Project construction will not impede migratory pathways either during or after construction, as the project site is not located within, or adjacent to, a major river system, where construction activities could deter Gulf sturgeon from migrating between their riverine and estuarine habitats.

Gulf sturgeon could be affected by impacts to the abundance and diversity of their prey items, but these effects are expected to be insignificant, as these benthic macro-invertebrates have been found to recolonize within one year of a dredging disturbance when sediment composition and depth remain consistent. Additionally, the majority of sand placed below MHW will be in water depths less than 5 ft (1.5 meters). While Gulf sturgeon are known to occasionally forage in very shallow waters, normal foraging depths are usually deeper than 5 ft. Further, it is likely that any Gulf sturgeon in the project area will find appropriate and abundant prey in the areas adjacent to the project location, as many nearby sandy areas exist.

Effects to Gulf sturgeon from impacts to water quality are expected to be insignificant. They will be minor and temporary. Because the material from the borrow site consists of mostly sand, with only ca. 1 percent fines (similar to the existing sand), almost no turbidity is expected to ensue. Potential impacts to water quality will be further minimized by compliance with the twice-daily state water quality sampling requirement which will ensure that turbidity levels remain low. No changes to temperature, salinity, pH, hardness, oxygen content, or other water quality parameter will occur.

In summary, NMFS has determined that the project will not impact sediment quality or migratory pathways, and effects to prey abundance and water quality will be insignificant. Therefore, we conclude that the proposed action is not likely to adversely affect Gulf sturgeon critical habitat.

This concludes your consultation responsibilities under the ESA for species under NMFS' purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. We have enclosed additional information on other statutory requirements that may apply to this action, and on NMFS' Public Consultation Tracking System (PCTS) to allow you to track the status of ESA consultations.

If you have any questions regarding this ESA consultation or PCTS use, please contact Dennis Klemm, Fishery Biologist, at (727) 824-5312, or by e-mail at dennis.klemm@noaa.gov.

Sincerely,

James E. Weaver

for Roy E. Crabtree, Ph.D.
Southeast Regional Administrator

Enclosures (2)

File: 1514-22.F.1.FL
Ref: I/SER/2007/06965

PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 5-13-2008)

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system at **https://pcts.nmfs.noaa.gov/** that allows federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants and their consultants to ascertain the status of NMFS' Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations, conducted pursuant to ESA section 7, and Magnuson-Stevens Fishery Conservation and Management Act's (MSA) sections 305(b)2 and 305(b)(4), respectively. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The COE "Permit Site" (no password needed) allows COE permit applicants and consultants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted, or is in the process of conducting, an ESA or EFH consultation with the COE.

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. For example: SAJ-2005-123; SAJ-2005-1234; SAJ-2005-12345.

For inquiries regarding applications processed by COE districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. For example: AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to PCTS.Usersupport@noaa.gov.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall 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 are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall 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. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall 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 will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. 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 shall be implemented to ensure its protection. These precautions shall 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 shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
O:\forms\Sea Turtle and Smalltooth Sawfish Construction Conditions.doc

Walton County Beach Nourishment Project
SAJ-2007-5152 (IP-DEB)/FWS 2008-F-0060
Walton County, Florida

Biological Opinion
October 2, 2008

Prepared by:
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, FL

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

Acronyms

ABM	Alabama Beach Mouse
Act	Endangered Species Act
BO	Biological Opinion
CAHA	Cape Hatteras National Seashore
CBM	Choctawhatchee Beach Mouse
Corps	Corps of Engineers
CR	County Road
DPS	Distinct Population Segment
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FWC	Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
GOM	Gulf of Mexico
GUIS	Gulf Island National Seashore
HCP	Habitat Conservation Plan
INBS	Index Nesting Beach Survey
MA	May Adversely Affect
MHWL	Mean High Water Line
MLW	Mean Low Water
NAM	Not Adversely Modify
NLAA	Not Likely Adversely Affect

NMFS	National Marines Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ORV	Off Road Vehicles
PCE	Primary Constituent Elements
PHVA	Population and Habitat Viability Analysis
PKBM	Perdido Key Beach Mouse
PSI	Per Square Inch
PVA	Population Viability Analysis
Service	U.S. Fish and Wildlife Service
STSSN	Sea Turtle Stranding and Salvage Network
TEDS	Turtle Excluder Devices
USDA	United States Department of Agriculture

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721

IN REPLY REFER TO:

Tel: (850) 769-0552
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October 2, 2008

Mr. Osvaldo Collazo
U.S. Army Corps of Engineers
Jacksonville District, Corps of Engineers
1002 West 23 Street, Suite 350
Panama City, Florida 32405

Attn: Mr. Dale Beter

Re: FWS Log No. 2008-F-0060
Date Started: November 2, 2007
Applicant: Walton County Board of County Commissioners
Project Title: Walton County Phase 2 Beach Nourishment
Public Notice: SAJ-2007-5152 (IP-DEB)
Location: Gulf of Mexico
Ecosystem: NE Gulf
County: Walton County, Florida

Dear Mr. Collazo:

Enclosed is the Fish and Wildlife Service's (Service) biological opinion (BO) for the Walton County, Phase 2 Beach Nourishment Project in Escambia County, Florida, and its effects on nesting loggerhead, green, leatherback, and Kemp's ridley sea turtles, Choctawhatchee beach mouse, and non-breeding piping plover, and designated critical habitat for the beach mouse. The Army Corps of Engineers (Corps) has determined that the project would not likely adversely affect (NLAA) the West Indian manatee, and not adversely modify (NAM) designated critical habitat for the piping plover. The Service concurs with your determination of: may adversely affect (MA) for nesting sea turtles, Choctawhatchee beach mouse, and the piping plover, and designated critical habitat for the beach mouse and NLAA for the manatee, and NAM determination for designated critical habitat for the piping plover (**Table 1**). The manatee determination is based upon inclusion of the standard Manatee Conditions for In-Water Work.

This opinion is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.). We have assigned log number 2008-F-0060 to this consultation.

This biological opinion is based on the permit application file, environmental assessment, and information provided during meetings and discussions with the Applicant, the Applicant's consultant's, Taylor Engineering, Inc., information from the Florida Fish and Wildlife Research Institute sea turtle nesting database, South Walton Turtle Watch turtle nesting monitoring, and information in our files. A complete administrative record of this consultation is on file in the Service's Panama City, Florida Field Office.

Table 1. Species and Critical Habitat Evaluated for Effects from the Proposed Action but not discussed further in this Biological Opinion.

SPECIES OR CRITICAL HABITAT	PRESENT IN ACTION AREA	PRESENT IN ACTION AREA BUT "NOT LIKELY TO ADVERSELY AFFECT" OR "NOT LIKELY TO ADVERSELY MODIFY"
West Indian manatee	Yes	Yes
Non-breeding piping plover critical habitat	No	No

Consultation History

May 18, 2007 — The Service attends an interagency meeting on the Walton County Phase 2 Beach Nourishment Project.

May 23, 2007 — The Service provides via email to the applicant's consultant, Taylor Engineering, Inc., additional information for conservation of piping plover.

October 18, 2007 — The Service receives a request via regular mail from the Jacksonville District, Corps, for initiation of formal consultation under section 7 of the Endangered Species Act for nesting sea turtles, non-breeding piping plover, and Choctawhatchee beach mice. The Corps provides a copy of the public notice and supporting information in the request.

November 2, 2007 — The Service transmits a letter via regular mail to the Corps our acknowledgement of the Corps request for concurrence of may adversely affect determination for nesting sea turtles, piping plover, and Choctawhatchee beach mice, and NLAA determination for manatee.

February 14, 2008	The Service provides via email to the applicant's consultant, Taylor Engineering, Inc., a list of outstanding information needs for the consultation.
February 22, 2008	The Service participates in a conference call about the project.
March 4, 2008	The Service receives via regular mail from the applicant's consultant, Taylor Engineering, Inc., dated March 3, 2008, the outstanding information needed to complete the consultation.
May 14, 2008	The Service provides a letter via regular mail to the Corps notifying them they have received the needed information to complete the consultation and that a draft BO would be completed by August 12, 2008.
August 12, 2008	The Service provides via email to the Corps that the submittal of the draft BO will be delayed because of Service work schedules.
August 13, 2008	The Service receives via email a response from the Corps concurring with the draft BO submittal delay.
August 21, 2008	The Service provides via regular mail to the Corps a draft BO.
September 24, 2008	The Service receives via email from the Corps concurrence to finalize the BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Applicant, Walton County, proposes to construct a dune, berm, and beach restoration project (dune, berm, and beach fill project) along a 13.5-mile stretch of the Gulf of Mexico (GOM) shoreline along the mainland of Walton County (**Figure 1**).

The project will be located between DNR monuments R-41 and R-64, R-67 and R-72, R-78 and R-98, R-105.5 and R-127. Approximately 5,682,000 cubic yards of beach quality material along four segments from west to east along the project GOM shoreline.

The project would include a berm consisting of a flat back-berm extending 50 feet from the existing 9.5 foot NAVD, and 8 foot wide transitional slope (1V:4H) from the back berm to the mid-berm, a variable width flat mid-berm at elevation 7.5 ft NAVD, a 100 foot wide fore-berm sloping 1V:100H from 7.5 feet to 6.5 feet NAVD, and a 1V:15H foreshore slope extending from the seaward edge of the fore-berm out to the existing bottom. In addition, a dune with a flat 10 foot wide crest would extend from the existing 14.5 foot NAVD contour and the dune face would slope 1V:4H down to the back berm. The seaward slope of the construction profile would be steeper than the native beach slope so that the equilibrium profile would mimic the existing profile shape. The volume density of the beach fill design averages about 79 cubic yards per linear foot of beach. The project includes planting appropriate vegetation along the dune crest and dune face.

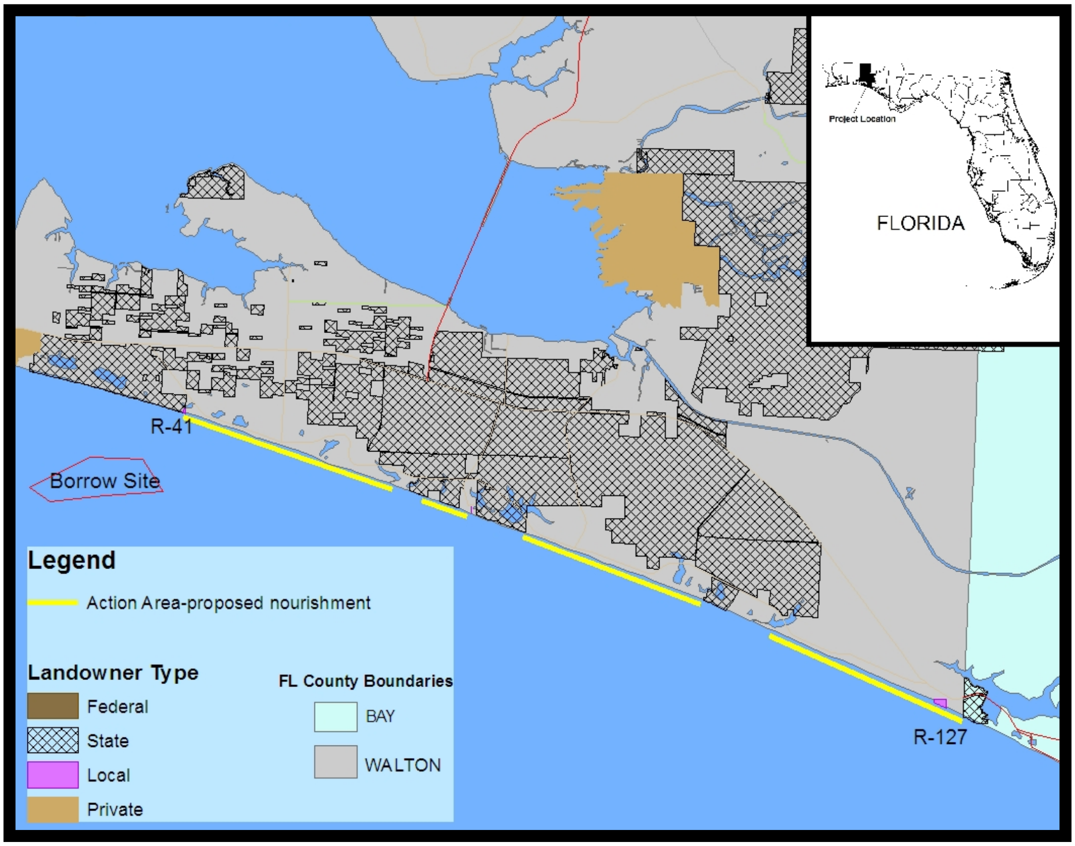

Figure 1. Location of the proposed Walton County beach restoration project, Walton County, Florida.

The beach fill material would be excavated from a 1,558-acre offshore borrow site located approximately 5 miles due southwest of the western project limit in water depths of approximately -74 to -80 ft NAVD. Compatible material has a Munsell color classification lighter than or equal to 5Y 6/2 and composition and grain size of material in the borrow area is 0.30 mm.

Beach accesses to be used for the project equipment, vehicles, and associated material will be at existing South Walton Tourist Development beach accesses (**Table 2**). In addition to the access and storage/staging areas, the contractor will utilize the approximately 500-foot wide daily construction zone for storage/staging.

Table 2. Locations of project equipment, vehicle access, and project-associated materials.

Work Type	Location
Vehicle Access	Dune Allen Ed Walline Park Grayton Beach (2) Seagrove Beach Inlet Beach
Storage/Staging Areas	Grayton Beach Seagrove Beach Inlet Beach

Conservation Measures

Beach Mice

The dune features proposed for construction within project would be enhanced with salt-tolerant vegetation.

Manatees

The standard Construction Conservation Measures for manatees will be incorporated into the project plans.

Action Area

The Action Area for nesting sea turtles, Choctawhatchee Beach Mouse (CBM), and non-breeding piping plovers is the 13.5 miles of shoreline proposed for nourishment in Walton County (**Figure 1**). The project fill site is located in the GOM, in four reaches (segments) between: R-41 and R-64, R-67 and R-72, R-78 and R-98, and R-105.5 and R-127. It begins at mean low water (MLW) along the GOM and includes intertidal areas of the GOM and coastal dune lakes, wrack lines, ephemeral pools, inlets, and the upper sandy beach with sparse or no vegetation and coastal dune lakes sand and mud flats habitat as well as any overwash areas that occur adjacent or connecting the GOM and the coastal dune lakes.

SEA TURTLES

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The Service has responsibility for implementing recovery of sea turtles when they come ashore to nest. This biological opinion 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-Fisheries (NOAA-Fisheries) has jurisdiction over sea turtles in the marine environment.

Four species of sea turtles are analyzed in this biological opinion: the threatened loggerhead sea turtle (*Caretta caretta*), the endangered green sea turtle (*Chelonia mydas*), the endangered leatherback sea turtle *(Dermochelys coriace*a), and the endangered Kemp's ridley sea turtle (*Lepidochelys kempii).*

Loggerhead Sea Turtle

The loggerhead sea turtle was 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.

Within the continental U.S., loggerheads nest from Texas to Virginia with major nesting concentrations found in South Florida. Additional nesting concentrations occur on coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (NMFS and Service 1991). Within the western Atlantic, loggerheads also nest in Mexico and the Caribbean.

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 (NOAA Fisheries 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. However, the majority of loggerhead nesting is at the western rims of the Atlantic and Indian Oceans. The species is widely distributed within its range. 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. Nesting occurs mainly on open beaches or along narrow bays having suitable sand, and often in association with other species of sea turtles.

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

On November 16, 2007, the Service and NMFS received a petition from Oceana and the Center for Biological Diversity requesting that loggerhead turtles in the western North Atlantic Ocean be reclassified as a Distinct Population Segments (DPS) with endangered status and that critical habitat be designated. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. The National Marine Fisheries Service (NMFS) took the lead on the petition response and issued a 90–day finding on March 5, 2008, in the federal register, that the petition presents substantial scientific information indicating that the petitioned action may be warranted. The NMFS has initiated a review of the status of the species to determine whether the petitioned action is warranted and to determine whether any additional changes to the current listing of the loggerhead turtle are warranted and solicited public comment that ended on May 5, 2008 (73 FR 11849).

Green Sea Turtle

The green sea turtle was federally listed as a protected species 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. 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 (NOAA Fisheries 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 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.

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 (NOAA Fisheries 2002b). Hatchling green turtles eat a variety of plants and animals, but adults feed almost exclusively on seagrasses and marine algae.

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 listed as an endangered species on June 2, 1970 (35 FR 8491), nests on shores of the Atlantic, Pacific and Indian Oceans. Leatherbacks have the widest distribution of sea turtles with nesting on beaches in the tropics and sub-tropics and foraging excursions 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. 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). Nesting grounds are distributed worldwide, with the Pacific coast of Mexico 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 (NOAA Fisheries and Service 1992; National Research Council 1990a).

The leatherback 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 (NOAA Fisheries 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 database); and in southwest Florida a false crawl (non-nesting emergence) has been observed on Sanibel Island (LeBuff 1990).

This is the largest, deepest diving of all sea turtle species. 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 (NOAA Fisheries 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.

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).

Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was 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. 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 GOM, while juveniles and subadults also regularly occur along the eastern seaboard of the U.S. (Service and NOAA Fisheries 1992). There have been rare instances when immature ridleys have been documented making transatlantic movements (Service and NOAA Fisheries 1992). It was originally speculated that ridleys that make it out of the GOM might be lost to the breeding population (Hendrickson 1980), but data indicate that many of these turtles are capable of moving back into the GOM (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 GOM, 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

<u>Loggerhead Sea Turtles</u>

Loggerheads have a complex life history that encompasses terrestrial, nearshore, and open ocean habitats. The three basic ecosystems in which loggerheads live are the: Terrestrial zone (supralittoral) - the nesting beach where both oviposition (egg laying) and embryonic development and hatching occur.

Neritic zone is the inshore marine environment (from the surface to the sea floor) where water depths do not exceed 656 feet (200 meters). The neritic zone generally includes the continental shelf, but in areas where the continental shelf is very narrow or non-existent, the neritic zone conventionally extends to areas where water depths are less than 656 feet (200 meters).

Oceanic zone is the vast open ocean environment (from the surface to the sea floor) where water depths are greater than 656 feet (200 meters).

The basic life cycle of the loggerhead turtle in the western North Atlantic consists of seven life stages (**Figure 2**) that are based on the size of the sea turtles at different ages (Bolten 2003; Crouse et al. 1987).

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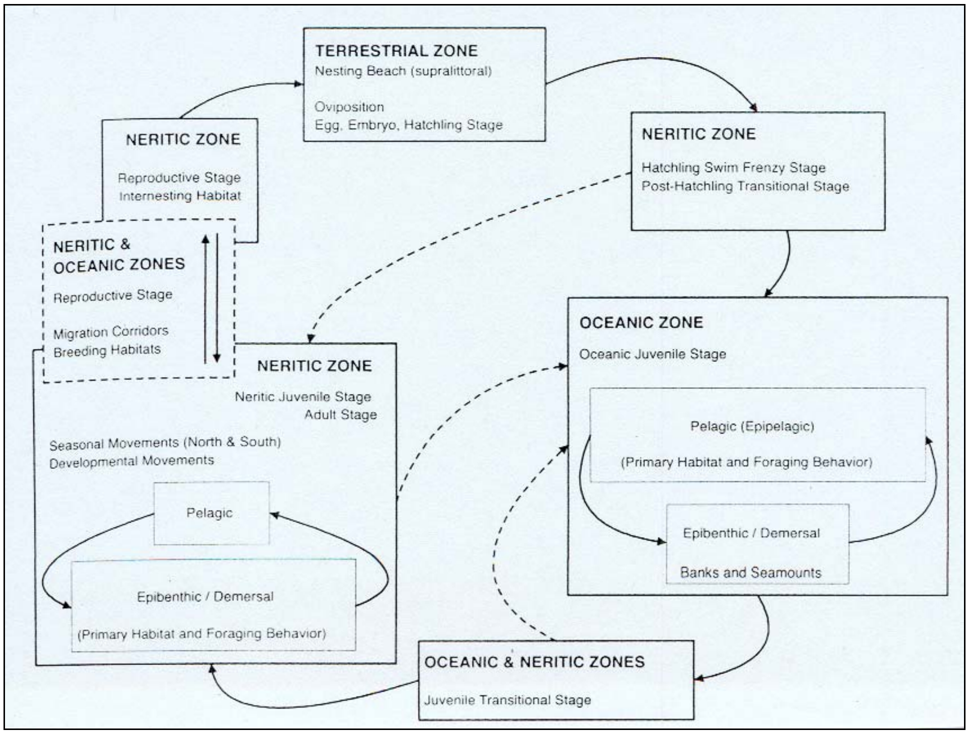

Figure 2. Life history stages of a loggerhead turtle. The boxes represent life stages and the corresponding ecosystems, solid lines represent movements between life stages and ecosystems, and dotted lines are speculative (Bolten 2003).

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, 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 3**).

Table 3. Summary of research on life history traits for loggerhead sea turtles.

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]
Juvenile (<87 cm CCL) sex ratio	65-70% female[4]
Pivotal temperature (incubation temperature that produces an equal number of males and females)	29.0˚C[5]

Life History Trait	Data
Nest productivity (emerged hatchlings/total eggs) x 100 (varies depending on site specific factors)	Range = 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]
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] Blair Witherington, FWC, personal communication, 2006 (information based on nests monitored throughout Florida beaches in 2005, n=865).
[4] National Marine Fisheries Service (2001); Allen Foley, FWC, personal communication, 2005.
[5] Mrosovsky (1988); Marcovaldi *et al*. (1997).
[6] Blair Witherington, FWC, personal communication, 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.
[8] Caldwell (1962), Dodd (1988).
[9] Richardson *et al*. (1978); Bjorndal *et al*. (1983); Ehrhart, unpublished data.
[10] Melissa Snover, NMFS, personal communication, 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. 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).

Sea turtle eggs require a high-humidity substrate that allows for sufficient gas exchange for development (Miller 1997; Miller et al. 2003). Loggerhead nests incubate for variable periods of time. The length of the incubation period (commonly measured from the time of egg deposition to hatchling emergence) is inversely related to nest temperature, such that between 26^{o}C and 32^{o}C, a change of 1^{o}C adds or subtracts approximately 5 days (Mrosovsky 1980).

The warmer the sand surrounding the egg chamber, the faster the embryos develop (Mrosovsky and Yntema 1980). Sediment 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. The pivotal temperature (i.e., the incubation temperature that produces equal numbers of males and females) in loggerheads is approximately 29^{o}C (Limpus et al. 1983; Mrosovsky 1988; Marcovaldi et al. 1997). However, clutches with the same average temperature may have different sex ratios depending on the fluctuation of temperature during incubation (Georges et al. 1994). Moisture conditions in the nest similarly influence incubation period, hatching success, and hatchling size (McGehee 1990; Carthy et al. 2003).

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).

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).

Green Sea Turtles

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 (NOAA Fisheries and Service 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Leatherback Sea Turtles

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 nests (NOAA Fisheries 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).

Kemp's Ridley Sea Turtles

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 Turtles

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 GOM 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 percent 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. in press). 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 and is second in size only to that which nests on islands in the Arabian Sea off Oman (Ross 1982; Ehrhart 1989). The status of the Oman colony has not been evaluated recently, but its location in a part of the world that is vulnerable to disruptive events (e.g., political upheavals, conflicts, catastrophic oil spills) is cause for considerable concern (Meylan et al. 1995). The loggerhead nesting aggregations in Oman, the U.S., and Australia account for about 88 percent of nesting worldwide (NOAA-Fisheries and Service 1991b).

<u>Green Sea Turtles</u>

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 (NOAA Fisheries 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).

<u>Leatherback Sea Turtles</u>

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 was 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 percent 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 percent 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 percent 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, 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).

Kemp's Ridley Sea Turtles

In contrast to other sea turtle species, the Kemp's ridley has only one primary nesting beach, which consists of an approximate 25-miles (40-km) stretch of beach occurring near Rancho Nuevo (Service 2006). There is a limited amount of scattered nesting to the north and south of the primary nesting beach. 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 2006, approximately 7,866 nests were laid at Rancho Nuevo, and the total number of nests for all the beaches was estimated to be 12,143 (Service 2006). In addition, approximately 100 nests were recorded during 2006 in the U.S., primarily in Texas. In addition, rare nesting events have been reported in Florida, Alabama, Georgia, South Carolina, and North Carolina. Most recently, the 2007 nesting season included an arribada of over 4,000 turtles over a 3-day period at Rancho Nuevo during May.

Status and Distribution

Nesting and hatchling sea turtles in the Florida panhandle have been affected by a variety of activities including military missions and testing, coastal development and associated activities, oil and gas exploration, and navigation channel dredging (**Table 4**).

Table 4. Previous biological opinions within northwest Florida that have been issued for all projects that had adverse impact to the nesting sea turtles.

SPECIES **Loggerhead, green, leatherback, and Kemp's ridley sea turtles**	YEAR	IMPACT **(Habitat/critical habitat/individuals)**
Tyndall Air Force Base mission related driving on the beach	1998	18 miles
Panama City Beach beach nourishment original and Amd. 1-8	1998, 2001-2007	16 miles
Lake Powell Emergency Opening	1998-2008	1,500 ft
Destin Dome OCS offshore oil and gas drilling	2000	No take
East Pass re-opening	2001	2 miles
Eglin AFB porous groin within season	2001	3,390 ft
City of Mexico Beach sand bypass system	2001-2007	3,700 ft
Eglin AFB INRMP	2002-2007	17 miles
Eglin 737 Sensor Test Site 13-A SRI	2002	0.12 mile
SPECIES	**YEAR**	**IMPACT**

Loggerhead, green, leatherback, and Kemp's ridley sea turtles		**(Habitat/critical habitat/individuals)**
Pensacola Beach beach nourishment original Amd. 1	2002-2005	8.3 miles CC - 14 nests CM - 1 nest DC - 1 nest LK - 1 nest
Eglin Marine Expeditionary Unit Training	2003	17 miles
Eglin AFB U.S. Army Ranger Los Banos	2003	7miles
Alligator Point beach nourishment	2004	2,500 ft CC – 2 nets CM & DC – 1 nest Project never started
Eglin AFB Airborne Littoral Reconnaissance Test and amd 1	2004-2008	0.5 mile
Eglin AFB Advance Skills Training	2004	7 miles
Navarre beach nourishment emergency consultation and amd. 1-6	2005	4.1 miles
FEMA beach berms post Hurricane Ivan emergency consultation	2005	Walton Co. - 20 miles Okaloosa Co. – 4.2 miles Mexico Bch- 1 mile Panama City Bch – Unk St. Joseph peninsula- Unk Perdido Key – Unk Navarre - Unk
Eglin Santa Rosa Island Programmatic	2005-2008	17 miles
Tyndall AFB INRMP	2006-2008	18 miles
Western Lake Emergency Opening	2006	0.5 mile
St. Joseph Peninsula beach restoration and amd 2	2007-2008	7.5 miles
Alligator Point beach restoration	2007	2,500 ft
Eastern Lake Emergency Opening	2007	0.5 mile
Panama City Harbor	2003-2008	500 ft – 1 mile
FEMA FL Statewide Emergency Berms programmatic	2008	50 miles
Eglin AFB SRI beach and dune restoration	2008	5 miles
Perdido Key beach nourishment	2008	6.5 miles

Loggerhead Sea Turtles

Genetic research involving analysis of mitochondrial DNA has identified five different loggerhead subpopulations/nesting aggregations in the western North Atlantic: (1) the Northern Subpopulation occurring from North Carolina to around Cape Canaveral, Florida (about 29^{o} N.); (2) South Florida Subpopulation occurring from about 29^{o} N. on Florida's east coast to Sarasota on Florida's west coast; (3) Dry Tortugas, Florida, Subpopulation, (4) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and (5) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen 1994, 1995; Bowen et al. 1993; Encalada et al. 1998; Pearce 2001). These data indicate that gene flow between these five regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation.

The Northern Subpopulation has declined substantially since the early 1970s. Recent estimates of loggerhead nesting trends from standardized daily beach surveys showed significant declines ranging from 1.5 percent to 2.0 percent annually (Mark Dodd, Georgia Department of Natural Resources, pers. comm. 2005). Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 3.3 percent annual decline in nesting since 1980. Overall, there is strong statistical evidence to suggest the Northern Subpopulation has sustained a long-term decline.

Data from all beaches where nesting activity has been recorded indicate that the South Florida Subpopulation has shown significant increases over the last 25 years. However, an analysis of nesting data from the Florida Index Nesting Beach Survey (INBS) Program from 1989 to 2002 (a period encompassing index surveys that are more consistent and more accurate than surveys in previous years), has shown no detectable trend and, more recently (1998 through 2002), has shown evidence of a declining trend (Blair Witherington, FWC, pers. comm. 2003). Given inherent annual fluctuations in nesting and the short time period over which the decline has been noted, caution is warranted in interpreting the decrease in terms of nesting trends.

A near census of the Florida Panhandle Subpopulation undertaken from 1989 to 2002 reveals a mean of 1,028 nests per year, which equates to about 251 females nesting per year (FWC 2003). However, preliminary analysis for nine years (1997 to 2006) of INBS data for the Florida Panhandle subpopulation shows a declining trend (Blair Witherington, FWC, pers. comm. 2007).

A near census of the Dry Tortugas Subpopulation undertaken from 1995 to 2001 reveals a mean of 213 nests per year, which equates to about 50 females nesting per year (FWC 2003). The trend data for the Dry Tortugas Subpopulation are from beaches that were not included in Florida's INBS program prior to 2004, but have moderately good monitoring consistency. There are 7 continuous years (1995 to 2001) of data for this Subpopulation, but the time series is too short to detect a trend (Blair Witherington, FWC, pers. comm. 2005).

Nesting surveys in the Yucatán Subpopulation has been too irregular to date to allow for a meaningful trend analysis (Turtle Expert Working Group 1998, 2000).

Loggerheads are the most common nesting sea turtle and account for over 99 percent of the sea turtle nests in northwest Florida. The eastern portion of the region has the majority of loggerhead nesting (**Figure 3**). Nesting densities range from 1.1 to 9.7 nests per mile in the region. The loggerhead sea turtle nesting and hatching season for the region is generally considered to extend between May 1 and November 1. The earliest nest documented was on May 1 (Franklin and Okaloosa counties) and the latest nest was on November 1 (Bay County) (FWC/FWRI statewide sea turtle nesting database). Nest incubation ranges from about 49 to 95 days.

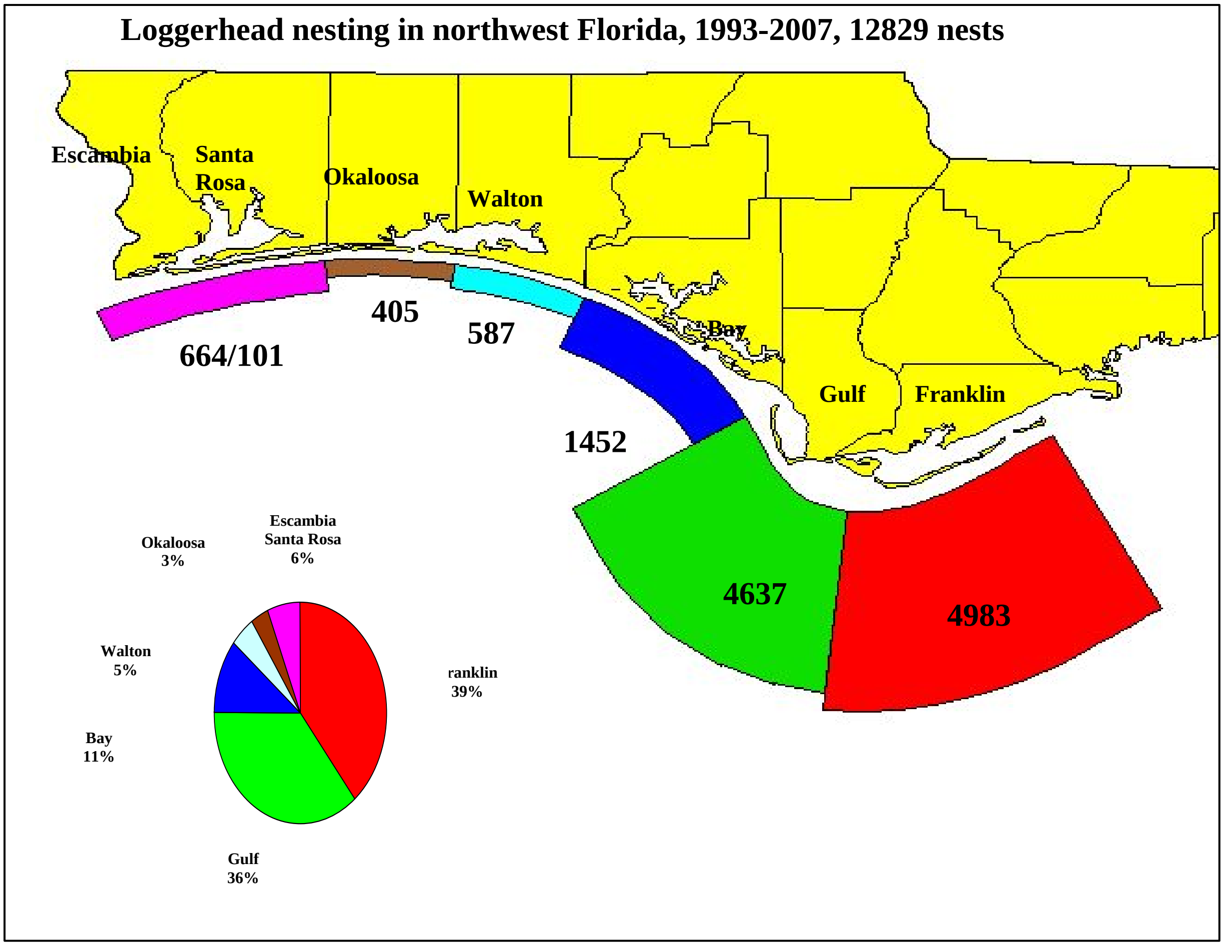

Figure 3. **Loggerhead nesting in northwest Florida, 1993-2007.**

Recovery criteria

The southeastern U.S. loggerhead population can be considered for delisting where, over a period of 25 years, the following conditions are met:

1. The adult female population in Florida is increasing and in North Carolina, South Carolina, and Georgia, it has returned to pre-listing levels (NC - 800, SC - 10,000,

and GA - 2,000 nests per season). The above conditions shall be met with the data from standardized surveys, which would continue for at least five years after delisting.

2. At least 25 percent (348 miles) of all available nesting beaches (1,400 miles) are in public ownership, distributed over the entire nesting range and encompassing at least 50 percent of the nesting activity in each state.

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

The Recovery Plan for the loggerhead sea turtle is currently under revision. An initial Recovery Plan for the loggerhead turtle was approved on September 19, 1984. This initial plan was a multi-species plan for all six species of sea turtles occurring in the U.S. On December 26, 1991, a separate recovery plan for the U.S. Atlantic population of the loggerhead turtle was approved. Since approval of the first revised plan in 1991, significant research has been accomplished and important conservation and recovery activities have been undertaken. As a result, we have a greater knowledge of the species and its status. Thus, a revision of the Recovery Plan was drafted and distributed for public comment on May 30, 2008 (73 FR 31066). Comments are requested by July 29, 2008.

The Service and the National Marine Fisheries Service completed a five-year status review of the loggerhead sea turtle in August 2007 (National Marine Fisheries Service and Service 2007a). A recommendation has been made to determine the application of the DPS policy for the species. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. This indicates that there is enough information available to consider designating DPS for the separate nesting subpopulations of loggerhead sea turtles, including the Florida panhandle subpopulation.

<u>Green Sea Turtles</u>

Total population estimates for the green turtle are unavailable, and trends based on nesting data are difficult to assess because of large annual fluctuations in numbers of nesting females. For instance, in Florida, where the majority of green turtle nesting in the southeastern U.S. occurs, estimates range from 150 to 2,750 females nesting annually (FWC 2003).

Green sea turtle nesting has been documented in all counties (but not on all beaches) in northwest Florida (**Figure 4)**. The green sea turtle nesting and hatching season for this region extends from May 1 through October 31, the earliest nest was documented on May 19 (Franklin County) and the latest nest was documented on August 23 (Escambia County). Nest incubation ranges from about 60 to 90 days. Nesting in northwest Florida has been consistently documented at least every other year since 1990 (FWC/FWRI statewide sea turtle nesting database).

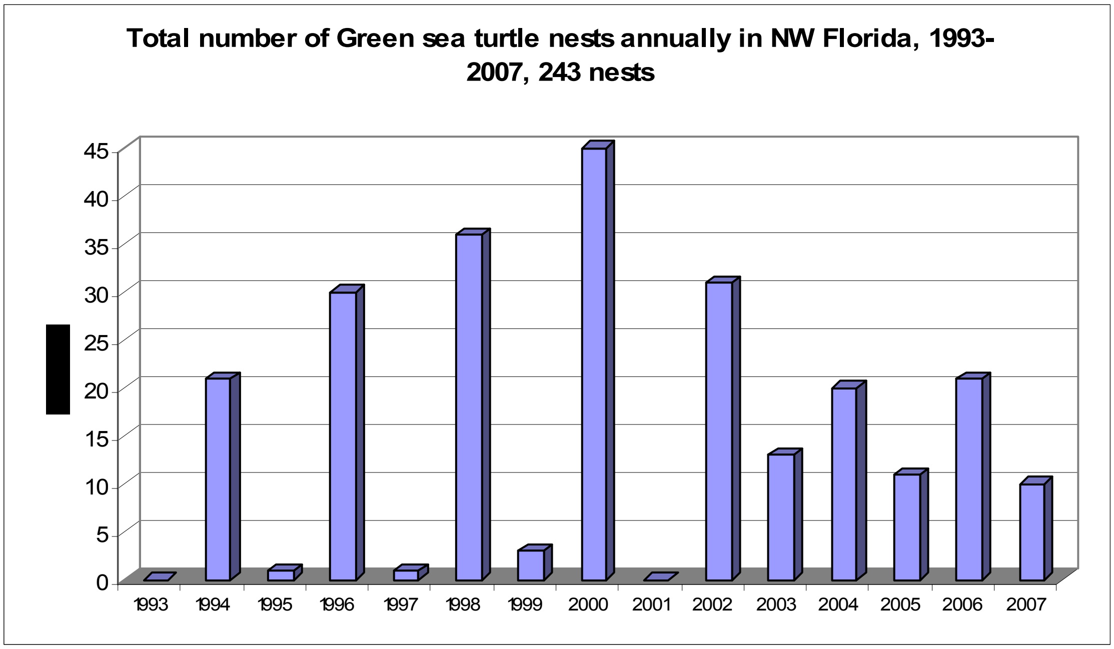

Figure 4. Green sea turtle nesting in northwest Florida, 1993-2007.

<u>Recovery criteria</u>

The U.S. 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.

The Service and the National Marine Fisheries Service completed a five-year status review of the green sea turtle in August 2007 (National Marine Fisheries Service and Service 2007b). A recommendation has been made to conduct an analysis and review of the species to determine the application of the DPS policy for the species. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. Since the species' listing, a substantial amount of information has become available on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies). The data has not been fully assembled or analyzed; however, at a minimum, these data appear to indicate a possible separation of populations by ocean basins.

<u>Leatherback Sea Turtles</u>

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.

Documented leatherback nests are rare in northwest Florida. From 1993 to 2007, a total of 47 nests have been reported on northwest Florida beaches (FWC/FWRI statewide sea turtle nesting database) (**Figure 5**). The first recorded leatherback nest in the region was in 1974, on St. Vincent Island, Franklin County. The majority of the nests have had low natural hatching success. The greatest number of successful nests in any one season occurred in 2000, when three leatherback nests were documented to produce hatchlings that successfully emerged from the nest. One nest was on the Fort Pickens Area of GUIS, Escambia County, and two of the nests were on Eglin Air Force Base, Santa Rosa Island, Okaloosa County. The leatherback sea turtle nesting and hatching season for this region extends from late April through October 31. For confirmed nesting, the earliest nest was documented on April 18 (Franklin County) and the latest nest documented on July 24 (Bay County). Documented nest incubation in northwest Florida ranges from about 63 to 84 days (FWC/FWRI statewide sea turtle nesting database).

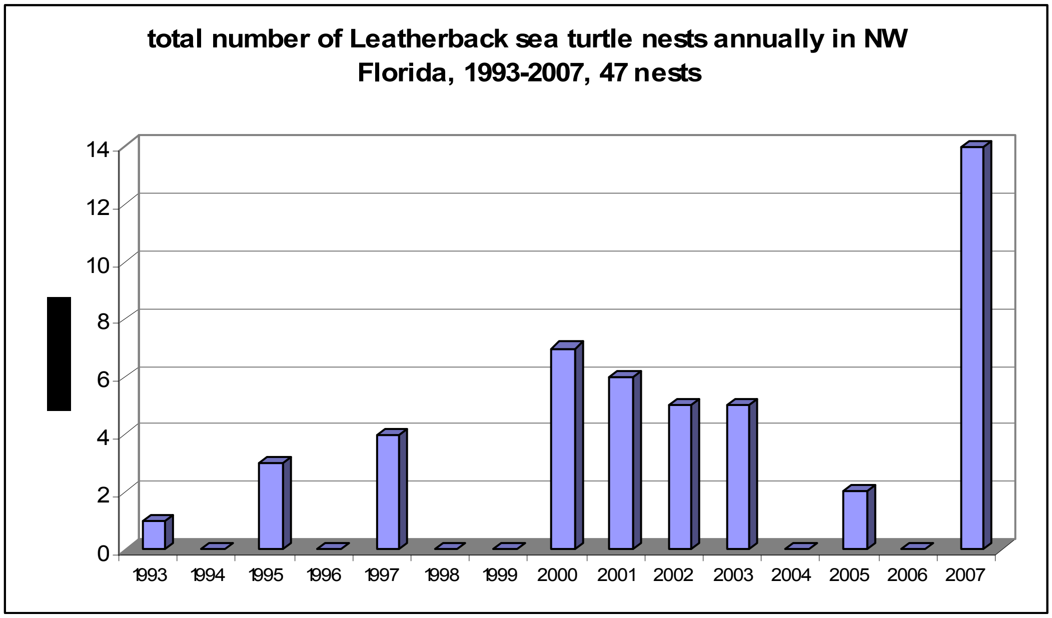

Figure 5. Number of leatherback sea turtle nests in NW Florida 1993-2007.

Recovery criteria

The U.S. 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.

The Service and the National Marine Fisheries Service completed a five-year status review of the leatherback sea turtle in August 2007 (National Marine Fisheries Service and Service 2007c). A recommendation has been made to conduct an analysis and review of the species to determine the application of the DPS policy for the species. A DPS is a population segment that is discrete in relation to the remainder of the species to which it belongs, and significant to the species to which it belongs. Since the species' listing, a substantial amount of information has become available on population structure (through genetic studies) and distribution (through telemetry, tagging, and genetic studies). The data has not been fully assembled or analyzed; however, at a minimum, these data appear to indicate a possible separation of populations by ocean basins.

<u>Kemp's Ridley Sea Turtles</u>

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.

Twenty-nine Kemp's ridley nests have now been documented in Florida in Brevard, Escambia, Gulf, Lee, Martin, Palm Beach, Pinellas, Santa Rosa, Sarasota, and Volusia counties (FWC/FWRI statewide sea turtle nesting database) (**Figure 6**). The Kemp's ridley sea turtle nesting and hatching season for this region extends from May 1 through October 31. For confirmed nesting, the earliest nest in northwest Florida was documented on May 14 (Escambia County) and the latest nest July 21 (Escambia County).

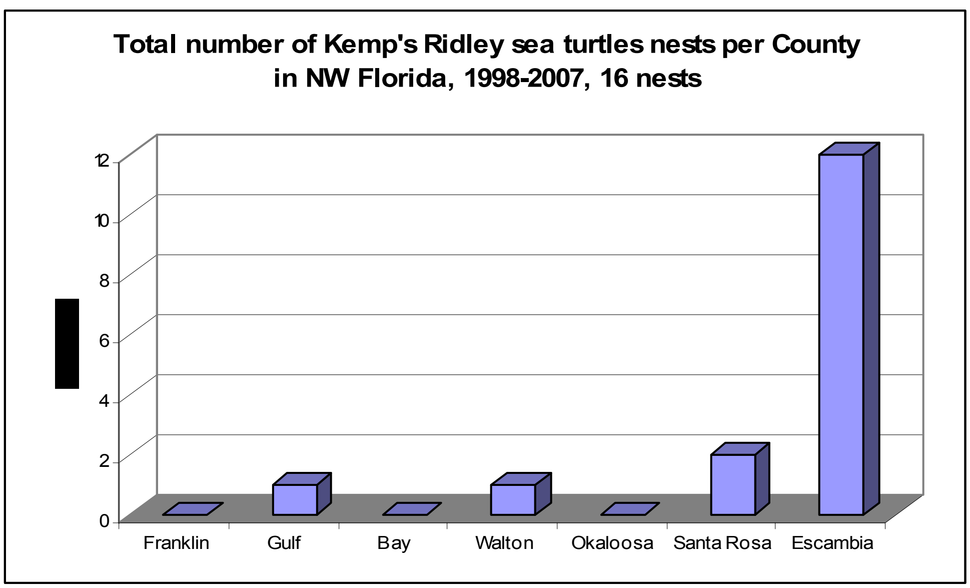

Figure 6. Number of Kemp's ridley sea turtle nests in NW Florida 1998-2007.

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 downlisting to threatened 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 Ranch 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 NOAA 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 the National Marine Fisheries Service completed a five-year status review of the Kemp's Ridley sea turtle in August 2007 (National Marine Fisheries Service 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).

Threats to Sea Turtles

Loggerhead Sea Turtles

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.

Loggerhead turtles are affected by a completely different set of anthropogenic threats in the marine environment. These 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. In the oceanic environment, loggerheads are exposed to a series of longline fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various fleets in the Mediterranean Sea (Aguilar et al. 1995; Bolten et al 1994; Crouse 1999). There is particular concern about the extensive incidental take of juvenile loggerheads in the eastern Atlantic by longline fishing vessels. In the neritic environment in waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, dredge, and trap fisheries.

Green Sea Turtles

A major factor contributing to the green turtle's decline worldwide is commercial harvest for eggs and food. Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and 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. Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from channel dredging and commercial fishing operations.

Leatherback Sea Turtles

The crash of the Pacific leatherback population is believed primarily to be the result of exploitation by humans for the eggs and meat, as well as incidental take in numerous commercial fisheries of the Pacific. Other factors threatening leatherbacks globally include loss or degradation of nesting habitat from coastal development; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; and watercraft strikes.

Kemp’s Ridley Sea Turtle

The decline of this species was primarily due to human activities, including the direct harvest of adults and eggs and incidental capture in commercial fishing operations. Nest relocation has assisted in increasing the population of this species; however, egg relocation has its own host of problems due to movement-induced mortality, disease vectors, catastrophic events like hurricanes, and marine predators once the predators learn where to concentrate their efforts.

All Sea Turtles

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.

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state.

The 2005 hurricane season was a record-breaking season with 27 named storms. Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy impacted Florida. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida.

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 which, although they may be stable or slightly erosional now, 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 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). Lighting disorientations continued to increase on Florida’s beaches (**Table 5**). Exterior and interior lighting associated with condominiums has the greatest impact causing approximately 42 percent of all the disorientation/misorientation in 2007. Other causes included sky glow and street lights (http://www.myfwc.com/seaturtle/Lighting/Light_Disorient.htm).

Table 5. Documented Disorientations along the Florida coast (Conti 2006).

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

Armoring

Research has shown that armoring changes essential behaviors (nesting) of female sea turtles in accessing, locating and selecting a suitable nest site, depositing nests in sub-optimal habitats, and decreasing nesting activity. Shoreline changes as a result of armoring can have various detrimental effects to sea turtles and their nesting habitat. Over the long term, the physical presence of an armored shoreline will result in the annual displacement of sea turtle nests. The existing habitat behind armoring structures is lost to nesting turtles and the beaches in front of armoring structures represent suboptimal nesting habitat and incubation environments. In summary, armoring results in the: 1) loss of available nesting habitat; 2) change turtle nesting behavior during the sea turtle nesting season (May 1 through October 31); and 3) contribute to physical changes of the coastline that would result in decreased nesting habitat quality and result in harm to nests laid seaward of armoring structures.

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, in particular on public lands.

Driving on the Beach

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. Apparently, hatchlings 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.

Sea Turtle Strandings

NOAA Fisheries leads the Sea Turtle Stranding and Salvage Network (STSSN). In Florida, strandings are documented by the FWRI staff biologists and by a network of permitted participants located around the state. Since the start of the program in 1980, loggerhead strandings (dead or debilitated turtles) documented by the Florida STSSN have increased significantly from 1989 to 2005 with the two highest yearly totals occurring in 2003 and 2005.

Analysis of the species/critical habitat likely to be affected

The northwest Florida loggerhead sea turtle nesting subpopulation has significantly declined in nesting based on data analyzed by the State of Florida from 1997 to 2006. While all turtle nesting beaches are adequately surveyed following standard operating procedures and management is in place on most beaches, nest numbers continue to decrease. A variety of factors have been indicated to contributing to the decline of the nesting: incidental take in offshore commercial fishing, an increase in boat strikes, and loss of nesting habitat from coastal development and associated activities including armoring, nourishment, lighting, predation, and increased human presence on the beach at night. In recent years, survival and success of nest hatching has been affected by severe weather events. All four species of sea turtles (loggerhead, green, leatherback, and Kemp's ridley sea turtles) have been documented to nest on Walton County beaches.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Sea turtle surveys are conducted on non-State managed beaches by the South Walton Turtle Watch. Nesting surveys have been conducted since 1993 and are conducted seven days a week from May 1 to September 1. Nest hatching surveys may continue into mid-November depending on nest incubation. Surveys begin at sunrise. Surveys are conducted on foot. Turtle crawls are identified as a true nesting crawl or false crawl. Nests are marked with stakes and surrounded with surveyor flagging tape, and if needed screened to prevent predation. The marked nests are monitored throughout the incubation period for storm damage, predation, hatching activity and hatch and emergence success. Nests are relocated if threatened by erosion or inundation. Nests are relocated within the first 12 hours of being deposited, or before 9 a.m. the morning following deposition. All monitoring is conducted in accordance with guidelines provided by the Florida Fish and Wildlife Conservation Commission (FWC).

The Florida Park Service conducts sea turtle monitoring on the State parks in Walton County (Topsail Hill Preserve State Park, Grayton Beach State Park, and Deer Lake State Park). Sea turtle surveys have been conducted since 1993. The monitoring is conducted by Park volunteers or staff. Nesting surveys are conducted seven days a week from May 1 to September 1. Nest hatching surveys may continue into mid-November depending on nest incubation. Surveys begin at sunrise. Surveys are conducted on foot or by using all terrain vehicles (ATVs). Turtle crawls are identified as a true nesting crawl or false crawl. Nests are marked with stakes and surrounded with surveyor flagging tape, and if needed screened to prevent predation. The marked nests are monitored throughout the incubation period for storm damage, predation, hatching activity and hatch and emergence success. Nests are relocated if threatened by erosion or inundation. Nests are relocated within the first 12 hours of being deposited, or before 9 a.m. the morning following deposition. All monitoring is conducted in accordance with guidelines provided by the FWC.

The loggerhead sea turtle average annual nesting density for the beaches of Walton County is 1.6 nests per mile (**Figure 7**). From 1993 to 2007, 584 loggerhead nests and 263 false crawls were documented, with an annual average of 39 nests. The nest to false crawl ratio for the beaches is approximately 1:2.2.

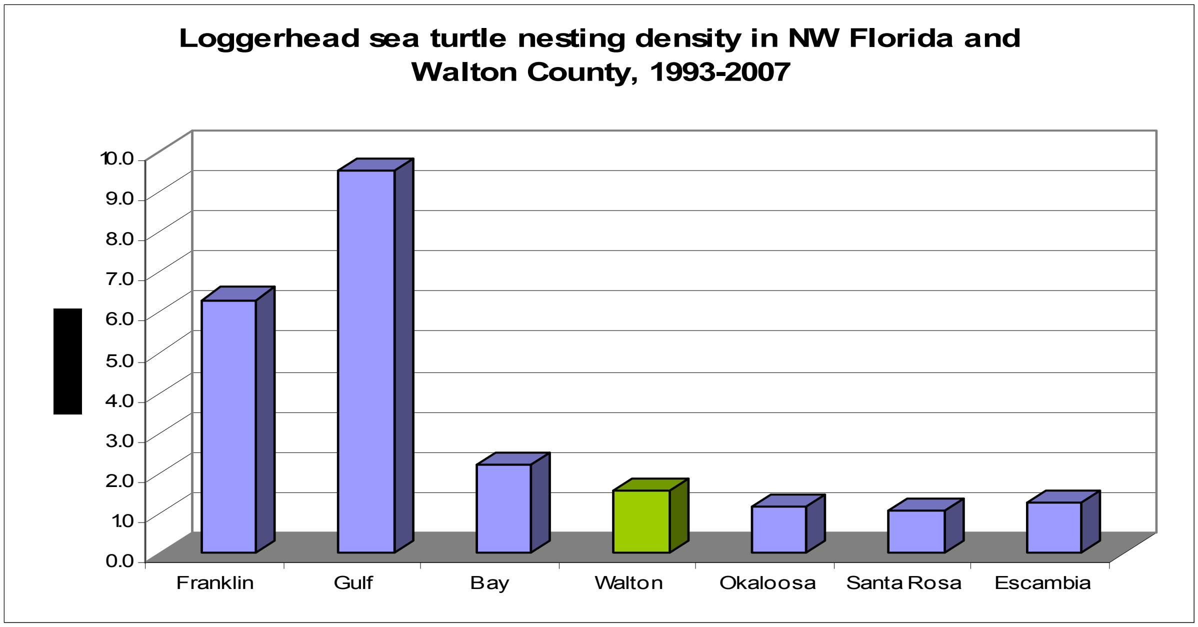

Figure 7. Loggerhead sea turtle nesting density in northwest Florida and the project area from 1993 to 2007.

Thirty-four green sea turtle nests have been documented on Walton County beaches from 1993-2007 (**Figure 8).**

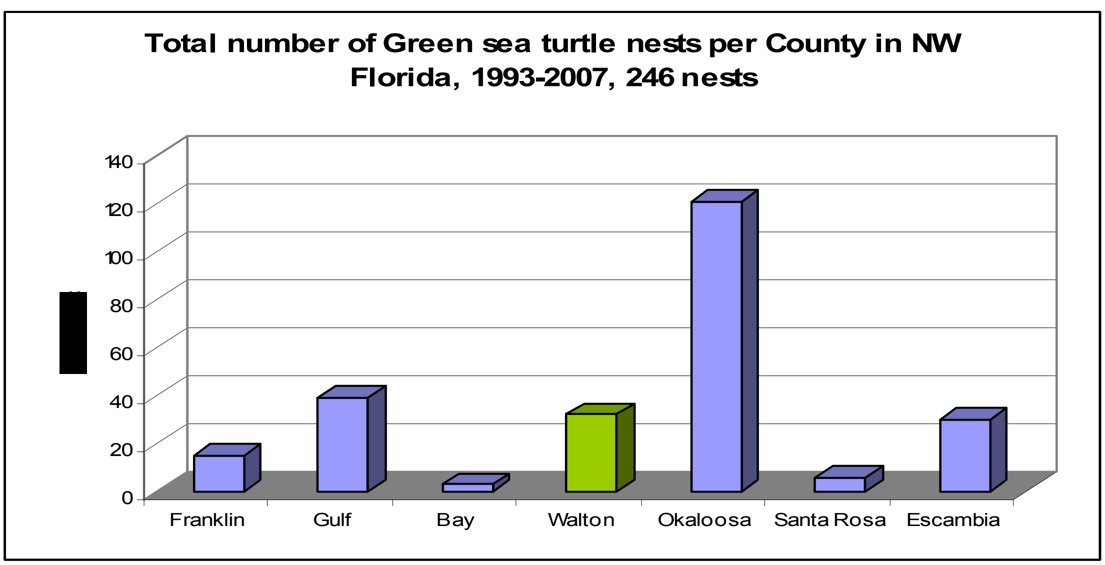

Figure 8. Total number of green sea turtle nests in northwest Florida and the project area from 1993 to 2007.

Only one leatherback sea turtle nest has been documented in Walton County (**Figure 9**). It was found in 2007 and successfully hatched.

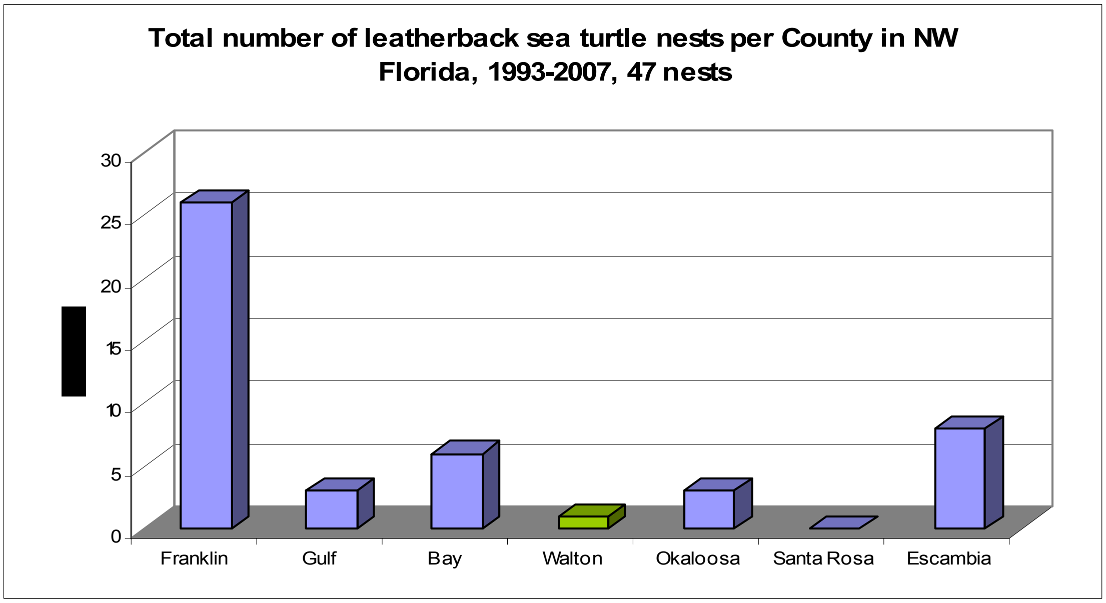

Figure 9. Total number of leatherback sea turtle nests in northwest Florida and the project area from 1993 to 2007.

Only one Ridley sea turtle nest has been documented in Walton County (**Figure 10**). It was found in 2007 and successfully hatched.

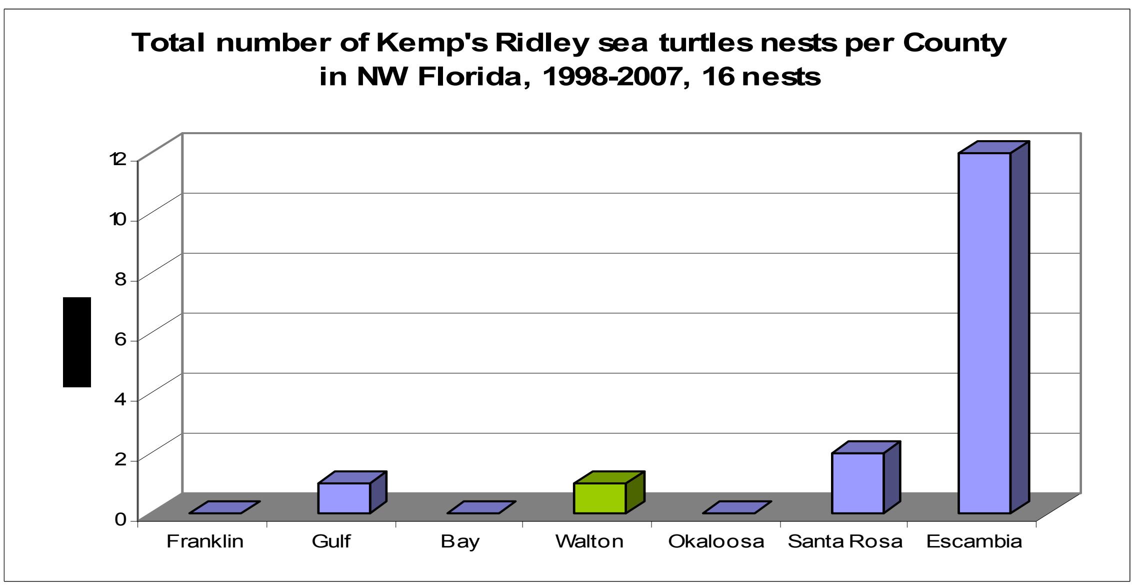

Figure 10. Total number of Kemp's Ridley sea turtle nests in northwest Florida and the project area from 1993 to 2007.

Factors affecting species environment within the action area

Primary impacts to sea turtle nesting within the Action Area include weather events, post weather-event actions, lighting disorientations, and disturbance by humans.

Artificial Beachfront Lighting

The South Walton Turtle Watch has documented an average annual nest disorientation rate of 20 percent (**Figure 11**) (unpublished data provided by FWC 2007). Walton County has not enacted a beachfront lighting ordinance. A 2006 survey of the nourished beach following the Western beach restoration project revealed 136 lighting problems over the 3.6-mile project shoreline (Taylor Engineering 2006). Of that, 39 percent were attributed to balcony or wall mounted lights, 19 percent to floodlights, 18 percent to streetlights, and 10 percent to pole mounted lights (excluding streetlights). Other problems included general commercial lighting, signs, landscape lighting, and interior lights.

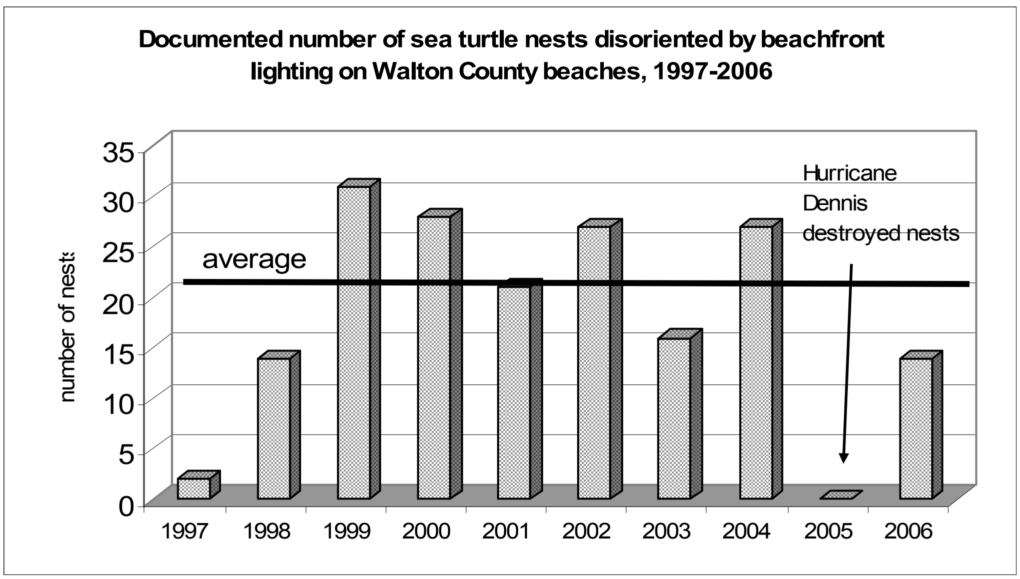

Figure 11. Lighting disorientation documented by the South Walton Turtle Watch from 1997 through 2006.

Erosion

There are eight critically eroded areas designated in Walton County (14.3 miles) by the Florida Department of Environmental Protection (FDEP), Bureau of Beaches and Coastal Systems (FDEP 2007). The western 5.0 miles (R-1 to R-22.8) threaten development, recreational interests, and the coastal road. This area had a beach restoration project completed in 2007. A 2.7-mile critically eroded segment at Dune Allen (R-41 to R-54.5) threatens development, Fort Panic Road, and County Road 30A. A 1.0-mile segment of Blue Mountain Beach (R-58 to R-63) is critically eroded where development is threatened by erosion of the bluff. To the east, erosion of a 0.2-mile segment of Gulf Trace (R-67.3 to R-68.3) and a 0.1-mile segment of Grayton Beach (R-70.95 to R-71.4) also threaten development. A 3.1-mile segment of critical erosion threatens development along Seagrove Beach (R-82 to R-98). To the east along Seacrest Beach, is another 1.8-mile segment (R-105.5 to R-114.7) where development is threatened by erosion of the bluff. A 0.4-mile segment at Inlet Beach (R-122 to R-124) is designated critically eroded due to its post-storm vulnerability threatening development interests.

Weather Events

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state. With the impact of Hurricane Ivan along the northern Gulf of Mexico coast, segments in Escambia (1.2 miles), Santa Rosa (0.7 mile), Okaloosa (2.8 miles), Walton (5.1 miles), and Gulf (0.5 mile) counties were added to the State list of critically eroded beaches.

The 2005 hurricane season was a record breaking season with 27 named storms. Florida was impacted by Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida. In northwest Florida, following the impact of Hurricane Dennis along with additional fringe impacts of Hurricanes Katrina and Rita, critically eroded segments were added in Okaloosa (1.6 miles), Walton (2.4 miles), Gulf (2.4 miles), Franklin (7.4 miles) and Perdido Key, Escambia (1.2 miles) counties.

The entire coast of Walton County sustained major beach and dune erosion (condition IV) and major damage to numerous structures from the impact of Hurricane Dennis. The erosion impact was comparable to the impact of Hurricanes Eloise (1975), Opal (1995), and Ivan (2004). The impact of Dennis exacerbated the severe erosion conditions which had not recovered from the 2004 storms (FDEP 2005).

The continual effects of increased tidal surges and the frequency of storms have caused beach erosion, dune damage, and structure damage. Sea turtles nests were lost from tidal inundation or wave action and were subjected to changed beach profiles and sand characteristics, eroded beaches, physical barriers, and disturbance from humans.

Coastal Development

The beaches of Walton County continue to grow along with the rest of Florida. Coastal development is on the rise. Shorefront development, increasing population growth and hurricane recovery resulted in a construction boom across the northwest region of Florida. However, for the past few years construction has declined especially in second home, resort, and vacation-targeted development. Development along the beachfront impacts sea turtles through the loss of nesting habitat, the increased use and presence of humans on the beach and associated effects (lighting, recreational furniture on the beach, impacts to the dunes). Incorporation of standard coastal construction measures significantly reduces these potential impacts. Development in the adjacent inland areas may also cause a huge influx of human use of the beach where more facilities may be needed to accommodate or service the number of users (parking, dune walkovers, public restrooms, restaurants, businesses).

Development along the coastline within the Action Area has contributed to a reduction in the width and quality of beach and dune habitats used by sea turtle for nesting. The physical presence of development interferes or disrupts the dynamic shoreline process of erosion and accretion such that erosion is accelerated within the Action Area. The degradation of the quality of the nesting beach habitat may be exacerbated by beachfront lighting and increased human presence.

Armoring

Following the passage of Hurricane Dennis in 2005, the Walton County Board of County Commissioners issued temporary emergency permits to allow property owners to protect their properties along the GOM beachfront. Approximately 200 properties had some type of armoring installed along the shoreline. The Service, Walton County, and the FDEP are working together to resolve the permanent installation of these structures (if appropriate and in accordance with federal and state laws and regulations including the Endangered Species Act.

Other Actions

Other activities have affected conservation of sea turtles and required consultation with the Service. The following consultations have been completed within the Action Area (**Table 6**).

Table 6. Activities for which consultation have been completed for sea turtles within the Action Area under the Endangered Species Act.

SPECIES LOGGERHEAD, GREEN, LEATHERBACK, AND KEMP'S RIDLEY SEA TURTLES	YEAR	IMPACT (Habitat/critical habitat/individuals)
LAKE POWELL EMERGENCY OPENING	1998-2008	1,500 ft
FEMA BEACH BERMS POST HURRICANE IVAN EMERGENCY CONSULTATION	2005	Walton Co. - 20 miles
WESTERN LAKE EMERGENCY OPENING	2006	0.5 mile
EASTERN LAKE EMERGENCY OPENING	2007	0.5 mile
FEMA FL STATEWIDE EMERGENCY BERMS PROGRAMMATIC	2008	50 miles

EFFECTS OF THE ACTION

Factors to be considered

The proposed beach nourishment project will occur within habitat that is used by sea turtles for nesting and may be constructed during a portion of the sea turtle nesting season. Long-term and permanent impacts could include a change in the nest incubation environment from the dune, berm, and beach fill project material. Short-term and temporary impacts to sea turtle nesting activities could result from project work occurring on the nesting beach during the active nesting or hatching period, changes in the physical characteristics of the beach from the placement of the dune, berm, and beach fill material and change in the nest incubation environment from the material.

Proximity of action: The beach nourishment project activities would occur directly in and adjacent to former and existing nesting habitat for sea turtles and dune habitats that ensure the stability and integrity of the GOM beaches in Walton County. Specifically, the project would potentially impact nesting and hatchling loggerhead, green, leatherback, and Kemp's ridley sea turtles.

Distribution: The beach nourishment project activities that may impact nesting and hatchling sea turtles would occur along 13.5 miles of beachfront along GOM shoreline of Walton County. Specifically, the project activities will cover the GOM beachfront between FDEP reference monuments R-41 and R-64, R-67 and R-72, R-78 and R-98, and R-105.5 and R-127 within Walton County.

Timing: The sea turtle nesting season for northwest Florida is considered to extend between May 1 and October 31. The timing of the beach nourishment project activities could directly and indirectly impact nesting and hatchling sea turtles when conducted between these times. Based on nesting survey data, the majority sea turtle nesting and hatching season on Walton County beaches occurs between mid May and early August.

Nature of the effect: The effects of the beach nourishment project activities may change nest environment and the nesting behavior of adult female sea turtles or diminish the nesting success, and change the behavior of hatchling sea turtles in future nesting seasons. Any decrease in productivity and/or survival rates would contribute to the vulnerability of the northwest Florida subpopulation of loggerhead sea turtles.

Duration: The beach nourishment project is a one-time activity and will take between 6 and 9 months to complete. Tentative plans are to begin the project in late 2008 or early 2009. Indirect effects from the activity may continue to impact nesting and hatchling sea turtles in subsequent nesting seasons.

Disturbance frequency: The northwest Florida loggerhead sea turtle nesting population may experience decreased nesting success, hatching success and hatchling emergence in the Action Area during subsequent nesting seasons.

Disturbance intensity and severity: Depending on the timing of the sand placement activities during sea turtle nesting season, effects to the loggerhead could be important. As noted in the "Status of the Species," the northern loggerhead subpopulation has experienced a long-term decline. Additional losses will likely result in additional declines. The significance of sea turtle nesting in northwest Florida to the conservation of the U.S. population of green, leatherback or Kemp's ridley sea turtles is unknown.

Analyses for effects of the action

The effects of the beach nourishment project include impacts associated with the project construction and maintenance within the Action Area. The construction would have short-term impacts while the presence of the nourished beach would have long-term impacts.

Beneficial effects

The placement of sand on a beach with reduced dry fore-dune habitat may increase sea turtle nesting habitat if the placed sand is highly compatible (i.e., grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project. In addition, a nourished beach that is designed and constructed to mimic a natural beach system may be more stable than the eroding one it replaces, thereby benefiting sea turtles.

Through many years of research, it has been documented that beach nourishment can have adverse effects on sea turtle adults and hatchlings. Results of monitoring of sea turtle nesting and beach nourishment activities provide additional information on how sea turtles respond to nourished beaches, minimization measures, and other factors that influence nesting, hatching, and emergence success. Science-based information on sea turtle nesting biology and review of empirical data on beach nourishment monitoring is used to manage beach nourishment activities to eliminate or reduce impacts to nesting and hatchling sea turtles so that beach nourishment can be accomplished (**Table 7**). Measures can be incorporated pre-, during, and post-construction to reduce impacts to sea turtles. Because of the long history of beach nourishment activity in Florida, it is not necessary to require studies on each project beach to document those effects each time.

Table 7. Effects of beach nourishment on sea turtles and minimization measure.

FACTOR	POST CONSTRUCTION	SEA TURTLE BEHAVIOR	MINIMIZATION		
			PRE	DURING	POST
Profile	Scarps Nest site selection Hatchling orientation	Shift nests seaward Misorientation landward than seaward	Design	Implement	Reconfigure Natural reworking
Elevation	Nest site selection Unnatural profile Disorientation	Shift nests seaward	Design	Implement	Natural reworking
Barriers - physical and visual	Scarps	Abort nesting	Design	Implement	Reconfigure Natural reworking
Substrate	Compaction Cementation Color	Abort nesting, Barrier to hatching Change in incubation length/sex ratio	Material quality	QA/QC Plan Limit equipment driving over beach fill	Tilling
Lights	Landward development	Confusion of adults Dis- and mis-orientation of hatchlings	Install Wildlife Lighting	Stop gap, lights off during times of nest hatching	Install Wildlife Lighting

Direct effects

Direct effects are those direct or immediate effects of a project on the species or its habitat. Placement of sand on a beach in and of itself may not provide suitable nesting habitat for sea turtles. Although beach fill/nourishment may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Nourishment during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, and/or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about 7 percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder 1994). The project is planned to occur outside of the sea turtle nesting season and minimize direct impacts to nesting and hatchling sea turtles. However, there is the possibility that the project schedule may be delayed because of weather, mechanical breakdowns or other reasons that may result in the project being constructed in a portion of the sea turtle nesting season.

1. *Nest relocation*

Besides the potential for missing nests during a nest relocation program, there is a potential for eggs to be damaged by nest movement or relocation, particularly if eggs are not relocated within 12 hours of deposition (Limpus et al. 1979). Nest relocation can have adverse impacts on incubation temperature (and hence sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence (Limpus et al. 1979; Ackerman 1980; Parmenter 1980; Spotila et al. 1983; McGehee 1990). Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard et al. 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard et al. 1985), hatchling size (Packard et al. 1981; McGehee 1990), energy reserves in the yolk at hatching (Packard et al. 1988), and locomotory ability of hatchlings (Miller et al. 1987).

In a 1994 Florida study comparing loggerhead hatching and emergence success of relocated nests with *in situ* nests, Moody (1998) found that hatching success was lower in relocated nests at 9 of 12 beaches evaluated. In addition, emergence success was lower in relocated nests at 10 of 12 beaches surveyed in 1993 and 1994. If the project is constructed outside the nesting season, relocation of sea turtle nests would not be needed. Thus, direct impacts to sea turtles from nest relocation would be avoided. However, there is the possibility that the project schedule may be delayed because of weather, mechanical breakdowns or other reasons that may result in the project being constructed in a portion of the sea turtle nesting season.

2. *Equipment*

The placement of pipelines and the use of heavy machinery on the beach during a dune, berm, and beach fill project may also have adverse effects on sea turtles. They can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure. The project is expected to be conducted outside the sea turtle nesting season. Thus, the severity of the direct impacts would be minimized. However, there is the possibility that the project schedule may be delayed because of weather, mechanical breakdowns or other reasons that may result in the project being constructed in a portion of the sea turtle nesting season.

3. *Artificial lighting*

Visual cues are the primary sea-finding mechanism for hatchling sea turtles (Mrosovsky and Carr 1967; Mrosovsky and Shettleworth 1968; Dickerson and Nelson 1989; Witherington and Bjorndal 1991). When artificial lighting is present on or near the beach, it can misdirect hatchlings once they emerge from their nests and prevent them from reaching the ocean (Philibosian 1976; Mann 1977; FWC sea turtle disorientation database). In addition, a significant reduction in sea turtle nesting activity has been documented on beaches illuminated with artificial lights (Witherington 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest, misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings from adjacent non-project beaches. Any source of bright lighting can profoundly affect the orientation of hatchlings, both during the crawl from the beach to the ocean and once they begin swimming offshore. Hatchlings attracted to light sources on dredging barges may not only suffer from interference in migration, but may also experience higher probabilities of predation to predatory fishes that are also attracted to the barge lights. This impact could be reduced by using the minimum amount of light necessary (may require shielding) or low pressure sodium lighting during project construction.

The newly created wider and flatter beach berm exposes sea turtles and their nests to lights that were less visible, or not at all visible, from nesting areas before the beach nourishment. Review of over ten years of empirical information from beach nourishment projects indicates that the number of sea turtles impacted by lights increases on the post-construction berm. A review of selected nourished beaches in Florida (South Brevard, North Brevard, Captiva Island, Ocean Ridge, Boca Raton, Town of Palm Beach, Longboat Key, and Bonita Beach) indicated disorientation reporting increased by approximately 300% (± 282 std. dev.) the first nesting season after project construction and up to 542% (+ 872 std. Dev.) the second year compared to pre-nourishment reports (Trindell et al. 2005) (**Figure 12)**.

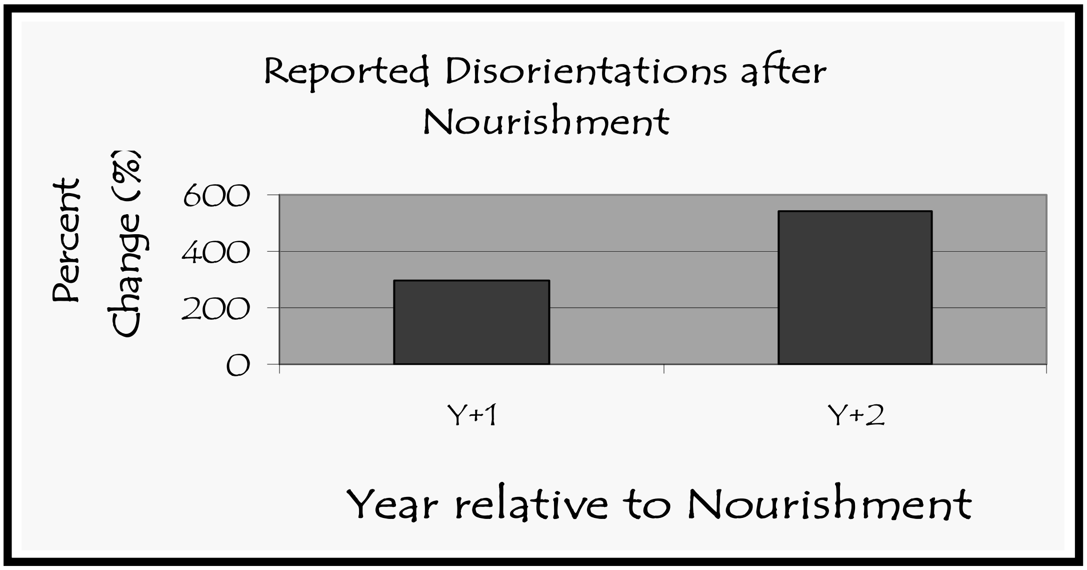

Figure 12. **Reported disorientations from seven nourished beaches compared to pre-nourishment.**

Specific examples of increased lighting disorientations after a beach nourishment project include Brevard and Palm Beach counties, Florida. A nourishment project in Brevard County, completed in 2002, showed an increase of 130 percent in disorientations in the nourished area. Disorientations on beaches in the County that were not nourished remained constant (R. Trindell, pers. comm. 2007). This same result was also documented in 2003 when another beach in Brevard County was nourished and the disorientations increased by 480 percent (R. Trindell, pers. comm. 2007). Installing appropriate beachfront lighting is the most effective method to decrease the number of disorientations on any developed beach including nourished beaches.

A shoreline protection project was constructed at Ocean Ridge in Palm Beach County, Florida between August 1997 and April 1998. Lighting disorientation events increased after nourishment. In spite of continued aggressive efforts to identify and correct lighting violations in 1998 and 1999, 86 percent of the disorientation reports were in the nourished area in 1998 and 66 percent of the reports were in the nourished area in 1999 (Howard and Davis 1999).

While the effects of artificial lighting have not been specifically studied on each beach that is nourished in Florida, based on the experience of increased artificial lighting disorientations on other Florida beaches, impacts are expected to potentially occur on all nourished beaches statewide.

Changing to sea turtle compatible lighting can be easily accomplished at the local level through voluntary compliance or by adopting appropriate regulations. Of the 64 coastal counties in Florida, 17 have passed beachfront lighting ordinances in addition to 49 municipalities. Local governments have realized that adopting a lighting ordinance is the most effective method to address artificial lighting along the beachfront.

Indirect effects

Indirect effects are those effects that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Effects from the proposed beach nourishment project may continue to affect sea turtle nesting on the project beach and adjacent beaches in future years.

Many of the direct effects of the dune, berm, and beach fill project may persist over time and become indirect impacts. These indirect effects include increased susceptibility of relocated nests to catastrophic events, the consequences of potential increased beachfront development, changes in the physical characteristics of the beach, the formation of escarpments, and future sand migration.

1. *Increased susceptibility to catastrophic events*

Nest relocation may concentrate eggs in an area making them more susceptible to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater predation rates from both land and marine predators, because the predators learn where to concentrate their efforts (Glenn 1998; Wyneken et al. 1998). The timing of the project occurring within or outside the sea turtle nesting season would affect the severity of direct impacts to nesting and hatchling sea turtles.

2. *Increased beachfront development*

Pilkey and Dixon (1996) state that beach replenishment frequently leads to more development in greater density within shorefront communities that then require further replenishment or more drastic stabilization measures. Dean (1999) also notes that the very existence of a beach nourishment project can encourage more development in coastal areas. Following completion of a beach nourishment project in Miami during 1982, investment in new and updated facilities substantially increased tourism there (National Research Council 1995). Increased building density immediately adjacent to the beach often resulted as older buildings were replaced by much larger ones that accommodated more beach users. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures. Increased shoreline development may adversely affect sea turtle nesting success. Greater development may support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas (National Research Council 1990a), and can also result in greater adverse effects due to artificial lighting, as discussed above.

3. *Changes in the physical environment*

Beach nourishment may result in changes in sand density (compaction), beach shear resistance (hardness), beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson 1988a). These changes could result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings (Nelson and Dickerson 1987; Nelson 1988). The Florida Department of Environmental Protection will determine whether the dredged material to be placed on the beaches meet the State's criteria under 62B-41.007, Florida Administrative Code, for beach placement.

Beach nourishment projects create an elevated, wider and unnatural flat slope berm (beach). Sea turtles nest closer to the water the first few years after nourishment because of the altered profile (and perhaps unnatural sediment grain size distribution) (Ernest and Martin 1999; Trindell 2005) (**Figure 13**).

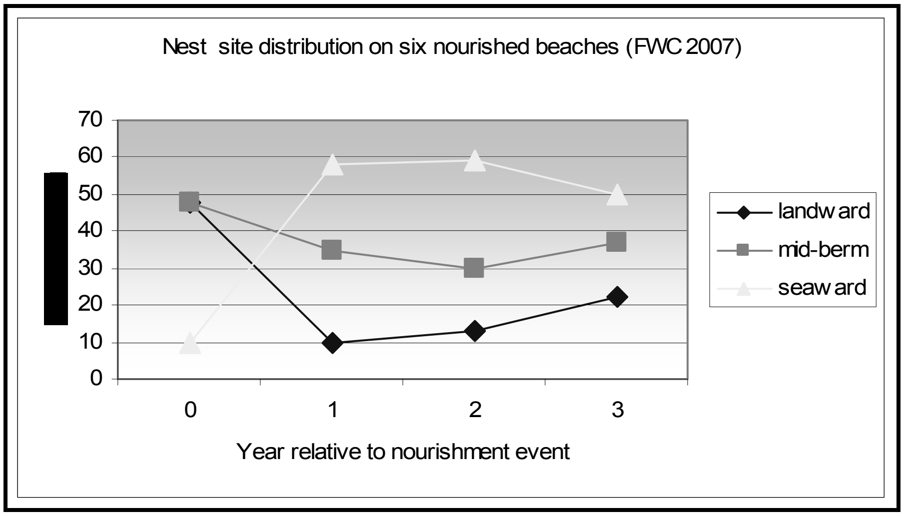

Figure 13. **Review of sea turtle nesting site selection following nourishment (Trindell 2005).**

Beach compaction and unnatural beach profiles that may result from beach nourishment activities could negatively impact sea turtles regardless of the timing of projects. Very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson et al. 1987; Nelson and Dickerson 1988a). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Fletemeyer 1980; Raymond 1984; Nelson and Dickerson 1987; Nelson et al. 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and also cause increased physiological stress to the animals (Nelson and Dickerson 1988b). Nelson and Dickerson (1988c) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

These impacts can be minimized by using suitable sand and by tilling compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain un-compacted for up to one year. Multi-year beach compaction monitoring and, if necessary, tilling would ensure that project impacts on sea turtles are minimized.

A change in sediment color on a beach could change the natural incubation temperatures of nests in an area, which, in turn, could alter natural sex ratios. To provide the most suitable sediment for nesting sea turtles, the color of the nourished sediments must resemble the natural beach sand in the area. Natural reworking of sediments and bleaching from exposure to the sun would help to lighten dark nourishment sediments; however, the timeframe for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

4. *Escarpment formation*

On nourished beaches, steep escarpments may develop along the water line interface as the beach adjusts from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center 1984; Nelson et al. 1987). These escarpments can hamper or prevent access to nesting sites (Nelson and Blihovde 1998). Researchers have shown that female turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (*e.g.*, in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

Species' response to the proposed action

The following summary illustrates sea turtle responses to and recovery from a nourishment project. A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on natural or pre-nourished beaches. This reduction in nesting success is most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics associated with the nourishment project (*e.g.*, beach profile, sediment grain size, beach compaction, frequency and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on untilled, hard-packed sands increases significantly relative to natural and background conditions. However, tilling is effective in reducing sediment compaction to levels that did not significantly prolong digging times. As natural processes reduced compaction levels on nourished beaches during the second post-construction year, digging times returned to background levels (Ernest and Martin 1999; Crain et al. 1995; Trindell et al. 2000).

During the first post-construction year, nests on nourished beaches are deposited significantly seaward of the toe of the dune and significantly landward of the tide line than nests on natural beaches. As the width of nourished beaches decreased during the second year, nest placement diminishes. More nests are washed out on the wide, flat beaches of the nourished treatments than on the narrower steeply sloped beaches of the non-nourished areas. This phenomenon may persist through the second post-construction year monitoring and resulting from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping, occurred as the beach equilibrated to a more natural contour.

The principal effect of nourishment on sea turtle reproduction is a reduction in nesting success during the first year following project construction. Although most studies have attributed this phenomenon to an increase in beach compaction and escarpment formation, Ernest and Martin (1999) indicated that changes in beach profile may be more important. Regardless, as a nourished beach is reworked by natural processes in subsequent years and adjusts from an unnatural construction profile to a more natural beach profile, beach compaction and the frequency of escarpment formation decline, and nesting and nesting success return to levels found on natural beaches.

CHOCTAWHATCHEE 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). The taxonomic validity of the beach mouse subspecies came into question when three of the Gulf Coast subspecies, CBM, Alabama Beach Mouse (ABM), and Perdido Key beach mouse (PKBM) were proposed for listing (1984-1985). Two unpublished letters (Dawson 1983; Griswold undated) were submitted to the Service for consideration in response to the proposed listing. The conclusion reached by these authors was that three of the beach mouse subspecies did not differ sufficiently from inland populations to warrant their recognition as subspecies. Close consideration of the Dawson and Griswold unpublished papers by Service biologists determined that neither paper constituted completed studies. Furthermore, Dawson clearly expressed the need for further taxonomic studies to adequately answer the questions concerning subspecific taxonomy of beach mice. To date, Bowen's work is the latest published comprehensive review of beach mice and is the taxonomy on which the Service continues to rely.

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). 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 (VanZant 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. Five subspecies of the beach mice live along the Gulf coast of Alabama and northwestern Florida.

Rivers and various inlets bisect the Gulf beaches and isolate habitats in which the beach mice live. Where populations are not separated by water, human development may have fragmented the ranges of the subspecies. 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. A consequence of coastal development and the dynamic nature of the coastal environment, beach mouse populations are generally comprised of various disjunct populations.

The CBM was listed with the PKBM and ABM as endangered species under the Act in 1985 (50 FR 23872). The PKBM is also listed as an endangered species by the State of Florida. Critical habitat was designated for the CBM, PKBM, and the ABM at the time of listing (50 Code of Federal Regulations [CFR] § 17.95, 50 FR 23872), and revised October 12, 2006 (71 FR 60238).

Since the listing of the CBM, research has refined previous knowledge of beach mouse habitat requirements and factors that influence their use of habitat. Based on our current knowledge of the life history, biology, and ecology of the species and the requirements of the habitat to sustain the essential life history functions of the species, we have determined that the PKBM critical habitat primary constituent elements include:

1. A contiguous mosaic of primary, secondary and scrub vegetation and dune structure, with a balanced level of competition and predation and few or no competitive or predaceous nonnative species present, that collectively provide foraging opportunities, cover, and burrow sites.

2. Primary and secondary dunes, generally dominated by sea oats, that, despite occasional temporary impacts and reconfiguration from tropical storms and hurricanes, provide abundant food resources, burrow sites, and protection from predators.

3. Scrub dunes, generally dominated by scrub oaks, that provide food resources and burrow sites, and provide elevated refugia during and after intense flooding due to rainfall and/or hurricane induced storm surge.

4. Functional, unobstructed habitat connections that facilitate genetic exchange, dispersal, natural exploratory movements, and recolonization of locally extirpated areas.

5. A natural light regime within the coastal dune ecosystem, compatible with the nocturnal activity of beach mice, necessary for normal behavior, growth and viability of all life stages.

We have designated critical habitat on lands that have been determined to be essential to the conservation of the CBM. An area is considered essential if it possesses one or more of the primary constituent elements and the following characteristics: (1) supports a core population of beach mice; (2) was occupied by CBM at the time of listing; (3) is currently occupied by the beach mouse and is an area essential to the conservation of the species because it represents an existing population needed for conservation. Five units were designated as critical habitat for the CBM consisting of 2,404 acres in Okaloosa, Walton, and Bay Counties, Florida (**Figure 14 and Table 8**).

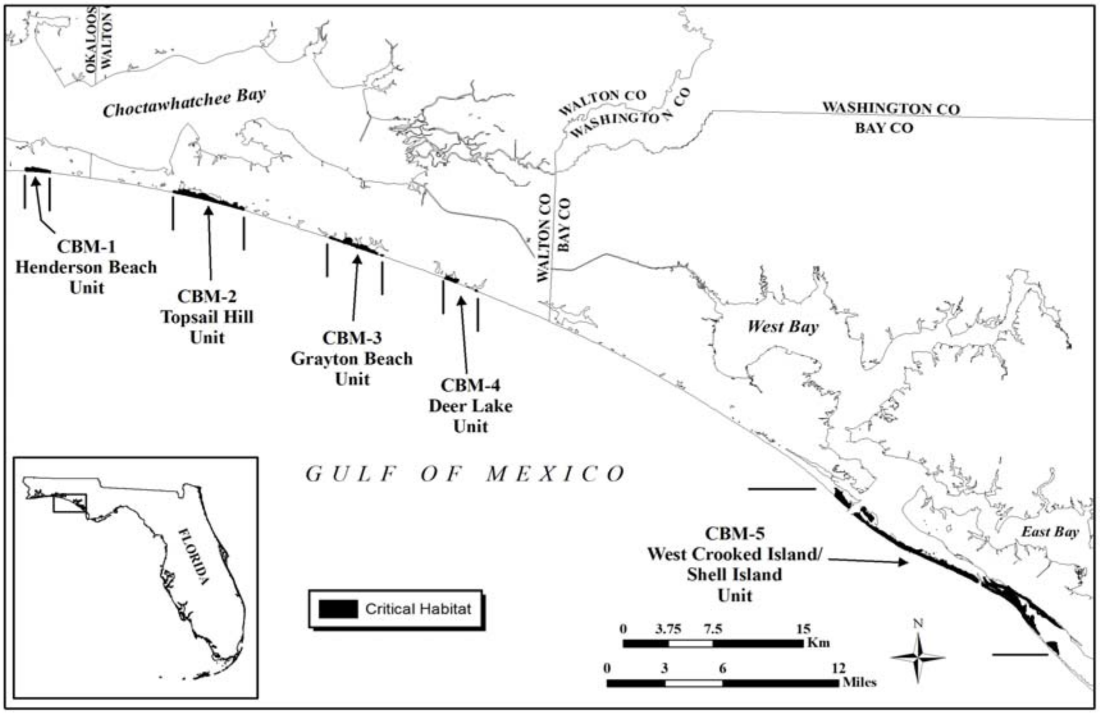

Figure 14. Critical habitat units designated for the Choctawhatchee beach mouse.

Table 8. Critical habitat units designated for the Choctawhatchee beach mouse.

Choctawhatchee Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. Henderson Beach Unit	0	96	0	96
2. Topsail Hill Unit	0	277	31	308
3. Grayton Beach Unit	0	162	17	179
4. Deer Lake Unit	0	40	9	49
5. W. Crooked Island/Shell Island Unit	1333	408	30	1771
Total	1333	982	87	2404

The Henderson Beach unit (CBM–1) consists of 96 acres in Okaloosa County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Henderson Beach State Park from 0.5 mi east of the intersection of Highway 98 and Scenic Highway 98 to 0.25 mi west of Matthew Boulevard and the area from the mean high water line (MHWL) north to the seaward extent of the maritime forest. This westernmost unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3). This unit is within the historic range of the subspecies; however, it was not known to be occupied at the time of listing and current occupancy is unknown because no recent efforts have been made to document beach mouse presence or absence. Because this unit includes protected, high-elevation scrub habitat, it may serve as a refuge during storm events and as an important source population if storms extirpate or greatly reduce local populations or populations to the east.

This unit is managed by the Florida Park Service and is essential to the conservation of the species. Threats specific to this unit that may require special management considerations include habitat fragmentation, Park development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The Topsail Hill Unit (CBM–2) consists of 308 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Topsail Hill Preserve State Park, as well as adjacent private lands from 0.1 mile east of the Gulf Pines subdivision to 0.6 mi west of the inlet of Oyster Lake and the area from the MHWL north to the seaward extent of human development or maritime forest. This unit provides primary, secondary, and scrub dune habitat and possesses all five PCEs. Its large, contiguous, high-quality habitat allows for natural movements and population expansion. CBM were confirmed present in the unit in 1979 (Humphrey 1992a), were present at the time of listing, and are still present. Beach mice have been captured on Stallworth County Park and Stallworth Preserve subdivision, a private development within the unit, east of the Park (Service 2003a). The population of CBM inhabiting this unit appears to harbor unique genetic variation and displays a relatively high degree of genetic divergence considering the close proximity of this population to other populations (Wooten and Holler 1999).

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include Park and residential development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the HCP for the Stallworth County Preserve (4 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act.

The Grayton Beach Unit (CBM–3) consists of 179 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Grayton Beach State Park, as well as adjacent private lands and inholdings, from 0.3 mi west of the inlet of Alligator Lake east to 0.8 mi west of Seagrove Beach and the area from the MHWL north to the seaward extent of human development or maritime forest. This unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3), habitat connectivity (PCE 4) and is essential to the conservation of the species. This unit also provides a relatively natural light regime (PCE 5). Beach mice were not detected in the unit in 1979 (Holler 1992); however, they were found to be present in 1995 after Hurricane Opal (Moyers et al. 1999). While it seems likely that beach mice were present at the time of listing (and may have been present, but not detected, in 1979), we do not have data to confirm this assumption. Therefore, we consider this unit to be unoccupied at the time of listing. A program to strengthen and reestablish the population began in 1989 and yielded a persistent population at the State Park. Recent evidence of beach mice on State Park land was documented in 2004 (Service 2004). Beach mice are also known to currently occupy the private lands immediately east of the park.

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include hurricane impacts that may require dune restoration and revegetation, excessive open, unvegetated habitat due to recreational use or storm impacts that may require revegetation, Park development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the HCP for the Watercolor development (4 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act.

The Deer Lake Unit (CBM–4) consists of 49 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Deer Lake State Park as well as adjacent private lands from approximately 1 mi east of the Camp Creek Lake inlet west to approximately 0.5 mi west of the inlet of Deer Lake and the area from the MHWL north to the seaward extent of maritime forest or human development. This unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3), habitat connectivity to adjacent lands (PCE 4), and is essential to the conservation of the species. This unit also provides a relatively natural light regime (PCE 5). Because live-trapping efforts in this area have been limited to incidental trapping, and beach mice were not detected in 1998 (Auburn University 1999), we consider this unit to be unoccupied at the time of listing. CBM were translocated from Topsail Hill Preserve State Park to private lands adjacent to this unit in 2003 and 2005 (Service 2003b, 2005a, 2005b, 2005c, 2005d). Tracking within the adjacent State park lands have indicated expansion of the population into the park.

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the HCP for Watersound (71 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act (see Application of Section 4(a)(3) and Exclusions Under Section 4(b)(2) of the Act section below). This excluded area is 0.5 mi west of the Camp Creek Lake inlet to 0.5 mi east of the Camp Creek Lake inlet.

The West Crooked Island/ Shell Island Unit (CBM–5) consists of 1,771 acres in Bay County, Florida. This unit encompasses essential features of beach mouse habitat within the boundaries of St. Andrew State Park mainland from 0.1 mile east of Venture Boulevard east to the entrance channel of St. Andrew Sound, Shell Island east of the entrance of St. Andrew Sound east to East Pass, and West Crooked Island southwest of East Bay and east of the entrance channel of St. Andrew Sound, and areas from the MHWL north to the seaward extent of the maritime forest. Shell Island consists of State lands, Tyndall AFB lands, and small private inholdings. CBM were known to inhabit the majority of Shell Island in 1987 (Holler 1992b) and were again confirmed present in 1998 (Auburn University 1999), 2002, and 2003 (Lynn 2004). Because beach mice inhabited nearly the entire suitable habitat on the island less than two years prior to listing and were reconfirmed after listing, we consider this area to be occupied at the time of listing. The West Crooked Island population is the result of a natural expansion of the Shell Island population after the two islands became connected in 1998 and 1999, a result of Hurricanes Opal and Georges (Service 2003b). Shell Island was connected to the mainland prior to the 1930s when a navigation inlet severed the connection on the western end. Beach mice were documented at St. Andrew State Park mainland as late as the 1960s (Bowen 1968), though no records of survey efforts exist again until Humphrey and Barbour (1981) and Meyers (1983) at which time beach mice were not detected. Therefore, it seems likely that this area was not occupied at the time of listing. Current beach mouse population levels at this site are unknown, and live-trapping to document the absence of mice has not been conducted. Similar to the original designation, this Park was designated as critical habitat because it has features essential to the CBM. It is also within the historic range of the mouse. This unit supports the easternmost population of CBM, with the next known population 22 miles to the west.

This unit provides primary, secondary, and scrub dune habitat and possesses all five PCEs. Portions of this unit are managed by the Florida Park Service, while the remaining areas are federally (Tyndall AFB) and privately owned. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high residential or recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

<u>Historic Range</u>

The historic range of the CBM extended 53 miles between the Destin Pass, Choctawhatchee Bay in Okaloosa County and East Pass in St. Andrew Bay, Bay County in Florida (**Figure 15**).

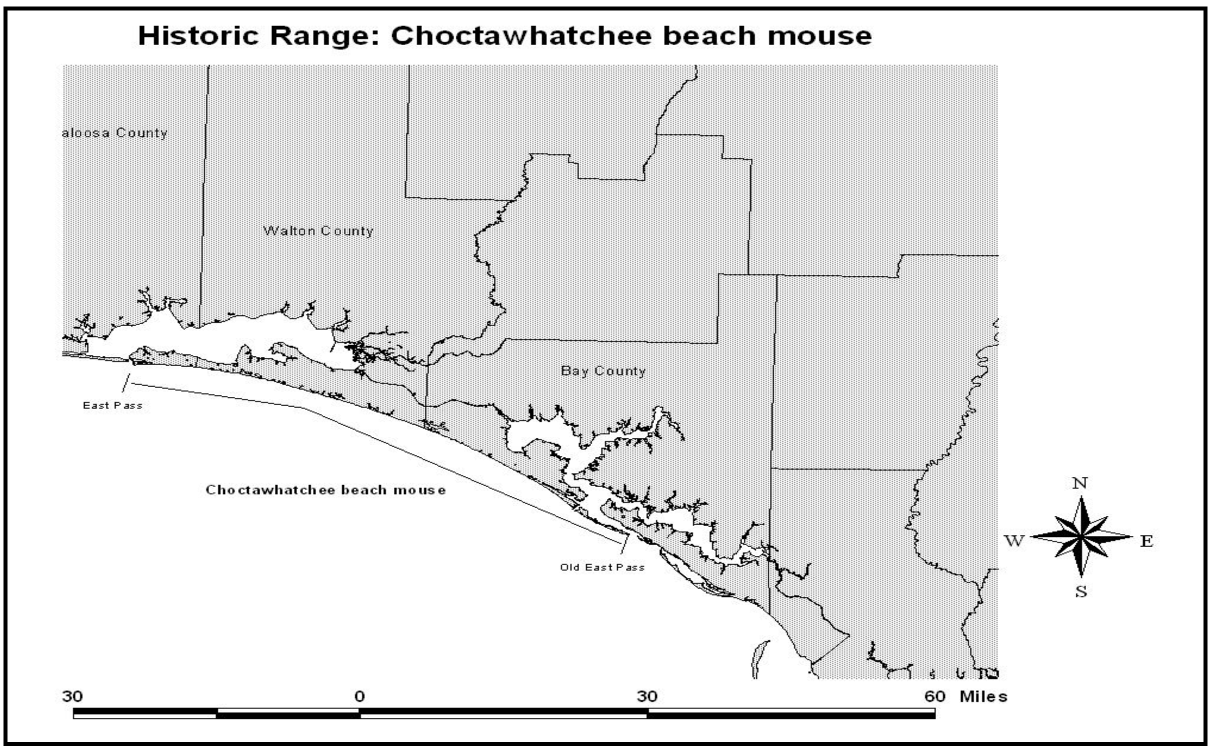

Figure 15. Historic range of the Choctawhatchee Beach Mouse.

Life history

All beach mice are differentiated from the inland subspecies because of a 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).

CBM have head and body lengths ranging from 2.7 to 3.5 inches (Holler 1992a). This beach mouse is distinctly more orange-brown to yellow-brown than the other Gulf coast beach mouse subspecies (Bowen 1968). Pigmentation on the head either extends along the dorsal surface of the nose to the tip, or ends posterior to the eyes leaving the cheeks white. A dorsal tail stripe is either present or absent.

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 (60 cm to 90 cm), and the escape tunnel rises from the nest chamber to within 9.8 inches (2.5 cm) of the surface (Blair 1951). Nests of beach mice are constructed in the nest chamber of their burrows, a spherical cavity about 4 to 6 cm 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 2000; Sneckenberger 2001). A shortage of potential burrow sites is considered to be a possible limiting resource.

Like other beach mice, CBM are nocturnal and forage for food throughout the dune system. Beach mice feed primarily upon seeds and fruits, but have been shown to prey on insects (Moyers 1996). In most cases, seeds and fruits consumed by PKBM are either produced by low-growing, prostrate plants, or become available as fallen seeds (Moyers 1996). Beach mice appear to forage on food items based on availability and have shown no preferences for particular seeds or fruits (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.

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.

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 2000). 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 (Kaufman and Kaufman 1987). Littering intervals may be as short as 26 days (Bowen 1968). Peak breeding season for 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).

Apparent survival rate estimates (products of true survival and site fidelity) of beach mice along the Gulf coasts of Florida and Alabama have demonstrated that their average life span is about nine months (Swilling 2000). Other research indicated that 63 percent of Alabama beach mice lived (or remained in the trapping area) for four months or less, 37 percent lived five months or greater and 2 percent lived 12 to 20 months (Rave and Holler 1992). Less than half (44 percent) of beach mice captured for the first time were recaptured the next season (Holler et al. 1997). Greater than ten percent of mice were recaptured three seasons after first capture, and four to eight percent were recaptured more than one year after initial capture. Beach mice held in captivity have lived three years or more (Blair 1951; Holler 1995).

Habitat and Movement

Beach mice inhabit coastal dune ecosystems on the Atlantic and Gulf coasts of Florida and the Gulf coast of Alabama. The dune habitat is generally categorized as: primary dunes (characterized by sea oats and other grasses), secondary dunes (similar to primary dunes but also frequently include such plants as woody goldenrod, false rosemary), and interior or scrub dunes (often dominated by scrub oaks and yaupon holly). 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.

Two main types of movement have been identified for small mammals: within home-range activity and long-range dispersal. Such movements are influenced by a suite of factors, such as availability of mates, predation risk, and habitat quality. Movement and home range studies have been conducted for most beach mouse subspecies, but are limited to natural habitat (i.e., research has been conducted on public lands within contiguous beach mouse habitat, not within a development or in a fragmented landscape). Studies of the home range size of beach mice (using trapping and telemetry data) have yielded estimates of 1 to 5 acres (Novak 1997; Lynn 2000). Individual beach mice have been observed traveling extensive distances (several hundreds to thousands of feet up to a mile) during one night (Swilling et al. 1998; Lynn 2000; Moyers and

Shea 2002). Beach mice have also been documented crossing two-lane roads within public lands (Gore and Schaefer 1993; Service 2004).

Significant seasonal differences in the movement of ABM have been found, which may be a result of seasonal fluctuations in food availability, food quality, and nutritional needs (Sneckenberger 2001). Santa Rosa beach mice demonstrated an increase in movement as habitat isolation increased suggesting that longer travel distances were needed to obtain necessary resources (Smith 2003). Santa Rosa beach mice also preferred vegetative cover and connectivity, which is likely a behavioral response to increased predation risk in open areas. Thus, while beach mice are able to travel great distances, the travel pathways should have vegetated cover and only a few large gaps or large open areas. Previous connectivity research suggests critical thresholds exist for species persistence in fragmented landscapes (With and Crist 1995). As connectivity becomes more reduced, species ability to move through and between habitats is reduced in a nonlinear fashion.

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 relatively standardized scientific methods, common to the study of small mammals. The basic census method for beach mice involves mark-recapture by live trapping. Mice are captured at night in live traps placed along lines or grids. Each captured animal is checked to determine if it has been captured for the first time (unmarked) or if it is a recapture (marked). A five-night minimum trapping period has been standard practice since 1987 for Gulf Coast beach mice. Data from such surveys have been analyzed using various methods with differing degrees of accuracy and bias, as number of individuals captured, minimum number known alive, number captured per 100 trap nights, or a mathematically modeled statistical population estimate (program CAPTURE, Otis et al. 1978) (**Table 9)**. As the referenced trapping events were not designed similarly or using a standardized sampling techniques, data should not compared between subspecies or trapping events, nor should densities (mice per 100 trap nights) be inferred beyond the trapping area during that trapping session. Additionally, tracking tubes have recently been used to estimate the distribution of beach mice within an area.

Table 9. Beach mouse trapping sessions and population density estimates.

Subspecies	Location	Reference	Dates of trapping	Number of mice per 100 trap nights	Range (mice per 100 trap nights)
CBM	Shell Island	Humphrey and Barbour (1981)	1979	8.60	NA
CBM	Shell Island	Meyers (1983)	1982	3.20	NA

Subspecies	Location	Reference	Dates of trapping	Number of mice per 100 trap nights	Range (mice per 100 trap nights)
CBM	Shell Island	Moyers et al. (1999)	1996	9.11	5.33 - 15.33
CBM	Topsail Hill Preserve State Park	Moyers et al. (1999)	1995 - 1998	0.68	0.23 - 2.21
CBM	Grayton Beach State Park - central unit	Moyers et al. (1999)	1995 - 1998	1.87	0.67 - 2.13
CBM	Shell Island		2002	1.06	NA
CBM	West Crooked Island Tyndall AFB	Lynn (2002a)	2002	0.72	0.13 - 1.86
CBM	Topsail Hill Preserve	Lynn (2002a, b)	2002	0.89	0.7 - 1.08
CBM	WaterSound	St. Joe Company (2004)	2003	1.66	1.66
CBM	WaterColor	St. Joe Company (2004)	2003	0	NA
CBM	WaterColor	St. Joe Company (2005)	2004	0	NA
CBM	WaterSound	St. Joe Company (2005)	2004	0	NA
CBM	Topsail Hill Preserve	US FWS (2005a, b, c)	2005	2.35	0.9 – 4.5
CBM	WaterColor	St. Joe Company (2006)	2005	0	NA
CBM	WaterSound	St. Joe Company (2006)	2005	0	NA
CBM	Topsail Hill Preserve	US FWS (2006)	2006	1.75	1.75
CBM	Topsail Hill Preserve	US FWS (2006)	2006	0	NA
CBM	WaterSound	St. Joe Company (2006)	2006	4.7	4.5 - 4.8

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 mice 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.

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. Tropical storms and drought may be associated with depressed beach mouse populations, perhaps resulting from elimination of habitat and food supply reduction. 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).

Population stability

Population viability analysis (PVA) is essentially a demographic modeling exercise to predict the likelihood a population will continue to exist over time (Groom and Pascual 1997). The true value in using this analytical approach is not to determine the probability of a species' extinction, but to clarify factors that have the most influence on a species' persistence. From 1996 to 1999, the Service's Panama City Florida Field Office funded Auburn University to develop PVAs for two PKBM and two ABM subpopulations (Holler et al. 1999; Oli et al. 2001). The subpopulations modeled consisted of two subpopulations of PKBM, one at GUIS-Perdido Key Area and one at Gulf State Park - Florida Point, and two subpopulations of ABM, one at Bon Secour NWR and one at Ft. Morgan State Park. They used a stochastic (random) differential equation (Wiener-drift) model, applied to long term demographic data. The model is "stochastic" because it incorporates the variable effects of the environment upon population change. However, it did not model the effects of hurricanes on the habitat or population of beach mice.

The Oli et al. (2001) analyses indicated that all four subpopulations were at risk of extinction, with habitat fragmentation as the most influential factor. The GUIS-Perdido Key Area has the highest risk for extinction; the PKBM had a 100 percent chance of reaching one individual (becoming functionally extinct) within 21 (mode) or 45 (median) years. At Gulf State Park - Florida Point, the PKBM had a low risk of becoming functionally extinct (1.3 percent) within 13 to 20 years. However, following Hurricane Opal in 1995 and subsequent predation pressure, the PKBM population at Florida Point was believed to be extirpated in 1998. This localized extirpation clearly demonstrates that while PVAs are useful in determining significant factors in species survival, they have limited use in predicting the time to extinction for a given species.

More recently, the Conservation Breeding Specialist Group (Traylor-Holzer 2004, 2005, 2006) was contracted by the Service to conduct a population and habitat viability analysis (PHVA) on

ABM using the Vortex population simulation model (Lacy 1993). The goal was to develop an ABM population model and use the model to assess the status of the ABM habitat and populations and projections for continued existence. This model, unlike the earlier one, includes the potential effects of hurricanes. The PHVA results project the ABM to have a 26.8% ± 1.0% likelihood of extinction over the next 100 years. Much of this risk is due to hurricane impacts on ABM populations and habitat which can result in population declines. The model suggests that hurricanes are a driving force for ABM populations, both directly and also indirectly as their impacts interact with other factors, including development of higher elevation (scrub) habitat and predation by cats. Due to the similarities in the subspecies and proximal location, it can be inferred that these factors also have a strong influence on the persistence of beach mouse populations. (Again, when reviewing PHVA results, it is crucial that the actual values for the risk of extinction are not the focus of the interpretation. The true value of a PHVA is the ability to compare management strategies and development scenarios, run sensitivity analyses, and determine the main influence(s) on population persistence.) The true value of a PHVA is the ability to compare management strategies and development scenarios, run sensitivity analyses, and determine the main influence(s) on population persistence). However, it is notable that a 5 to 10 percent chance of extinction in 100 years is considered high to very high (Shaffer 1981; IUCN 2001).

The Service contracted with The Georgia Cooperative Fish and Wildlife Research Unit to critique the PVAs for the ABM accomplished by Oli et al. (2001) and Conservation Breeding Specialist Group (Traylor-Holzer 2005). Conroy and Runge (2006) indicate that neither PVA provide reliable estimates of extinction probability for ABM. They recommended that future PVA work should incorporate sampling, temporal, and possibly spatial variance for input variables and should clearly and explicitly express uncertainty in extinction output. Until this can be done, reliable estimates of extinction probability for the ABM (and other beach mouse subspecies such as PKBM) cannot be estimated.

Species which are protected across their ranges have lower probabilities of extinction (Soulé and Wilcox 1980). Beach mouse populations naturally persist through local extirpations due to storm events or the harsh, stochastic nature of coastal ecosystems. Historically, these areas would be recolonized as population densities increase and dispersal occurs from adjacent populated areas. From a genetic perspective, beach mice recover well from population size reductions (Wooten 1994), given sufficient habitat is available for population expansion after the bottleneck occurs. As human development has fragmented the coastal dune landscape, beach mice can no longer recolonize along these areas as they did in the past (Holliman 1983). As a continuous presence of beach mice or suitable habitat along the coastline is no longer possible and any hurricane can impact the entire range of each subspecies, the probability of beach mice persisting would be enhanced by the presence of contiguous tracts of suitable habitat occupied by multiple independent populations (Danielson 2005). The history of the PKBM illustrates the need for multiple populations (a now extirpated population was the source of the two remaining populations of the subspecies) (Holler et al. 1989; Service 2006). While maintaining multiple populations of beach mouse subspecies provides protection from total loss (extinction), especially when migration and relocations are possible (Oli et al. 2001), conservation of each subspecies necessitates protection of genetic variability throughout their ranges (Ehrlich 1988). Preservation of natural populations is therefore crucial, as the loss of a population of beach mice can result in a permanent loss of alleles (Wooten et al. 1999). This loss of genetic variability cannot be regained through translocations or other efforts.

Status and distribution

The CBM was listed as an endangered species primarily because of the fragmentation, adverse alteration, and loss of habitat due to coastal development. This subspecies is assigned a high recovery priority because the degree of threat to its persistence is high, it is a subspecies with high level of taxonomic distinctness, and its potential for recovery is great if threats can be eliminated or minimized. Recovery of the CBM is in conflict with economic activities, a factor which further elevates its priority ranking.

The threat of development-related habitat loss continues to increase. Additional contributing factors include low population numbers, habitat loss from other causes (including hurricanes), predation (fox, coyotes, and cats), and competition by animals associated with human development (house mice), and regulatory weaknesses regarding coastal development.

Coastal development

Habitat loss and fragmentation associated with residential and commercial real estate development are important factors contributing to the endangered status of beach mice (Holler 1992; Humphrey 1992; James 1992; Stout 1992). Beachfront development along the Gulf coast of Florida began in the 1950s and continues to this day. 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). These factors, along with the influx of development-related predators such as the domestic cat and competition with house mice, probably caused the extinction of the Pallid beach mouse (Humphrey 1992).

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 or fragmented populations may experience severe declines or extirpation (Caughley and Gunn 1996). Contiguous tracts or functionally connected patches of suitable habitat are essential to the long-term conservation of beach mice.

CBM are now known to occupy approximately 15 miles of GOM beachfront; 12 of those miles are publicly owned lands. In the 1950s, the CBM was widespread and abundant at that time according to Bowen (1968). By 1979, Humphrey and Barbour (1981) reported only 40 percent of the original habitat remained undeveloped in non-contiguous areas. They also documented that the CBM had been extirpated from seven of its nine historical localities being restricted to the Topsail Hill area in Walton County and Shell Island in Bay County. In 1985 when the CBM became federally protected, CBM were still only known from the Topsail Hill area and Shell Island, an area consisting of about ten miles of coastline (50 FR 23872).

There are four sub-populations of CBM that currently exist: 1) Topsail Hill Preserve State Park (and adjacent eastern and western private lands), 2) Shell Island (includes St. Andrew State Park mainland and Shell Island with private inholdings and Tyndall Air Force Base), 3) Grayton

Beach (and adjacent eastern private lands), and 4) West Crooked Island. Approximately 96 percent of the lands known to be occupied by CBM are public lands.

Topsail Hill Preserve State Park consists of 1,637 acres of which 262 acres provide CBM habitat; the majority being occupied by CBM. The Florida Park Service prepared a Unit Management Plan for the Preserve that explicitly plans for conservation and protection of CBM habitats (FDEP 2000). Private lands on the east side consist of approximately 9.63 acres. Of that, 7 acres consist of the development known as the Stallworth Preserve. The Service issued an ITP for CBM to the Stallworth Preserve development in 1995; an amendment to the permit was issued in 1999. The remaining 2.63 acres has been purchased by Walton County with a grant from the Service. Private lands on the west side of the Preserve consist of 24 acres and include Four-Mile Village, a low density single family development, and the Coffeen Nature Preserve managed by the Sierra Club.

At Topsail Hill Preserve State Park, trapping conducted in March 2003 and March 2005 yielded a population estimate of 190 to 250 CBM (Service 2005d). From late 2006 through 2007 results of tracking tubes surveys at Topsail Hill Preserve State Park suggested that the CBM population was not densely distributed (FWC 2008). Trapping of four 100-trap transects yielded population estimates of 190, 250, <10 (too few to estimate), and 87 in 2003, 2005, 2006, and 2007 (Service 2007a). The track and trapping data together indicate that Topsail Hill Preserve State Park currently does not support a high population of beach mice. In 2003 and again in 2005, a total of 26 mice were translocated from Topsail Hill Preserve State Park to the WaterSound private development adjacent to Deer Lake State Park. Trapping has been sporadic on WaterSound but has yielded population estimates of 5 to 46 individuals in 2003 to 2007 (Moyers 2007). Deer Lake State Park has not been trapped, however tracks have been observed as recently as 2006 (FWC 2008).

Shell Island consists of lands within the St. Andrew State Park, Tyndall Air Force Base, and private lands. The Unit Management Plan for the State Park was completed in 1999. The plan identifies the need for protection and management of the CBM. Tyndall Air Force Base manages their portion of Shell Island under the installation's Integrated Natural Resources Management Plan. The Service has joined with the State Park and Tyndall AFB since 1995 by providing funding to protect and restore CBM habitats on Shell Island.

Population estimates using CAPTURE on Shell Island from February 1993 to March 1994, ranged from 105 to 338 CBM on a 23-acre study area (Novak 1997). Just prior to Hurricane Opal in 1995, it was estimated that Shell Island supported 800 to 1,200 CBM (Gore, FWC, personal communication 1999). Three years following Hurricane Opal in June 1998, one trapping effort at six different sites on Shell Island resulted in a cumulative population estimate of 195 CBM (164 CBM captured) (Moyers et al. 1999). The east portion of Shell Island has been trapped from 2000 to 2003. Population estimates have ranged between 24 and 67 CBM (Lynn 2004). In 1999, with the closing of East Pass and Shell Island connecting to West Crooked Island, CBM increased their range by approximately four miles (Lynn 2004). CBM are now known to occupy approximately 15 miles of Gulf of Mexico beachfront; 12 of the 15 miles are publicly owned lands.

The St. Andrew State Park mainland consists of 1,260 acres of which 123 acres are beach mouse habitat. Several tracking efforts looking for signs of CBM on the mainland were made between 1995 and 1998; no evidence was found that indicated the presence of the beach mouse (Moyers et al. 1996; Moyers et al. 1999). However, live-trapping to document the absence of the mouse has not been conducted. Reintroduction of this area is considered an action to support recovery of CBM.

The Grayton Beach sub-population consists of two units in Grayton Beach State Park. The Park is divided into a central and western unit and is currently connected by a narrow band of primary dunes. Total acreage of the Park is 2,236 acres with 153 acres providing suitable CBM habitat. The Unit Management Plan for the Park identified the protection of the CBM as an important component. The Park has requested and received funds from the Service to implement CBM habitat restoration and protection. Portions of private lands (WaterColor and Seaside developments) on the east side of the central unit are occupied by CBM or provide suitable habitat.

In 1989, a cooperative interagency effort reintroduced CBM onto the central and west units of Grayton Beach State Park increasing the occupied coastline by another mile (Holler and Mason 1989). Population estimates from trapping at Grayton Beach State Park (main unit) from 1995 to 2000, ranged from 25 to 116 CBM (Moyers et al. 1999; VanZant 2000). The central unit was trapped for 3 nights in August 2002; however, no mice were captured (Lynn 2002c). Limited tracking surveys were accomplished in 2003, 2004 and 2005 and beach mouse tracks were observed (Kovatch 2003; Toothacker 2004; FWC 2008). The western area, although it provides CBM habitat, has not been documented as occupied by CBM (Moyers et al. 1999; VanZant 2000). The population estimates for the WaterColor development for the two years prior to and one year following development ranged from 3 to 7 CBM (The St. Joe Company 1999). CBM were last captured in February of 2001 at WaterColor; quarterly trapping has continued on the site through mid-2008 without CBM being captured (St. Joe/Arvida 2003).

West Crooked Island consists of 1,558 acres of which 730 acres provide CBM habitat and remains occupied by CBM (Lynn 2004). The West Crooked Island sub-population resulted from its connection to Shell Island in 1998 -1999. The construction of the St. Andrew Pass navigation inlet in the early 1930s severed Shell Island from the mainland on its western end. Since then, the original pass, East Pass (or Old Pass) began to close. After passage of Hurricane Opal in 1995, East Pass temporarily closed and reopened; however, after passage of hurricanes Earl and Georges in 1998, the pass closed (Coastal Tech 1999; Middlemas1999). CBM dispersed onto West Crooked Island from Shell Island colonizing most of the island within two years (Lynn 2004). Auburn University trapped West Crooked Island in October 2000, and the Service trapped the area in 2001 to 2003. The population estimate ranged from a low of 174 to a high of 244 CBM (Lynn 2004). East Pass was reopened as a joint venture between Tyndall Air Force Base and Bay County in December of 2001 but has since closed again.

Recovery criteria

The Recovery Plan for the CBM, PKBM, and ABM (Service 1987) identifies the primary recovery objectives to be the stabilization of present populations by preventing further habitat deterioration, and the re-establishment of populations in areas where they were extirpated. For each of the subspecies to be considered for downlisting to threatened, it is required that there be a minimum of at least three distinct self-sustaining populations in designated critical habitat with at least 50 percent of the critical habitat being protected and occupied by beach mice (Service 1987).

While this is the currently approved Recovery Plan for the three beach mouse subspecies, studies and research since the Recovery Plan publication has provided additional information concerning recovery needs for the subspecies. Protection and enhancement of existing populations and their habitat, plus reestablishment of populations in suitable areas within their historic ranges, are necessary for the subspecies survival and recovery. Core beach mouse populations remain isolated and are vulnerable to natural and anthropogenic factors that may further reduce or degrade habitat and/or directly reduce beach mouse population sizes. Maximizing the number of independent populations is critical to species survival. Protection of a single, isolated, minimally viable population risks the extirpation or extinction of a species as a result of harsh environmental conditions, catastrophic events, or genetic deterioration over several generations (Kautz and Cox 2001). To reduce the risk of extinction through these processes, it is important to establish multiple protected populations across the landscape (Soule and Simberloff 1986; Wiens 1996). Through the critical habitat designation process we are addressing this by designating five independent units for the subspecies spaced throughout its historic range, depending on the relative fragmentation, size, and health of habitat, as well as availability of areas with beach mouse primary constituent elements.

The Service completed a five-year status review of the Choctawhatchee and Perdido Key beach mice in August 2007 (Service 2007a, 2007b). For both subspecies the following is recommended: designate a beach mouse recovery coordinator, revise the Recovery Plan, accomplish habitat, population, and habitat improvement monitoring, and corridor persistence, hurricane response, and genetic studies, conduct translocations as necessary and education and outreach, complete an emergency response plan.

In accordance with the Act, the Service completes consultations with federal agencies (including ourselves) for actions that may adversely affect beach mice and their designated habitat. In Florida consultations have included military missions and operations, beach nourishment and other shoreline protection, and actions related to protection of coastal development (**Table 10**).

Table 10. Previous biological opinions within Florida that have been issued for projects that had adverse impact to CBM.

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
Stallworth Preserve Development	1995	7 acres
Navy Panama City Beach site 4 construction	2000	0.01 acre
East Pass Re-opening	2001	Temporary, indirect take
WaterColor and WaterSound Developments	2000	7.6 acres
FWS scientific collecting permit	2004-2005	1 beach mouse per 400 trap-nights per area
FEMA beach berms post hurricane Ivan emergency consultation	2005	Consultation not complete
Western Lake Reopening consultation	2006	2.7 acres annually for five years

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
Alligator Lake emergency Opening	2007	0.5 mile
Eastern Lake emergency opening	2007	0.5 mile
FEMA FL emergency berm programmatic	2007	75 miles

<u>Threats to Choctawhatchee beach mice</u>

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 1992; 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*) and corn snakes (*Elaphe guttata guttata*), pygmy rattlesnake (*Sistrurus miliarius*), and 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; VanZant 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 and shorebird nests/young 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 are known to affect beach mouse population densities in various habitats. Mechanisms for 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.

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). Five months post-storm, "densities (individuals/km) were up to 7.5 times greater in scrub areas than in frontal dune grids" (Sneckenberger 2001). 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). Similar results were found 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 (Moyers et al. 1999). 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, the average 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 (Swilling et al. 1998). The average for the three trapping periods immediately following was even higher, at 42.7 percent of the individuals captured. This increased presence of new individuals reflected increased reproduction (Swilling et al. 1998). 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). Similar results were also found at Topsail Hill Preserve State Park. Four to five months following Hurricane Opal, all female CBM captured were pregnant or lactating (Moyers et al. 1999). Trapping six months after the hurricane, 52 percent of captured CBM were new unmarked beach mice.

Although hurricanes can significantly alter CBM 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. Hurricanes may function to break up population subgroups and force population mixing (Holler et al. 1999). The resultant breeding between members of formerly isolated subgroups increases genetic heterogeneity and could decrease the probability of genetic drift and bottlenecks.

Genetic viability

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).

In 1995, the Service contracted with Auburn University to conduct genetic analysis in CBM (Wooten and Holler 1999) of: 1) post-re-establishment gene structure in CBM; 2) if feasible, the historical relationship of St. Andrews Beach Mouse (SABM) from Crooked Island relative to CBM from Shell Island and SABM from St. Joseph Peninsula.

Results of the work found: 1) founder effects were observed in the Grayton Beach population (fixation of alleles common to the donor population and allele frequency shifts); 2) incongruity in number and size of several alleles was observed between Grayton Beach and Shell Island; 3) overall genetic divergence between the donor and re-established population was moderate; 4) genetic differences between Topsail Hill Preserve State Park and other CBM sites were higher than expected given the spatial proximity; 5) Topsail Hill Preserve State Park appears to be a reservoir for unique variation within the remaining populations of CBM; and 6) the overall relatedness estimated for Grayton State Park suggested that any mating would involve close relatives (Wooten and Holler 1999).

Wooten and Holler (1999) recommended management of CBM based on genetics by managing the Grayton Beach population for genetic characteristics; however, additional genetic analyses would be needed. Although they recommended relocation of CBM to Grayton Beach from Shell Island should be continued; subsequent translocation work (VanZant and Wooten 2003) indicated that translocations should not be conducted if the population carrying capacity was reached.

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 of beach mice 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).

Wildlife lighting is recommended for development projects on Walton County shorelines. These are light sources that emit long wavelength light (greater than 580 nanometers). These long-wavelength light sources include low pressure sodium vapor lamps or less, incandescent bug lamps, amber and red LEDs (light emitting diodes), true red neon, and some color-filtered compact fluorescent lamps. All lamps must be housed in a full cut off or fully shielded fixture. Fixtures should be mounted as low in elevation (height) for the needed purpose.

Analysis of the species/critical habitat likely to be affected

Aspects of the beach nourishment encompass primary and secondary dune habitats. Suitable habitat for the CBM occurs on all these habitats, as well as on lands to the north, east and west. Trapping and tracking surveys for CBM have occurred within the State Park properties. Suitable habitat for the CBM occurs within the entire beach nourishment area. Portions of the beach nourishment placement are located seaward of areas designated as critical habitat for the CBM. In addition, beach access sites for equipment and vehicles and possibly staging storage are within designated critical habitat for the CBM. The Action Area includes areas within the geographic range occupied by the subspecies at the time of listing, provides essential connectivity between public lands, and provides habitat for natural movements, behaviors, and long-term persistence of CBM.

The Action Area includes all habitat within two CBM critical habitat units – Grayton, and Deer Lake Units (refer to **Species/critical habitat description** for a detailed description of units). Beach mouse habitat within the critical habitat units provides the primary constituent elements necessary to sustain the essential life history functions of the subspecies. These include: primary and secondary dunes, generally dominated by sea oats, that despite occasional temporary impacts and reconfiguration from tropical storms and hurricanes, provide abundant food resources, burrow sites, and protection from predators; scrub dunes, generally dominated by scrub oaks, that provide food resources and burrow sites, and provide elevated refugia during and after intense flooding due to rainfall and/or hurricane induced storm surge; and, functional, unobstructed habitat connections that facilitate genetic exchange, dispersal, natural exploratory movements, and recolonization of locally extirpated areas.

ENVIRONMENTAL BASELINE

Status of the species within the Action Area

The Action Area for the beach nourishment project encompasses approximately 1.5 to 2 acres (beach access or storage areas) of CBM habitat. Actual placement of material on CBM habitat is not anticipated. While no long-term formal trapping surveys for CBM have been conducted within the Action Area, various trapping and tracking efforts have been conducted at Topsail Hill State Preserve State Park, Grayton Beach State Park, Stallworth County Park, WaterColor (private) and WaterSound (private). The CBM habitat within the Action Area provides habitat for use on a permanent basis, natural movements and behavior, refugia during storm events, and recolonization. This area is essential to the conservation of the species.

The effects of the 2004-2005 hurricanes and subsequent post-storm activities (armoring) on the habitat are still depressing beach mouse populations. Based on these data, we would anticipate that CBM are found in suitable habitat but in reduced numbers throughout the Action Area. Areas with recovering or intact dune habitat remain especially important habitat for the CBM.

Factors affecting species environment within the Action Area

The greatest threat to the beach mouse in the Action Area is habitat loss from storm events, pedestrian trespass across the beach mouse habitat (including critical habitat), and to some degree predation by cats and other non-native species. The discussion of hurricane impacts to sea turtles also applies for beach mice. Impacts to the beach mouse from hurricanes are similar to sea turtles where habitat is either altered severely by overwash, covered by sand or washed away. Depending on the intensity and frequency of the storm event, and habitat recovery efforts recovery of beach mice varies. Immediately after a storm supplemental feeding with sunflower seeds helps during the period when the surviving dune plants overcome the effects from the storm (being covered by sand or burning from salt spray, standing water, etc.).

The armoring of the shoreline that took place post Hurricane Dennis in 2005 has led to the direct and indirect loss of CBM habitat. The construction of shoreline armoring prevents the dynamics of the coastline from forming and reforming dune habitats and creates barriers to CBM movement for foraging, reproduction, and dispersal. In addition, following immediate post-storm response protecting the remaining dunes from vehicle and pedestrian traffic is needed while determining the appropriateness for replacing lost vegetation. Dune habitat restoration and 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 beach goers off the dunes and replanting as necessary when impacts occur or are observed.

Feral and domestic cats may have the greatest impact of the predators. 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.

While cats may instinctively hunt wildlife, it is clear that they are not adapted to life in the wild as are our native wild cats like the bobcat, panther, and mountain lion. Outdoor domestic cat populations are most commonly found in and around human settlements; most do not survive without direct or indirect support by humans. They are in this way very different from native predators.

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.

Individual pet owners can be at fault by allowing their pet cats to roam freely. Individuals or groups contribute to the adverse effects by providing food for feral cats. Placing food in or adjacent to undeveloped areas frequently creates cat colonies. Supplemental feeding of feral cats results in high densities of cats because food is not a limiting factor. The presence of feral cat trap, neuter and release (TNR) group(s) in coastal Walton County has exacerbated the impacts to beach mice from cats. Cat tracks are routinely observed in beach and dune habitats. These TNR programs have not proven themselves to control or reduce the population of feral cats (Hatley and Ankerson 2003; The Wildlife Society 2006; American Bird Conservancy 1999). In fact, the programs encourage the “dropping off” of unwanted pets.

In addition, cats spread diseases to native wildlife including rabies, feline immunodeficiency virus, and feline leukemia, to name a few. Cats also spread zoonotic diseases (animal diseases that are naturally communicable to humans) such as rabies, ringworm, cat scratch disease, or toxoplasmosis by contact with cat feces or cat bites or scratches (Humane Society of the U.S. 2002).

Other Actions

Other activities have affected the conservation of CBM in the Action Area and required consultation with the Service. These are located within and outside of the Action Area and are important in the Service’s overall evaluation of the subspecies current status **(Table 11)**.

Table 11. Previous biological opinions within the Action Area completed for Choctawhatchee beach mouse.

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
Stallworth Preserve Development	1995	7 acres
WaterColor and WaterSound Developments	2000	7.6 acres

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
FWS scientific collecting permit	2004-2005	1 beach mouse per 400 trap-nights per area
FEMA beach berms post hurricane Ivan emergency consultation	2005	Consultation not complete
Western Lake Reopening consultation	2006	2.7 acres annually for five years
Alligator Lake emergency Opening	2007	0.5 mile
Eastern Lake emergency opening	2007	0.5 mile
FEMA FL emergency berm programmatic	2007	75 miles

EFFECTS OF THE ACTION

Factors to be considered

Aspects of the beach nourishment project activities would occur within CBM habitat including designated critical 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 the dune, berm, and beach fill project. The work is anticipated to be conducted beginning in late 2008 to early 2009 and continue for up to six to nine months. While most effects would be expected to be temporary, long-term and permanent impacts from the activities could include the loss of beach mice from excavation or compaction of dune habitat and degradation and fragmentation of CBM habitat including critical habitat. Short-term and temporary impacts could include loss of foraging habitat and altering beach mouse movement and dispersal activities.

There are typically different "levels" of access sites needed for a beach nourishment 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.

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 with most of these at existing established beach accesses.

Analyses for effects of the action

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 CBM and/or their designated critical habitat. The work will occur on public and/or private lands.

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

Distribution: The storage or staging of pipe and other equipment and vehicles and use of beach access points that could occur in habitat occupied or used by CBM.

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, dispersal and population expansion, 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: The project may take 6 to 9 months to complete 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 6 months and as long as the projected 9 months. Beach mouse habitats would remain disturbed until the project is completed and the habitats are restored. Following initial beach nourishment maintenance activities could occur every eight to ten years. Thus, impacts related to the subject activities would be expected to occur no more often than every eight to ten years. However, while not anticipated, work could occur annually in response to emergency events such as hurricanes.

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

Disturbance intensity and severity: If the projected material retention is realized impacts would occur for about 6 to 9 months every eight to ten years albeit a response to a storm event. The area of direct project impacts encompasses less than .06 percent of the CBM's range. The intensity is likely to be minimal and confined to beach access areas and the severity slight as few if any mice would be lost and impacted dune habitats are quickly restored.

The staging and storage of equipment and materials and beach access points could occur within habitat occupied or used by CBM and within designated critical habitat for the CBM. Beach mice are permanent inhabitants of the coastal ecosystem conducting all their life cycles in this environment. While the current status of CBM is unknown, their general distribution is known.

The Action Area consists of the Gulf beachfront including the wet and dry unvegetated beach, developing foredunes and interdunal swales, and areas that were formerly primary or secondary dunes. Beach nourishment project work would not occur on existing vegetated primary or secondary dunes. However, construction of or expansion of an existing beach access could be located through scrub, secondary, or primary dunes. Beach mice would generally be found inhabiting stable primary, secondary, and scrub dunes on a permanent basis with other habitats being used periodically on a daily or seasonal basis for feeding and movement. Some of these areas also include CBM designated critical habitat. The primary constituent elements for CBM critical habitat include the following.

1. A contiguous mosaic of primary, secondary and scrub vegetation and dune structure, with a balanced level of competition and predation and few or no competitive or predaceous nonnative species present, that collectively provide foraging opportunities, cover, and burrow sites.

2. Primary and secondary dunes, generally dominated by sea oats, that, despite occasional temporary impacts and reconfiguration from tropical storms and hurricanes, provide abundant food resources, burrow sites, and protection from predators.

3. Scrub dunes, generally dominated by scrub oaks, that provide food resources and burrow sites, and provide elevated refugia during and after intense flooding due to rainfall and/or hurricane induced storm surge.

4. Functional, unobstructed habitat connections that facilitate genetic exchange, dispersal, natural exploratory movements, and recolonization of locally extirpated areas.

5. A natural light regime within the coastal dune ecosystem, compatible with the nocturnal activity of beach mice, necessary for normal behavior, growth and viability of all life stages.

Direct and Indirect Impacts

Direct impacts are effects of the action on the species occurring as the project is implemented -- during the construction of the dune, berm, and beach fill project. The beach nourishment project may provide beneficial effects for CBM by creating a wider beach and berm that would provide storm protection to the landward habitat of CBM. Also, the planting of the dunes and/or berms would accelerate habitat restoration of CBM habitat (food source and burrow habitat). Direct loss of individual beach mice may occur during the creation or expansion of beach access points when heavy equipment clears the habitat and packs the sand. In general, the length of time between project maintenance work is expected to be sufficient for beach mouse habitat to be restored. Thus, it is not anticipated that the beach nourishment project activities would result in permanent beach mouse habitat destruction (including critical habitat). However, habitat for

CBM within the Action Area including designated critical habitat that provides food or cover may be temporarily destroyed or altered from the activities.

Indirect effects are a result of a proposed action that occur later in time and are reasonably certain to occur. The indirect effect of the nourishment activities would be newly created or expanded existing beach access points that act as barriers to beach mouse movement for foraging, or population expansion or dispersal. Maintaining the connectivity among habitats is vital to persistence of beach mice recovery. Recovery actions needed to assure the connectivity include restoration and maintenance of the dune system following project completion.

For the Service to determine if the project impacts on proposed critical habitat would be an adverse modification, we must determine if the impact on the habitat appreciably diminishes the capability of the critical habitat to satisfy essential requirements of beach mice with designated critical habitat. The long-term maintenance of the beach mouse populations in the project areas could be compromised if the dune, berm, and beach fill project activities occur too frequently resulting in a long-term barrier to mice movement. However, our evaluation indicates the impacts to critical habitat should be temporary in nature based on past history of similar type (nourishment) projects. In addition, the area to be directly affected would be a small percentage of the overall critical habitat and would not be expected to reduce the carrying capacity of the recovery units.

Species' response to a proposed action

This biological opinion is based on effects that are anticipated to CBM (all life stages) as a result of the temporary physical disturbance of beach mouse habitat from the dune, berm, and beach fill activities. The project may provide benefits for CBM through storm protection of habitat and acceleration of habitat restoration. However, some beach mice (all life stages) may be lost during the initial construction or expansion of beach accesses where heavy equipment destroys dune habitat and compacts the sand within the access corridor. Any mice that survive the initial construction may move outside of the disturbed area and construct burrows elsewhere in the vicinity. Following access construction, a bare gap of sand could form a barrier to limit beach mouse movement within the area altering regular movement patterns. These impacts are expected to be limited to the construction phase of the project (up to 9 months). As the life span of a beach mouse is estimated to be approximately 9 months, the loss of individual mice or the temporary loss of habitat could affect several generations of beach mice, but because beach mice can reproduce rapidly (every 26 days), colonization or recolonization of the restored habitat would be expected within several months/generations.

While beach mice have evolved to adapt to catastrophic weather events, additional factors such as surrounding development pressure and non-native predators may affect the species' ability to recover from the loss of individuals. However, the temporary loss of the habitat itself is not expected to permanently impact the populations as only about 0.06 percent of the habitat within the project areas would be temporarily impacted. Therefore, while a few mice may be lost initially and temporary impacts to dune habitats may occur, the function and conservation role of the remaining beach mouse habitat including habitat designated as critical habitat is not expected to be altered.

PIPING PLOVER

Action Area

The Project and Action Area for piping plovers is the 13.5 miles of shoreline proposed for nourishment in Walton County (**Figure 2**). The project fill site is located in the GOM in four reaches (segments) demarcated by the following FDEP monuments: R -41 to R-64, R-67 to R-72, R-78 to R-98, and R-105.5 to R-127. It begins at MLW along the GOM and includes intertidal areas of the GOM and coastal dune lakes, wrack lines, ephemeral pools, inlets, and the upper sandy beach with sparse or no vegetation and coastal dune lakes sand and mud flats habitat as well as any overwash areas that occur adjacent or connecting the GOM and the coastal dune lakes.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The piping plover is a small, pale sand-colored shorebird, about seven inches long with a wingspan of about 15 inches (Palmer 1967). On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (Service 1985). Piping plovers were listed principally because of habitat destruction and degradation, predation, and human disturbance. Protection of the species under the Act reflects the species' precarious status range-wide. Three separate breeding populations have been identified, each with its own recovery criteria: the northern Great Plains (threatened), the Great Lakes (endangered), and the Atlantic Coast (threatened) (**Figure 16).** The piping plover winters in coastal areas of the U.S. from North Carolina to Texas, and along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the Bahamas (Haig and Elliott-Smith 2004). Information from observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a degree.

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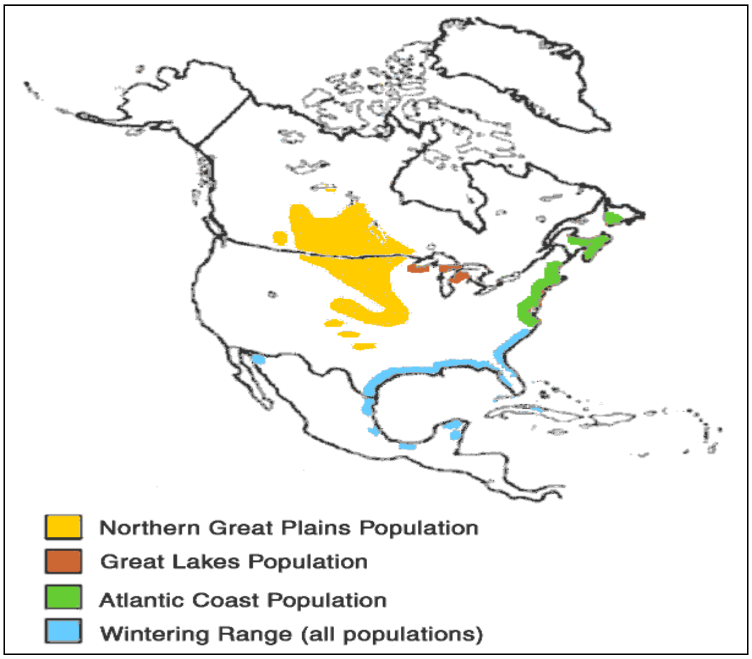

Figure 16. Range of piping plovers.

Natural protection: Cryptic coloration is a primary defense mechanism for this species; nests, adults, and chicks all blend in with their typical beach surroundings. Piping plovers on wintering and migration grounds respond to intruders (pedestrian, avian and mammalian) usually by squatting, running, and flushing (flying).

Foraging/food: Behavioral observation of piping plovers on the wintering grounds suggests that they spend the majority of their time foraging (Nicholls and Baldassarre 1990a; Drake 1999a, 1999b). Feeding activities may occur during all hours of the day and night (Staine and Burger 1994; Zonick 1997), and at all stages in the tidal cycle (Goldin 1993; Hoopes 1993). Wintering plovers primarily feed on invertebrates such as polychaete marine worms, various crustaceans, fly larvae, beetles, and occasionally bivalve mollusks (Bent 1929; Cairns 1977; Nicholls 1989; Zonick and Ryan 1996). They peck these invertebrates on top or just beneath the surface.

Feeding areas: Plovers forage on moist substrate features such as intertidal portions of ocean beaches, washover areas, mudflats, sand flats, algal flats, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons, ephemeral pools and adjacent to salt marshes (Gibbs 1986; Zivojnovich 1987; Nichols 1989; Nicholls and Baldassarre 1990a; Nicholls and Baldassarre 1990b; Coutu et al. 1990; Hoopes et al. 1992; Loegering 1992; Goldin 1993; Elias-Gerken 1994; Wilkinson and Spinks 1994; Zonick 1997; Service 2001a). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990; McConnaughey et al. 1990; Loegering 1992; Goldin 1993; Hoopes 1993). Cohen et al. (2006) documented more abundant prey items and biomass on sound island and sound beaches than the ocean beach.

Habitat: Wintering piping plovers appear to 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 (Cohen et al. 2006). Wintering plovers are dependent on a mosaic of habitat patches and move among these patches depending on local weather and tidal conditions (Nicholls and Baldassarre 1990a). Drake (1999b) monitored the movement of 48 piping plovers in south Texas for one season. She found, using 95 percent of the documented locations, that these birds had a mean home range of 3,117 acres. Drake (1999b) also noted that the mean linear distance moved per individual bird was 2 miles for the fall through the spring of 1997-1998. Observations suggest that this species exhibits a high degree of wintering site fidelity (Drake et al. 2001; Stucker and Cuthbert 2006).

Migration: Plovers depart their breeding grounds for their wintering grounds from July through late August, but southward migration extends through November. Piping plovers use habitats in the Florida from July 15 through May 15. Both spring and fall migration routes of Atlantic Coast breeders are believed to occur primarily within a narrow zone along the Atlantic Coast (Service 1996). Some mid-continent breeders travel up or down the Atlantic Coast before or after their overland movements (Stucker and Cuthbert 2006). Use of inland stopovers during migration is also documented (Pompei and Cuthbert 2004). Information from observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a significant degree. Therefore, the source breeding population of a given wintering individual cannot be determined in the field unless it has been banded or otherwise marked. Confirmed sightings from all three breeding populations have been documented in the Florida panhandle.

While piping plover migration patterns and needs remain poorly understood and occupancy of a particular habitat may involve shorter periods relative to wintering, information about the energetics of avian migration indicates that this might be a particularly critical time in the species' life cycle. The possibility of lower survival rates for Atlantic Coast piping plovers breeding at higher latitudes (based on relationships between population trends and productivity) suggest that migration stress may substantially affect survival rates of this species (Hecht 2006). The pattern of both fall and spring counts at many Atlantic Coast sites demonstrates that many piping plovers make intermediate stopovers lasting from a few days up to one month during their migrations (Noel et al. 2005; Stucker and Cuthbert 2006). In addition, this species exhibits a high degree of intra- and inter-annual wintering site fidelity (Nicholls and Baldassarre 1990a; Drake et al. 2001; Noel et al. 2005; Stucker and Cuthbert 2006).

The Service has designated critical habitat for the piping plover on three occasions. Two of these designations protected different breeding populations of the piping plover. Critical habitat for the Great Lakes breeding population was designated May 7, 2001 (66 FR 22938, Service 2001a), and critical habitat for the northern Great Plains breeding population was designated September 11, 2002 (67 FR 57637, Service 2002). The Service designated critical habitat for wintering piping plovers on July 10, 2001 (66 FR 36038, Service 2001b). Wintering piping plovers may include individuals from the Great Lakes and northern Great Plains breeding populations as well as birds that nest along the Atlantic coast. The three separate designations of piping plover critical habitat demonstrate diversity of constituent elements between the two breeding populations as well as diversity of constituent elements between breeding and wintering populations.

Designated wintering piping plover critical habitat originally included 142 areas [the rule states 137 units; this is in error] encompassing about 1,793 miles of mapped shoreline and 165,211 acres of mapped areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

Since the designation of wintering critical habitat, 19 units (TX- 3,4,7-10, 14-19, 22, 23, 27,28, and 31-33) in Texas have been vacated and remanded back to the Service for reconsideration by Court order (Texas General Land Office v. U.S. Department of Interior (Case No. V-06-CV-00032)). The Courts vacated and remanded back to the Service for reconsideration, four units in North Carolina (Cape Hatteras Access Preservation Alliance v. U.S. Department of Interior (344 F. Supp. 2d 108 (D.D.C. 2004)). The four critical habitat units vacated were NC-1, 2, 4, and 5, and all occurred within Cape Hatteras National Seashore (CAHA). On June 12, 2006, the Service proposed to amend and re-designate these four units as critical habitat for wintering piping plover (71 FR 33703, Service 2006a). On May 15, 2008, the USFWS proposed a revised designation of critical habitat which would add areas to units NC-1 and NC-4 (USFWS 2008d). A total of 119 designated critical habitat units and 110,461 acres remain designated.

The primary constituent elements for piping plover wintering habitat are those biological and physical features that are essential to the conservation of the species. The primary constituent elements are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. These areas typically include those coastal areas that support intertidal beaches and flats and associated dune systems and flats above annual high tide (Service 2001a). PCEs of wintering piping plover critical habitat include sand or mud flats or both with no or sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers (Service 2001a). Important components of the beach/dune ecosystem include surf-cast algae, sparsely vegetated back beach and salterns, spits, and washover areas. Washover areas are broad, unvegetated zones, with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action. The units designated as critical habitat are those areas that have consistent use by piping plovers and that best meet the biological needs of the species. The amount of wintering habitat included in the designation appears sufficient to support future recovered populations, and the existence of this habitat is essential to the conservation of the species. Additional information on each specific unit included in the designation can be found at 66 FR 36038 (Service 2001a).

Life history

Piping plover breeding activity begins in mid-March when birds begin returning to their nesting areas (Coutu et al. 1990; Cross 1990; Goldin 1990; MacIvor 1990; Hake 1993). Plovers are known to begin breeding as early as one year of age (MacIvor 1990; Haig 1992); however, the percentage of birds that breed in their first adult year is unknown. Piping plovers generally fledge only a single brood per season, but may renest several times if previous nests are lost.

Demographic models for piping plovers indicate that even small declines in adult and juvenile survival rates will cause very substantial increases in extinction risk (Melvin and Gibbs 1994; Amirault et al. 2005). Furthermore, insufficient protection of non-breeding piping plovers and their habitat has the potential to quickly undermine the progress toward recovery achieved at other sites. For example, a banding study conducted between 1998 and 2004 in Atlantic Canada found lower return rates of juvenile (first year) birds to the breeding grounds than was documented for Massachusetts (Melvin and Gibbs 1996, cited in Appendix E, Service 1996), Maryland (Loegering 1992), and Virginia (Cross 1996) breeding populations in the mid-1980s and very early 1990s. This is consistent with failure of the Atlantic Canada population to increase in abundance despite very high productivity (relative to other breeding populations) and extremely low rates of dispersal to the U.S. over the last 15 plus years (Amirault et al. 2005). Simply stated, this suggests that maximizing productivity does not ensure population increases. Management must focus simultaneously on all sources of stress on the population within management control (predators, off road vehicles (ORVs), etc.). Drake et al. (2001) evaluated winter piping plover habitat use in Texas and determined they have relatively small home-ranges and high survivorship from arrival in fall through spring departure. Cohen et al. (2006) experienced 100 percent winter survival of radio-tagged birds in a study conducted in North Carolina from December 2005 to March 2006. They speculate their high survival rate was attributed to plovers food availability much of the day as well as the low occurrence of days below freezing and infrequent wet weather.

Piping plovers live an average of five years, although studies have documented birds as old as 11 (Wilcox 1959) and 15 years.

Population dynamics

<u>Northern Great Plains Population</u>

The Northern Great Plains plover breeds from Alberta to Manitoba, Canada and south to Nebraska; although some nesting has recently occurred in Oklahoma. Currently the most westerly breeding piping plovers in the United States occur in Montana and Colorado.

Nesting occurs on sand flats or bare shorelines of rivers and lakes, including sandbar islands in the upper Missouri River system, and patches of sand, gravel, or pebbly-mud on the alkali lakes of the northern Great Plains. Breeding surveys in the early 1980s reported 2,137 to 2,684 adult plovers in the northern Great Plains/Prairie region (Haig and Oring 1985). In 1991, 2,032 adult plovers were observed in the U.S. portion of the northern Great Plains (Haig and Plissner 1993). The number declined to 1,599 in 1996 (Plissner and Haig 1997), a reduction of 21 percent from 1991. Part of this reduction may be an artifact of increased numbers of plovers nesting in Canada in 1996 due to high water levels in the U.S. (Plissner and Haig 1997). Overall in both the U.S. and Canadian portion of the northern Great Plains, 3,469 adult piping plovers were observed in 1991; 3,286 were observed in 1996; and 2,953 were observed in 2001 (Ferland and Haig 2002). The 2001 figure includes 1,291 breeding pairs.

The northern Great Plains is the largest of the three breeding populations (2006 data report 4,698 birds including the 2,962 in the U.S. (Ryba 2007)). The 2006 International Census reported a substantial increase since 2001 in both the U.S. and Canadian portion of the northern Great Plains breeding population.

The decline of piping plovers on rivers in the Northern Great Plains has been largely attributed to the loss of sandbar island habitat and forage base due to dam construction and operation. While piping plovers do nest on shorelines of reservoirs created by the dams, reproductive success is often low and reservoir habitat is not available in many years due to high water levels or vegetation. Dams operated with steady constant flows allow vegetation to grow on potential nesting islands, making these sites unsuitable for nesting. Population declines in alkali wetlands are attributed to wetland drainage, contaminants, and predation.

<u>Great Lakes Population</u>

The Great Lakes plovers once nested on Great Lakes beaches in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario. Russell (1983) reviewed historical records to estimate the pre-settlement populations of the plover throughout this range. While estimates may be high for some Great Lakes states, no other historic estimates are available. Total population estimates ranged from 492 to 682 breeding pairs in the Great Lakes region; Michigan alone may have had the most with as many as 215 pairs. When listed, the Great Lakes population numbered only 17 known breeding pairs that nested in northern Michigan. Gradual increases in this population have been documented since listing and these birds are now known to have expanded to the south and west (USFWS 2003). Twenty-nine breeding pairs were observed in 2001 (Ferland and Haig 2002). As of 2007, there were an estimated 63 nesting pairs (Dingledine 2008, *in litt*.).

Great Lakes piping plovers nest on wide, flat, open, sandy or cobble shoreline with very little grass or other vegetation. Reproduction is adversely affected by human disturbance of nesting areas and predation by foxes, gulls, crows and other avian species. Shoreline development, such as the construction of marinas, breakwaters, and other navigation structures, has adversely affected nesting and brood rearing.

<u>Atlantic Coast Population</u>

The Atlantic Coast piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. Historical population trends for the Atlantic Coast piping plover have been reconstructed from scattered, largely qualitative records. Nineteenth-century naturalists, such as Audubon and Wilson, described the piping plover as a common summer resident on Atlantic Coast beaches (Haig and Oring 1987). However, by the beginning of the 20th Century, egg collecting and uncontrolled hunting, primarily for the millinery trade, had greatly reduced the population, and in some areas along the Atlantic Coast, the piping plover was close to extirpation. Following passage of the Migratory Bird Treaty Act (40 Stat. 775; 16 U.S.C. 703-712) in 1918, and changes in the fashion industry that no longer exploited wild birds for feathers, piping plover numbers recovered to some extent (Haig and Oring 1985).

Available data suggest that the most recent population decline began in the late 1940s or early 1950s (Haig and Oring 1985). Reports of local or statewide declines between 1950 and 1985 are numerous, and many are summarized by Cairns and McLaren (1980) and Haig and Oring (1985). While Wilcox (1939) estimated more than 500 pairs of piping plovers on Long Island, New York, the 1989 population estimate was 191 pairs (see Table 4, USFWS 1996). There was little focus on gathering quantitative data on piping plovers in Massachusetts through the late 1960s because the species was commonly observed and presumed to be secure. However, numbers of piping plover breeding pairs declined 50 to 100 percent at seven Massachusetts sites between the early 1970s and 1984 (Griffin and Melvin 1984). Piping plover surveys in the early years of the recovery effort found that counts of these cryptically colored birds sometimes went up with increased census effort, suggesting that some historic counts of piping plovers by one or a few observers may have underestimated the piping plover population. Thus, the magnitude of the species decline may have been more severe than available numbers imply.

The Atlantic Coast population has increased from 790 pairs since listing to a preliminary estimate of 1,887 pairs in 2007 (USFWS 2008)(final 2006 estimate of 1,749 pairs, USFWS 2006b). Population growth has been greatest in the New England and New York-New Jersey recovery units, with a more modest and recent increase in the Southern unit and an even smaller increase in Atlantic Canada. Periodic rapid declines in abundance of breeding pairs at the level of the recovery unit, including a 68 percent decline in the southern half of the Virginia barrier island chain and North Carolina between 1995 and 2001, illustrate continued population vulnerability.

Status and distribution

Non-breeding (migrating and wintering)

Piping plovers migrate through and winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Birds from the three breeding populations overlap in their use of migration and winter habitat. In Florida, the majority of wintering birds on the Gulf Coast are likely to be from the northern Great Plains population, although individuals from the Great Lakes and Atlantic populations have been documented. The majority of the birds using the Atlantic Coast are believed to be from the Atlantic breeding population. Repeated sightings for >8 years of banded Great Lakes birds have documented their use of the coast of the Carolinas, Georgia (Noel et al. 2005), Alabama (Stucker and Cuthbert 2006) and Florida's Atlantic Coast (Leary 2007).

In 2001, 2,389 piping plovers were located during a winter census, accounting for only 40 percent of the known breeding birds recorded during a breeding census (Ferland and Haig 2002). About 89 percent of birds that are known to winter in the U.S. do so along the Gulf Coast (Texas to Florida), while eight percent winter along the Atlantic Coast (North Carolina to Florida). Four range-wide population surveys have been conducted for the piping plover; the 1991 (Haig and Plissner 1992), the 1996 (Plissner and Haig 1997), the 2001 (Ferland and Haig 2002) and the 2006. The 2006 International Census results have not yet been published. These four surveys were completed to help determine the species distribution and to monitor progress towards recovery. **Table 12** provides a summary of the results of the four International wintering censuses. Total numbers have fluctuated over time with some areas experiencing increases and others decreases. Fluctuations are predominately due to the location, quality, and extent of suitable non-breeding habitat that may vary over time due to regional rainfall and anthropogenic hydrologic manipulation and disturbance. Fluctuations could also represent unequal survey efforts or localized conditions during surveys. The increased numbers of birds counted in Texas in 2006 may reflect a shift of birds away from areas such as the Chandeleur Islands in Louisiana that were negatively impacted by Hurricane Katrina in 2005 (Cobbs 2006). The increase in the 2006 numbers from the Caribbean is due to increased survey efforts (Maddock 2006).

Table 12. Results of the 1991, 1996, 2001, and unofficial 2006 International Piping Plover Wintering Census.

Location	**1991**	**1996**	**2001**	**2006**
North Carolina	20	50	87	84
South Carolina	51	78	78	82
Georgia	37	124	111	212
Florida	551	375	416	414
-Atlantic	*70*	*31*	*111*	*unk*
-Gulf	*481*	*344*	*305*	*unk*
Alabama	12	31	30	29
Mississippi	59	27	18	78
Louisiana	750	398	511	224

Location	1991	1996	2001	2006
Texas	1,904	1,333	1,042	2,158
Puerto Rico	0	0	6	?
U.S. Total	**3,935**	**2,416**	**2,299**	**~3,281**
Mexico	27	16	Not surveyed	76
Caribbean	40	83	90	378
GRAND TOTAL	**3,451**	**2,515**	**2,389**	**3,735**
% of Breeding Census	62.9%	42.4%	40.2%	unknown

The status of piping plovers on winter and migration grounds is difficult to assess, but threats to piping plover habitat used during winter and migration identified by the Service during its designation of critical habitat continue to affect the species. Unregulated motorized and pedestrian recreational use, inlet and shoreline stabilization projects, beach maintenance and nourishment, and pollution affect most winter and migration areas. Conservation efforts at some locations have likely resulted in the enhancement of wintering habitat.

The 2004 and 2005 hurricane seasons affected a substantial amount of habitat along the Gulf Coast. Habitats such as those along Gulf Islands National Seashore have benefited from increased washover events which created optimal habitat conditions for piping plovers. On the flip side, hard shoreline structures are put into place throughout the species range to prevent such shoreline migration (see *Factors Affecting Species Environment within the Action Area*). The Chandeleur Islands, a north-south oriented chain of low-lying islands, located approximately 62 miles east of the city of New Orleans, Louisiana, were impacted by hurricanes Lili (2002), Ivan (2004), Dennis (2005) and Katrina (2005), the strongest and closest in proximity to the Chandeleurs) (USGS 2005). Early estimates are that Hurricane Katrina removed about 85 percent of the sand from the beach and dunes of the Chandeleur Islands. It is unknown how much sand is likely to return under natural conditions to rebuild these barrier islands (Williams 2006). The Chandeleur Island Chain was used consistently by piping plovers and was designated critical habitat in 2001.

The Service is aware of the following site-specific conditions that affect the status of several habitats piping plover use while wintering and migrating, including critical habitat units. In Texas, one critical habitat unit was afforded greater protection due to the acquisition of adjacent upland properties by the local Audubon chapter. In another unit in Texas, vehicles were removed from a portion of the beach decreasing the likelihood of automobile disturbance to plovers. In Florida, land acquisition has been initiated within portions of one critical habitat unit in the panhandle. Exotic plant removal is occurring in another Florida critical habitat unit in South Florida that threatens to invade suitable piping plover habitat. The Service remains in a contractual agreement with the USDA for predator control within limited coastal areas in the panhandle, including portions of some critical habitat units. Continued removal of potential terrestrial predators is likely to enhance survivorship of wintering and migrating piping plovers. In North Carolina, one critical habitat unit was afforded greater protection when the local Audubon chapter agreed to manage the area specifically for piping plovers and other shorebirds following the relocation of the nearby inlet channel.

Several projects have resulted in formal consultation for piping plovers or their designated critical habitat in Florida (**Table 13**). Emergency consultation for beach nourishment at Navarre

Beach resulted in supplying the permittee with avoidance and minimization measures to lessen the impacts to optimal piping plover habitat that may have been created by the hurricane. Emergency consultations with the Corps for berm placement post Hurricane Ivan, resulted in similar guidance. These projects are complete; however, final consultation is not yet complete. A few consultations have resulted in formal consultation for piping plovers or their designated critical habitat in Northwest Florida. The Service has completed a statewide programmatic consultation in draft form with the Corps for emergency berm repair.

Table 13. Biological opinions issued for all projects that had adverse impact to the piping plovers on non-breeding grounds in Florida.

SPECIES Piping plover	YEAR	PROJECT ACTIVE YES/NO
East Pass re-opening	2001	Completed
Amend BO for south jetty extension in Ponce De Leon Navigation Inlet	2003	Completed
Terminal groin and nearshore breakwater on south end of Amelia Island, Nassau, FL	2004	Completed
Eglin AFB INRMP	2007-2011	Completed
Pensacola Beach beach nourishment original Amd. 1	2002-2005	Initial completed & hurricane recovery completed
Navarre beach nourishment emergency consultation and Amd. 1-6	2005	Project completed, consultation not completed
Eglin Santa Rosa Island Programmatic	2005-2007	Completed
Tyndall AFB INRMP	2007-2011	Completed
St. Joseph Peninsula beach restoration	2007	Consultation complete, project started
Alligator Point beach nourishment	2007	Consultation complete, project cancelled
NAS Pensacola pass dredging and spoil placement	2007	Consultation ongoing
FEMA emergency berm repair for Florida coast	2008	Consultation complete
Eglin AFB nourishment	2008	Consultation complete, project on hold until 2010.
Perdido Key beach nourishment	2008	Consultation complete, project not started.

Recovery criteria

Northern Great Plains Population (Service 1994)

1. Increase the number of birds in the U.S. northern Great Plains states to 2,300 pairs.

2. Attain recovery objective of 813 pairs amongst 4 Provinces for Prairie Canada (Goossen et al. 2002).
3. Secure long term protection of essential breeding and wintering habitat.

Great Lakes Population (Service 2003)

1. At least 150 pairs (300 individuals), for at least 5 consecutive years, with at least 100 breeding pairs (200 individuals) in Michigan and 50 breeding pairs (100 individuals) distributed among sites in other Great Lakes states.
2. Five-year average fecundity within the range of 1.5-2.0 fledglings per pair, per year, across the breeding distribution, and ten-year population projections indicate the population is stable or continuing to grow above the recovery goal.
3. Protection and long-term maintenance of essential breeding and wintering habitat is ensured, sufficient in quantity, quality, and distribution to support the recovery goal of 150 pairs (300 individuals).
4. Genetic diversity within the population is deemed adequate for population persistence and can be maintained over the long-term.
5. Agreements and funding mechanisms are in place for long-term protection and management activities in essential breeding and wintering habitat.

Atlantic Coast Population (Service 1996)

1. Increase and maintain for 5 years a total of 2,000 breeding pairs, distributed among 4 recovery units.
2. Verify the adequacy of a 2,000 pair population of piping plovers to maintain heterozygosity and allelic diversity over the long term.
3. Achieve a 5-year average productivity of 1.5 fledged chicks per pair in each of the 4 recovery units described in criterion 1, based on data from sites that collectively support at least 90 percent of the recover unit's population.
4. Institute long-term agreements to assure protection and management sufficient to maintain the population targets and average productivity in each recovery unit.
5. Ensure long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution to maintain survival rates for a 2,000-pair population.

Threats to Piping Plovers

Predation

Predation has been identified as a major factor limiting piping plover reproductive success but the impact predation has on piping plovers while on migration or wintering grounds is unknown. Substantial evidence exists that human activities are affecting types, numbers, and activity patterns of predators, thereby exacerbating natural predation. Non-native species such as feral cats are considered significant predators on some sites (Goldin et al. 1990; Post 1991). Humans have also indirectly influenced predator populations; for instance, human activities abetted the expansions in the populations and/or range of other species such as gulls (Drury 1973; Erwin 1979). Strauss (1990) found that the density of fox tracks on a beach area was higher during periods of more intensive human use. Predatory birds also are relatively common during their fall and spring migration and there is a possibility they may occasionally take piping plovers.

Weather

Piping plover habitats (breeding and non-breeding) are dependent on natural forces although storms and severe cold weather are believed to take their toll on piping plovers. After an intense snowstorm swept the entire North Carolina coast in late December 1989, high mortality of many coastal bird species was noted (Fussell 1990). Piping plover numbers decreased significantly from about 30 to 40 birds down to 15 birds. While no dead piping plovers were found, circumstantial evidence suggests that much of the decrease was mortality (Fussell 1990). Hurricanes may also result in direct mortality or habitat loss, and if piping plover numbers are low enough or if total remaining habitat is very sparse relative to historical levels, population responses may be impaired even through short-term habitat losses. Wilkinson and Spinks (1994) suggest that, in addition to the unusually harsh December 1989 weather, low plover numbers seen in South Carolina in January 1990 (11 birds, compared with more than 50 during the same time period in 1991 to 1993) may have been influenced by effects on habitat and food availability caused by Hurricane Hugo which came ashore there in September 1989. Hurricane Elena struck the Alabama Coast in September 1985 and subsequent surveys noted a reduction of foraging intertidal habitat on Dauphin and Little Dauphin Islands (Johnson and Baldassarre 1988). Birds were observed foraging at Sand Island, a site that was used little prior to the hurricane.

Vehicles

Vehicles significantly degrade piping plover habitat or disrupt normal behavior patterns. Vehicular and/or pedestrian disturbance that reduces plover use and/or impairs their foraging efficiency on soundside tidal flats is particularly injurious. Multiple studies have shown that bay tidal flats have relatively high indices of arthropod abundance compared with other microhabitats, and that piping plovers select these habitats in greater proportion than their availability (Loegering and Fraser 1995; Cross and Terwilliger 2000; Elias et al. 2000; Houghton et al. 2005). Zonick (2000) found that off road vehicle (ORV) density negatively correlated with abundance of roosting plovers on the ocean beach. Cohen et al. (in press) found that piping plovers appear to show preference of foraging and roosting in areas with no ORV disturbance. Studies elsewhere (Wheeler 1979) demonstrate adverse effects of ORV driving on soundside beaches on the abundance of infauna essential to piping plover foraging requirements.

Recreational Activities

Pedestrian and non-motorized recreational activities can be a source of both direct mortality and harassment of piping plovers. There are a number of potential sources for pedestrians on the beach, including those individuals driving and subsequently parking on the beach, those originating from off-beach parking areas (hotels, motels, commercial facilities, beachside parks, etc.), and those from beachfront and nearby residences. Essentially, the magnitude of threats to coastal species is particularly significant because vehicles extend impacts to remote stretches of beach where human disturbance would be very slight if access were limited to pedestrians only. Human recreation on coastal habitats can cause adverse impacts on dune formation, vegetation, and the invertebrate and vertebrate fauna.

Elliott and Teas (1996) found a significant difference in actions between piping plovers encountering pedestrians and those not encountering pedestrians. Piping plover not encountering pedestrians spend proportionately less time in active non-foraging behavior. This study suggests that interactions with pedestrians on beaches cause birds to shift their activities from calorie acquisition to calorie expenditure. In winter and migration sites, human disturbance continues to decrease the amount of undisturbed habitat and appears to limit local piping plover abundance (Zonick and Ryan 1996). The disturbance distance for wintering and migrating western snowy plovers in a California study was 98.4 feet for pedestrians and pets, but a higher proportion of pets than pedestrians disturbed plovers (Lafferty 2001).

During spring, summer, and fall months in Florida, recreational boaters find barrier island washover areas and peninsular tips attractive landing spots to spend the day, which may prove an increasing issue for piping plovers especially during migration months. This is particularly true on weekends and holidays.

Dogs

The presence of pets increases disturbance to wintering and migrating piping plovers. Pedestrians have been observed walking their dogs through congregations of feeding shorebirds and encouraging their dogs to chase the birds. Noncompliant pet owners who allow their dogs off leash have the potential to flush piping plovers and these flushing events may be more prolonged than those associated with pedestrians or pedestrians with dogs on leash. A study conducted on Cape Cod, Massachusetts found that the average distance at which piping plovers were disturbed by pets was 150 feet, compared with 75 feet for pedestrians. Furthermore, the birds reacted to the pets by moving an average of 187 feet, compared with 82 feet when the birds were reacting to a pedestrian, and the duration of the disturbance behavior stimulated by pets was significantly greater than that caused by pedestrians (Hoopes 1993). Disturbance also reduces the time migrating shorebirds spend foraging (Burger 1991) and has been implicated as a factor in the long-term decline of migrating shorebirds at staging areas (Pfister et al. 1992).

Viruses

Preliminary reports suggested West Nile virus was a potential threat on the northern Great Plains population in 2003 or 2004, but a case has yet to be confirmed (Dingledine 2006). Shorebird testing throughout the U.S. for Avian Flu is ongoing. One piping plover was captured and swabbed in Florida in December 2006. Results are undetermined with ongoing research.

Oil Spills

Oil spills pose a threat to piping plovers throughout their life cycle. Oiled plovers have been reported from Matagorda Island National Wildlife Refuge, Texas (Service 1996). Four piping plovers have been reported in the Jacksonville, Florida area with greased undersides (Leary 2007). No known oil spill was reported in the area. It is possible they became greased while roosting in wrack that accumulated remnant oil from some offshore activity. Impacts are undetermined.

Exotic vegetation

In Florida, 39-64 percent of the non-indigenous plant species considered to be most invasive by the Florida Exotic Pest Plant Council may actually alter the ecosystems that they invade through changes in such properties as geomorphology, hydrology, biogeochemistry, and disturbance

(Gordon 1998). Like many invasive species, coastal exotic plants reproduce and spread quickly and exhibit dense growth habits, often outcompeting native plant species. Crowfootgrass (*Dactyloctenium aegyptium*) grows invasively along portions of the Florida coastline and it forms thick bunches or mats that may change the vegetative structure of coastal plant communities and alter shorebird habitat. The exotic Australian pine (*Casuarina equisetifolia*) also changes the vegetative structure of the community. Because shorebirds prefer foraging in open areas where they are able to see potential predators and because tall trees provide good perch sites for avian predators, Australian pines may impact shorebirds by limiting the availability of optimal foraging habitat.

Habitat Loss/Degradation

Important components of ecologically sound barrier beach management include perpetuation of natural dynamic coastal formation processes. Man-made structures along the shoreline or manipulation of natural inlets upset the dynamic processes and result in habitat loss or degradation (Melvin et al. 1991). Throughout the range of migrating and wintering piping plovers, inlet and shoreline stabilization, inlet dredging, and beach maintenance and renourishment activities continue to constrict natural coastal processes. Dredging of inlets can affect spit formation adjacent to inlets, while jetties can cause widening of islands and subsequent growth of vegetation on inlet shores. Over time, both result in loss of plover habitat. Additional investigation is warranted to determine the extent to which these disturbance factors affect wintering plovers on a cumulative nature.

Analysis of the species/critical habitat likely to be affected

The proposed action has the potential to adversely affect wintering and migrating piping plovers and their habitat from all three populations within the proposed project area and Action Area. The Atlantic Coast nesting population of piping plover is a component of the entity listed as threatened which encompasses all breeding piping plovers (Great Plains and Atlantic) except the Great Lakes breeding population. As reported by Haig et al. (2005), results of the 2001 Plover Breeding Census indicate an 8.4 percent increase from 1991 census, but only a 0.2 percent increase since 1996. Regional trends suggest that since 1991, numbers of breeding birds increased on the Atlantic Coast by 78 percent and by 80 percent in the Great Lakes. The 2006 International Census reported a substantial increase since 2001 in both the U.S. and Canadian portion of the northern Great Plains breeding population.

Florida has 34 piping plover designated critical habitat units, comprising approximately 26 percent of its coastline. The 34 units include approximately 68 miles of federal shoreline, 120 miles of State shoreline and 24 miles of shoreline in private ownership (including non-profit organizations). This equates to approximately 212 miles of shoreline in Florida designated as critical habitat for the piping plover. No critical habitat is located within the Action Area. Coastal projects, which include beach nourishment, jetty extensions, and inlet dredging activities that affect the conservation of piping plovers wintering or migrating in northwest Florida are included in the Service's evaluation of the species current status.

ENVIRONMENTAL BASELINE

Walton County coastal beaches and connected coastal lakes are part of a complex and dynamic coastal system that continually respond to inlets, tides, waves, erosion and deposition, longshore sediment transport, and depletion, fluctuations in sea level, and weather events. The location and shape of the coastline and coastal dune outlets 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 into the coastal lakes are common, depositing sediments on the interior of the lakes, clearing vegetation and increasing the amount of open, sandflat habitat ideal for shoreline dependent shorebirds. However, the protection or persistence of these important natural land forms, processes, and wildlife resources is often in conflict with long-term, large-scale beach stabilization projects and their indirect effects, i.e., increases in residential development, infrastructure, and public recreational uses, and preclusion of overwash which limits the creation of open sand flats preferred by piping plovers.

Status of the species within the action area

Piping plover habitat within the Action Area occurs within an area affected by dynamic coastal processes and ongoing human uses. Suitable piping plover habitat appears to be present at and near Draper Lake, Alligator Lake, and Eastern Lake outfall areas and lake side sand and mud flats and along ocean shoreline. The number of piping plovers within the Action Area during the winter or migration is difficult to assess. Regular surveys have not been conducted for non-breeding (including migrating and overwinterng) plovers within the Action Area. Surveyors report no piping plovers in the project area during either the 2001 or 2006 International Piping Plover Census (Ferland and Haig 2002; Service 2006 Recovery Plan).

The known distribution of the piping plover in Florida is a result of occasional statewide cursory surveys combined with sporadic localized surveys that provide better estimates on abundance and seasonal use in those specific areas depending on the strength of the surveys. Currently the International Plover Winter Census as summarized in **Table 12** remains the only consistent winter survey effort for piping plovers on a statewide basis (Ferland and Haig 2002). Relative to abundance and relying on the results of the International Plover Winter Census, Florida ranks in the top third of eight southeastern states on which wintering piping plovers depend. The section above "*Status and Distribution: non-breeding (migrating and wintering*)" explains the limitations in the data collected during the International Census survey window with regard to locating all sites and exact numbers of plovers in specific locations. By their nature, the habitat features that piping plovers depend on are in a constant state of change thereby making it difficult to document the exact status of piping plovers in the Action Area on any given year at any given site.

We use the results of the following survey effort to demonstrate the limitations of relying on just the results of the International Plover Winter Census or any short term, one day or season survey effort for a species dependent on dynamic habitats. In 2006, the Service and the American Bird Conservancy funded the Apalachicola Riverkeeper to collect shorebird abundance and distribution data throughout Franklin County, Florida. A biologist for the Apalachicola Riverkeeper, Bradley Smith, collected survey data from August 2006, through May 2007. He attempted to visit each primary site at least twice monthly. He visited Phipps Preserve, an area known for its historic plover use, twenty-four times with surveys occurring August 15, 2006, through May 1, 2007. Numbers of piping plover recorded ranged from zero to a high of 47 piping plovers on two different days (**Figure 17**). The 2006 International Plover Winter Census reports 17 piping plovers on Phipps Preserve. Given that piping plovers evolved in a dynamic system, and that they are dependent upon these ever-changing features for their survival and conservation it is important that sites that experience these natural processes where plover habitat may come and go, are protected.

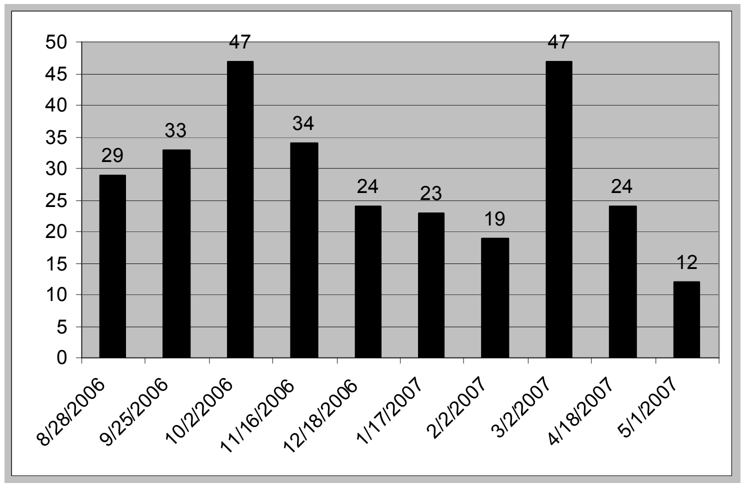

Figure 17. Piping plover sightings reported from Phipps Preserve, Franklin County, FL, from August 2006 through May 1, 2007.

Factors affecting species environment within the action area

A number of ongoing anthropogenic and natural factors may affect the species addressed in these biological opinions. Many of these effects have not been evaluated with respect to biological impacts on the species. In addition, some are interrelated and the effects of one cannot be separated from others. Known or suspected factors affecting the species addressed in these biological opinions are discussed below.

Most threats discussed above ***(see threats: Status and Distribution section)*** are threats seen throughout piping plover habitat in the entire Action Area. Depending on the local land codes, land ownership and enforcement capabilities, some threats are more pronounced in some areas than others.

Predation

Mammalian and avian predators are relatively common within the action area. In 1997, a multi-agency predator control partnership formed with US Department of Agriculture (USDA). The partnership has proven benefits for coastal species such as beach mice and shorebird and sea turtle nests. No depredation of piping plover during winter or migration has been noted, but would be difficult to document.

Pedestrian Use of the Beach

There are a number of potential sources of pedestrians, including those individuals driving and subsequently parking on the beach, those originating from off-beach parking areas (hotels, motels, commercial facilities, beachside parks, etc.), and those from beachfront and nearby residences. The effect of pedestrian traffic on roosting piping plovers on the Gulf beach side is unknown but evidence exists that pedestrian traffic affects wintering piping plovers. Lack of their visibility on the Gulf beaches may be a result of high pedestrian use. When approached, piping plovers typically flush to avoid close contact with humans *(see Life History section for more detail).* There are no closures areas within the Action Area for foraging and roosting piping plovers.

<u>*Dogs*</u>

Leashed dogs are a permitted activity on Walton County beaches between 3:00 p.m and 9:00 a.m. Dogs are restricted from State Park lands. On private and public lands, violations probably occur but enforcement is difficult because of the limited number of County and Park staff. Dogs running freely on beaches are potential predators of piping plovers and can harass migrating and wintering adults. The extent of the effects that free-running dogs have on piping plovers within the Action Area is unknown *(see Life History section for more detail).*

<u>*Vehicle Impacts*</u>

Walton County permits recreational beach driving in the Town of Grayton along approximately 600 feet of beachfront. The Tourist development Council collects trash along the beachfront. Vehicles can significantly degrade piping plover habitat and disrupt normal behavior patterns of the birds. Two studies show piping plovers avoidance of areas with vehicle use *(see Life History section for more detail).* Two sections of Walton County beaches are closed to vehicle use due to beach erosion.

<u>*Increasing Trend of Berm Placement and Nourishment Projects in Response to Storm Events*</u>

In the wake of an apparent increasing trend in episodic storm events, managers of lands under public, private and county ownership chose to protect coastal structures using emergency storm berms usually followed by nourishment activities. Berm placement and beach nourishment place substantial amounts of sand along the Gulf beaches in hopes of preventing what otherwise would be considered “natural processes” of overwash and island migration.

Past and ongoing stabilization projects along the northwest Florida coastline have fundamentally altered the naturally dynamic coastal processes that create and maintain beach strand habitats (**Figure 18**). Hard shoreline stabilization structures such as jetties and groins interrupt littoral drift, while artificially created berms and nourishment prevent overwash. These structures prevent natural shoreline migration. Such stabilization has encouraged residential and commercial development and associated infrastructure along otherwise ephemeral and/or flood prone habitats. The subsequent development has forestalled formation of highly productive piping plover overwash habitats and eliminated connectivity of piping plover oceanfront and bayside roosting and foraging habitats. The results of these projects have essentially forced public lands and some undeveloped private lands into becoming an oasis for endangered species such as the piping plover as well as other non-listed species. Of concern is the increasing trend of public lands applying these same actions. **Figure 18** shows the results of the 2006 International Plover Winter Census. It does not seem a coincidence that the areas populated with piping plovers in this snapshot survey are the areas that are not artificially stabilized and developed and preclude natural successional stages and processes from occurring. While shoreline hardening projects are installed to protect existing structures they further prevent natural shoreline processes. A similar pattern is seen throughout Florida (ABC and FWS unpublished data 2007). Recreational pressures are heavy on both the natural and unnatural lands, so it appears to be more a habitat component that makes the difference in areas selected for use by piping plovers.

Seven miles of Walton County shorelines within the Action Area were bermed in 2004. Approximately ten miles had artificial dunes constructed in 2005. The intentions of both efforts were to protect structures from eroding shorelines.

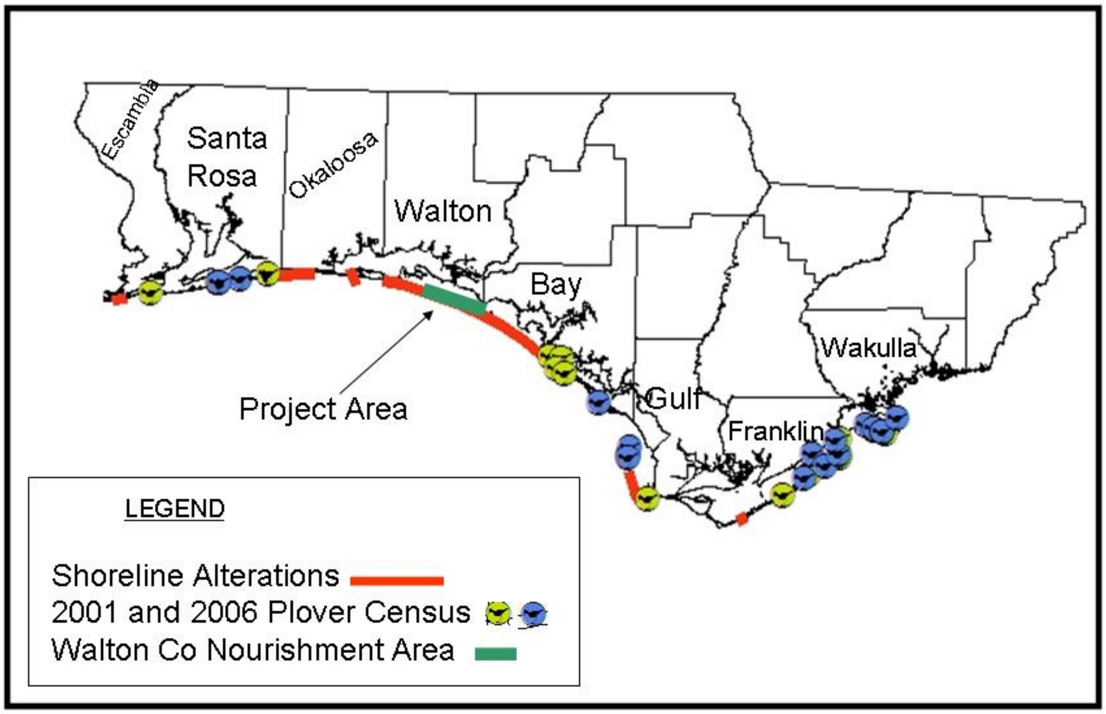

Figure 18. Comparison of shoreline stabilization projects (beach nourishment, hardening) and 2001 and 2006 piping plover census data.

Intraspecific and Interspecific Shorebird Competition

Historically, prior to high human densities and beach hardening projects, approximately 825 miles of coastline and parallel bayside flats (unspecified amount) of habitat occurred in Florida. This provided an unspecified amount of optimal foraging habitat for many shorebird species depending on the cumulative successional stages of the coastline. To date, approximately thirty-five percent of the coastline remains where coastal dynamics are allowed to function in Florida. As coastal functions are prohibited, formations of habitat appealing to different bird species dependent on these processes become more and more concentrated into the remaining optimal areas for foraging and roosting. It is likely they are, or will be, forced to forage and roost in less optimal areas.

Up to 24 shorebird species migrate or winter along the Atlantic Coast and almost 40 species of shorebirds occur during migrational and wintering periods in the GOM region (Helmers 1992). Continual degradation and loss of habitat needed by migrating and wintering shorebirds elevates the risk of increased pressure on remaining food supplies. Food limitations potentially increase intraspecies and interspecies competition and could result in eventual mortality. Shorebirds require maximum fat reserves to complete migrations. Birds with less than maximum fat reserves could be expected to show reduced survivorship. Piping plovers are part of this overall shorebird niche that may be forced to compete with the other 24 to 40 species of shorebirds dependent on Florida coastline habitats for some part of their life cycle. Shorebird species numbers are universally declining. The complexities of a shorebird life cycle make it difficult to determine what role the loss of 65 percent of habitat has played in this overall decline but it is likely significant.

EFFECTS OF THE ACTION

Factors to be considered

The proposed activity includes dune restoration, berm construction, and beach fill over approximately 13.5 miles of eroding shoreline. The proposed project is the first major nourishment of this shoreline segment. It intends to raise the beach berm and widen the beach providing storm protection and increasing recreational space. The proposed project occurs within habitat that appears suitable for piping plover use. The Corps expects construction to begin late 2008 or early 2009, with completion six to nine months later. This coincides with the piping plovers migration and wintering period (July 15 through May 15). Short-term and temporary impacts to piping plovers will occur if the birds are roosting and feeding in the area during a migration stopover. The deposition of sand will temporarily deplete the intertidal food base and temporarily disturb roosting birds during project construction. The tilling to loosen compaction of the sand required to minimize sea turtle impacts may affect any wrack that has accumulated on the “new” beach. This impacts feeding and roosting habitat for piping plovers, since they often use wrack.

The geomorphic characteristics of barrier islands, peninsulas, beaches, dunes, overwash fans, and inlets are critical to a variety of natural resources and influence a beach’s ability to respond to wave action, including storm overwash and sediment transport. However, the protection or persistence of these important natural land forms, processes, and wildlife resources is often in conflict with long-term, large-scale beach stabilization projects and their indirect effects, i.e., increases in residential development, infrastructure, and public recreational uses, and preclusion of overwash, especially into coastal dune lakes and creation of spit formations on which piping plovers thrive.

The manufactured dunes, berms and beach fill will partially impede overwash into the connected coastal dune’s lake sides, thereby causing successional advances in the habitat that will minimize sand flat formation and therefore its use by piping plovers in the project area. The proposed nourishment project will completely impede any overwash potential for at least two, coastal dune lakes (Allen Lake and Oyster Lake) that are close to the Gulf shoreline but not currently connected. Residential houses separate the Lakes from the Gulf. No specific conservation measures were provided by the applicant that would minimize the impacts of the project to the piping plover. The project design, which leaves necessary gaps lacking fill for most coastal dune lake outlet areas, will allow some overwash into the lakes to continue, thereby minimizing impacts to potential piping plover habitat.

Proximity of action: Lack of regular surveys along most of the project area makes it difficult to measure the amount of piping plovers actually using the Gulf beach within the project area. Regardless, we expect short-term impacts by direct disturbance during construction and temporary loss of food base along the Gulf shoreline. The footprint of the proposed action does not occur within any critical habitat units for wintering piping plover. We expect the indirect effects of the action, alterations of the natural processes of overwash, to occur throughout the project area where-ever coastal dune lakes occur within the Project Area. There are 8 lakes intermittently connected to the Gulf and two that are unnaturally restricted.

Distribution: The Corps proposes project construction activities on the GOM shoreline between FDEP reference monuments Reach (R) -41 to R-64, R-67 to R-72, R-78 to R-98, and R-105.5 to R-127 within Walton County. We expect direct and indirect impacts to migrating and wintering piping plover along lake side habitat and washover areas that, but for the project, would exist in the future. We expect indirect impacts to piping plover and optimal piping plover roosting and foraging habitat in the Action Area from increased human disturbance (vehicles, dog walking, and pedestrian traffic).

Timing: The timing of the dune, berm, and beach fill project may occur completely or partially during the migration and wintering period for piping plovers (July 15-May 15). We expect indirect effects to occur later in time.

Nature of the effect: The effects to piping plover are direct, indirect and long term. We anticipate changes to plover habitat in morphology due to the elimination or reduction of potential for washover into dune lakes due to the presence of the constructed beach. A decrease in survival of birds on migrating or wintering grounds due to lack of optimal habitat contribute to decreased survival rates, decreased productivity on the breeding grounds, and therefore increased vulnerability to any of the three piping plover populations.

In addition, we expect increased recreational use inside the project area to affect the shoreline by reducing the value of the beaches because of direct disturbance to foraging and roosting piping plovers. We expect short-term impacts from disturbance during project construction. Activities that impact or alter the use of optimal habitat or increase disturbance to the species may decrease the survival and recovery potential of the piping plover.

Duration: The activities associated with the dunes, berm, and beach fill project are a one-time occurrence and expect completion within 6 to 9 months. The Corps expect to begin in late 2008 and early 2009 and complete the project in late 2009 to 2010. We expect long term, if not permanent, alteration of the natural coastal processes.

We expect permanent increased recreational pressures within the Action Area due to the expansion of the beach.

Disturbance frequency: We expect short-term disturbance from construction activities. We expect long-term effects of sand placement and the impact of increased disturbance within the Action Area on the piping plover. Most nourishment activities and effects are expected to cycle every 8 to 10 years but Walton County is generally an accreting beach. Nourishment activities are expected to occur less often than normal for this reason.

Disturbance intensity and severity: We anticipate construction activities to have short-term and temporary effects on the piping plover populations. We anticipate piping plovers located within the construction area to move outside of the construction zone due to disturbance. We anticipate project construction to indirectly effect shoreline morphology and lake side shoreline dynamics by reducing the creation of piping plover habitat. Permanent impacts to less than 3,186 feet of optimal and temporary impacts of 13.5 miles of less optimal piping plover habitat are expected.

Analyses for Effects of the Action

Direct effects

Direct effects are those direct or immediate effects of a project on the species or its habitat. The construction window (i.e., disposal of sand) will extend through approximately one piping plover migration and winter season. Heavy machinery and equipment (e.g., trucks and bulldozers operating on project area beaches, the placement of the dredge pipeline along the beach, and sand disposal) may adversely affect migrating and wintering piping plovers in the project area by disturbance and disruption of normal activities such as roosting and feeding, and possibly forcing birds to expend valuable energy reserves to seek available habitat elsewhere.

Burial and suffocation of invertebrate species will occur during each nourishment and renourishment cycle. Impacts will affect the entire 13.5 miles along the Project Area, as well as at some downdrift areas. Timeframes projected for benthic recruitment and re-establishment following beach nourishment are between 6 months to 2 years. Depending on actual recovery rates, impacts will occur even if nourishment activities occur outside the plover migration and wintering seasons.

Indirect effects

The proposed project includes construction of berm, dunes, and beach fill along 13.5 miles of GOM shoreline as protective elements against shoreline erosion to protect man-made infrastructure. Indirect effects of reducing potential for the formation of optimal habitats, especially along shorelines that are susceptible to overwash, pose a critical concern for piping plovers with respect to survival and recovery.

Eventually the inter-tidal zone along the beach front will re-establish and provide some feeding habitat for piping plovers but these feeding areas are considered substantially inferior to natural overwash habitat that is highly likely to form to a greater extent within sections of the project area absent the proposed project. The plover’s rapid responses (bird occurred within 6 months) to habitats formed by washovers from the hurricanes in 2004-2005 in the Florida panhandle at Gulf Islands National Seashore, and similar observations of their preferences for overwash habitats at Phipps Preserve and Lanark Reef in Franklin County, Florida, and elsewhere in their range, demonstrate the importance of overwash created habitats for wintering and migrating piping plovers. The proposed project will perpetuate and contribute to the widespread activities that prevent the formation of these preferred early successional overwash habitats. These disturbance factors warrant additional investigation to determine the extent to which they cumulatively affect wintering plovers.

At the same time that the proposed project limits the creation of optimal foraging and roosting habitat, it increases the attractiveness of these beaches and increases recreational pressures within the project area. The draft biological assessment provided by the applicant states that the "proposed beach restoration project is a protective measure that reduces the risk of storm damage to upland property. At the same time, a healthy and wide beach provides increased recreational opportunities to the county's citizens, promotes tourism and increases revenue streams to local businesses….". Recreational activities that potentially adversely affect plovers include disturbance by unleashed pets, increased pedestrian use (walking, sunbathing, beach driving) and reduction of foraging habitat from deliberate removal of wrack (beach cleaning and raking), often seen as unattractive to beach goers.

We expect landowners and local governments to initiate construction of new infrastructure or upgrade existing facilities, such as buildings or parking areas adjacent to the project area. Long-term impacts include a decrease in use of habitat due to increased disturbance levels and preclusion of the creation of additional recovery habitat.

Species response to the proposed action

The Service bases this biological opinion on anticipated direct and indirect effects to piping plovers (wintering and migrating) as a result of dune, berm, and beach fill construction which restricts the formation of habitat that plovers consider optimal for foraging and roosting. In the context of migrating and wintering piping plovers, we anticipate that approximately 3,186 feet (estimated from Taylor Engineering permit drawings and the Services' Geographical Imaging System (GIS)) of lake side habitat, its associated mud and sand flat area, and an unspecified number of piping plovers will be impacted by habitat loss if the lake sides are restricted from future overwash processes. Foraging on suboptimal habitat on the non-breeding grounds by migrating and wintering piping plovers may reduce the fitness of individuals.

The Service anticipates adverse affects throughout the project area from increased recreational pressure resulting in increased disturbance to roosting and foraging piping plovers from levels of human presence significantly greater than those currently experienced.

Elliott and Teas (1996) found a significant difference in actions between piping plovers encountering pedestrians and those not encountering pedestrians. Piping plover encountering pedestrians spend proportionately more time in non-foraging behavior. This study suggests that interactions with pedestrians on beaches cause birds to shift their activities from calorie acquisition to calorie expenditure. In winter and migration sites, human disturbance continues to decrease the amount of undisturbed habitat and appears to limit local piping plover abundance (Zonick and Ryan 1996).

The presence of pets increases disturbance to wintering and migrating piping plovers. A study conducted on Cape Cod, Massachusetts, found that pets disturbed piping plovers by an average distance of 150 feet, compared with 75 feet from pedestrians. Furthermore, the birds reacted to the pets by moving an average of 187 feet, compared with 82 feet when the birds reacted to a pedestrian. The duration of the disturbance behavior stimulated by pets was significantly greater than that caused by pedestrians (Hoopes 1993). Disturbance also reduces the time migrating shorebirds spend foraging (Burger 1991). Pfister et al. (1992) implicate disturbance as a factor in the long-term decline of migrating shorebirds at staging areas. While piping plover migration patterns and needs remain poorly understood and occupancy of a particular habitat may involve shorter periods relative to wintering, information about the energetics of avian migration indicates that this might be a particularly critical time in the species' life cycle.

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 project are not considered in this opinion because they require separate consultation pursuant to section 7 of the Endangered Species Act.

The majority of the land within the Action Area is privately owned and is close to build out. It is reasonably certain to expect that coastal development, human occupancy and recreational use along the Gulf Coast of Florida, including Walton County, will increase in the future until build out occurs. Redevelopment along with new developments following the hurricane seasons of 2004 and 2005 occurs as allowed by local zoning standards and state and federal permitting. It is unknown how much influence a nourished beach contributes to the development and recreational use of the shoreline. Any projects that are within endangered or threatened species habitat will require section 7 or 10 permitting from the Service.

CONCLUSION

Sea Turtles

After reviewing the current status of the loggerhead, green, leatherback, 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 project, as proposed, is not likely to jeopardize the continued existence of the loggerhead, green, leatherback, 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 nesting subpopulations is essential to the recovery of the loggerhead sea turtle. Each individual subpopulation 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 subpopulation contributes to the overall population. This project is within the Florida panhandle subpopulation.

There is approximately 1,400 miles of available sea turtle nesting habitat in the southeastern U.S and 234 miles in the panhandle. Of this available nesting habitat, project impacts will occur on 1.0 percent of the nesting habitat statewide and 6.0 percent of the nesting habitat in the panhandle.

Choctawhatchee Beach Mouse

After reviewing the current status of the CBM, the environmental baseline for the Action Area, the effects of beach nourishment and associated activities, 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 the CBM and is not likely to destroy or adversely modify designated critical habitat for the CBM.

As discussed in the Effects of the Action section of this opinion, we would not expect the carrying capacity of CBM 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. A contiguous mosaic of beach mouse habitats will be provided within the Action Area during and after project construction.

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

3. Impacts to beach mouse habitat will be restored 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 expected to be completed within six to nine months. As the life span of a beach mouse is estimated to be approximately 9 months, the temporary impacts of the proposed action may effect several generations of PKBM, but because the subspecies can reproduce rapidly (every 26 days) colonization or recolonization of the restored habitat would be expected within several months.

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. While we remain concerned for the current low numbers of CBM remaining since the 2004 and 2005 storm seasons, the habitat appears to be recovering and some increase in populations have occurred. Therefore, for this project we do not consider the potential loss of individuals to be significant.

Also, we would not anticipate that the temporary loss of the critical habitat would alter or affect the remaining critical habitat in the Action Area for CBM to the extent that it would appreciably diminish the habitat's capability to provide the intended conservation role for the subspecies in the wild.

Piping Plover

After reviewing the current status of the wintering population of the northern Great Plains, the Great Lakes and the Atlantic Coast piping plover, the environmental baseline for the berm, dune and beach fill project and associated construction activities, and the cumulative effects, it is the Service's biological opinion that implementation of the project, as proposed, is not likely to jeopardize the continued existence of non-breeding piping plover. Specific rationale for the non-jeopardy determination for each population is provided below. As noted previously, the overall status of the listed entity is stable, if not increasing.

Of greatest concern is the reliance that piping plovers have on the remaining 35 percent of Florida's coastal shoreline where the natural coastal processes are allowed to function. In these natural areas, piping plover habitat conceivably comes and goes as a function of storm events and associated tides, winds, elevation, and vegetational succession. The best we can hope for is a balance between suitable and unsuitable piping plover habitat remaining in Florida as there is little opportunity to expand the amount of habitat available for future conservation of the species. The amount available today appears sufficient to sustain the species but it is unknown if it is sufficient to conserve the species into perpetuity. The remaining habitat in Florida available today for piping plover use where coastal processes are allowed to function are still subjected to threats, especially human disturbance, coastal highways, military missions, dredge disposal and nourishment projects. Increased management to minimize such impacts to piping plover in these areas is the best defense we may have to conserve the species.

The proposed project would directly affect 13.5 miles of Gulf beach shoreline temporarily and indirectly affect less than 3,186 feet (0.60 mile) of subsequent mud and sand flats by precluding natural development of additional habitat within the Project Area. An unspecified amount of piping plovers are probably using the Gulf shoreline and lake side sand and mud flats of the Action Area, at least temporarily during migration or winter months.

Ferland and Haig (2002) calculated from the 2001 International Plover Census results that 57 percent of piping plover sites contained 1-10 birds, 36 percent contain 11-50, and less than 8 percent contain more than 50 piping plovers. At the moment, this area appears to be of minimal importance with regard to piping plovers since they remain undocumented within the project area. It is difficult to determine how the preclusion of the creation of additional recovery habitat will affect the species.

On winter and migration sites, human disturbance continues to decrease the amount of undisturbed habitat and appears to limit local piping plover abundance (Zonick and Ryan 1996). It is unknown what the carrying capacity may be within the project area with removal of human disturbance, but it is believed to be greater than its current use. Foraging on optimal, but disturbed habitat, on the non-breeding grounds by migrating and wintering piping plovers may reduce the fitness of individuals, which will have an unknown affect on the listed entity.

Florida’s shoreline equates to approximately 825 miles, of which, 211 are designated critical habitat for piping plovers. Permanent impacts to less than 3,186 feet (0.60 mile) of optimal and temporary impacts to 13.5 miles of less optimal piping plover habitat represents less than 0.07 percent and 1.6 percent, respectively, of shoreline in Florida. For the reasons stated above, this leads us to conclude that implementation of the project, with the temporary loss of 13.5 miles of coastal shoreline and the partial loss of 3,186 feet of lake side sand and mud flats and harassment of an unspecified amount of piping plovers would not appreciably affect the survival and recovery of the piping plover from the Atlantic Coast and Great Plains population.

The Great Lakes population of piping plovers is a separate listed entity, classified as endangered. Piping plovers from this population may occur within the Action Area during the non-breeding season. This population is currently increasing, but remains at very low levels. The current number, if any, of the Great Lakes piping plovers using the Action Area during migration and over winter is unknown. Assuming a worst case scenario of a fully diminished coastal dune lake sides and GOM shoreline habitat, less suitable for piping plover use, this may result in the incidental take of individuals. However, coupled with continued intensive management in the breeding range of the Great Lakes population, the lack of known use in this area, a reasonable portion of the population’s repeated use of Georgia’s mostly protected coastline, and the status of the listed entity rangewide, we conclude that implementation of the proposed project would not appreciably affect the survival and recovery of the piping plover from the Great Lakes population.

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 permittee 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

Sea Turtles

The Service expects that no more than 13.5 miles of highly eroded shoreline where sea turtles nest could be affected as a result of the beach nourishment. The Service expects the incidental take of sea turtles will be difficult to detect for the following reasons (**Table 9**):

(1) turtles nest primarily at night and all nests are not located 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 expected by the disturbance and changes to suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) the dune, berm, and beach fill will likely occur during a portion of the nesting season; (3) the project will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter and/or misdirect nesting females and hatchlings during and following beach nourishment.

Take is expected to be in the form of:

(1) harm in the 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 during the sea turtle nesting season from May 1 through October 31;

(2) harm in the destruction of all nests deposited from October 31 through April 30 when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project;

(3) harm in the 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) harassment by the 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) harassment in the 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) harm in the destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service.

The level of take can be monitored with the use of standardized sea turtle nesting surveys (**Table 14**).

Table 14. How the monitoring of incidental take for the proposed project will be monitored if the specific individuals cannot be determined based on the best available commercial and scientific information.

SPECIES	CRITICAL HABITAT	HABITAT	Monitoring
Loggerhead, Green, Leatherback, and Kemp's Ridley sea turtles	None	13.5 miles	Statewide Nesting Beach Survey protocol

Choctawhatchee Beach Mouse

The Service expects that no more than 1.5 acres of suitable CBM habitat could be affected as a result of the beach nourishment. The Service expects incidental take of beach mice would be difficult to detect for the following reasons (**Table 15**):

(1) an unknown number of beach mice may be injured, crushed or buried during beach access use and remain entombed in the sand;
(2) beach mice are nocturnal, small and finding a dead or injured mouse is unlikely because of predation and scavengers, and
(3) changes in essential beach mouse life behaviors may not be detectable in standardized monitoring surveys.

However, the following level of take of beach mice can be expected by the loss of habitat that is fragmented temporarily for use as construction beach accesses because: (1) CBM are known to inhabit the project area; (2) are found year round in the project area; and (3) creation or expansion of beach access corridors could fragment CBM habitat.

The incidental take is expected to be in the form of:
(1) harm or harassment to all beach mice occupying the 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.

To assess the effects of the impacts to beach mice, the success of habitat restoration can be monitored (**Table 15**).

Table 15. The amount of CBM habitat that will be affected by the project and the monitoring of incidental take for the proposed project.

SPECIES	CRITICAL HABITAT	HABITAT	MONITORING
CBM	Temporary impacts at beach access points covering 0.83 acre (2 accesses, storage, or staging sites)	Temporary impacts at beach access points covering 1.5 acres (9 accesses, storage, or staging sites)	Beach access habitat restoration success monitoring

Piping Plovers

The Service anticipates that directly and indirectly an unspecified amount of piping plovers and 13.5 miles of GOM shoreline and 0.60 mile of coastal dune lake side shoreline potentially used by piping plovers could be taken in the form of harm and harassment as a result of this proposed action; however, incidental take of piping plovers will be difficult to detect for the following reasons:

(1) Harassment to the level of harm may only be apparent on the breeding grounds the following year; and
(2) dead plovers may be carried away by waves or predators.

The level of take of this species can be anticipated by the proposed activities because (**Table 16**):

(1) Piping plovers probably migrate and winter in the Action Area;

(2) the placement of the constructed beach is expected to affect the coastal mainland morphology and prevent early successional stages, thereby precluding the maintenance and creation of additional recovery habitat;
(3) increased levels of pedestrian and dog disturbance is expected; and
(4) a temporary reduction of food base will occur.

Table 16. The amount of piping plover roosting and foraging habitat that will be affected by the project and the monitoring of incidental take for the proposed project.

SPECIES	CRITICAL HABITAT	HABITAT AFFECTED	MONITORING
Piping plover	N/A	13.5 miles of shoreline and 0.60 mile of coastal dune lakes shoreline habitat affected by physical alterations; in addition to 13.5 miles affected by increased human disturbance	Surveys/ educational and restrictive measures applied

EFFECT OF THE TAKE

Sea Turtles

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the loggerhead, green, leatherback, or Kemp's ridley sea turtle species. 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 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 beach nourishment is placed.

Choctawhatchee Beach Mouse

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to CBM. The Service has determined that the project would not result in destruction or adverse modification of designated critical habitat for the CBM.

Incidental take of CBM is anticipated to occur during the construction of the beach nourishment. The 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.

Piping Plover

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the piping plover species or destruction or adverse modification of its critical habitat. Incidental take of piping plovers is anticipated to occur along 13.5 miles of GOM shoreline and 0.60 mile of shoreline along coastal dune lakes during and following the life of the project.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of nesting and hatchling loggerhead, green, leatherback, and Kemp's Ridley sea turtle, CBM, and non-breeding piping plover in the proposed dune, berm and beach fill project within the Action Area.

1. Conservation Measures included in the permit application/project plans that provides for planting of the created dunes shall be implemented (unless revised below in the Term and Conditions) in the proposed project.

2. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence, beach mouse burrow construction and piping plover food prey species substrate shall be used for the project.

3. If the project is conducted during the sea turtle nesting season the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation.

4. Construction equipment and materials shall be stored in a manner that will minimize impacts to sea turtles, CBM, and piping plover to the maximum extent practicable.

5. The beach nourishment project report must provide all sea turtle nesting activity for the initial nesting season and for a minimum of two additional nesting seasons. Monitoring of nesting activity shall include daily surveys.

6. Immediately after completion of the project and prior to the next three nesting seasons, beach compaction shall be monitored and tilling shall be conducted as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

7. Immediately after completion of the project and prior to the next three nesting seasons, monitoring shall be conducted to determine if escarpments are present and escarpments shall be leveled to reduce the likelihood of impacting sea turtle nesting and hatching activities.

8. The County shall minimize disturbance to optimal piping plover feeding and roosting habitat.

9. Vegetated habitat at each of the beach access points shall be protected to the maximum extent practicable and shall be delineated by fence or other suitable material to ensure vehicles and equipment transport stay within the access corridor.

10. Expanded or newly created beach access shall be restored to dune habitat within 3 months following project completion. The habitat restoration shall consist of restoring the beach and 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). All dune restoration and planting shall be designed and conducted to minimize impacts to sea turtles, CBM and piping plover.

11. All vegetation planting on the newly constructed dunes shall be designed and conducted to minimize impacts to sea turtles, beach mice and non breeding piping plovers.

12. Sand fence installation shall occur outside the sea turtle nesting season and utilize the design approved by the Service and FWC.

13. The contractors performing the project work shall install and maintain predator proof trash receptacles at all public beach access points to minimize the potential for attracting predators of sea turtles, beach mice, and piping plover.

14. Lighting associated with the project night work shall be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles, nocturnal movements of CBM, and piping plover roosting activities.

15. Pre and post-project surveys of all artificial lighting visible from the beach fill shall be completed. This information shall be provided to the Service and FWC.

16. The contractors performing the project shall fully understand and correctly implement the sea turtle, beach mice, and non-breeding piping plover protection measures detailed in this incidental take statement.

17. Upon locating a sea turtle, CBM, or piping plover harmed or destroyed as a direct or indirect result of the project, notification shall be made to the Service and FWC.

18. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Service within 60 days of completion of the proposed work for each year when the activity has occurred.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall ensure that the permittee complies 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.

Proposed work

1. In accordance with 62B-41.007, Florida Administrative Code, all fill material placed on the beach or in the dunes or berm shall be analogous to that which naturally occurs within the project location or vicinity in quartz to carbonate ratio, color, median grain size and median sorting. Specifically, such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062 mm and 4.76 mm (classified as sand by either the Unified Soil Classification System or the Wentworth classification). The material shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size, and sorting coefficient) to the material in the existing coastal system at the disposal site and shall not contain:

    a. greater than five percent, by weight, silt, clay, or colloids passing the #230 sieve; greater than five percent, by weight, fine gravel retained on the #4 sieve;
    b. coarse gravel, cobbles, or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;

c. construction debris, toxic material or other foreign matter; and not result in cementation of the beach.

These standards shall not be exceeded in any 1,000 square foot section, extending through the depth of the nourished beach. If the natural beach exceeds any of the limiting parameters listed above, then the fill material shall not exceed the naturally occurring level for that parameter.

2. The project may occur during the sea turtle nesting season except on publicly owned conservation lands such as state or federal parks and areas where such work is prohibited under land management plans or local land use codes.

3. The permittee shall ensure that the contractors conducting the work 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. Predator proof trash receptacles shall be installed and maintained at all access points, eating areas, and rest-room areas.

4. A meeting between representatives of the contractor, the Service, the FWC, and the permitted sea turtle surveyor and other species surveyors as appropriate prior to the commencement of work on this project must be held. At least 10 business days advance notice must be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle, CBM, and piping plover protection measures as well as additional guidelines when construction occurs during the nesting season such as storing equipment, minimizing driving, and follow up meetings during construction.

5. Reports on all sea turtle nesting activity shall be provided for the initial nesting season and for a minimum of two additional nesting seasons. Monitoring of sea turtle nesting activity in the seasons following construction shall include daily surveys and any additional measures authorized by the Service and FWC.

Protection of Species

1. The project may occur during the sea turtle nesting season (May 1 through October 31) if not prohibited by state or federal park land management plans or local land use codes.

2. If any portion of the project occurs in the sea turtle nesting season, nesting surveys shall be initiated 70 days prior or by May 1 whichever is later. Nesting surveys must continue through the end of the project or through August 31 whichever is earlier. If nests are constructed in areas where they may be affected by the project activities, eggs must be relocated per the requirements listed below:

   2a. Sea turtle nesting surveys and egg relocations will only be conducted by persons with prior experience and training in these activities and who is duly authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Nesting surveys must be conducted daily between sunrise and 9 a.m. (this is for all time zones). The contractor shall not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys must be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

2b. Only those sea turtle nests that may be affected by project activities shall be relocated. Nests requiring relocation must 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; must 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.

2c. Sea turtle nests deposited where project activities have ceased or will not occur for 70 days shall be marked and left *in situ* 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 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 10-foot radius around the nest. No activity shall 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 activities.

3. 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. If the 500 feet is not feasible for the project, an agreed upon distance shall be decided on during the preconstruction meeting. Once the beach has been cleared and the necessary nest relocations have been completed, the contractor is allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length limitation shall apply.

4. Immediately after completion of the project and prior to April 15 for 3 subsequent years, sand compaction shall be monitored in the area of beach fill in accordance with a protocol agreed to by the Service, the FWC, and the applicant. At a minimum, the protocol provided under 4a and 4b below shall be followed. If tilling is required, the area shall be tilled to a depth of 24 inches. All tilling activity must be completed prior to April 15.

   Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling. If the project is completed during the nesting season, tilling shall 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 must be submitted to the Service's Panama City Ecological Service Office field office, 1601 Balboa Avenue, Panama City, FL 32405 prior to any tilling actions being taken.

4a. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station must 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).

4b. 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 shall include all 18 values for each transect line, and the final 6 averaged compaction values.

4c. 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.

4d. 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 shall be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling shall not be required.

4e. Tilling shall occur landward of the wrack line and avoid all vegetated areas three (3) square feet or greater with a three (3) square foot buffer around the vegetated areas.

5. Visual surveys for escarpments along the project area shall be made immediately after completion of the project and prior to April 15 for 3 subsequent years. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled and the beach profile reconfigured to minimize scarp formation.

   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. Surveys for escarpments shall be conducted weekly. Results of the surveys shall be submitted within one month to the Service's appropriate Field Office prior to any action being taken during the nesting season. 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 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 Panama City, Florida Field Office. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach).

6. Staging areas for construction equipment shall be located off the beach to the maximum extent practicable from May 1 to October 31.

7. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, 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. Temporary storage of pipes shall be off the beach to the maximum extent possible. Temporary storage of pipes on the beach shall be in such a manner so as to impact the least amount of nesting habitat and shall not compromise the integrity of the dune systems. Pipes placed parallel to the dune shall be five to ten feet away from the toe of the dune.

8. Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area and shall comply with safety requirements from May 1 to October 31.

9. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (**Figure 19)**.

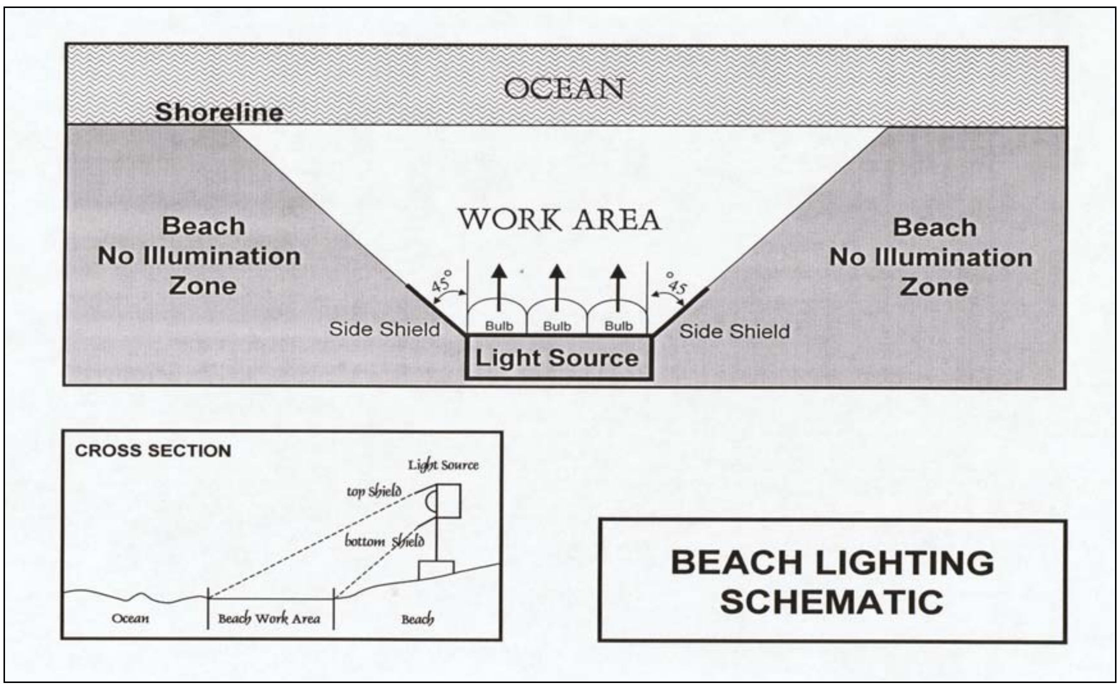

Figure 19. Beach lighting schematic.

10. A survey of all artificial lighting visible from the project beach shall be conducted before and after the project since there is no lighting ordinance in place. The survey shall use standard techniques (**Appendix 1**).

The surveys shall document all lighting visible from the pre-project beach and then the post-project beach. The surveys shall document all lighting visible from the un- or previously nourished beach and then the nourished beach by May 15 following the nourishment work and again by June 15, July 15, August 15, and September 15 of that nesting season. For each light source visible, it must be documented that the property owner(s) have been notified of the problem light with recommendations for correcting the light. Recommendations must be in accordance with the Florida Model Lighting Ordinance for Marine Turtle Protection FAC 62B55. A summary report of each survey including documentation of property owner notification shall be submitted to the Service's Panama City Florida Field Office by the 1st of the following month; and a final summary report provided by December 15 of that year. After the final report is completed, a meeting shall be set up with the FWC and the Service to discuss the survey report and documented sea turtle disorientations.

Dune Planting

1. Dune vegetation planting may occur during the sea turtle nesting season (May 1 through October 31) under the following conditions.

    1a. Daily early morning sea turtle nesting surveys shall be conducted during the period from May 1 through October 31. Nest surveys shall only be conducted by personnel with prior experience and training in nest surveys. Surveyors must have a valid FWC permit. Nest 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.

    1b. Nesting surveys shall be initiated 70 days prior to dune planting activities or by May 1, whichever is later and by March 1. Nesting surveys shall continue through the end of the project or through August 31, whichever is earlier. Hatching and emerging success monitoring shall involve checking nests beyond the completion date of the daily early morning nesting surveys.

    1c. Any nests deposited in the dune planting area not requiring relocation for conservation purposes shall be left in situ. 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. A series of stakes and highly visible survey ribbon or string shall be installed to establish an area of 3-foot radius surrounding the nest. No planting or other activity shall 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 planting activity.

    1d. If a nest is disturbed or uncovered during planting activity, the contractor, permittee or the permittee's contractors shall cease all work and immediately contact the responsible turtle permit holder. If a nest(s) cannot be safely avoided during planting, all activity within the affected project site shall be delayed until hatching and emerging success monitoring of the nest is completed.

    1e. All dune planting activities shall be conducted by hand and only during daylight hours.

    1f. 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) (**Appendix 2**). Seedlings shall be at least 1 inch by 1 inch with a 2.5-inch pot. Planting shall be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the acreage of the area to be planted and the size of the plants. Vegetation shall be planted with an appropriate amount of fertilizer and anti-desiccant material for the plant size.

1g. No use of heavy equipment (trucks) shall occur on the dunes or seaward for planting purposes. A lightweight (ATV type) vehicle, with tire pressures of 10 psi or less may be operated on the beach.

2. Sand fencing or other dune restoration material placed in the project area shall be installed outside of the main portion of sea turtle nesting season (June 1 through October 31) in accordance with the following conditions:

2a. A maximum of 10 foot- long spurs of parallel fence spaced at a minimum of 7 feet apart shall be installed on a northeast or southwest (diagonal) alignment depending on where it is installed **(Figure 20).**

2b. Upon site inspection by the Service, FDEP, or the FWC, if it is determined that the fence adversely impacts nesting or hatchling turtles, the fence shall be removed or repositioned, as appropriate.

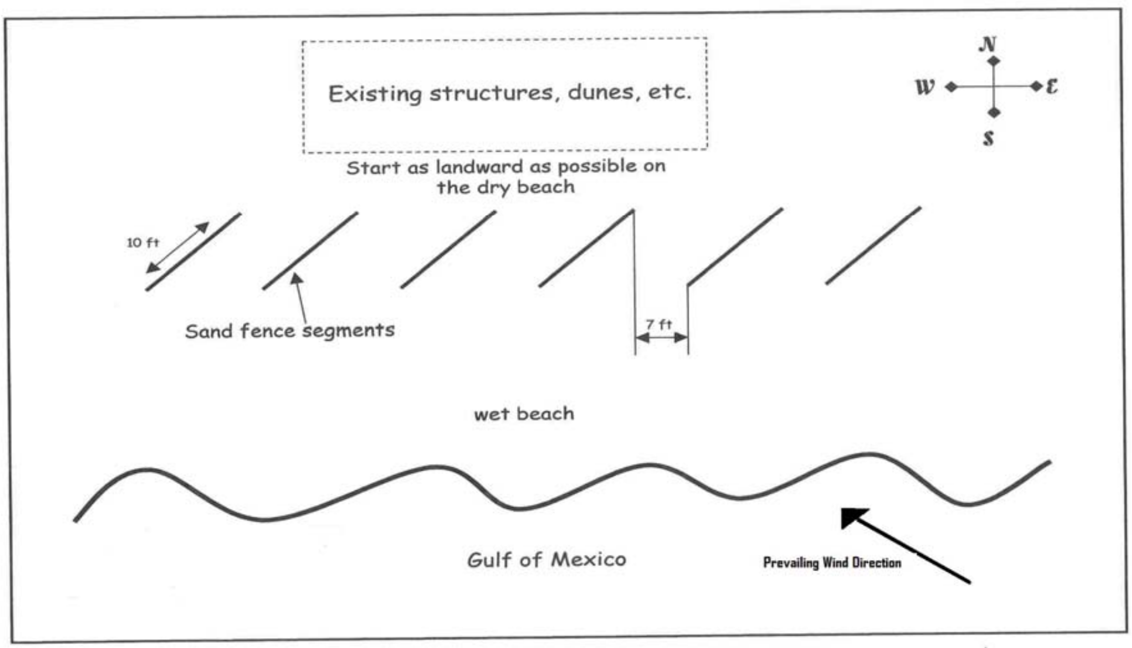

Figure 20. Dune restoration fence alignment.

<u>Protection of Beach Mice</u>

1. 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 (often dominated by scrub oaks and yaupon holly).

2. Equipment 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. The toe of the dune is where the slope breaks at the seaward foot of the dune (**Figure 21**).

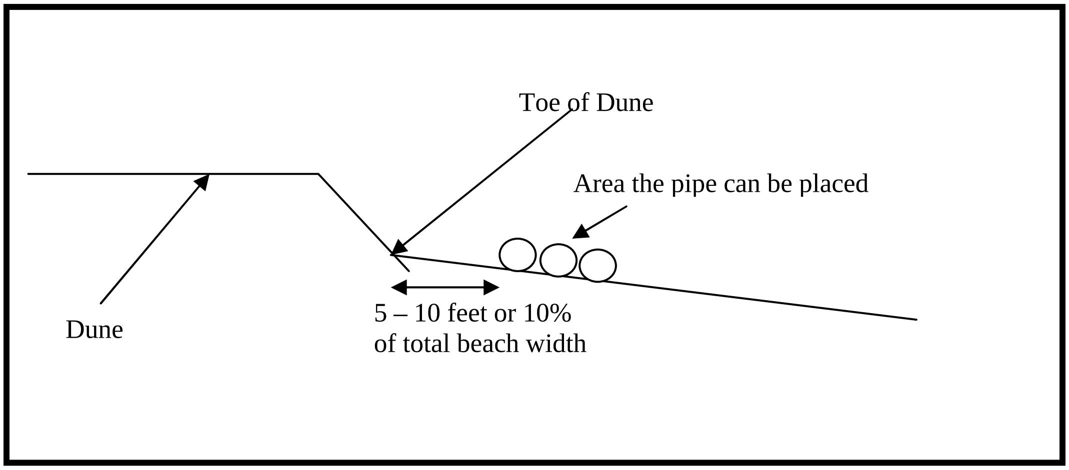

Figure 21. Placement of pipe in areas where there are existing dunes.

3. Existing beach access points shall be used for vehicle and equipment beach access to the maximum extent practicable. These accesses shall 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 shall be fully restored to pre-project work configuration following project completion. Equipment and material staging/storage areas for the project shall be located outside of vegetated dune habitat. Parking areas for construction crews shall 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.

4. The creation of new or expansion of existing beach accesses for vehicles and equipment within beach mouse habitat consisting of vegetated dunes shall be delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The access points must be as follows:

   a) No more than 25 feet wide for vehicles;
   b) No more than 50 feet wide for equipment.

5. New or expanded 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) (**Appendix 2**). Seedlings must be at least 1 inch by 1 inch with a 2.5-inch pot. Planting must be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the area to be planted. Vegetation must be planted with an appropriate amount of fertilizer and anti-desiccant material, as appropriate, for the plant size. No sand stabilizer material (coconut matting or other material) must be used in the dune restoration. The plants may be watered without installing an irrigation

system. In order for the restoration to be considered successful 80 percent of the total planted vegetation is 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.

Protection of Piping Plovers

1. **The permittee shall implement Term and Conditions "1a-b", or "Protection of Piping Plovers prior, during, and after the project 2a-i:"**

1a. Annually, the applicant shall contribute at least **$3,100** for each mile or **$0.60** per linear foot of berm, dune, or beach fill constructed per life of the project*. The Service will specify where the funds shall be deposited once project is initiated. The funds will be used towards the management and monitoring of piping plovers and their habitat on public or private lands which have a demonstrated use or potential use by piping plovers. Management may include but not be limited to posting and roping important use areas, enforcement of pet ordinances, and protection of closed off areas. Monitoring may assist in summarizing the status of plovers and their habitat. Trends in areas used by piping plovers may also be assessed in portions of Florida depending on data collected as funding allows.* These funds are to be used to minimize potential impacts to areas that may be used by piping plover that may be displaced permanently or temporarily by the project.

*Given the randomness of storm events and the unknowns associated with defining the "life" of the project, we will specify that at least **two** years of funding shall be required from the applicant regardless of the state of the project and no more than 10 years of funding will be required. The "life" of the project is defined by the applicant's contractor as the point where only 50% of the original placement volume remains.

1b. To preserve piping plover feeding and roosting habitat, the mechanical removal of natural organic material (wrack) shall be prohibited year-around along the shoreline. This has been identified as important foraging and roosting habitat by piping plovers as well as an abundance of other shorebirds on the winter and migration grounds as well. Trash and litter may be manually removed. Exceptions apply when health of humans may be affected such as with red tide events. Protection of wrack will help to offset the impacts of shorebird habitat directly or indirectly by the proposed project and ensuing human disturbance.

OR

2. **Protection of piping plover prior, during, and after the project.**

2a. Prior to construction, survey and map onto aerial photography, throughout the Action Area, optimal non-breeding piping plover habitat (low lying areas, washover passes, inlets, ephemeral ponds, lagoons, and mud and sand flats). The applicant will work with the Service to integrate piping plover habitat features into the project design when possible.

2b. Avoid berm and dune construction within public lands such as county access areas and State Park lands.

2c. Poles or pier pilings occurring within 200 feet of piping plover habitat shall be retro-fit to reduce avian predation.

2d. Conduct surveys for non-breeding piping plover in the **Project** area (includes connected coastal dune lake shorelines daily starting two weeks prior to project initiation for the duration of the berm, dune, and beach fill construction period between July 15 and May 15 (10 months of the year). Submit daily piping plover survey results to the Service's Panama City Florida Field Office with maps documenting the locations of piping plovers (with GPS coordinates or latitude and longitude coordinates) if seen during this survey period. Negative data shall also be reported.

2e. Conduct bi-monthly surveys for piping plovers in the **Action** areas (includes Walton County beaches, State Park lands, and connected coastal dune lake shorelines) from July 15 through May 15 of each year (10 months of the year) beginning two weeks post construction and continuing for the duration of the project*. Maintain information in a database (e.g. Access or Excel). Report negative and positive survey data and the amount and type of recreational use documented. Record piping plover locations with a Global Positioning System (GPS), habitat type used (intertidal area, mid-beach, etc), and observed behavior (foraging, roosting, etc). Incorporate all information collected into the database. Guidelines for conducting surveys are included in **Appendix 3.** Submit yearly piping plover survey results (datasheets and database) to the Service's Panama City Florida Filed Office with maps documenting the locations of piping plovers (with GPS coordinates or latitude and longitude coordinates) when seen. Negative data (i.e., no plovers seen) shall also be reported.

Conduct at least one of the bi-monthly shorebird surveys April through October on a weekend to document the amount of recreational pressure potentially occurring along the shoreline.

*Given the randomness of storm events and the unknowns associated with defining the "life" of the project, we will specify that at least **two** years of surveys shall be required from the applicant regardless of the state of the project and no more than 10 years of surveys will be required. The "life" of the project is defined by the applicant's contractor as the point where only 50% of the original placement volume remains.

2f. To preserve piping plover feeding and roosting habitat, the mechanical removal of natural organic material (wrack) shall be prohibited year-around along the shoreline. This has been identified as important foraging and roosting habitat by piping plovers as well as an abundance of other shorebirds on the winter and migration grounds as well. Trash and litter may be manually removed. Exceptions apply when health of humans may be affected such as with red tide events. Protection of wrack will help to offset the impacts of shorebird habitat directly or indirectly by the proposed project and ensuing human disturbance.

2g. Annually, Walton County staff shall notify holders of beach driving permits to drive their vehicles just above or just below the primary "wrack" line.

2h. At approximately every mile of beach, a "Disturbance-Free Zone" at least a one half acre area shall be posted and roped off where potential bird roosting and feeding could occur (not into the tidal area and allowing enough space for walkers to cross) **OR** at least one half acre area adjacent to **3** coastal dune lake outlets shall be posted and roped off where potential bird roosting and feeding could occur. These areas shall remain rope off year around for the duration of the project*.

2i. Walton County shall post, where appropriate, at each beach access points, the provisions of the County Dogs on the Beach Permit Requirements. Annually a notice shall be placed in the local paper informing in this same regard. A copy of the published notice should be mailed to the USFWS. Warnings and citations should be issued when appropriate to minimize harassment of piping plovers and other shorebirds.

2j. Walton County shall restrict, and enforce this restriction, the use of all fireworks on the Walton front beaches adjacent to the roped and posted areas as discussed in Terms and Conditions 2h.

Reporting

1. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Service's Panama City Florida Field Office by January 15 of the following year of completing the proposed work for each year when the activity has occurred. This report will include the dates of actual construction activities, names and qualifications of personnel involved in piping plover surveys and sea turtle nest surveys and relocation activities (separate the nest surveys for nourished and non-nourished areas), descriptions and locations of self-release beach sites, nest survey and relocation results and the information outlined in **Table 17.**

2. Upon locating a sea turtle adult, hatchling, or egg, CBM, or a piping plover harmed or destroyed as a direct or indirect result of the project, notification shall be made to the Service's Law Enforcement Office at (352) 429-1037 and the Panama City Field Office at (850) 769-0552. The FWC Sea Turtle Stranding and Salvage Network by Pager: 1-800-241-4653, ID#274-4867 and/or Wildlife Alert 1-888-404-3922 shall also be notified. Care shall be taken in handling injured turtles or eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

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Table 17. Sea turtle nesting data required for annual reports.

CHARACTERISTIC	PARAMETER	MEASUREMENT	VARIABLE
Nesting Success	False crawls - number	Visual assessment of all false crawls	Number and location of false crawls in nourished areas and non nourished areas: any interaction of the turtle with obstructions, such as groins, seawalls, or scarps, should be noted.
	False crawl - type	Categorization of the stage at which nesting was abandoned	Number in each of the following categories: emergence-no digging, preliminary body pit, abandoned egg chamber.
	Nests	Number	The number of sea turtle nests in nourished and non nourished areas should be noted. If possible, the location of all sea turtle nests must be marked on map of project, and approximate distance to sea walls or scarps measured using a meter tape. Any abnormal cavity morphologies should be reported as well as whether turtle touched groins, seawalls, or scarps during nest excavation
		Lost Nests	The number of nests lost to inundation, erosion or the number with lost markers that could not be found.
	Lighting Impacts	Disoriented sea turtles	The number of disoriented hatchlings and adults must be documented and reported in accordance with existing FWC protocol for disorientation events.
Reproductive Success	Emergence & hatching success	Standard survey protocol	Numbers of the following: unhatched eggs, depredated nests and eggs, live pipped eggs, dead pipped eggs, live hatchlings in nest, dead hatchlings in nest, hatchlings emerged, disoriented hatchlings, depredated hatchlings

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. Walton County should consider measures to limit coastal development that would exacerbate coastal erosion and require storm protection in the future;

2. The Applicant should consider purchasing land for shorebird conservation which could include locations where natural shoreline processes can occur unimpeded. These might include not only undeveloped areas, but the potential "buy-out" of developments in areas that are sparsely developed and have high potential habitat value (*e.g.*, proximity to feeding areas, prone to coastal dune outlets, etc.).

3. In order to comply with the MBTA[a] and potential for this project to impact nesting shorebirds, the Corps grant Applicant should follow FWC's standard guidelines to protect against impacts to nesting shorebirds during implementation of this project during the periods from February 15-August 31.

4. Additional dune walkovers and parking areas should be constructed where appropriate to protect dune habitats at beach access points.

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.

The Migratory Bird Treaty Act (MBTA)

The Fish and Wildlife Service will not refer the incidental take of piping plover for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions specified here.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. 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 shall cease pending reinitiation.

The above findings and recommendations constitute the report of the Department of the Interior. If you have any questions about this opinion, please contact Lorna Patrick of this office at extension 229.

Sincerely,

Janet Mizzi
Deputy Field Supervisor

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[a] The Migratory Bird Treat Act (MBTA) implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory bird. Under the provisions of the MBTA it is unlawful "by any means or manner to pursue, hunt, take, capture or kill any migratory bird except as permitted by regulations issued by the Fish and Wildlife Service. The term "take" is not defined in the MBTA, but the Service has defined it by regulation to mean to pursue, hunt, shoot, wound, kill, trap, capture or collect any migratory bird, or any part, next or egg or any migratory bird covered by the conventions or to attempt those activities.

cc:
Nicole Adimey, FWS, Jacksonville, FL
Robbin Trindell, FWC, Office of Protected Species Management, Tallahassee, FL
John Himes, FWC, Non-game Program, PC, FL
Brad Pickel, Seahaven Consulting, Beaufort, SC
South Walton County Tourist Development Council, Santa Rosa Beach, FL
Michael Trudnak, Taylor Engineering, Inc, Jacksonville, FL
FDEP, Beaches and Coastal Systems, Tallahassee, FL
Ken Graham, FWS, Ecological Services, Atlanta, GA (electronic version only)
Anne Hecht, FWS, Piping Plover Coordinator, Sudbury, MA (final version only)

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APPENDIX 1

Assessments: Discerning Problems caused by Artificial Lighting

Excerpt from:
Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches
Florida Wildlife Research Institute Technical Report TR-2
Revised 2003

Assessments: Discerning Problems caused by Artificial Lighting

WHAT ARE LIGHTING INSPECTIONS?

During a lighting inspection, a complete census is made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. The goal of lighting inspections is to locate lighting problems and to identify the property owner, manager, caretaker, or tenant who can modify the lighting or turn it off.

WHICH LIGHTS CAUSE PROBLEMS?

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven to be useful in identifying problem lighting under a variety of conditions:

An artificial light source is likely to cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the nesting beach.

If light can be seen by an observer on the beach, then the light is reaching the beach and can affect sea turtles. If any glowing portion of a luminaire (including the lamp, globe, or reflector) is directly visible from the beach, then this source is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct glow visible from the beach. This “urban skyglow" is common over brightly lighted areas. Although some indirect lighting may be perceived as nonpoint-source light pollution, contributing light sources can be readily identified and include sources that are poorly directed or are directed upward. Indirect lighting can originate far from the beach.

Although most of the light that sea turtles can detect can also be seen by humans, observers should realize that some sources, particularly those emitting near-ultraviolet and violet light (e.g., bug-zapper lights, white electric-discharge lighting) will appear brighter to sea turtles than to humans. A human is also considerably taller than a hatchling; however, an observer on the dry beach who crouches to the level of a hatchling may miss some lighting that will affect turtles. Because of the way that some lights are partially hidden by the dune, a standing observer is more likely to see light that is visible to hatchlings and nesting turtles in the swash zone.

HOW SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Lighting inspections to identify problem light sources may be conducted either under the purview of a lighting ordinance (see Appendix H and the section below on sea turtle lighting ordinances) or independently. In either case, goals and methods should be similar.

GATHER BACKGROUND INFORMATION

Before walking the beach in search of lighting, it is important to identify the boundaries of the area to be inspected. For inspections that are part of lighting ordinance enforcement efforts, the jurisdictional boundaries of the sponsoring local government should be determined. It will help to have a list that includes the name, owner, and address of each property within inspection area so that custodians of I problem lighting can be identified. Plat maps or aerial photographs will help surveyors orient themselves on heavily developed beaches.

PRELIMINARY DAYTIME INSPECTIONS

An advantage to conducting lighting inspections during the day is that surveyors will be better able to judge their exact location than they would be able to at night. Preliminary daytime inspections are especially important on beaches that have restricted access at night. Property owners are also more likely to be available during the day than at night to discuss strategies for dealing with problem lighting at their sites.

A disadvantage to daytime inspections is that fixtures that are not directly visible from the beach will be difficult to identify as problems. Moreover, some light sources that can be seen from the beach in daylight may be kept off at night and thus present no problems. For these reasons, daytime inspections are not a substitute for nighttime inspections. I Descriptions of light sources identified during daytime inspections should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (e.g., needs turning off; should be redirected 90° to the east). These detailed descriptions will show property owners exactly which luminaires need what remedy.

NIGHTIME INSPECTIONS
Surveyors orienting themselves on the beach at night will benefit from notes made during daytime surveys. During nighttime lighting inspections, a surveyor walks the length of the nesting beach looking for light from artificial sources. There are two general categories of artificial lighting that observers are likely to detect:

1. **Direct lighting**. A luminaire is considered to be direct lighting if some glowing element of the luminaire (e.g., the globe, lamp [bulb], reflector) is visible to an observer on the beach. A source not visible from one location may be visible from another farther down the beach. When direct lighting is observed, notes should be made of the number, lamp type (discernable by color; Appendix A), style of fixture (Appendix E), mounting (pole, porch, etc.), and location (street address, apartment number, or pole identification number) of the luminaire(s). If exact locations of problem sources were not determined during preliminary daytime surveys, this should be done during daylight soon after the nighttime survey. Photographing light sources (using long exposure times) is often helpful.

2. **Indirect lighting**. A luminaire is considered to be indirect lighting if it is not visible from the beach but illuminates an object (e.g., building, wall, tree) that is visible from the beach. Any object on the dune that appears to glow is probably being lighted by an indirect source. When possible, notes should be made of the number, lamp type, fixture style, and mounting of an indirect-lighting source. Minimally, notes should be taken that would allow a surveyor to find the lighting during a follow-up daytime inspection (for instance, which building wall is illuminated and from what angle?).

WHEN SHOULD LIGHTING INSPECTIONS BE CONDUCTED?
Because problem lighting will be most visible on the darkest nights, lighting inspections are ideally conducted when there is no moon visible. Except for a few nights near the time of the full moon, each night of the month has periods when there is no moon visible. Early-evening lighting inspections (probably the time of night most convenient for inspectors) are best conducted during the period of 2-14 days following the full moon. Although most lighting problems will be visible on moonlit nights, some problems, especially those involving indirect lighting, will be difficult to detect on bright nights.

A set of daytime and nighttime lighting inspections before the nesting season and a minimum of three additional nighttime inspections during the nesting-hatching season are recommended. The first set of day and night inspections should take place just before nesting begins. The hope is that managers, tenants, and owners made aware of lighting problems will alter or replace lights before they can affect sea turtles. A follow-up nighttime lighting inspection should be made approximately two weeks after the first inspection so that remaining problems can be identified. During the nesting-hatching season, lighting problems that seemed to have been remedied may reappear because owners have been forgetful or because ownership has changed. For this reason, two midseason lighting inspections are recommended. The first of these should take place approximately two months after the beginning of the nesting season, which is about when hatchlings begin to emerge from nests. To verify that lighting problems have" been resolved, another follow-up inspection should be conducted approximately one week after the first midseason inspection.

WHO SHOULD CONDUCT LIGHTING INSPECTIONS?

Although no specific authority is required to conduct lighting inspections, property managers, tenants, and owners are more likely to be receptive if the individual making recommendations represent a recognized conservation group, research consultant, or government agency. When local ordinances regulate beach lighting, local government code-enforcement agents should conduct lighting inspections and contact the public about resolving problems.

WHAT SHOULD BE DONE WITH INFORMATION FROM LIGHTING INSPECTIONS?

Although lighting surveys serve as a way for conservationists to assess the extent of lighting problems on a particular nesting beach, the principal goal of those conducting lighting inspections should be to ensure that lighting problems are resolved. To resolve lighting problems, property managers, tenants, and owners should be give the information they need to make proper alterations to light sources. This information should include details on the location and description of problem lights, as well as on how the lighting problem can be solved. One should also be prepared to discuss the details of how lighting affects sea turtles. Understanding the nature of the problem will motivate people more than simply being told what to do.

MONITORING SEA TURTLE BEHAVIOR

In part, the behavior of nesting sea turtles and their hatchlings on the beach can be monitored by studying the tracks they leave in the sand. This evidence can reveal how much and where nesting occurs and how well oriented hatchlings are as they attempt to find the sea from their nest. Monitoring this behavior is one way to assess problems caused by artificial lighting, but it is no substitute for a lighting inspection program as described above. Many lighting problems may affect sea turtles and cause mortality without their leaving conspicuous track evidence on the beach.

SEA TURTLE NESTING

On many beaches, sea turtle biologists make early morning surveys of tracks made the previous night in order to gather information on nesting. With training, one can determine the species of sea turtles nesting, the success of their nesting attempts, and where these attempts have occurred. These nesting surveys are one of the most common assessments made of sea turtle populations.

Because many factors affect nest-site choice in sea turtles, monitoring nesting is a not a very sensitive way to assess lighting problems. However, changes that are observed in the distribution or species composition of nesting can indicate serious lighting problems and should be followed with a program of lighting inspections if one is not already in place.

HATCHLING ORIENTATION

Although hatchlings are more sensitive to artificial lighting than are nesting turtles, the evidence they leave behind on the beach is less conspicuous. Evidence of disrupted sea-finding in hatchlings (hatchling disorientation) can vastly under represent the extent of a lighting problem; however, this evidence can be useful in locating specific problems between lighting inspections. There are two ways one can use hatchling-orientation evidence to help assess lighting problems:

HATCHLING-ORIENTATION SURVEYS

Of the two methods, hatchling-orientation surveys, which involve measuring the orientation of hatchling tracks at a sample of sites where hatchlings have emerged, provide the most accurate assessment. Because the jumble of hatchling tracks at most emergence sites is often too confused to allow individual tracks to be measured, simple measures of angular range (the width that the tracks disperse) and modal direction (the direction that most hatchlings seem to have gone) are substituted. If the sampling of hatchling emergence sites does not favor a specific stretch of beach or a particular time of the lunar cycle, data from these samples can be an accurate index of how well hatchlings are oriented (Witherington et al., 1996).

HATCHLING-DISORIENTATION REPORTS

Although many cases of hatchling disorientation go unnoticed, some are observed and reported. The evidence of such events includes numerous circling tracks, tracks that are directed away from the ocean, or the carcasses of hatchlings that have succumbed to dehydration and exhaustion. Because reporters often discover this evidence while conducting other activities, such as nesting surveys, the events reported often include only the most conspicuous cases. Although these reports have a distinct coverage bias, they can still yield valuable information.

Hatchling-disorientation reports can help researchers immediately identify light-pollution problems. Although not every hatchling that is misled by lighting may be observed and reported, each report constitutes a 'documented event. When reports are received by management agencies or conservation groups, action can be taken to correct the light-pollution problem at the specific site recorded in the report. To facilitate the gathering of this information, standardized report forms should be distributed to workers on the beach who may discover evidence of hatchling disorientation. The following is a list of information that should be included on a standardized hatchling-disorientation report form:

1. Date and time (night or morning) that evidence was discovered.
2. Observer's name, address, telephone number, and affiliation (if any). The reporter may need to be contacted so that information about the event can be verified and the site can be located.
3. Location of the event and the possible light sources responsible. Written directions to the locations should be detailed enough to guide a person unfamiliar with the site. The reporter should judge which lighting may have caused the sea-finding disruption, a decision that may involve knowledge about lighting that was on during the previous night and the direction(s) of the tracks on the beach. If possible, the type of lighting responsible should be identified (e.g. a high pressure sodium street light).
4. The number of hatchlings of each species involved in the event. Unless carcasses or live hatchlings are found, the species and numbers involved will be an estimate.
5. Additional notes about the event.

Excerpted from: Witherington, B.E., and R.E. Martin. 2003. Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches. 3rd ed. Rev. Florida Fish and Wildlife Research Institute. St Petersburg, FL. http://research.myfwc.com/engine/download_redirection_process.asp?file=tr-2_3101.pdf&objid=2156&dltype=article

APPENDIX 2

Species Plant List for Coastal Dune and Beaches in Walton County, FL

Species Plant List for Coastal Dune and Beaches in Walton County, Florida

Scientific Name	Common Name	Height	Container	Primary & Secondary Dune	Inter-dunal	Scrub dune
Trees						
Magnolia grandiflora	Southern Magnolia	60'-90'*	1gTP,3gTP,D			X
Osmanthus americanus	Wild Olive	70'*	1gTP,3gTP,D			X
Pinus clausa	Sand Pine	20'*	1gTP,3gTP,D			X
Pinus elliottii	Slash Pine	80'-100'*	1gTP,3gTP,D			X
Quercus geminata	Sand Live Oak	30'*	1gTP,3gTP,D			X
Quercus myrtifolia	Myrtle Oak	40'*	1gTP,3gTP,D			X
Quercus virginiana maritima	Sand Live Oak	40'-50'*	1gTP,3gTP,D			X
Medium to Large Shrubs &	**Small Trees**					
Callicarpa americana	Beautyberry	5'	1gTP,TB,D			X
Erythrina herbacea	Eastern Coralbean	4' (25')	1gTP,TB,D	X		X
Ilex vomitoria	Yaupon Holly	20'	1gTP,TB,D			X
Iva frutescens	Marsh-Elder	11'	1gTP,TB,D		X	
Rhus copallina	Winged Sumac	10' (30')	1gTP,TB,D		X	X
Serenoa repens	Saw Palmetto	10' (30')	1gTP,TB,D			X
Small Shrubs &	**Ground Covers**					
Schizachyrium scoparium (formerly maritimum)	Bluestem		LT,TB	X		
Asclepias humistrata	Sandhill Milkweed		LT,TB			X
Bignonia capreolata	Cross Vine		LT,TB			X
Cakile constricta	Sea Rocket		LT,TB	X		
Ceratiola ericoides	Seaside Rosemary		LT,TB			X
Chryosoma pauciflosculosa	Seaside Goldenrod		LT,TB	X		X
(T) Chrysopsis gossypina cruiseana	Cruise’s Golden Aster		LT,TB	X		X
Conradina canescens	Beach Heather		LT,TB	X		X
Cyperus sp.	Sedge		LT,TB		X	
Heterotheca subaxillaris	Aster (Camphor weed)		LT,TB	X		X
Hydrocotyle bonariensis	Pennywort		LT,TB	X	X	X
Ipomoea pes-caprae	Railroad Vine		LT,TB	X		
Ipomoea imperati (formerly stolonifera)	Beach Morning Glory		LT,TB	X		
Licania michauxii	Gopher Apple		LT,TB			X
Panicum amarum	Beach Grass		LT,TB	X		
(E) Polygonella macrophylla	Large-leavedJointweed		LT,TB			X
Tradescantia ohiensis	Spiderwort		LT,TB			X
Uniola paniculata	Sea Oats		LT,TB	X		

T & E = State of Florida protected plant. Planting is stongly encouraged to help recover the species. Make sure the nursery you purchase the plant from is in the Association of Florida Native Plants; they follow all State regulations to grow and sell protected species.

*****Trees living in coastal dunes do not reach “normal heights.” They tend to be stunted and “pruned” by the wind, sand, and salt spray. Plant small specimens preferably in protected areas such as on the landward side of the dunes.

APPENDIX 3

Piping and Snowy Plover Non-breeding Season Survey Guidelines

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Piping and Snowy Plover Non-breeding Season Survey Guidelines*
June 2007

*In coordination with the Florida Fish and Wildlife Conservation Commission, we recommend these guidelines for conducting piping and snowy plover non-breeding season surveys. These guidelines combine the survey protocol from the International Piping Plover Census and the International Shorebirds Survey (ISS). Please note that these guidelines only pertain to routine plover population monitoring and that a separate set of guidelines may be recommended for the purposes of evaluating potential project impacts.

1. Sites should be selected based on geographic features, suitability of habitat, and ability for you to adequately and consistently survey the site.

2. We have prepared a survey form for your use (enclosed). We also have the form in an Excel file if you need it. Let us know.

3. Monitoring should be conducted July 15 through May 15 which mostly follow ISS census dates listed below. The ISS schedule usually results in three surveys per month. If this is not feasible, try to do at least two surveys per month on the ISS census dates. Surveys should be conducted on ISS dates plus or minus 2 days (example: a survey scheduled for the 15th could be conducted on any day from the 13th through the 17th.)

Spring Migration	Fall Migration	Winter
February 25	July 15	October 15
March 5	July 25	October 25
March 25	August 5	November 5
April 5	August 15	November 15
April 15	August 25	November 25
April 25	September 5	December 5
May 5	September 15	December 15
May 15	September 25	December 25
	October 5	January 5
		January 15
		January 25
		February 5
		February 15

4. To the extent possible, surveys should be conducted when birds are feeding. The best time is at low tide, but surveys can also be conducted on a falling or rising tide provided that the feeding areas are not completely covered. During high tide, birds will be roosting. Although piping plovers often roost near feeding areas, the birds will be much more difficult to locate.

5. If conducting the surveys by ATV or vehicle, driving speeds should be limited to 5 mph (8 kph) so that birds may be more easily observed. Avoid driving on feeding areas (e.g., flats) during low tides and avoid driving over the wrack line or areas of dense seaweed which provide food and cover for shorebirds.

6. Do not drive on the upper beach, in the dunes, or over beach vegetation.

7. If beach scarps or high tides require driving above the high tide line, avoid those areas with known sea turtle nests or shorebird breeding areas (combined nesting seasons for turtles and shorebirds are from February through October 31).

8. Avoid conducting surveys during poor weather conditions (e.g., high winds, rain).

9. Negative data is as important as positive data. Indicate when you have surveyed and no birds were observed.

10. Although piping and snowy plovers are the target species for the surveys, any additional observations of other species will help us to identify shorebird concentration areas and management needs.

11. The FWS and the FWC would appreciate receiving copies of your survey data. Please provide the information to the following individuals:

Patty Kelly
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, FL 32405
(850) 769-0552 x228
Fax (850) 763-2177
Patricia_Kelly@fws.gov

John Himes
Florida Fish and Wildlife Conservation Commission
3911 Highway 2321
Panama City, FL 32409-1658
(850) 265-3676
Fax (850) 747-5690
John.Himes@MyFWC.com

Above all, have fun and please try and minimize disturbance to the birds!

Piping Plover and Snowy Plover Survey Results in FL Panhandle

Surveyor(s) name:________________________________ Date:___________________

_________________ start GPS____________________ end GPS____________________

Ownership if known: public__________ private__________

Time surveyed: from _______ to ________ Temperature: _______ C°___ or F° ___

Tide stage: low_____ Mid_____ High _____ (rising____/falling____)

Disturbance: Number of people on beach_____ Number of dogs leashed_____unleashed_____

# of Piping plovers seen: __________

Circle location: dunes foredune mid-beach tidal zone bay shoreline mudflat other________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

# of Snowy plovers seen: _________

Circle location: dunes foredune mid-beach tidal zone bay shoreline mudflat other________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

# of Red Knots seen: _________

Circle location: dunes foredune mid-beach tidal zone bay shoreline mudflat other________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

Bands seen: Right Leg____________Left Leg____________ GPS______________________________

Other Species Seen:	Number:	Comments:
Black-bellied Plover		
American Golden Plover		
Wilson's Plover		
Semipalmated Plover		
Killdeer		
American Oystercatcher		
Greater Yellowlegs		
Lesser Yellowlegs		
Solitary Sandpiper		
Willet		
Spotted Sandpiper		
Whimbrel		
Marbled Godwit		
Ruddy Turnstone		
Sanderling		
Semipalmated Sandpiper		
Western Sandpiper		
Least Sandpiper		
White-rumped Sandpiper		
Baird's Sandpiper		
Pectoral Sandpiper		
Dunlin		
Stilt Sandpiper		
Peep sp.		
Short-billed Dowitcher		
Long-billed Dowitcher		
Other:		

Please send copies to: Patty Kelly, USFWS, 1601 Balboa Avenue, Panama City, FL 32405 or fax to 850/763-2177 (Ph: 850/769-0552) and John Himes FWCC, 3911 Highway 2321, Panama City, FL 32409 or fax 850/747-5690 (Ph: 850/265-3676). Thank You.

Panama City FO:L.Patrick:lap:bs:9-29-08:850-769-0552x229:c:Server/Public/Lorna/Walton County beach nourishment/Walton Co beach nourishment Project final BO 9-29-08.doc

EA-APPENDIX B

SECTION II

Coordination Documents for the Selected Plan

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF:

CESAM-PD-EC 23 July 2004

MEMORANDUM FOR RECORD

SUBJECT: Walton County Shore Protection Feasibility Environmental Coordination Meeting

1. On 29 June 2004, an interagency meeting was held at the Walton County, Tourist Development Council facility in Santa Rosa Beach, Florida. The purpose of the meeting was to initiate environmental coordination with the interagency team involved in the permitting and environmental compliance processes for the Walton County Shore Protection Feasibility Study. The meeting's primary objects were to identify and discuss environmental issues and opportunities, permitting issues, and environmental compliance requirements associated with the proposed Walton County project. In attendance were representatives from the U.S. Army Corps of Engineers (USACE), Walton County, U.S. Fish and Wildlife Service (FWS), Florida Department of Environmental Protection (DEP), and Florida Fish and Wildlife Conservation Commission (FWCC). It should be noted that representatives from the U.S. National Marine Fisheries Service were invited to attend. Communications with the Habitat Conservation Division expressed that the project did not raise issues that would require their representation. Representatives from the Protected Resources Division did not respond. The meeting agenda and attendance list are attached.

2. A summary of Walton County's proposed shore protection plan was presented by Brad Pickel. Walton County has approximately 26 miles of shoreline and contains a number of areas exhibiting excessive beach erosion and deterioration of the dunes and bluffs. Although the County has approximately 26 miles of shoreline, the proposed actions will not encompass the entire shoreline. The project would be comprised of smaller reaches of beach nourishment and/or dune and bluff restoration. Each of the problem areas have their own unique characteristics that require different approaches and will be treated on a case-by-case basis. The project is separate from and in addition to the existing beach nourishment project currently being pursued for Destin and the western end of Walton County.

3. Projects such as this present certain problems that must be overcome as well as opportunities providing advantages to the project. Some of the problems identified throughout the discussion specific to this project include issues associated with the dune lakes existing along Walton County's shoreline. These areas provide excellent habitat for nesting shorebirds and special attention must be given towards assuring that any nourishment or restoration activities will not interfere with their normal water fluctuation. Walton County contains six miles of State Park lands and concerns have been expressed pertaining to project end points adjacent to this

property. All activities that impact State Park lands should be coordinated with officials from the parks. This situation can be turned into a positive situation by offering the State Park Service opportunity to participate in the shore protection project. Other opportunities exist to take advantage of existing data such as beach sediment data, beach profile surveys, and aerial photography. These types of data have been collected through DEP and independent contracts and available to this project.

4. The meeting was next directed to environmental issues concerning potential borrow sites. An issue was raised by DEP that any potential borrow sources in the vicinity of East Pass should be avoided and would likely result in permitting problems. Other features to be aware of during sand search operations are the presence of offshore limestone ridges. These known features provide habitat for a variety of species and possibly soft corals. Efforts should be made to avoid these areas as potential borrow sites. In addition to the limestone ridges a required search for known authorized artificial reefs must be conducted in the vicinity of potential borrow areas and should be avoided. Sediment quality is another major issue when determining a borrow source. Comprehensive sediment suitability analysis will be required including grain size, color, and compaction characteristics. DEP expressed that it would beneficial if they would be involved in the sediment QA/QC process early on in the project and before submittal of the WQC application. Benthic resource assessments of potential borrow sites would also be expected as well as post-borrow monitoring for determination of benthic recovery rates. If a hopper dredge will be used to harvest borrow materials, the activities should adhere to conditions and recommendations specified in the regional biological opinion conducted by NMFS for the use of hopper dredges.

5. Environmental issues concerning beach placement was another important topic of discussion. As with the borrow sites, a comprehensive sediment compatibility analysis will be required. In addition to grain size, color, etc., special attention should be given to suitability for sea turtles, shorebirds and beach mice. Efforts should be made to create "turtle friendly" design profiles to minimize scarping, overwash, and ponding. The proper Section 7 coordination must be conducted pertaining to sea turtles, beach mice, manatees, shorebirds and Gulf sturgeon. If any beach/dune placement activities occur during sea turtle nesting season, a formal consultation will be necessary.

Dune restoration design should take into consideration existing beach mice habitat and shorebird nesting habitat. Dune creation is not always beneficial towards providing shorebird nesting areas. In some cases the creation of dunes has covered up lower elevated sandy areas providing preferred nesting conditions for many shorebirds. Consideration should be taken to assure that such a situation is avoided. Dune reconstruction should also attempt to achieve, as much as possible, a contiguous dune line to allow for beach mice migration along the shoreline. Any beach and/or dune restoration activities must be cognizant of the natural processes supporting the local dune lakes. Existing permit applications for the dune-lake outfall projects are currently incomplete. Possible adverse impacts from these projects to the lakes, wetlands, dunes, beach and Gulf (water quality) have not yet been sufficiently addressed.

Another important issue discussed was the identification of storm water outfalls within proposed action areas. If there are any existing storm water outfalls within the project areas, the environmental documents should address their impacts and the possibility of their removal. Other issues that should be addressed in the feasibility phase of this project include formation of a sea turtle lighting plan and identifying staging areas that minimize second hand impacts.

6. The Walton County project also presents some environmental opportunities that can act to create positive impacts. Such opportunities include re-establishment of coastal dune vegetation, providing and maintaining sea turtle nesting habitat, enhancement of beach mice habitat, and the protection and regulation of the sensitive habitats of the dune lakes. This project will provide overall stabilization of the Walton County shoreline, providing greater stability and maintenance to the existing regional environment.

7. Several permitting issues were identified and should be kept in consideration during all phases of the project. Such issues include maintaining coastal lake outfalls, identification and modification of storm water outfalls that affect the beach system, sand suitability, and sea turtle lighting requirements. Given that this project will likely be composed of several smaller beach nourishment and/or dune reconstruction activities, it is anticipated that permitting may be done on a case-by-case basis. Beach restoration projects should be submitted as Joint Coastal Permit applications. Dune restorations may be included in these applications, especially if the sand is dredged from the Gulf or an inlet. However, stand-alone dune restoration projects that don't involve sand dredged from the Gulf or an inlet should be submitted as Coastal Construction Control Line Permit applications.

8. The final topic of discussion dealt with the NEPA process that should be conducted for the Walton County projects, specifically whether the project would require an EA or EIS. The FWS is not viewing this project as one that would require an EIS. Although the project area encompasses some 26 miles of shoreline, the activities will be comprised of smaller beach nourishment and/or dune restoration that will be conducted on a case-by-case basis. The group in attendance felt that given the project characteristics, low level of controversy, and precedent set by other local beach projects that an EA would be the appropriate level of environmental documentation for Walton County. However, an EA must adequately address the cumulative impacts of the entire project and may be subject to future change into an EIS should any major issues and controversy arise.

9. Please address any questions or concerns pertaining to this meeting to Mr. Larry Parson at (251) 690-3139 or larry.e.parson@sam.usace.army.mil.

/Lp/

Larry E. Parson CESAM-PD-EC
USACE, Coastal Environment Team

CF:

Curtis Flakes - CESAM-PD
Kenneth Day - CESAM-PD-E
Susan Rees - CESAM-PD-EC
Elaine Baxter - CESAM-PD-FP
Tim Caldwell - CESAM-PM-CM
Brad Pickel - Walton County
Lorna Patrick – FWS
Robbin Trindell – Florida FWCC
Marty Seeling - Florida DEP, BBWR
Jamie Christoff - Florida DEP, BBWR
Philip Flood - Florida DEP
Ralph Clark - Florida DEP
Mark Thompson - NMFS, Habitat Conservation Division
Stephania Bolden - NMFS, Protected Resources Division

AGENDA

WALTON COUNTY SHORE PROTECTION ENVIRONMENTAL COORDINATION MEETING

WALTON COUNTY TOURIST DEVELOPMENT COUNCIL

TUESDAY, 29 JUNE 2004

- Walton County – Proposed Shore Protection Plan
- Problems and Opportunities
- Environmental Issues (Borrow Sites)
- Environmental Issues (Placement Sites)
- Environmental Opportunities
- Permitting Issues
- EA vs. EIS

Walton County Shore Restoration Feasibility
Environmental Coordination Meeting
29 June 2004

		Name	Affiliation	Phone
	1	Larry Parson	USACE	(251) 690-3139
	2	Phil Flood	DEP	850/487-1262 x168
	3	Ralph Clark	DEP - Beaches	850/487-4469 ext 174
	4	Brad Pickel	WC TDC	(850) 267-1216 x 131
	5	Lorna Patrick	USFWS	(850) 769-0552 x 229
Conferenced by phone	6	Marty Seeling	DEP	(850) 487-4469 x10
Conferenced by phone	7	Jamie Christoff	DEP	(850) 487-4469 x12
	8	Robbin Trindell	FWC	(850) 922-4330
	9			
	10			

Attachment 2 – Attendance List

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF

January 12, 2010

Coastal Environment Team
Planning and Environmental Division

Ms. Lorna Patrick
U.S. Department of Interior
Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Patrick:

The U.S. Army Corps of Engineers (Corps), Mobile District is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet as illustrated in the enclosed biological assessment (BA). This area and the adjacent waters support federally protected species under the Service's purview such as sea turtles (loggerhead, green, leatherback, and Kemp's ridley), piping plover, West Indian manatee, and the Choctawhatchee beach mouse (CBM). Gulf sturgeon and associated critical habitat also exists within the project limits but fall under the purview of the National Marine Fisheries Service and will not be considered under this BA. Based on our evaluation of the selected Federal plan described in the BA, it is our assessment that the actions may have an adverse affect on sea turtles, piping plovers, and CBM. Upon further consideration of a previous biological opinion (BO) issued for the local Walton County Beach Nourishment Project, SAJ-2007-5152 (IP-DEB)/FWS 2008-F-0060 Walton County, Florida, BO, October 2, 2008, it is the U.S. Fish and Wildlife Service's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of these species and not likely to destroy or adversely modify designated critical habitat for the CBM.

Based on the above determinations, a formal consultation is being requested under Section 7 of the Endangered Species Act. Please find the enclosed BA associated with the proposed action. Please address any questions or concerns to Mr. Larry Parson at (251) 690-3139 or email at larry.e.parson@usace.army.mil.

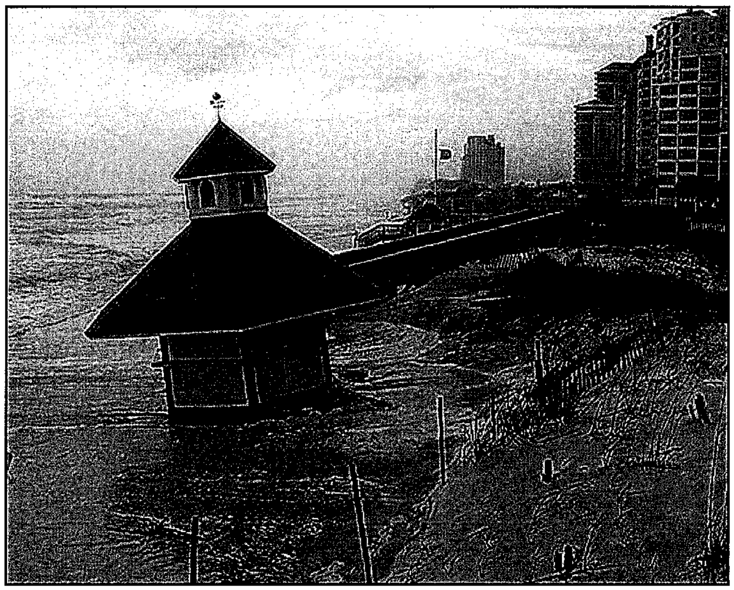
Sincerely,

Jennifer Jacobson

Jennifer L. Jacobson
Chief, Coastal Environmental Team

Enclosure

BIOLOGICAL ASSESSMENT
FOR
WALTON COUNTY, FLORIDA HURRICANE AND STORM DAMAGE REDUCTION PROJECT
WALTON COUNTY, FLORIDA



January 2010

Biological Assessment (BA)
Walton County, Florida
Hurricane and Storm Damage Reduction Project

The U.S. Army Corps of Engineers, Mobile District (Corps) is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County's shoreline located in the Florida's panhandle is receding; the protective dunes and high bluffs are being destroyed by hurricane and storm forces that are occurring more frequently than before. During the late 1990s, the area endured several strong hurricanes resulting in extensive shoreline erosion (Taylor Engineering, 2003). In 2004, the area was affected severely by Hurricane Ivan (Sep 04) and early into the 2005 hurricane season it was impacted by Hurricanes Arlene (June 05) and Dennis (July 05). The impacts of these storms to property and infrastructure are considerable and can possibly be reduced through a beach restoration and stabilization project, which also includes environmental restoration opportunities associated with the beach and dune system.

A feasibility study was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida.

Resolution Adopted July 24, 2002, by The United States House of Representatives:

"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida.

The non-Federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council (TDC).

Project Location

Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 11.9 miles of state-designated critically eroding areas and three State of Florida park areas that cover approximately six miles of the 26-mile shoreline.

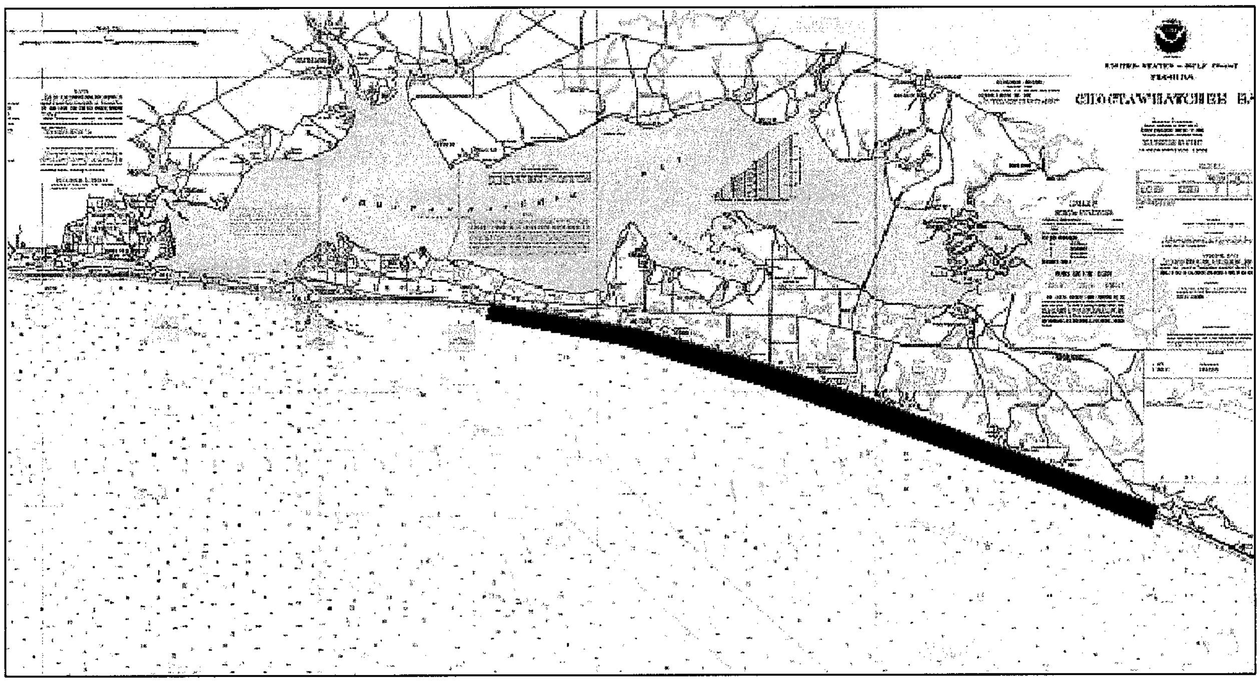


Figure 1. Location of Walton County project area

Project Description

The Walton County upland cross-section is defined by dune elevations ranging from +9.5 to + 33 feet NAVD88 and a natural berm elevation of +5.5 feet NAVD88. The study region was divided into five study reaches based on structural development and state park areas as illustrated in Figure 2. The historical and 2004 beach surveys were used to develop 11 representative profiles which characterize the existing condition for the five study reaches. The representative profiles were identified based on similarity in shape of the upper beach profile (dune height and width, berm width, foreshore beach slope, and profile volume) and shape of the offshore profile.

The tentatively selected plan recommended for construction consists of the five construction reaches. The project will be composed of a 50-foot berm width, a 25-foot

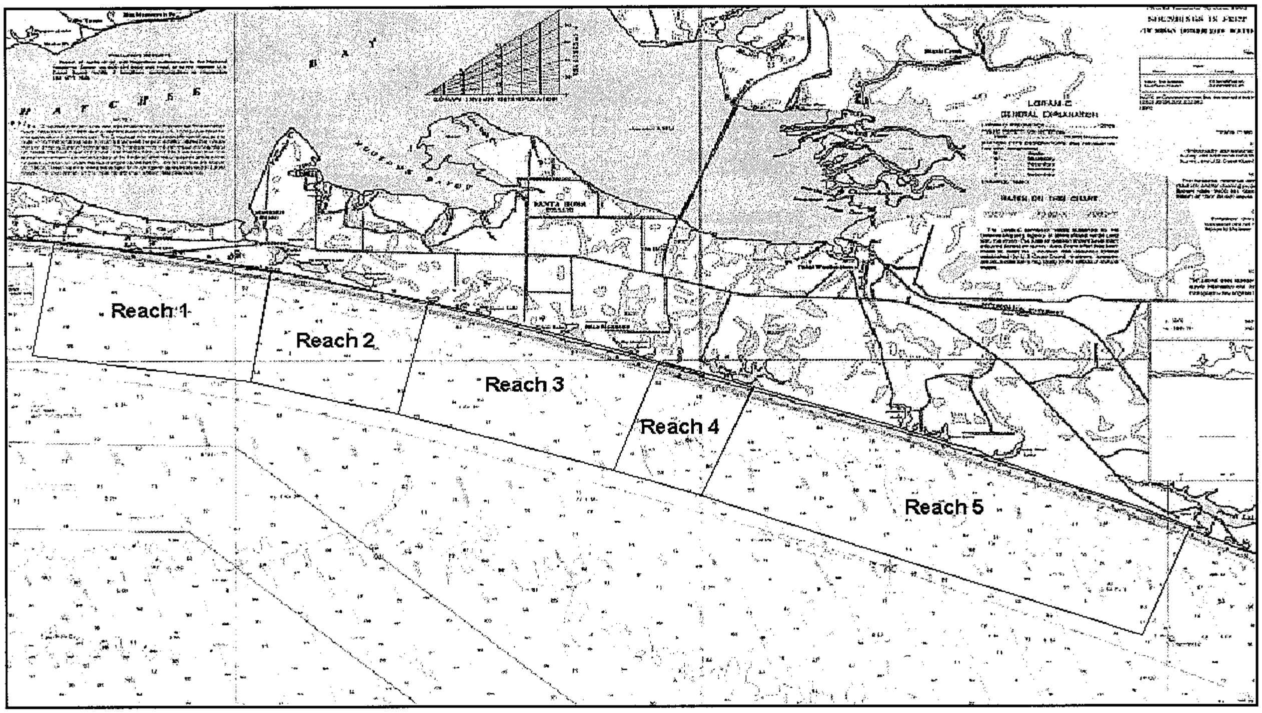


Figure 2. Location of the 5 construction reaches within the project area.

berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The modeling efforts predicted necessary the beach fill requirements to be 3,350,000 cubic yards (cy) for initial construction. Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters. The typical cross-sections for the selected plan illustrated in Figure 3. When dune construction is complete, the dune will be planted with at least three species of dune vegetation to create a dune that matches the surrounding natural dune patterns in the area. Upon reconstruction immediate steps will be taken to plant and stabilize the dune for rapid stabilization. This will be accomplished through the use of sand fences and dune plants. The dune plants will be planted to cover 60-80% of the total area. The vegetation will consist of local dominant species that populate nearby natural dune systems. The selection of the dune vegetation will consist of species that are most widely used for dune restoration and are readily available from local nurseries and suppliers. The selection will be coordinated with local experts familiar with dune ecosystems in the immediate area. Species being considered are:

- sea oats *(Uniola paniculata)*
- bitter panic grass *(Panicum ararum)*
- sea rocket *(Cakile constricta)*
- beach morning glory *(Ipomoea imperati)*
- railroad vine *(Ipmea pes-caprae)*
- blue stem *(Schizachyrium scoparium)*
- blanket flower *(Gaillardi pulchella)*

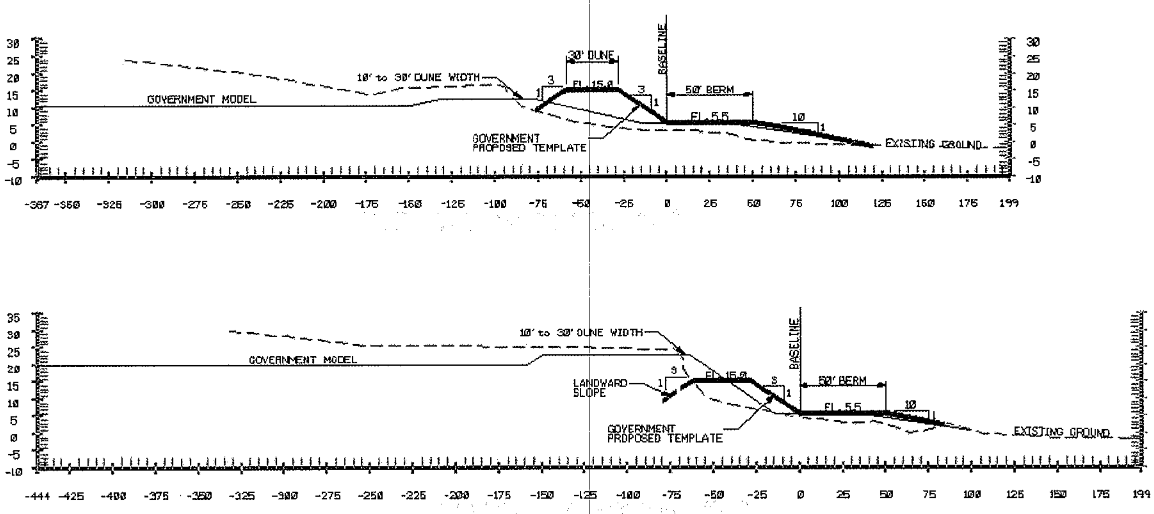


Figure 3. Selected plan typical cross sections to be constructed

Borrow Areas

Recent offshore studies to include geological and geophysical interpretation to identify a suitable offshore borrow area has been performed by Taylor Engineering, Inc. (2003) in the Walton County Destin Beach Management Feasibility Study Final Report under contract to the local sponsor, which conducted investigations on the East Pass area southwest of Destin and the eastern most end of Okaloosa County and the westernmost end of Walton County. Subsequent investigations looked at the entire coastline to assess locations with sufficient quantities for borrow development for the initial beach placement and future re-nourishments.

A large scale reconnaissance level geophysical, lithological and granulomteric investigation was undertaken off Walton County, Florida. Sub-bottom profiles were used initially to locate prospective core locations to identify high quality sand sources for beach nourishment. Vibracores and selected seismic records were interpreted in an attempt to confirm the presence and quality of sand off Walton County.

The proposed borrow area sediments are typically well sorted medium sand (1-2 phi) with some 10,000,000 cubic yards proven by the geotechnical investigations. This volume covers the selected Federal plan placement and the four planned subsequent re-nourishments for the next 50 years. The borrow area is centrally located and offers the best source for now and in the future. Based on the extensive geotechnical investigations, this borrow site has been demonstrated to be the most suitable source, located offshore East Pass, has sand of color, size, and composition generally similar to that of the native beach. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and pumped into the beach template. Small bulldozers will be used on land to shape the material to the prescribed template. Required Section 7 coordination for the borrow area has been initiated with the National Marine Fisheries Service, Protected Species Division.

Previous Coordination

It should be recognized that the local sponsor proceeded with pursuing a beach restoration plan of their own. Their local project area lays the length of Walton County. The proposed local plan includes a berm design that on average exhibits a construction profile that has a 207-ft wide berm measured from the existing 9.5 ft NAVD contour with a 10-ft wide dune crest. The sponsor's local proposed plan view and profiles are larger than and totally encompass the selected Federal plan described above. Subsequently, the County has already completed the process of applying for the state WQC/CZC. They have also initiated and completed formal consultation for threatened and endangered species as required by the Endangered Species Act (ESA) resulting in the following biological opinion (BO): Walton County Beach Nourishment Project, SAJ-2007-5152 (IP-DEB)/FWS 2008-F-0060 Walton County, Florida, BO, October 2, 2008. Other related coordinations included the Regional Biological Opinion (RBO) for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287) dated November 19, 2003 and amendments.

Description of Listed Species

There are several environmental concerns that must be addressed in order to achieve environmental compliance for both permitting and National Environmental Protection Act (NEPA). All efforts will be made to conduct the dredging and sand placement during the most desirable environmental windows to the maximum extent practicable to provide protection of species and habitats while accomplishing project objectives.

The project area is host to a variety of wildlife on the State and Federal protected species list presented in Table 1. Of particular concern in the proposed project vicinity are the:

- Atlantic loggerhead turtle *(Caretta caretta caretta)*
- Atlantic green turtle *(Chelonia mydas mydas)*
- Kemp's ridley turtle *(Lepidochelys kempi)*
- Leatherback turtle *(Dermochelys coriacea)*
- Gulf sturgeon *(Acipenser oxyrinchus desotoi)*
- West Indian manatee *(Trichechus manatus floridanus)*
- Choctawhatchee Key beach mouse *(Peromystus polionotus allophrys)*
- piping plover *(Charadvius melundus)*

Table 1. State and Federal Listed Species

Common Name	Scientific Name	State	Federal
Fish			
Gulf sturgeon	*Acipenser oxyrhynchus desotoi*	SSC	n/a
salt marsh topminnow	*Fundulus jenkinsi*	SSC	n/a
Reptiles			
American alligator	*Alligator mississipiensis*	SSC	T (s/a)
Atlantic loggerhead turtle	*Caretta caretta caretta*	T	T
Leatherback turtle	*Dermochelys coriacea*	E	E
Atlantic green turtle	*Chelonia mydas mydas*	E	E
Kemp's ridley	*Lepidochelys kempi*	E	E
Birds			
snowy plover	*Charadrius alexandrinus tenuirostris*	T	SSC
piping plover	*Charadrius melodus*	T	T
Arctic peregrine falcon	*Falco peregrinus tundrius*	E	T
American oystercatcher	*Haematopus palliatus*	SSC	n/a
bald eagle	*Haliaeetus leucocephalus*	T	T
brown pelican	*Pelecanus occidentalis*	SSC	n/a
least tern	*Sterna antillarum*	T	n/a
Mammals			
Choctawhatchee beach mouse	*Peromystus polionotus allophrys*	E	E
West Indian manatee	*Trichechus manatus*	E	E

State listings are taken from the Florida Fish and Wildlife Conservation Commission or as with plants Florida Department of Agriculture. Federal listings are taken from the United States Fish and Wildlife Service. E = Endangered; T = Threatened; T (s/a) = Threatened due to similarity in appearance; SSC = Species of Special Concern; UR = Under review; n/a = information not available or no designation listed

Atlantic Loggerhead Sea Turtle

The loggerhead sea turtle is a medium to large turtle. Adults are reddish-brown in color and generally 31 to 45 inches in shell length with the record set at more than 48 inches. Loggerheads weigh between 170 and 350 pounds with the record set at greater than 500 pounds. Young loggerhead sea turtles are brown above and whitish, yellowish, or tan beneath, with three keels on their back and two on their underside.

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Gulf of Mexico, Pacific, and Indian Oceans. This species may be found hundreds of miles out to sea, as well as in inshore areas, such as bays, lagoons, salt marshes, creeks, and the mouths of large rivers. In shallow Florida lagoons, loggerheads were found during the morning and evening, leaving the area during mid-day when temperatures reached 87° F. At dusk, turtles moved to a sleeping site and remained there until morning, possibly in response to changes in light or water temperature (Nelson 1986).

Loggerhead turtles are essentially carnivores, feeding primarily on sea urchins, sponges, squid, basket stars, crabs, horseshoe crabs, shrimp, and a variety of mollusks. Their strong beak-like jaws are adapted for crushing thick-shelled mollusks. Although loggerhead sea turtles are primarily bottom feeders, they also eat jellyfish and mangrove leaves obtained while swimming and resting near the sea surface. Presence of fish species, such as croaker, in stomachs of stranded individuals may indicate feeding on the by-catch of shrimp trawling (Landry 1986). Caldwell et al. (1955) suggest that the willingness of the loggerhead to consume any type of invertebrate food permits its range to be limited only by the presence of cold water.

As loggerheads mature, they travel and forage through nearshore waters until their breeding season, when they return to the nesting beach areas. The majority of mature loggerheads appear to nest on a two or three year cycle. Major nesting beaches for loggerheads include the Sultanate of Oman, southeastern United States, and eastern Australia. From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to the nesting aggregation on Masirah Island, Oman. This species nests within the U.S. from Texas to Virginia, although the major nesting concentrations are found along the Atlantic cost of Florida, Georgia, South Carolina, and North Carolina. About 80 percent of all loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties). Total estimated nesting in the U.S. is approximately 50,000 to 70,000 nests per year. Nesting in the northern Gulf outside of Florida occurs primarily on the Chandeleur Islands in Louisiana and to a lesser extent on adjacent Ship, Horn, and Petit Bois Islands in Mississippi.

Loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in northern Gulf of Mexico. Overall the loss of nesting beaches, hatchling disorientation from artificial light, drowning in fishing and shrimping trawls, marine pollution, and plastics, and styrofoam have led to the decline of loggerheads.

Loggerhead sea turtles are considered turtles of shallow water. Juvenile loggerheads are thought to utilize bays and estuaries for feeding, while adults prefer waters less than 165 feet deep (Nelson 1986). Aerial surveys suggests that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico. During aerial surveys of the Gulf of Mexico, the majority (97 percent) of loggerheads were seen off the east and west coasts of Florida (Fritts 1983). Most were observed around mid-day near the surface, possibly related to surface basking behavior (Nelson 1986). Although loggerheads were seen off the coast of Alabama, Mississippi, and Louisiana, they were 50 times more abundant in Florida than in the western Gulf. The majority of the sightings were in the summer (Fritts et al. 1983). An individual tagged in Perdido Bay, Alabama was recaptured one year later only about a mile from the original capture site. In another case, a loggerhead had moved from Perdido Bay, Alabama into Pensacola Bay, Florida over a several month period.

Loggerheads are frequently observed near offshore oil platforms, natural rock reefs, and rock jetties along the Gulf Coast. Large numbers of stranded turtles were observed inshore of such areas (Rabalais and Rabalais 1980). Fishermen reported sightings of large turtles near the Gulf Coast. In a recent tracking study, loggerheads spent more than 90 percent of the time underwater, tended to avoid colder water, and spent much of the time in the vicinity of oil and gas structures, such as those found offshore of Mississippi and Alabama.

Green Sea Turtle

The green sea turtle is mottled brown in color. The name is derived from the greenish fat of the body. The carapace is light or dark brown. It is sometimes shaded with olive, often with radiating mottled or wavy dark markings or large dark brown blotches. This species is considered medium to large in size for sea turtles with an average length of 36 to 48 inches. The record was set at about 60 inches in length. Its weight ranges from about 250 to 450 pounds with the record at more than 650 pounds. The upper surfaces of young green turtles are dark brown, while the undersides are white.

Although green sea turtles are found worldwide, this species is concentrated primarily between the 35° North and 35° South latitudes. Green sea turtles tend to occur in waters that remain warmer than 68° F; however, there is evidence that they may be buried under mud in a torpid state in waters to 50° F (Ehrhart 1977; Carr et al. 1979).

This species migrates often over long distances between feeding and nesting areas (Carr and Hirth 1962). During their first year of life, green sea turtles are thought to feed mainly on jellyfish and other invertebrates. Adult green sea turtles prefer an herbivorous diet frequenting shallow water flats for feeding (Fritts et al. 1983). Adult turtles feed primarily on seagrasses, such as *Thalassia testudinum*. This vegetation provides the turtles with a high fiber content and low forage quality (Bjorndal 1981a). Caribbean green sea turtles are considered to be nutrient-limited, resulting in low growth rate, delayed sexual maturity, and low annual reproductive effort. This low reproductive effort makes recovery of the species slow once the adult population numbers have been severely reduced (Bjorndal 1981). In the Gulf of Mexico, principal foraging areas are located in the upper west coast of Florida. Nocturnal resting sites may be a considerable distance from feeding areas, and distribution of the species is generally correlated with grassbed distribution, location of resting beaches, and possibly ocean currents (Hirth 1971).

Major nesting areas for green sea turtles in the Atlantic include Surinam, Guyana, French Guyana, Costa Rica, the Leeward Islands, and Ascension Island in the mid-Atlantic. Historically in the U. S., green turtles have been known to nest in the Florida Keys and Dry Tortugas. Yet, these turtles primarily nest on selected beaches along the coast of eastern Florida, predominantly Brevard through Broward Counties. However, they probably nested along the Gulf Coast before their decline. In the southeastern U.S., nesting season is roughly June through September. Nesting occurs nocturnally at 2, 3, or 4-year intervals. Only occasionally do females produce clutches in successive years. Estimates of age at sexual maturity range from 20 to 50 years (Balazs 1982; Frazer and Ehrhart 1985) and they may live over 100 years. Immediately after hatching, green turtles swim past the surf and other shoreline obstructions, primarily at depths of about 8 inches or less below the water surface, and are dispersed both by vigorous swimming and surface currents. The whereabouts of hatchlings to juvenile size is uncertain. Green turtles tracked in Texas waters spent more time on the surface, with fewer submergences at night than during the day, and a very small percentage of the time was spent in the Federally maintained navigation channels. The tracked turtles tended to utilize jetties, particularly outside of them, for foraging habitat (Renaud et. Al. 1993).

Most green turtle populations have been depleted or endangered because of direct exploitation or incidental drowning in trawl nets. A major factor contributing to the green turtle's decline worldwide is commercial harvest for eggs and meat. In Florida, the nesting population was nearly extirpated within 100 years of the initiation of commercial exploitation. Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. These tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens become severely debilitated and die. Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from commercial fishing operations.

Leatherback Sea Turtle

The leatherback sea turtle is the largest of all sea turtles. It may reach a length of about 7 feet and weigh as much as 1600 pounds. The carapace is smooth and is colored gray, green, brown and black. The plastron is yellowish white. Juveniles are black on top and white on the bottom.

This species is highly migratory and is the most pelagic of all sea turtles (NMFS and USFWS 1992). They are commonly found along continental shelf waters. Leatherback turtles' range extends from Cape Sable, Nova Scotia, south to Puerto Rico and the U.S. Virgin Islands. Leatherbacks are found in temperate waters while migrating to tropical waters to nest (Ross 1981). Distribution of this species has been linked to thermal preference and seasonal fluctuations in the Gulf Stream and other warm water features (Fritts et al. 1983). General decline of this species is attributed to exploitation of eggs (Ross 1981).

Leatherback sea turtles are omnivorous. Leatherbacks feed mainly on pelagic soft-bodied invertebrates such as jellyfish and tunicates. Their diet may also include squid, fish, crustaceans, algae, and floating seaweed. Highest concentrations of these prey animals are often found in upwelling areas or where ocean currents converge. They will also ingest plastic bags and other plastic debris, which are commonly generated by oil drilling rigs and production platforms in coastal Florida, Alabama, Mississippi, and Louisiana (Fritts et al. 1983).

Nesting of leatherback sea turtles is nocturnal with only a small number of nests occurring in the United States in the Gulf of Mexico (Florida) from April to late July (Pritchard 1971; Fuller 1978; Fritts et al. 1983). Leatherbacks prefer open access beaches possibly to avoid damage to their soft plastron and flippers. Unfortunately, such open beaches with little shoreline protection are vulnerable to beach erosion triggered by seasonal changes in wind and wave direction. Thus, eggs may be lost when open beaches undergo severe and dramatic erosion. The Pacific coast of Mexico supports the world's largest known concentration of nesting leatherbacks. There is very little nesting in the United States (Gunter 1981).

Disturbance of the nesting grounds is the most serious threat to leatherback sea turtles. Although the flesh of this sea turtle is not eaten, the population has been threatened by egg-harvesting in countries such as Malaysia, Surinam, the Guianas, the west coast of Mexico, Costa Rica, and in several Caribbean islands. Leatherbacks were killed in the past for the abundant oil they yield, which was used for oil lamps and for caulking wooden boats. Ingesting plastic bags and other plastic wastes are another cause of death for leatherbacks turtles. The sea turtles confuse plastic wastes with one of their favorite foods jellyfish. When swallowed, plastics can clog a turtle's throat, esophagus, and intestines.

Kemp's ridley turtle

The Kemp's ridley occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean with occasional individuals reaching European waters. Adults of this species are generally confined to the Gulf of Mexico, although some adults are sometimes found on the east coast of the U.S. Females return to their nesting beach about every other year with nesting occurring from April into July and usually limited to the western Gulf of Mexico. The mean clutch size for this species is about 100 eggs per nest and an average of 2.5 nests per female per season.

Benthic immature turtles have been found along the eastern seaboard of the U.S. and in the Gulf of Mexico. In Gulf, studies suggest that immature turtles stay in shallow, warm, nearshore waters in the northern Gulf until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching stage (pelagic stage) within the Gulf. Studies have indicated that this stage varies from 1 to 4 or more years and the benthic immature stage lasts about 7 to 9 years. The maturity age of this species is estimated to be 7 to 15 years. Of the seven extant species of sea turtles, the Kemp's ridley has declined to the lowest population level. However, recent studies have indicated that increased nesting activities and suggest that the decline in ridley population has stopped and the population is now increasing. A period of steady increase in the benthic immature turtles has been occurring since 1990 and suggests a result of increased hatchling production and survival rates of the immature turtles. The increased survival of immature individuals is believed to be in part a result of the use of turtle exclusion devices (TEDs) in the commercial shrimping fleets. Future threats to the species include interaction with fishery gear; marine pollution; destruction of foraging habitat; illegal poaching; and impacts to nesting beaches associated with rising sea level, development, and tourism pressure.

Gulf Sturgeon

The National Marine Fisheries Service (NMFS) and FWS listed the Gulf sturgeon as a threatened species on September 30, 1991 and designated critical habitat areas as defined by the Federal Register Vol. 68, No. 53. For purposes of this project consultation, Gulf sturgeon fall under the jurisdiction of the NMFS. A formal consultation with NMFS regarding the effects of the proposed action on Gulf sturgeon and subsequent potential modification to Gulf sturgeon critical habitat has been initiated and will not be considered further in this Biological Assessment (BA).

West Indian Manatee

The West Indian manatee, also known as the Florida manatee, is a federally-listed endangered aquatic mammal protected under the ESA. Manatees inhabit both salt and fresh water and can be found in shallow (5 ft to usually <20 ft), slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas (FWS, 1991) throughout their range. On occasion, manatees have been observed as much as 3.7 miles off the Florida

Gulf coast. The West Indian manatee is herbivorous and eats aquatic plants, such as hydrilla, eelgrass, and water lettuce.

During the cooler months between October and April, Florida manatees concentrate in areas of warmer water. Manatees are thermally stressed at water temperatures below 18°C (64.4°F); therefore, during winter months, when ambient water temperatures approach 20°C (68°F), manatee population confines itself to the coastal waters of the southern half of peninsular Florida and to springs and warm water industrial outfalls as far north as southeast Georgia. Manatees also winter in the St. Johns River near Blue Spring State Park. Severe cold fronts have been known to kill manatees when the animals did not have access to warm water refuges. During summer months, they may migrate as far north as coastal Virginia on the east coast and the Louisiana coast on the Gulf of Mexico and appear to choose areas based on an adequate food supply, water depth, and proximity to fresh water. Annual migratory circuits of some individuals through the intracoastal waterway of the Atlantic Coast are 1,700 km round trips at seasonal travel rates as high as 50 km/day.

Manatee population trends are poorly understood, but deaths have increased steadily. The population of manatees in Florida has been estimated to be at least 1,865 individuals. In the last decade, yearly mortality in Florida has averaged nearly 150 animals a year. A large percent of mortality is due to collisions with watercrafts, especially of calves. Another closely related factor in their decline has been the loss of suitable habitat through incompatible coastal development, particularly destruction of sea grass beds by boating facilities.

Piping Plover

The piping plover is a small, pale-colored North American shorebird. The bird's light sand-colored plumage blends in with the sandy beaches and shorelines that are its primary habitat. It weighs 1-2 ounces (43-63 grams) and is 6-6 ½ inches (17-18 centimeters) long. During the breeding season the legs are bright orange and the short stout bill is orange with a black tip. There are two single dark bands, one around the neck and one across the forehead between the eyes. Plumage and leg color help distinguish this bird from other plovers. The female's neck band is often incomplete and is usually thinner than the male's neck band. In winter, the bill turns black, the legs remain orange but pale, and the black plumage bands on the head and neck are lost. Chicks have speckled gray, buff, and brown down, black beaks, orange legs, and a white collar around the neck. Juveniles resemble wintering adults and obtain their adult plumage the spring after they fledge

Historically, piping plovers bred across three geographic regions. These regions include: the United States and Canadian Northern Great Plains from Alberta to Manitoba and south to Nebraska; the Great Lakes beaches; and the Atlantic coastal beaches from Newfoundland to North Carolina. Currently, piping plovers live in an area similar to their historical range, although the numbers of those breeding in the Great Lakes region have decreased significantly since the 1930s. The Great Lakes breeding population is now found mainly in Michigan, with one pair nesting in Wisconsin. Generally, piping plovers favor open sand, gravel, or cobble beaches for breeding. Breeding sites are generally found on islands, lake shores, coastal shorelines, and river margins.

Birds from all three populations build their nests in the north but spend the winter along the south Atlantic and Gulf coasts, sometimes arriving as early as mid-July. Since the three populations are indistinguishable from one another, while on their overlapping wintering grounds, all plovers are classified as threatened in their wintering areas.

Piping plovers winter in coastal areas of the United States from North Carolina to Texas. They also winter along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the Bahamas. Information from observation of color-banded piping plovers indicate that the winter range of the three breeding populations overlap, to a significant degree. Therefore, the source breeding population of a given wintering individual cannot be accurately determined in the field, without having marked the individual. The 1996 census numbers reflect the following: Great Lakes – approximately 32 breeding pairs (all but one of these pairs are in Michigan); Northern Great Plains (including the Canadian Prairie region) – approximately 1,398 breeding pairs; and the Atlantic Coast – approximately 1372 breeding pairs.

Piping plovers begin arriving on the wintering grounds in early July, with some late nesting birds arriving in September. A few individuals can be found on the wintering grounds throughout the year, but sightings are rare in June and early July. Migration is poorly understood, but most piping plovers probably migrate non-stop to wintering grounds.

Piping plovers feed along beaches and intertidal mud and sand flats. Primary prey for piping plovers includes worms, various crustaceans, insects, and occasionally bivalve mollusks. Many of the coastal beaches traditionally used by piping plovers for nesting, feeding, and roosting have been lost to commercial, residential, and recreational developments. Also, developments near beaches provide food that attracts increased numbers of predators, such as raccoons, skunks, and foxes. Water level manipulation along the major rivers may also lead to loss of breeding habitat. In order to recover the piping plover and remove it from the endangered species list, threats to reproductive success at breeding grounds must be addressed. Availability of quality foraging and roosting habitat in the regions where this species winters is necessary in order to insure that an adequate number of adults survive to migrate back to breeding sites and successfully nest. Piping plovers often nest on beaches where people like to live and enjoy the shoreline. Their nests accidentally get stepped on or crushed by people and vehicles. The presence of people also may cause the birds to desert the nest, exposing eggs or chicks to the hot sun and predators. Interruption of feeding may stress juvenile birds during critical periods in their life cycle. Pets, especially dogs, may harass or kill the birds.

Critical habitat for the piping plover is identified on the attached map in the vicinity of the project area. The primary constituent elements essential for the conservation of the wintering plovers are those habitat components that support foraging, roosting, sheltering and the physical features necessary to maintaining the natural processes that support these habitat components. The primary constituent elements are found in geologically dynamic coastal areas that support or have the potential to support intertidal beaches and flats and associated dune systems. Important components of intertidal flats include sand and or mud flats with no or sparse emergent vegetation.

Choctawhatchee Beach Mouse.

The Choctawhatchee beach mouse (CBM), a federally listed endangered species, inhabits the coastal dune communities along portions of the northern Gulf coast. This endemic subspecies once had a historic range from East Pass in Okaloosa County to Shell Island in Bay County. Today, only three main populations exist in Topsail Hill State Preserve and Grayton Beach State Recreation Area in Walton County, and Shell Island in Bay County. The FWS designated all three areas as critical habitat for the CBM. In Walton County, Topsail Hill State Preserve comprises about 200 acres of critical habitat along 2.7 miles of coastline. Critical habitat within Grayton Beach State Recreation Area consists of 67 acres along 1.7 miles of coastline. The Florida Department of Environmental Protection manages these areas. The population at Grayton Beach State Recreation Area exists only as a result of a translocation program in cooperation with the Florida Fish and Wildlife Conservation Commission (FWCC) and the Florida Department of Environmental Protection.

Beach mouse habitat is restricted to mature coastal barrier sand dunes along the Gulf. Optimal beach mouse habitat should have: (1) high maximum elevation of coastal sand dunes; (2) relatively great differences between maximum dune height and minimum interdunal elevation; (3) close proximity of forest; (4) a sparse ground cover, and (5) relatively low cover of sea oats. Early research suggested that the frontal dune system was a significant habitat component utilized by the beach mice. However, new research suggests that scrub dune habitat serves an invaluable role in the persistence of the beach mouse population. Therefore, habitat components considered critical for beach mice extend from the frontal dune landward to the transition from scrub habitat to maritime forest. Within the rows of dunes paralleling the shoreline towards the scrub habitat are three microhabitats including the frontal dune (primary), interdunal areas (secondary), and inland dunes (scrub). The primary, secondary, and scrub dune habitat is utilized for burrow sites, food resources, cover, and high-elevation refuge from storm events. The food plants most utilized by beach mice are beach grass and sea oats; however, they may eat invertebrates when seed sources are scarce in the late winter or early spring (USFWS, 1992).

Beach mice are burrow-inhabiting animals occupying either old burrow of ghost crabs or digging their own burrows. Burrows are located mainly on the lee side of the primary, secondary, and scrub dunes where vegetation provides suitable cover. As many as 20 burrows may be found within their home range, suggesting that they are semi-nomadic. Each burrow may be used for various purposes (refuge, nesting, food storage, etc.) at different periods of time. Beach mice are nocturnal, spending the day sleeping in their burrows and foraging at night.

Critical habitat receives protection under section 7 of the ESA through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Critical habitat determinations are based on the best scientific data available and consider those physical and biological features (primary constituent elements) that are essential to the conservation of the species, and that may require special management considerations and protection.

The FWS issued in the Federal Register a proposed rule for revising designated critical habitat for the Perdido Key (PKM) and CBM. The primary constituent elements of critical habitat for the PKM and CBM are the habitat components that provide: (1) a contiguous mosaic of primary, secondary, and scrub vegetation and dune structure, with a balanced level of competition and predation and few or no competitive or predaceous non-native species present, that collectively provide foraging opportunities, cover, and burrow sites, (2) Primary and secondary dunes, generally dominated by sea oats, that, despite occasional temporary impacts and reconfiguration from tropical storms and hurricanes, provide abundant food resources, burrow sites, and protection from predators, (3) scrub dunes, generally dominated by scrub oaks, that provide food resources and burrow sites, and provide elevated refugia during and after intense flooding due to rainfall and/or hurricane-induced storm surge, (4) functional, unobstructed habitat connections that facilitate genetic exchange, dispersal, natural exploratory movements and re-colonization of locally extirpated areas, and (5) a natural light regime within the coastal dune ecosystem, compatible with the nocturnal activity of beach mice, necessary for normal behavior, growth, and viability of all life stages. The Perdido Key beach mouse is located in critical habitat units (1) Gulf State Park Unit, (2) West Perdido Key Unit, and (3) Perdido Key State Park Unit.

Effects of Proposed Action

Sea Turtles

The effects of beach nourishment and impacts on nesting sea turtles has been extensively documented and indicate that, in nesting success rates may decrease the year following beach placement as a result of escarpments, altered beach profiles, and sand compaction. Post-placement monitoring has shown an increase in abandoned nest attempts on altered beaches compared to that of unnourished beaches as well as increases water inundation during the beach equilibration process. This suggests that a post-placement decline in nesting is a result from variation in the beach profile than beach compaction and escarpment formation. Other studies, however, have shown that sediment used for the nourishment of some beaches in Florida exhibited little or no impediments to nesting sea turtles and that the physical characteristics of the placed sediment did not cause excessive scarp formation and limit their ability to nest across the beach. Minimal post-placement effects can be achieved by using compatible beach material and innovative design methods. For this particular project, the sand dredged from the borrow area and placed on the beach or nearshore matches closely with the native beach sand. However, there will likely be some potential impacts resulting from altering the profile and equilibration process. Changes in beach slope as well as the development of escarpments may develop along the mean high water line as the constructed beach adjusts from a construction profile to a natural beach profile

Though the equilibration process and subsequent escarpment formation are features of most beach projects, management techniques can be implemented to reduce the impact of escarpment formations. For completed sections of beach during beach construction operations, and for subsequent three years following as the construction profile approaches a more natural profile, visual surveys for escarpments would be performed. Escarpments that are identified prior to or during the nesting season that interfere with sea turtle nesting (exceed 18 inches in height for a distance of 100 ft.) can be leveled to the natural beach for a given area for these three subsequent years. If it is determined that escarpment leveling is required during the nesting or hatching season, actions should be taken as directed by the FWS.

It likely that pipeline equipment will be used to place the material on the beach and if conducted within the nesting season, may act as an impediment to nesting females and/or hatchlings. Nesting females may either encounter the pipe and false crawl, or nest in front of the pipeline in a potentially vulnerable area to erosion and water inundation. This problem can easily be avoided by conducting the beach placement outside of the turtle nesting window.

The presence of artificial lighting on or within the vicinity of nesting beaches has shown to be detrimental to the nesting process both for the nesting females and emerging hatchlings. Lighting on beaches tends to deter sea turtles emerging from the sea to nest and the sea-finding process of hatchlings during the nest emergence. The impact of light on nesting females and hatchlings can be minimized by reducing the number and wattage of light sources or by modifying the direction of light sources through shielding, redirection, elevational modifications, etc. During construction, all lighting will be minimized to the maximum extent practicable while maintaining compliance with all Corps, OSHA, and Coast Guard requirements.

All efforts will be made to conduct the proposed dredging and placement activities outside of the sea turtle nesting window. Additionally, the conservation measures and recommendations specified in the RBO for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges will be followed to the maximum extent practicable. However, it is inevitable that some of the placed sand will remain on the beach during subsequent nesting seasons. Given these considerations it was initially determined that the proposed action may adversely affect sea turtles. However, after considering the findings of the BO issued for the local plan which is larger than and totally encompasses the selected Federal plan, it is the FWS's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of the loggerhead, green, leatherback, or Kemp's ridley sea turtles.

<u>West Indian Manatee</u>

Manatees may be occasionally found in the shallow waters of the project area during the warmer months of the year. Given their slow-moving and low visibility nature, it is possible that manatees could wander into close proximity of the dredging and placement operations. To minimize contact and potential injury to manatees, the Manatee Construction Conservation Measures as specified by the FWS letter dated August 31, 2006 will be strictly observed. In addition, there will be NMFS approved observers on board all hopper dredge operations. By adhering to these measures and recommendations, the proposed action may affect but not likely to adversely affect manatees.

Piping Plovers

The beach placement proposed during this action may actually enhance beach habitat and even potentially restore lost habitat in the long term. However, short-term impacts to foraging and roosting habitat may occur during beach construction operations. Since piping plovers do not nest in Florida, construction activities will not impact breeding and nesting activities. Wintering habitat for roosting and foraging may be impacted; however, project construction limits will avoid areas designated as critical habitat to the maximum extent practicable. Direct short-term foraging habitat losses may occur during the placement of sediment on the beach and associated construction operations. Since only a small portion of the foraging habitat is directly affected at and around the discharge site, adjacent habitat is still available and the overall direct loss of foraging habitat will be minimal and short-term. However, the placement of sediment on the beach may temporarily impact foraging, sheltering, and roosting habitat and; therefore, it was initially determined that the beach and dune placement activities may adversely affect piping plovers. However, after considering the findings of the BO issued for the local plan which is larger than and totally encompasses the selected Federal plan, it is the FWS's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of non-breeding piping plover.

Choctawhatchee Beach Mouse (CBM)

The direct dune and beach placement is adjacent to designated critical habitat for the CBM. The placement of sediment directly on the beach and seaward of the toe of the existing primary dune line would not generally impact existing habitat. Pipeline routes for beach construction will be avoided for identified primary constituent elements for critical habitat. Considering that much of the mature coastal barrier sand dunes and scrub dune habitat on the Gulf and Atlantic coasts of Florida have been lost and populations of beach mice have declined as a result, the development of new habitat or enhancement of existing habitat is beneficial to the recovery goals of beach mice. Dune restoration activities allows for the availability of materials for the natural formation and growth of primary and secondary dunes. Such processes would help in the development of new beach mouse habitat and may aid in the enhancement and expansion of existing populations by stabilizing and enhancing existing dune communities with available sand and associated aeolian transport processes. This in turn promotes natural recruitment of native dune vegetation that contributes to the primary constituent elements for critical habitat by providing food resources for beach mice.

With these considerations in mind and the uncertainties associated with the direct beach placement and location of the dune building processes it was initially determined that the action may adversely affect the CBM and designated critical habitat. However, after considering the findings of the BO issued for the local plan which is larger than and totally encompasses the selected Federal plan, it has been determined that the effects of the proposed activities are not likely to jeopardize the continued existence of the CBM and is not likely to destroy or adversely modify designated critical habitat for the CBM.

Conclusions

Based upon the findings of this BA, the following determinations have been made:

Sea Turtles – All efforts will be made to conduct the proposed dredging and placement activities outside of the sea turtle nesting window. The conservation measures and recommendations specified in the RBO for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges will be followed to the maximum extent practicable. During construction, all lighting will be minimized to the maximum extent practicable while maintaining compliance with all Corps, OSHA, and Coast Guard requirements. After placement of material on the beaches and prior to April 15 for three (3) subsequent years, if placed sand still remains on the beach, compaction testing will be performed in accordance with a accepted protocols to determine if tilling is necessary. Tilling may be conducted in lieu of compaction testing.

Because it is inevitable that some of the placed sand will remain on the beaches during subsequent nesting seasons was initially determined that the proposed action may adversely affect sea turtles. However, after considering the findings of the BO (SAJ-2007-5152 (IP-DEB)/FWS 2008-F-0060) issued October 2, 2008 for the local plan which is larger than and totally encompasses the selected Federal plan, it is the Fish and Wildlife Service's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of the loggerhead, green, leatherback, or Kemp's ridley sea turtles.

West Indian Manatee - To minimize contact and potential injury to manatees, the Manatee Construction Conservation Measures as specified by the FWS letter dated August 31, 2006 will be strictly observed. In addition, there will be NMFS approved observers on board all hopper dredge operations. By adhering to these measures and recommendations, the proposed action may affect but not likely to adversely affect manatees.

Piping Plover - The placement of sediment on the beach may temporarily impact foraging, sheltering, and roosting habitat and therefore was initially determined that direct beach placement of sediment may adversely affect piping plovers. However, after considering the findings of the BO issued for the local plan which is larger than and totally encompasses the selected Federal plan, it is the Fish and Wildlife Service's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of non-breeding piping plover.

Choctawhatchee beach mouse - Direct beach placement and dune restoration of compatible sand may enhance existing habitat or establish new habitat for beach mice. It was initially determined that the action may adversely affect the Perdido Key beach mouse or designated critical habitat. However, after considering the findings of the BO issued for the local plan which is larger than and totally encompasses the selected Federal plan, it is the Fish and Wildlife Service's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of the CBM and is not likely to destroy or adversely modify designated critical habitat for the CBM.

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DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF

January 15, 2010

Coastal Environment Team
Planning and Environmental Division

Mr. Eric Hawk
National Marine Fisheries Service,
Southeast Regional Office
Protected Resources Division
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Mr. Hawk:

The U.S. Army Corps of Engineers (Corps), Mobile District is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet as illustrated in the attached biological assessment (BA). This area and the adjacent waters support federally protected species under your agency's purview, such as sea turtles (loggerhead, green, leatherback, and Kemp's ridley) and Gulf sturgeon and its designated critical habitat. Based on our evaluation of the selected Federal plan described in the BA, it is our assessment that the actions may have an adverse affect on sea turtles and Gulf sturgeon but not likely to jeopardize their continued existence, which are covered under the Regional Biological Opinion (RBO) for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287) dated November 19, 2003 and amendments.

Formal consultation is being requested under Section 7 of the Endangered Species Act (ESA) regarding Gulf sturgeon and its designated critical habitat for the selected Federal plan described in the enclosed BA. The local sponsor proceeded with pursuing a beach restoration plan of their own in which their proposed project is larger than and totally encompasses the selected Federal plan and uses the same borrow area. Subsequently, the County has initiated and completed formal ESA Section 7 consultation with the National Marine Fisheries Service (NMFS), Protected Resources Division concerning Gulf sturgeon critical habitat which resulted in a letter dated August 13, 2008 stating that the NMFS has determined that the proposed action is not likely to adversely affect Gulf Sturgeon critical habitat. A copy of this letter is included with this BA. The Corps is therefore requesting that consideration be given to applying that coordination to the selected Federal plan.

Please address any questions or concerns to Mr. Larry Parson at (251) 690-3139 or email at larry.e.parson@usace.army.mil.

Sincerely,

Jennifer L. Jacobson

Jennifer L. Jacobson
Chief, Coastal Environmental Team

Enclosure

ESA Section 7 - Biological Assessment (BA)
Walton County, Florida
Hurricane and Storm Damage Reduction Project

The U.S. Army Corps of Engineers, Mobile District (Corps) is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County's shoreline located in the Florida's panhandle is receding; the protective dunes and high bluffs are being destroyed by hurricane and storm forces that are occurring more frequently than before. During the late 1990s, the area endured several strong hurricanes resulting in extensive shoreline erosion (Taylor Engineering, 2003). In 2004 the area was affected severely by Hurricane Ivan (Sep 04) and early into the 2005 hurricane season it was impacted by Hurricanes Arlene (June 05) and Dennis (July 05). The impacts of these storms to property and infrastructure are considerable and can possibly be reduced through a beach restoration and stabilization project which also includes environmental restoration opportunities associated with the beach and dune system.

A feasibility study was authorized by a resolution of both the United States Senate and the U.S. House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

> *"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida.*

> Resolution Adopted July 24, 2002, by The United States House of Representatives:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida.*

The non-Federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council (TDC).

Project Location

Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 11.9 miles of state-designated critically eroding areas and three State of Florida park areas that cover approximately six miles of the 26-mile shoreline.

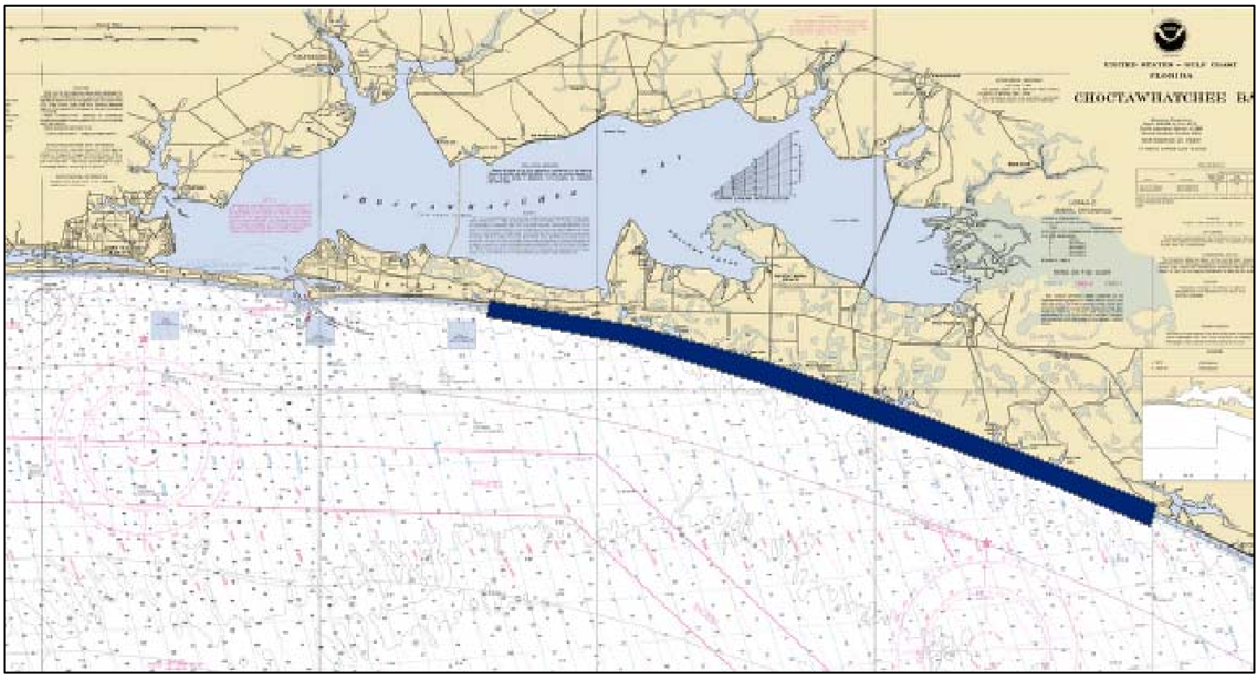

Figure 1. Location of Walton County project area

Project Description

The Walton County upland cross-section is defined by dune elevations ranging from +9.5 to + 33 feet NAVD88 and a natural berm elevation of +5.5 feet NAVD88. The study region was divided into five study reaches based on structural development and state park areas as illustrated in Figure 2. The historical and 2004 beach surveys were used to develop 11 representative profiles which characterize the existing condition for the five study reaches. The representative profiles were identified based on similarity in shape of the upper beach profile (dune height and width, berm width, foreshore beach slope, and profile volume) and shape of the offshore profile.

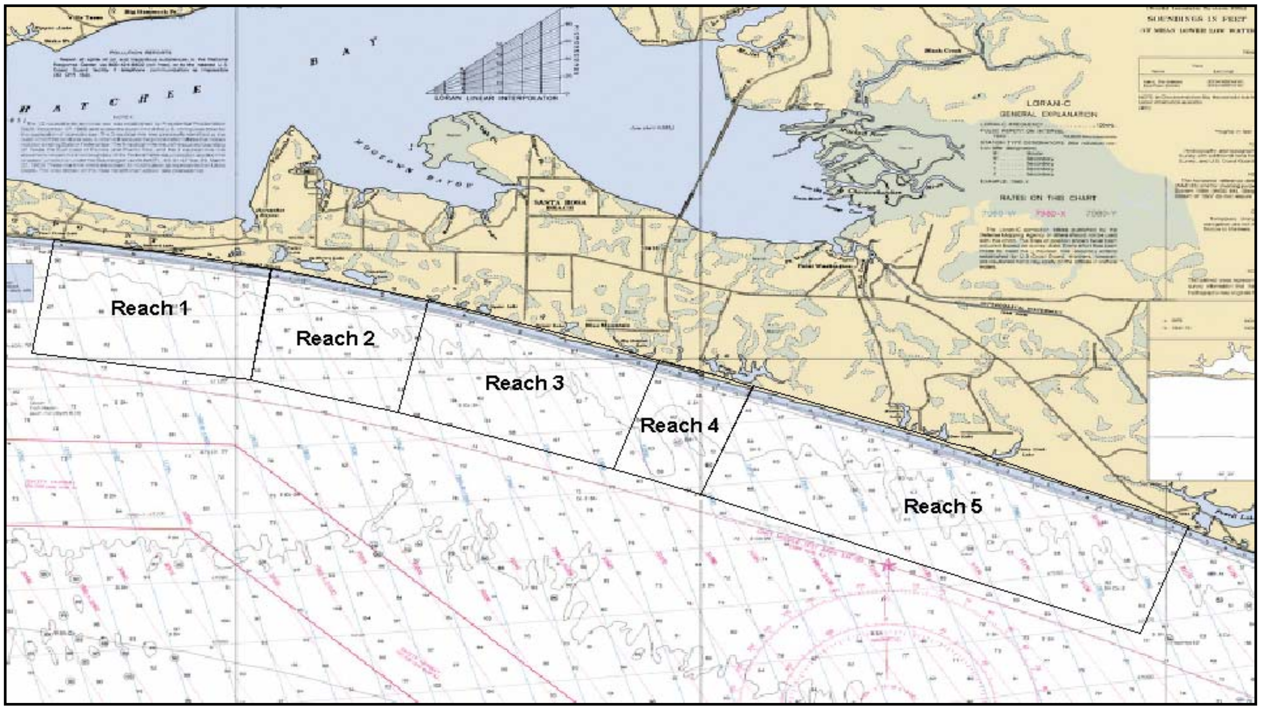

Figure 2. Location of the 5 construction reaches within the project area.

The selected plan recommended for construction consists of the five construction reaches (Figure 2). The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The modeling efforts have predicted fill requirements of 2,400,000 cy. If this condition can be extrapolated to the predicted construction timeframe of FY11, then the necessary beach fill requirements will be 3,350,000 cy. Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters. The typical cross-sections for the selected plan illustrated in Figure 3. When dune construction is complete, the dune will be planted with at least three species of dune vegetation to create a dune that matches the surrounding natural dune patterns in the area. Upon reconstruction immediate steps will be taken to plant and stabilize the dune for rapid stabilization. This will be accomplished through the use of sand fences and dune plants. The dune plants will be planted to cover 60-80% of the total area. The vegetation will consist of local dominant species that populate nearby natural dune systems. The selection of the dune vegetation will consist of species that are most widely used for dune restoration and are readily available from local nurseries and suppliers. The selection will be coordinated with local experts familiar with dune ecosystems in the immediate area.

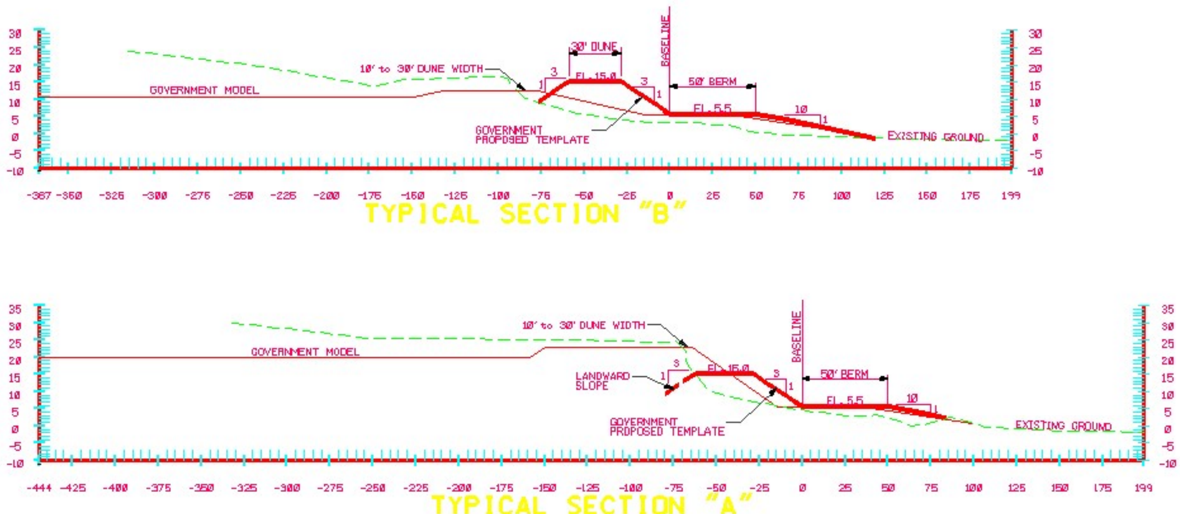

Figure 3. Selected plan typical cross sections to be constructed

Borrow Areas

Recent offshore studies to include geological and geophysical interpretation to identify a suitable offshore borrow area has been performed by Taylor Engineering, Inc. (2003) in the Walton County Destin Beach Management Feasibility Study Final Report under contract to the local sponsor, which initially concentrated on the East Pass area southwest of Destin and the eastern most end of Okaloosa County and the westernmost end of Walton County. Subsequent investigations looked at the entire coastline to assess locations with sufficient quantities for borrow development for the initial beach placement and future re-nourishments.

A large scale reconnaissance level geophysical, lithological and granulomteric (grain size) investigation was undertaken off Walton County, Florida. Sub-bottom profiles were used to locate prospective core locations to identify high quality sand sources for beach nourishment. Vibracores and selected seismic records were interpreted to confirm the presence and quality of sand off Walton County. The borrow area investigation locations are shown in Figure 4.

The proposed borrow area sediments are typically well sorted medium sand 0.25 - 0.50 mm (1-2 phi). Monitoring of the borrow discharges will be a constant requirement for compliance with color and grain size criteria. Borrow area B-4 shown on Figure 4 is the borrow site that was selected with some 10,000,000 cubic yards proven by these initial investigations. This volume covers the recommended locally preferred plan placement and the four planned subsequent re-nourishments for the next 50 years. The B-4 borrow area is most centrally located and offers the best source for the initial project construction and future re-nourishments. Based on the extensive geotechnical investigations, this borrow site has been demonstrated to be the most suitable source and has sand of color, size, and composition generally similar to that of the native beach. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and pumped into the beach template. Small bulldozers will be used on land to shape the material to the prescribed template.

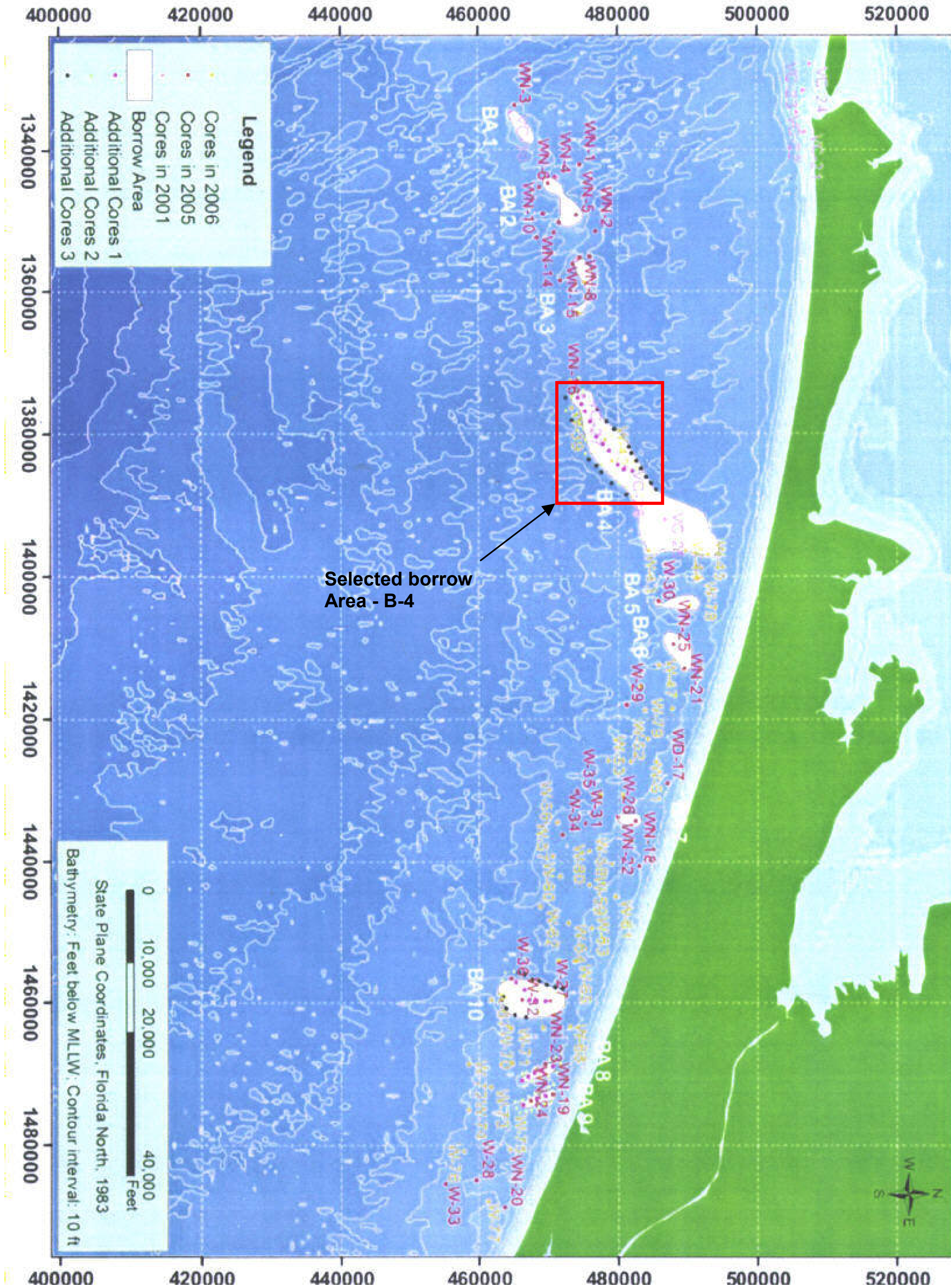

Figure 4. Borrow area investigation locations and selected borrow site.

Previous Coordination

It should be recognized that the local sponsor proceeded with pursuing a beach restoration plan of their own. Their local project area lays the length of Walton County. The proposed local plan includes a berm design that on average exhibits a construction profile that has a 207-ft wide berm measured from the existing 9.5 ft NAVD contour with a10-ft wide dune crest. The sponsor's local proposed plan view and profiles are larger than and totally encompass the selected Federal plan described above. Subsequently, the County has initiated and completed formal ESA Section 7 consultation with the National Marine Fisheries Service (NMFS), Protected Resources Division concerning Gulf sturgeon critical habitat, which resulted in a letter dated August 13, 2008 stating that the NMFS has determined that the proposed actions will not impact sediment quality or migratory pathways, and effect to prey abundance and water quality will be insignificant. It was therefore concluded that the proposed action is not likely to adversely affect Gulf Sturgeon critical habitat. A copy of this letter is enclosed with this BA.

Other related coordinations, which cover sea turtles and Gulf sturgeon, are included in the Regional Biological Opinion (RBO) for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287) dated November 19, 2003 and associated amendaments.

Description of Listed Species

There are several environmental concerns that must be addressed in order to achieve environmental compliance for both permitting and National Environmental Protection Act (NEPA). The NMFS lists the following species under their purview as either threatened and/or endangered that may occur within the area:

Marine Mammals
E-blue whale - (*Balaenoptera musculus*)
E- finback whale - (*Balaenoptera physalus*)
E-humpback whale - (*Megaptera novaeangliae*)
E- sei whale - (*Balaenoptera borealis*)
E- sperm whale - (*Physeter macrocephalus*)

Turtles
T- green sea turtle - (*Chelonia mydas*)
E- hawksbill sea turtle - (*Eretmochelys imbricate*)
E- Kemp's ridley sea turtle - (*Lepidochelys kempii*)
E- leatherback sea turtle - (*Dermochelys coriacea*)
T- loggerhead sea turtle - (*Caretta caretta*)

Fish
T- Gulf sturgeon- (*Acipenser oxyrinchus*)

Federally protected species, such as the blue whale, finback whale, humpback whale, sei whale, and sperm whale are not considered in this BA as these species are unlikely to be found in or near the project area. Of particular concern in this BA are the species of sea turtles identified in the RBO (green, loggerhead, and Kemp's ridley) that could potentially be affected by hopper dredging operations and the Gulf sturgeon and its designated critical habitat (Unit 11). A description of these species are included below.

Loggerhead Sea Turtle

The loggerhead sea turtle is a medium to large turtle. Adults are reddish-brown in color and generally 31 to 45 inches in shell length with the record set at more than 48 inches. Loggerheads weigh between 170 and 350 pounds with the record set at greater than 500 pounds. Young loggerhead sea turtles are brown above and whitish, yellowish, or tan beneath, with three keels on their back and two on their underside.

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Gulf of Mexico, Pacific, and Indian Oceans. This species may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, and the mouths of large rivers. In shallow Florida lagoons, loggerheads were found during the morning and evening, leaving the area during mid-day when temperatures reached 87° F. At dusk, turtles moved to a sleeping site and remained there until morning, possibly in response to changes in light or water temperature (Nelson 1986).

Loggerhead turtles are essentially carnivores, feeding primarily on sea urchins, sponges, squid, basket stars, crabs, horseshoe crabs, shrimp, and a variety of mollusks. Their strong beak-like jaws are adapted for crushing thick-shelled mollusks. Although loggerhead sea turtles are primarily bottom feeders, they also eat jellyfish and mangrove leaves obtained while swimming and resting near the sea surface. Presence of fish species such as croaker in stomachs of stranded individuals may indicate feeding on the by-catch of shrimp trawling (Landry 1986). Caldwell et al. (1955) suggest that the willingness of the loggerhead to consume any type of invertebrate food permits its range to be limited only by the presence of cold water.

As loggerheads mature, they travel and forage through nearshore waters until their breeding season, when they return to the nesting beach areas. The majority of mature loggerheads appear to nest on a two or three year cycle. Major nesting beaches for loggerheads include the Sultanate of Oman, southeastern United States, and eastern Australia. From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to the nesting aggregation on Masirah Island, Oman. This species nests within the U.S. from Texas to Virginia, although the major nesting concentrations are found along the Atlantic cost of Florida, Georgia, South Carolina, and North Carolina. About 80 percent of all loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties). Total estimated nesting in the U.S. is approximately 50,000 to 70,000 nests per year. Nesting in the northern Gulf outside of Florida occurs primarily on the Chandeleur Islands in Louisiana and to a lesser extent on adjacent Ship, Horn, and Petit Bois Islands in Mississippi (Ogren 1977).

Ogren (1977) reported a historical reproductive assemblage of sea turtles, which nested seasonally on remote barrier beaches of eastern Louisiana, Mississippi, and Alabama.

Loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in northern Gulf of Mexico. Overall the loss of nesting beaches, hatchling disorientation from artificial light, drowning in fishing and shrimping trawls, marine pollution, plastics, and styrofoam have led to the decline of loggerheads.

Loggerhead sea turtles are considered turtles of shallow water. Juvenile loggerheads are thought to utilize bays and estuaries for feeding, while adults prefer waters less than 165 feet deep (Nelson 1986). Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico. During aerial surveys of the Gulf of Mexico, the majority (97 percent) of loggerheads was seen off the east and west coasts of Florida (Fritts 1983). Most were observed around mid-day near the surface, possibly related to surface basking behavior (Nelson 1986). Although loggerheads were seen off the coast of Alabama, Mississippi, and Louisiana, they were 50 times more abundant in Florida than in the western Gulf. The majority of the sightings were in the summer (Fritts et al. 1983). An individual tagged in Perdido Bay, Alabama was recaptured one year later only about a mile from the original capture site. In another case, a loggerhead had moved from Perdido Bay, Alabama into Pensacola Bay, Florida over a several month period (Nelson 2002).

Loggerheads are frequently observed near offshore oil platforms, natural rock reefs, and rock jetties along the Gulf Coast. Large numbers of stranded turtles were observed inshore of such areas (Rabalais and Rabalais 1980). Fishermen reported sightings of large turtles near the Gulf Coast. In a recent tracking study, loggerheads spent more than 90 percent of the time underwater, tended to avoid colder water, and spent much of the time in the vicinity of oil and gas structures, such as those found offshore of Mississippi and Alabama.

Green Sea Turtle

The green sea turtle is mottled brown in color. The name is derived from the greenish fat of the body. The carapace is light or dark brown. It is sometimes shaded with olive, often with radiating mottled or wavy dark markings or large dark brown blotches. This species is considered medium to large in size for sea turtles with an average length of 36 to 48 inches. The record was set at about 60 inches in length. Its weight ranges from about 250 to 450 pounds with the record at more than 650 pounds. The upper surfaces of young green turtles are dark brown, while the undersides are white.

Although green sea turtles are found worldwide, this species is concentrated primarily between the 35° North and 35° South latitudes. Green sea turtles tend to occur in waters that remain warmer than 68° F; however, there is evidence that they may be buried under mud in a torpid state in waters to 50° F (Ehrhart 1977; Carr et al. 1979).

This species migrates often over long distances between feeding and nesting areas (Carr and Hirth 1962). During their first year of life, green sea turtles are thought to feed mainly on jellyfish and other invertebrates. Adult green sea turtles prefer an herbivorous diet frequenting shallow water flats for feeding (Fritts et al. 1983). Adult turtles feed primarily on seagrasses, such as *Thalassia testudinum*. This vegetation provides the turtles with a high fiber content and low forage quality (Bjorndal 1981a). Caribbean green sea turtles are considered by Bjorndal (l981b) to be nutrient-limited, resulting in low growth rate, delayed sexual maturity, and low annual reproductive effort. This low reproductive effort makes recovery of the species slow once the adult population numbers have been severely reduced (Bjorndal 1981). In the Gulf of Mexico, principal foraging areas are located in the upper west coast of Florida (Hirth 1971). Nocturnal resting sites may be a considerable distance from feeding areas, and distribution of the species is generally correlated with grassbed distribution, location of resting beaches, and possibly ocean currents (Hirth 1971).

Major nesting areas for green sea turtles in the Atlantic include Surinam, Guyana, French Guyana, Costa Rica, the Leeward Islands, and Ascension Island in the mid-Atlantic. Historically in the U.S., green turtles have been known to nest in the Florida Keys and Dry Tortugas. Yet, these turtles primarily nest on selected beaches along the coast of eastern Florida, predominantly Brevard through Broward Counties. However, they probably nested along the Gulf Coast before their decline. In the southeastern U.S., nesting season is roughly June through September. Nesting occurs nocturnally at 2, 3, or 4-year intervals. Only occasionally do females produce clutches in successive years. Estimates of age at sexual maturity range from 20 to 50 years (Balazs 1982; Frazer and Ehrhart 1985) and they may live over 100 years. Immediately after hatching, green turtles swim past the surf and other shoreline obstructions, primarily at depths of about 8 inches or less below the water surface, and are dispersed both by vigorous swimming and surface currents (Balzas 1980). The whereabouts of hatchlings to juvenile size is uncertain. Green turtles tracked in Texas waters spent more time on the surface, with fewer submergences at night than during the day, and a very small percentage of the time was spent in the Federally maintained navigation channels. The tracked turtles tended to utilize jetties, particularly outside of them, for foraging habitat (Renaud et. Al. 1993).

Most green turtle populations have been depleted or endangered because of direct exploitation or incidental drowning in trawl nets (King 1981). A major factor contributing to the green turtle's decline worldwide is commercial harvest for eggs and meat. In Florida, the nesting population was nearly extirpated within 100 years of the initiation of commercial exploitation (King 1981). Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. These tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens become severely debilitated and die. Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from commercial fishing operations.

Kemp’s ridley turtle

The Kemp’s ridley occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean with occasional individuals reaching European waters. Adults of this species are generally confined to the Gulf of Mexico, although some adults are sometimes found on the east coast of the U.S. Females return to their nesting beach about every other year with nesting occurring from April into July and usually limited to the western Gulf of Mexico. The mean clutch size for this species is about 100 eggs per nest and an average of 2.5 nests per female per season.

Benthic immature turtles have been found along the eastern seaboard of the U.S. and in the Gulf of Mexico. In Gulf, studies suggest that immature turtles stay in shallow, warm, nearshore waters in the northern Gulf until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching stage (pelagic stage) within the Gulf. Studies have indicated that this stage varies from 1 to 4 or more years and the benthic immature stage lasts about 7 to 9 years (Schmid and Witzell 1997). The maturity age of this species is estimated to be 7 to 15 years.

Of the seven extant species of sea turtles, the Kemp’s ridley has declined to the lowest population level. However, recent studies have indicated that increased nesting activities and suggest that the decline in ridley population has stopped and the population is now increasing (USFWS 2000). A period of steady increase in the benthic immature turtles has been occurring since 1990 and suggests a result of increased hatchling production and survival rates of the immature turtles. The increased survival of immature individuals is believed to be in part a result of the use of turtle exclusion devices (TEDs) in the commercial shrimping fleets. Future threats to the species include interaction with fishery gear; marine pollution; destruction of foraging habitat; illegal poaching; and impacts to nesting beaches associated with rising sea level, development, and tourism pressure.

Gulf Sturgeon

The NMFS and U.S. Fish and Wildlife Service (FWS) listed the Gulf sturgeon as a threatened species on September 30, 1991. The Gulf sturgeon, also known as the Gulf of Mexico sturgeon, is a subspecies of the Atlantic sturgeon. It is a large fish with an extended snout, vertical mouth, and with the upper lobe of the tail longer than the lower. Adults are 180 to 240 cm (71-95 inches) in length, with adult females larger than adult males. The skin is scaleless, brown dorsally and pale ventrally and imbedded with 5 rows of bony plates.

Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms and crustaceans. Gulf sturgeon are anadromous, with reproduction occurring in fresh water. Most adult feeding takes place in the Gulf of Mexico and its estuaries. The fish return to breed in the river system in which they hatched. Spawning occurs in areas of deeper water with clean (rock and rubble) bottoms. The eggs are sticky and adhere in clumps to snags, outcroppings, or other clean surfaces. Sexual maturity is reached between the ages of 8 and 12 years for females and 7 and 10 years for males.

Historically, the Gulf sturgeon occurred from the Mississippi River to Charlotte Harbor, Florida. It still occurs, at least occasionally, throughout this range, but in greatly reduced numbers. The fish is essentially confined to the Gulf of Mexico. River systems where the Gulf sturgeon are known to be viable today include the Mississippi, Pearl, Escambia, Yellow, Choctawhatchee, Appachicola, and Swannee Rivers, and possibly others.

Effects of Proposed Action

The RBO in November 2003 and subsequent revisions for use of hopper dredges analyzed the impacts to sea turtles and Gulf sturgeon. The effects to these species as stated in the RBO are summarized below. Also included in this section are effects of the proposed action to the designated Gulf sturgeon critical habitat.

Sea Turtles

The RBO identified three species of sea turtles described above, that could potentially be affected through use of hopper dredging operations. Hopper dredge entrainment is a documented source of sea turtle mortality. Conducting hopper dredging operations within the waters of the Gulf of Mexico, especially during turtle nesting season (April through November) or when water temperatures are above 11ºC creates an increased risk for taking sea turtles. Injuries inflicted on sea turtles from a draghead are typically fatal. Based on sea turtle life history and strandings data sited in the RBO, it would be expected that the proposed action may result in sea turtle mortality from hopper dredging activity. During operations when hydraulic cutter-head pipeline dredging equipment is being used, no effects to sea turtles are anticipated, as they are not known to impact sea turtles.

Disposal of the dredged material on the beach nearshore area is unlikely to affect sea turtles in the immediate vicinity. Sea turtles are known to be highly mobile and would be expected to exit the area during such activities. Disposal of the dredged material is a slow process that has not been shown to adversely affect sea turtles.

The conservation measures and recommendations specified in the RBO for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges will be followed to the maximum extent practicable. Given these considerations it is determined that the proposed action may affect, but not likely to adversely affect sea turtles and will not jeopardize the continued existence of the species.

Gulf Sturgeon

Effects to Gulf Sturgeon resulting from the proposed dredging and nearshore disposal activities would be confined to direct impacts associated with the dredge equipment. Effects resulting from the use of hopper dredges were considered in the RBO. Mobile District will abide by the reasonable and prudent measures set forth in that opinion. Disposal of dredged material in the nearshore area is unlikely to affect Gulf sturgeon in the immediate vicinity. Sturgeons are known to be highly mobile and would be expected to exit the area during such activities. Disposal of the dredged material is a slow process that has not been shown to adversely affect

Gulf sturgeon. No effects to Gulf Sturgeon are anticipated with the use of a hydraulic cutter-head dredge, as they are not known to impact Gulf Sturgeon.

The conservation measures and recommendations specified in the RBO will be followed to the maximum extent practicable pertaining to Gulf sturgeon. It is therefore determined that if the conservation measures specified in the RBO are observed, the proposed action may affect, but not likely to adversely affect Gulf sturgeon and will not jeopardize the continued existence of the species.

Gulf Sturgeon Critical Habitat

The proposed project area falls within the designated Gulf sturgeon critical habitat. As defined by the Federal Register Vol. 68, No. 53, the proposed dredging of the navigation channel is located within Unit 11 - Florida Nearshore Gulf of Mexico. Unit 11 extends from the mean high water line seaward one nautical mile and terminates one nautical mile west of Pensacola Pass. The selected borrow area does not fall within Gulf sturgeon critical habitat, however, the direct beach placement activities will be occurring within Unit 11. Alteration of Gulf sturgeon critical habitat Unit 11 is likely to occur in areas of direct beach placement by extending the shoreline seaward.

The primary constituent elements essential for the conservation of the Gulf sturgeon are those habitat components that support foraging, riverine spawning sites, normal flow regime, water quality, sediment quality, and safe unobstructed migratory pathways.

Forage Area: Activities associated within beach placement cover epibenthic crustaceans and infaunal polychaetes in the beachfront area that serve as potential prey items for the sturgeon. The impacts are considered short-term in nature and consist of a temporary loss of benthic invertebrate populations where the shoreline extends seaward. This is believed that this will not result in a significant impact to critical habitat. Due to the fact that, before the recent hurricane activity the area was above mean high water and was not contributing to the benthic productivity of the coastal system. The project will restore the shoreline to pre-hurricane Ivan (2004) conditions and provide more suitable nesting habitat for endangered sea turtles and shorebird foraging area. The loss of Gulf bottom from beach placement area will not jeopardize the continued existence of the species. The areas immediately adjacent to the shoreline are extremely dynamic and shallow and likely not utilized by feeding sturgeon. The total area influenced by the placement of sand along the construction zones is approximately 45 acres, which falls with the extreme nearshore zone and constitutes a minute fraction of the total available forage habitat for the species in that area. It is believed the impacts to the Gulf sturgeon critical habitat would be relatively minor in nature and not result in an adverse modification.

Migratory passage: The primary migration pattern through the area would be parallel to the shoreline in the nearshore area. The proposed beach placement is occurring primarily on dry beach and immediate nearshore along an open-water shoreline and will not restrict fish migration. No significant short-term or long-term effects to migratory passage have been identified.

Sediment and water quality: This constituent element will not be significantly affected by the proposed activity. All conditions of the FDEP Water Quality Certification will be followed during construction. No long-term impacts were identified.

Normal Water Flow: Water flow patterns associated with the littoral environment will not be effected. Therefore, no effects to this constituent element will occur.

Spawning habitat: The placement areas are obviously not located in a riverine system where Gulf sturgeon spawning takes place and therefore, no impacts to this constituent element will occur.

Riverine aggregation areas: No impact

Conservation Measures

The proposed project will adhere to the reasonable and prudent measures set forth in the Regional Biological Opinion for Dredging of Gulf of Mexico Navigation Channels and Sand Mining Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287) dated November 19, 2003 and subsequent revisions. This would include screens, observers, drag head deflectors, and relocation trawling within the active dredging areas.

Conclusions

The Corps is not aware of any evidence that would change conservation measures recommended in 2003 RBO and subsequent revisions. Conducting the proposed action will implement all reasonable and prudent measures, recommendations, and conditions as specified in the RBO.

Based upon the findings of this biological assessment and measure set forth by the 2003 RBO, the Corps has found that the proposed action “may affect” the following species under the purview of the NMFS:

Loggerhead Sea Turtle - The dredging operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Green Sea Turtle - The dredging operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Leatherback Sea Turtle - The dredging operations associated with this project may affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Gulf Sturgeon - May affect, but not likely to adversely affect and will not jeopardize the continued existence of the species.

Gulf Sturgeon Critical Habitat - The beach disposal areas do fall within the extreme nearshore areas of Gulf sturgeon critical habitat - Unit 11. The direct beach disposal will be restoring the historic shoreline position to pre-Hurricane Ivan dimensions. Given these considerations, it has been determined that the disposal activities associated with this project will not adversely modify designated Gulf sturgeon critical habitat.

The U.S. Army Corps of Engineers is requesting that since the local sponsor for the Federal project has already completed ESA Section 7 consultation with your agency for a local plan that is larger than and totally encompasses the selected Federal plan described herein, that consideration be given to applying that coordination to the Federal plan.

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UNITED STATES DEPARTMENT OF COMMERCE
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AUG 13 2008

F/SER31:DK

Mr. Osvaldo Collazo
Panama City Regulatory Office
Jacksonville District Corps of Engineers
1002 West 23rd Street, Suite 350
Panama City, FL 32405

Re: SAJ-2007-5152 (IP-DEB)

Dear Mr. Collazo:

This responds to your letter dated October 15, 2007, regarding the referenced U.S. Army Corps of Engineers' (COE) permit application submitted by the Walton County Board of County Commissioners. The applicant proposes to nourish 13.5 miles of beach and restore dunes along the Gulf of Mexico. The project is located in Walton County, Florida, and includes four reaches: from the Florida Department of Environmental Protection (FDEP) survey monument R-41 to R-64, from R-67 to R-72, from R-78 to R-98, and from R-105.5 to R-127. The central coordinates for the proposed fill area are latitude 30.31629°N, longitude 86.12845°W. You requested concurrence from the National Marine Fisheries Service (NMFS), pursuant to section 7 of the Endangered Species Act (ESA), with your determination that the proposed project may affect the federally-listed loggerhead, leatherback, hawksbill, Kemp's ridley, and green sea turtles, and Gulf sturgeon. You also determined that the proposed project, portions of which will occur in designated Gulf sturgeon critical habitat Unit 11 (nearshore Gulf of Mexico in Florida), may adversely modify sturgeon critical habitat. NMFS' determinations regarding the effects of the proposed action are based on the description of the action in this informal consultation. You are reminded that any changes to the proposed action may negate the findings of the present consultation and may require reinitiation of consultation with NMFS.

The intent of the Walton County beach nourishment and dune management project is to increase the storm protection function and restore the recreational capacity of the beach. The proposed project includes renourishing approximately 13.5 miles of beach over a span of four segments as described above. The total volume of sand to be placed along the beach is approximately 5,682,000 cubic yards (cy), with an average volume density of 79 cy/ft. The material will be obtained from a proposed borrow area located approximately 5 miles offshore western Walton County within a northeast/southwest-oriented ridge with water depths ranging from 70-80 ft below NAVD. The COE and applicant have not specified the dredge type to be used at this time. If a hopper dredge is to be used, the potential impacts from the hopper dredging portion of the project are covered by the incidental take statement of the regional biological opinion on hopper dredging for the Gulf of Mexico, dated November 19, 2003, and the reasonable and prudent measures and terms and conditions of that opinion would be required to be followed for this action. The other possible dredge type to be used is a hydraulic cutterhead/pipeline dredge, the potential impacts of which will be addressed below. The borrow area contains fine- to medium-to-fine sand with less than 1 percent shell content. The grain size and composition is similar to the native beach sediment. Much of the sand placement will take place above the water level, using a berm design. A typical section will include sand placement for the dune crest, back berm, mid berm, and fore berm, all above the MHW level. The foreshore slope will be constructed from the fore berm seaward out to the existing bottom, extending a couple of hundred feet past the MHW mark. This slope is steeper than the natural slope and, between berm erosion and equilibration, is expected to adjust rapidly until it approaches a more natural slope. The bottom areas below MHW that will be covered by the initial placement and later equilibration consist of sediments similar to those on the beach, with no hardbottom habitat, corals, or seagrasses. This project is a one-time restoration that is expected, in the absence of large storm events, to maintain as much as 60 percent of the fill for a 10 year period.

Conservation measures that have been incorporated into the project description include:

1. As required by the FDEP, a minimum of a 1-foot buffer will be maintained between sediments consistent with the type removed from the borrow area and any underlying materials (e.g., mud, dark sands, or rock). This ensures that the surface sediments in the borrow area will be the same post-construction as they were pre-construction.

2. Sand dikes for purposes of turbidity control will be utilized as needed to maintain state water quality standards, as indicated by the FDEP's Bureau of Beaches and Coastal Systems.

3. Turbidity levels will be monitored twice daily at both the borrow area and the beach; if turbidity values exceed values permitted by the state, all dredging and deposition activities will be suspended until water quality meets state standards.

4. The applicant has agreed to utilize NMFS' Sea Turtle and Smalltooth Sawfish Construction Conditions to reduce the potential for impacts to listed species.

NMFS believes the following listed species may be present and affected by the proposed beach renourishment project: loggerhead, leatherback, Kemp's ridley, hawksbill, and green sea turtles, and Gulf sturgeon. NMFS has previously determined that non-hopper-type dredging activities, including hydraulic-type dredges, are not likely to adversely affect sea turtles and Gulf sturgeon. These species will likely temporarily avoid the immediate project vicinity during construction (i.e., dredging and sand pumping) due to vessel and machinery noise; however, this avoidance will not affect migration and foraging behaviors. If sea turtles or Gulf sturgeon do enter the project site during dredging activities, they are unlikely to be harmed by the hydraulic dredge. Listed species may also be affected if they were to be struck by the dredge as it transits the site or by the pipeline as it is being positioned or moved to place sand on the beach; however, due to their mobility, the likelihood of this occurring is discountable. The likelihood of creating an obstacle for turtles approaching and exiting the beach during nesting season is minimized by the perpendicular placement of the sand discharge pipe on the seafloor from the dredge to the beach, which reduces the length of pipe necessary for renourishment. Seaward bound sea turtle hatchlings could be affected by project activities. However, this is unlikely because daily sea turtle nest surveys will be completed during nesting season and construction will not occur on any segment of the beach with active nests. In summary, NMFS believes that listed species under its purview will not be adversely affected by the proposed action. Note that this consultation does not cover onshore impacts, such as to nesting sea turtles on the beach, or sea turtle nests or hatchlings on the beach. A consultation with the U.S. Fish and Wildlife Service is required to ensure ESA compliance for onshore impacts to sea turtles.

Gulf sturgeon critical habitat was designated in 2003 (50 CFR 226.214). The portion of the beach renourishment area below MHW is located within critical habitat Unit 11. The primary constituent elements (PCEs) present in Unit 11 and essential for the conservation of Gulf sturgeon include abundant prey items, water quality, sediment quality, and safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats. Of these PCEs, NMFS believes only prey abundance and water quality may be affected. No impacts to sediment quality are expected as sediment composition at the borrow sites and on the beach are expected to be the same pre- and post-construction, and all sediments are free of contaminants. Project construction will not impede migratory pathways either during or after construction, as the project site is not located within, or adjacent to, a major river system, where construction activities could deter Gulf sturgeon from migrating between their riverine and estuarine habitats.

Gulf sturgeon could be affected by impacts to the abundance and diversity of their prey items, but these effects are expected to be insignificant, as these benthic macro-invertebrates have been found to recolonize within one year of a dredging disturbance when sediment composition and depth remain consistent. Additionally, the majority of sand placed below MHW will be in water depths less than 5 ft (1.5 meters). While Gulf sturgeon are known to occasionally forage in very shallow waters, normal foraging depths are usually deeper than 5 ft. Further, it is likely that any Gulf sturgeon in the project area will find appropriate and abundant prey in the areas adjacent to the project location, as many nearby sandy areas exist.

Effects to Gulf sturgeon from impacts to water quality are expected to be insignificant. They will be minor and temporary. Because the material from the borrow site consists of mostly sand, with only ca. 1 percent fines (similar to the existing sand), almost no turbidity is expected to ensue. Potential impacts to water quality will be further minimized by compliance with the twice-daily state water quality sampling requirement which will ensure that turbidity levels remain low. No changes to temperature, salinity, pH, hardness, oxygen content, or other water quality parameter will occur.

In summary, NMFS has determined that the project will not impact sediment quality or migratory pathways, and effects to prey abundance and water quality will be insignificant. Therefore, we conclude that the proposed action is not likely to adversely affect Gulf sturgeon critical habitat.

This concludes your consultation responsibilities under the ESA for species under NMFS' purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. We have enclosed additional information on other statutory requirements that may apply to this action, and on NMFS' Public Consultation Tracking System (PCTS) to allow you to track the status of ESA consultations.

If you have any questions regarding this ESA consultation or PCTS use, please contact Dennis Klemm, Fishery Biologist, at (727) 824-5312, or by e-mail at dennis.klemm@noaa.gov.

Sincerely,

James E. Weaver

for Roy E. Crabtree, Ph.D.
Southeast Regional Administrator

Enclosures (2)

File: 1514-22.F.1.FL
Ref: I/SER/2007/06965

PCTS Access and Additional Considerations for ESA Section 7 Consultations (Revised 5-13-2008)

Public Consultation Tracking System (PCTS) Guidance: PCTS is an online query system at **https://pcts.nmfs.noaa.gov/** that allows federal agencies and U.S. Army Corps of Engineers' (COE) permit applicants and their consultants to ascertain the status of NMFS' Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations, conducted pursuant to ESA section 7, and Magnuson-Stevens Fishery Conservation and Management Act's (MSA) sections 305(b)2 and 305(b)(4), respectively. Federal agencies are required to enter an agency-specific username and password to query the Federal Agency Site. The COE "Permit Site" (no password needed) allows COE permit applicants and consultants to check on the current status of Clean Water Act section 404 permit actions for which NMFS has conducted, or is in the process of conducting, an ESA or EFH consultation with the COE.

For COE-permitted projects, click on "Enter Corps Permit Site." From the "Choose Agency Subdivision (Required)" list, pick the appropriate COE district. At "Enter Agency Permit Number" type in the COE district identifier, hyphen, year, hyphen, number. The COE is in the processing of converting its permit application database to PCTS-compatible "ORM." An example permit number is: SAJ-2005-000001234-IPS-1. For the Jacksonville District, which has already converted to ORM, permit application numbers should be entered as SAJ (hyphen), followed by 4-digit year (hyphen), followed by permit application numeric identifier with no preceding zeros. For example: SAJ-2005-123; SAJ-2005-1234; SAJ-2005-12345.

For inquiries regarding applications processed by COE districts that have not yet made the conversion to ORM (e.g., Mobile District), enter the 9-digit numeric identifier, or convert the existing COE-assigned application number to 9 numeric digits by deleting all letters, hyphens, and commas; converting the year to 4-digit format (e.g., -04 to 2004); and adding additional zeros in front of the numeric identifier to make a total of 9 numeric digits. For example: AL05-982-F converts to 200500982; MS05-04401-A converts to 200504401. PCTS questions should be directed to Eric Hawk at Eric.Hawk@noaa.gov. Requests for username and password should be directed to PCTS.Usersupport@noaa.gov.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA section 101 (a)(5) is necessary. Contact Ken Hollingshead of our NMFS Headquarters' Protected Resources staff at (301) 713-2323 for more information on MMPA permitting procedures.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall 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 are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall 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. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall 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 will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. 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 shall be implemented to ensure its protection. These precautions shall 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 shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF

January 15, 2010

Coastal Environment Team
Planning and Environmental Division

Ms. Gail Carmody
U.S. Department of Interior
Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Carmody:

This letter pertains to possible conflicts with the Coastal Barrier Resources Act (CBRA) of 1982 associated with the Walton County, Florida hurricane and storm damage reduction project. CBRA was passed by the U.S. Congress to address problems caused by coastal barrier development. CBRA restricts most Federal expenditures and financial assistance that tend to encourage development, including Federal flood insurance, in the John H. Chafee Coastal Barrier Resource System. Three important goals of CBRA are to:

- minimize loss of human life by discouraging development in high risk areas;
- reduce wasteful expenditure of Federal resources; and
- protect fish and wildlife and other natural resources associated with coastal barriers.

As you are aware, the U.S. Army Corps of Engineers (Corps), Mobile District is seeking Federal authorization to conduct this hurricane and storm damage reduction project. A feasibility study was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida."

Resolution Adopted July 24, 2002, by The United States House of Representatives:

"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida."

The non-federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council (TDC).

The project is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet as indicated by the map included in Enclosure 1.

The study region was divided into five study reaches based on structural development and state park areas as illustrated in Enclosure 1. The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches up to 30 feet. The typical cross-sections for the selected plan are illustrated in Enclosure 1. The necessary beach fill requirements will be about 3,350,000 cubic yards (cy). Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters.

In addition to providing shoreline protection, there are numerous environmental opportunities that will restore, protect, and enhance fish and wildlife resources and habitats associated with the project area. Coastal ecological resources throughout Walton County have consistently been diminished due to the high shoreline recession rates exhibited in this region (Taylor Engineering 2003). The result has been the loss of valuable habitat including sea turtle nesting habitat, shorebird foraging and roosting areas, dune habitat supporting various flora and fauna, and general beach ecosystem functions. Restoring a beach-dune system allows greater sustainability of the coastal environment once it has become established. Restoring beach habitat that supports a variety of associated flora and fauna contributes to the success and continual survival of several threatened or endangered species such as sea turtles, piping plover, and the Choctawhatchee beach mouse (CBM) as well as designated critical habit. The restoration effort will also contribute to the well being of various other flora and fauna that naturally occur along the northern Gulf region.

The storm activities of recent years have left the fragile coastal dune lakes found throughout Walton County vulnerable to future damages and catastrophic breaching. The lakes support a variety of coastal wildlife with natural communities unique to this region. Coastal dune lakes are important breeding areas for insects and crustaceans. Many birds and mammals also utilize coastal dune lakes for food and habitat. Restoring a beach-dune system in the areas adjacent to the dune lake resources will provide for continued sustainability to the fragile ecosystems of the lakes.

There is currently little beach within the project area, which reduces the capabilities of this area in supporting sea turtle nesting activities. Although, initial beach renourishment operations may have an impact on sea turtle nesting activities, the Corps believes that the long-term benefits of restoring berm width in this area will increase future opportunities towards protecting and enhancing sea turtle nesting opportunities. The enhanced berm creates additional habitat beneficial to a variety of shore birds as well as other inhabitants of the coastal environment. Wider beaches augment natural dune creation and maintenance, which will be beneficial for dune dwelling organisms and threatened and endangered species, such as the CBM and the Gulf coast lupine.

When dune construction is complete, the dune will be planted with at least three species of dune vegetation. Sand dunes are dynamic coastal features, which are formed and maintained by the accumulation of wind blown sand. The dune restoration activities will be designed to create a dune that mimics the surrounding natural dune patterns in the area. Upon reconstruction immediate steps will be taken to plant and stabilize the dune for rapid colonization. This will be accomplished through the use of sand fences and dune plants. The dune plants will be planted to cover 60-80% of the total area. Plantings will occur across the entire dune on approximate two-foot spacing. The vegetation will consist of local dominant species that populate nearby natural dune systems. The selection of the dune vegetation will consist of species that are most widely used for dune restoration and are readily available from local nurseries and suppliers. The selection will be coordinated with local environmental experts familiar with dune ecosystems in the immediate area. Dune plant species being considered are:

- sea oats *(Uniola paniculata)*;
- bitter panic grass *(Panicum ararum)*;
- sea rocket *(Cakile constricta)*;
- beach morning glory *(Ipomoea imperati)*;
- railroad vine *(Ipmea pes-caprae)*;
- blue stem *(Schizachyrium scoparium)*; and/or
- blanket flower *(Gaillardi pulchella)*.

CBRA units P32, P31A, FL-96, FL-95P, FL-94, and FL-93P fall within or are adjacent to the project area as illustrated in Enclosure 2.

Unit P32 - This unit is located at the western-most end of the project area and corresponds with project segments R1-1 thru R1-4 (Enclosure 2) which lies within a reach (segments R1-1 thru R1-10) that is not justifiable for Federal funding. Therefore, this reach is considered as part of the Locally Preferred Plan (LLP) and will be 100% funded by the non-Federal sponsor. Since no Federal funding will be used in the construction of this segment of the project, the CBRA is not applicable with this reach of the project.

Unit P31A - Located in west one third of the project, this unit for the most part, is located in an area that in not within the construction area except for the eastern-most boundary of the unit, which contains an approximate 400-ft portion of the berm and dune transition. This unit corresponds to the Topsail State Preserve. Even though the construction reach is small, it is believed that establishing the proposed beach-dune system will contribute to the overall sustainability of the fish and wildlife and various other natural resources including the dune lakes. Being that this area is a state preserve, the use of Federal funds is not likely to result in future development within this unit.

Unit FL-96 - This CBRA unit is associated with Draper Lake, one of the many coastal dune lakes in the county. The construction of the berm-dune system tapers to an end on each side (approximately 500 feet on the west side and 200 feet on the east side) of the lake outfall in order to preserve the natural breaching capabilities. The restoration of the beach-dune system adjacent to the dune lake will provide valuable shoreline stability towards preventing catastrophic breaching of the already vulnerable ecosystems supported by the dune lake. A healthy and stable beach-dune system will contribute to the protection and overall sustainability of the fish and wildlife and various other natural resources including the dune lakes.

Unit FL-95P - This unit is considered an Otherwise Protected Area (OPA) and only applies for Federal flood insurance which is not applicable to this project.

Unit FL-94 - This unit is associated with the Deer Lake Complex. The bulk of the unit is excluded from the construction reaches except for the ends on either side (approximately 600 feet on the west side and 1,000 feet on the east side). The construction of the berm-dune system tapers to an end on each side of the lake outfall in order to preserve the natural breaching capabilities. The restoration of the beach-dune system adjacent to the dune lake complex will provide valuable shoreline stability towards preventing catastrophic breaching of the already vulnerable ecosystems supported by the dune lakes. A healthy and stable beach-dune system will contribute to the overall sustainability and protection of the fish and wildlife and various other natural resources including the dune lakes. The unit is in the vicinity of Deer Lake State Park and believed that the use of Federal funds in this area is not likely to result in future development.

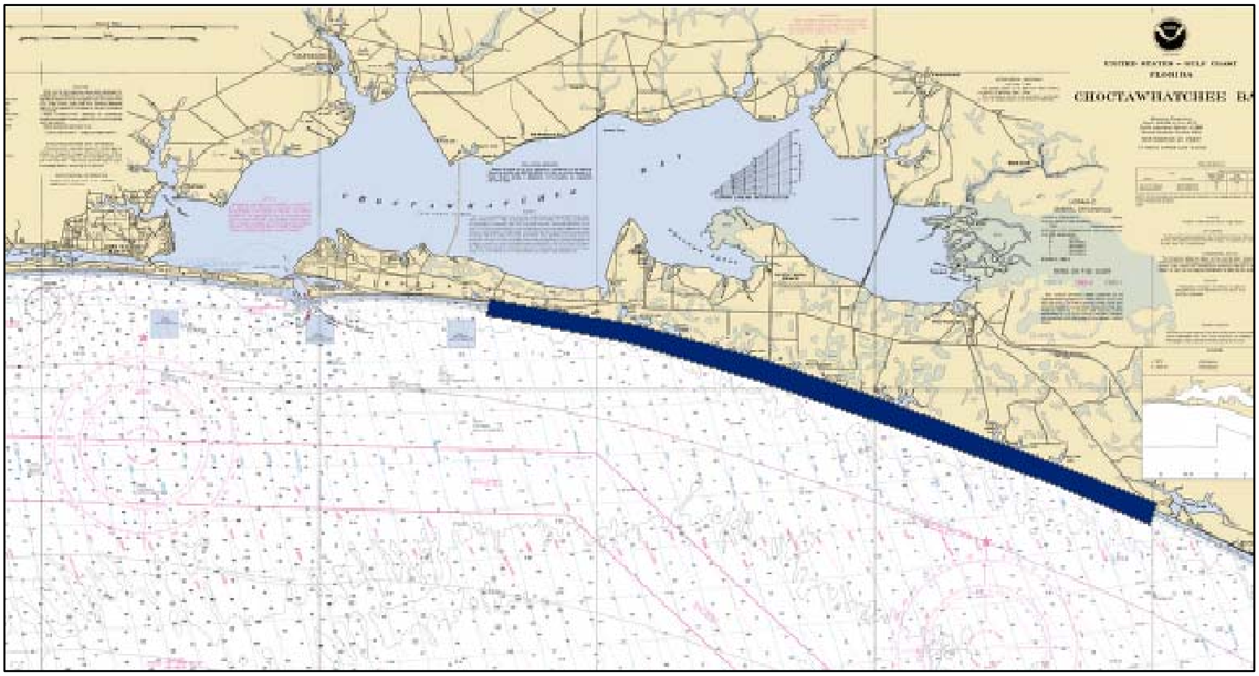
Unit FL-93P - This unit is considered an Otherwise Protected Area (OPA) and only applies for Federal flood insurance which is not applicable to this project.

The Corps believes that this project would qualify for an exemption under Section 6 Exemptions for CBRA units P31A, FL-96, and FL-94. Section 6(a)(6)(A) identifies projects relating to the study, management, protection, or enhancement of fish and wildlife resources and habitats, including recreational projects. Section 6(a)(6)(G) also exempts nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore natural stabilization systems. The Corps is seeking your concurrence in this matter. Coordination for this effort should be directed to Mr. Larry Parson at (251) 690-3139 or email at larry.e.parson@usace.army.mil. Thank you for your assistance in this project.

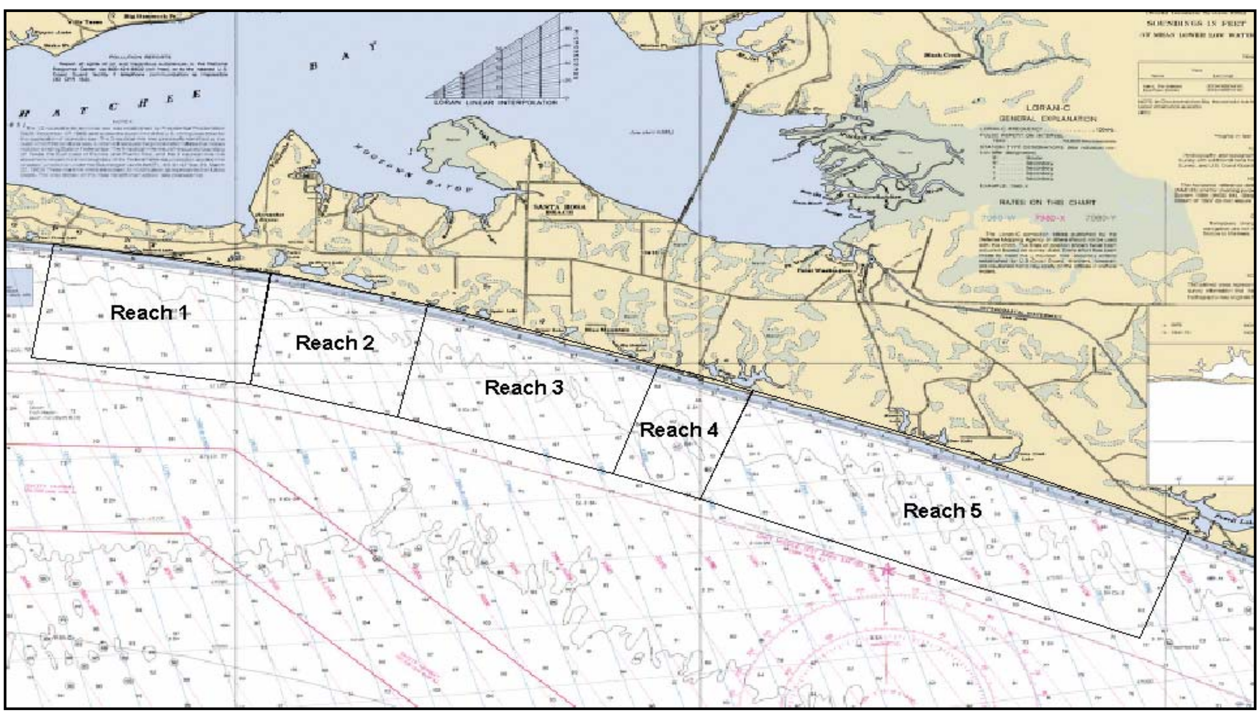
Sincerely,

Kenneth P. Bradley
Chief, Environment and Resources
Branch

Enclosures

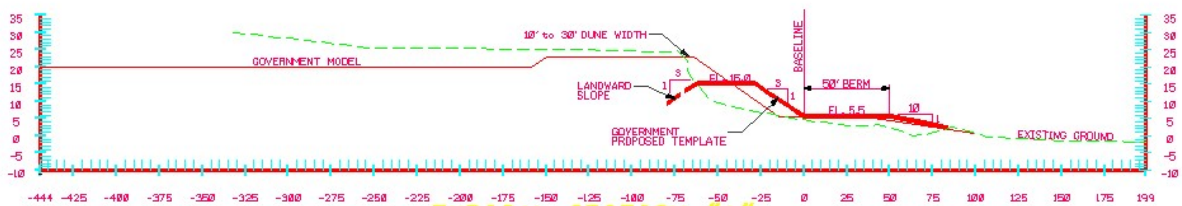


Location of Walton County project area



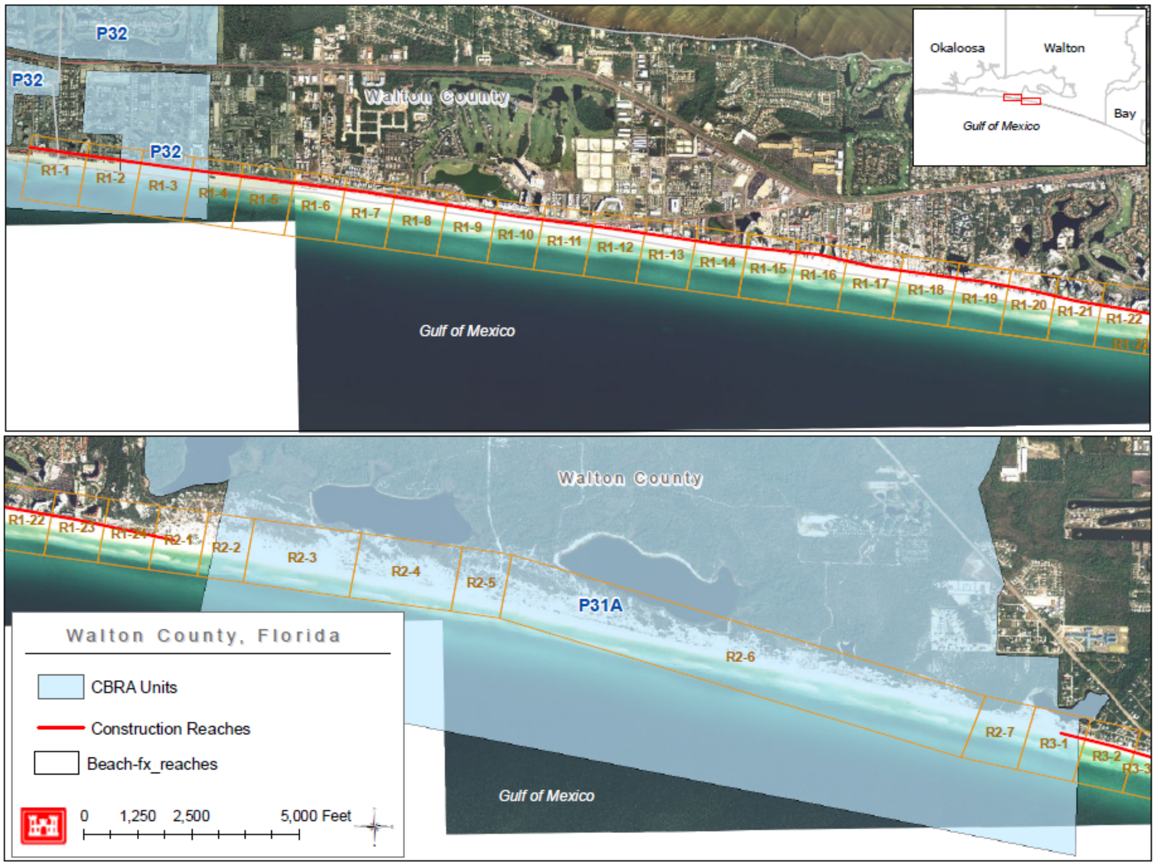
Location of the 5 construction reaches within the project area.

TYPICAL SECTION "B"

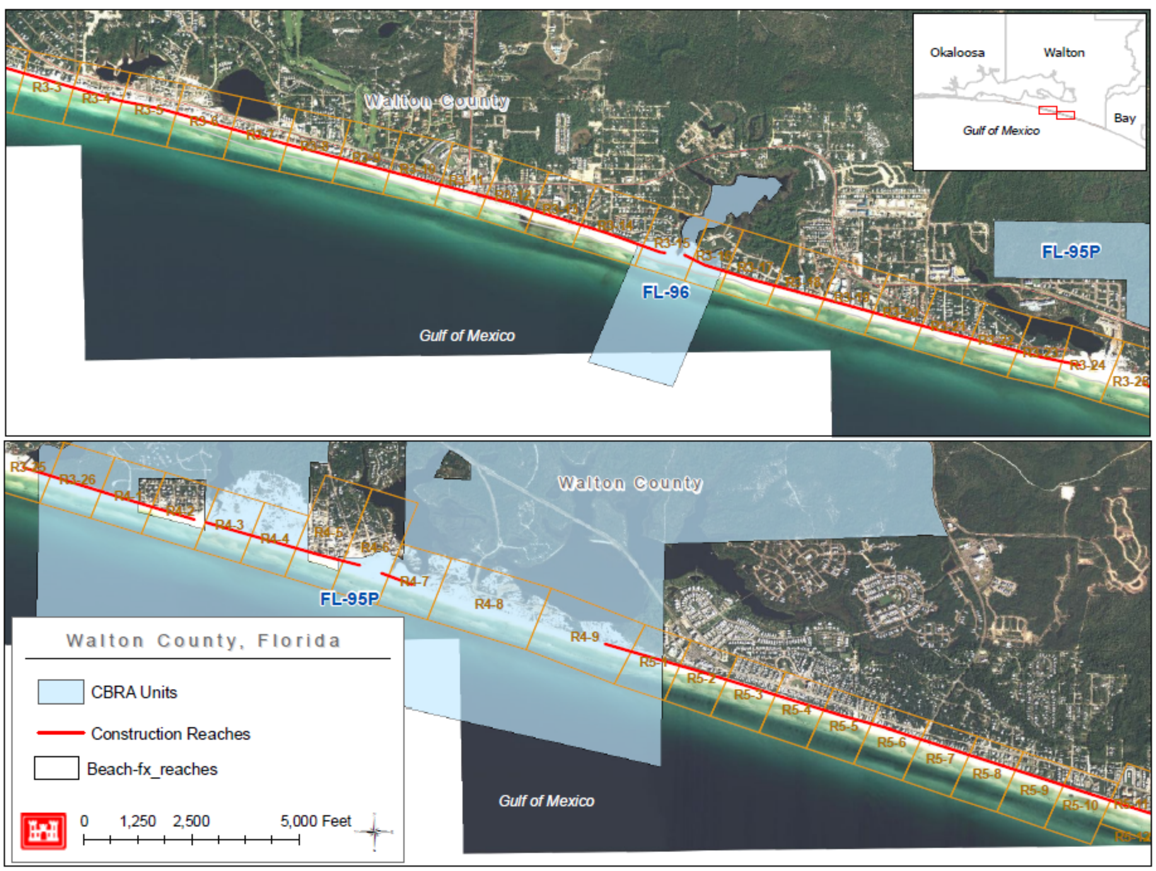


TYPICAL SECTION "A"

Selected plan typical cross sections to be constructed



Locations of CBRA Units P32 and P31A in relation to the project area



Locations of CBRA Units FL-96 and FL-95P in relation to the project area

Locations of CBRA Units FL-94 and FL-93P in relation to the project area

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF

January 13, 2010

Coastal Environment Team
Planning and Environmental Division

Mr. Mark Thompson
National Marine Fisheries Service,
Habitat Conservation Division
Panama City Office
3500 Delwood Beach Road
Panama City, Florida 32404

Dear Mr. Thompson:

The U.S. Army Corps of Engineers (Corps), Mobile District is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County's shoreline located in the Florida's panhandle is receding; the protective dunes and high bluffs are being destroyed by hurricane and storm forces that are occurring more frequently than before. During the late 1990s, the area endured several strong hurricanes resulting in extensive shoreline erosion (Taylor Engineering, 2003). In 2004, the area was affected severely by Hurricane Ivan (September 04) and early into the 2005 hurricane season it was impacted by Hurricanes Arlene (June 05) and Dennis (July 05). The impacts of these storms to property and infrastructure are considerable and can possibly be reduced through a beach restoration and stabilization project which also includes environmental restoration opportunities associated with the beach and dune system.

A feasibility study was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

> *"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida."*

Resolution Adopted July 24, 2002, by The United States House of Representatives:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida.*

The non-federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council (TDC).

Project Location

Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 11.9 miles of state-designated critically eroding areas and three State of Florida park areas that cover approximately six miles of the 26-mile shoreline.

Project Description

The Walton County upland cross-section is defined by dune elevations ranging from +9.5 to + 33 feet NAVD88 and a natural berm elevation of +5.5 feet NAVD88. The study area was divided into five study reaches based on structural development and state park areas as illustrated in Figure 2. The selected plan recommended for construction will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The predicted fill requirements for initial construction is approximately 3,350,000 cubic yards (cy). Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters. The typical beach cross-sections for the selected plan are illustrated in Figure 3. When dune construction is complete, the dune will be planted with at least three species of dune vegetation to create a dune that matches the surrounding natural dune patterns in the area.

Borrow Areas

Recent offshore studies, included geological and geophysical interpretation to identify a suitable offshore borrow area, has been performed by Taylor Engineering, Inc. (2003) in the Walton County Destin Beach Management Feasibility Study Final Report under contract to the local sponsor, which initially concentrated on the East Pass area southwest of Destin and the eastern most end of Okaloosa County and the westernmost end of Walton County. Subsequent investigations looked at the entire coastline to assess locations with sufficient quantities for borrow development for the initial beach placement and future re-nourishments.

A large scale reconnaissance level geophysical, lithological and granulomteric investigation was undertaken off Walton County, Florida. Sub-bottom profiles were used to locate prospective core locations to identify high quality sand sources for beach nourishment. Vibracores and selected seismic records were interpreted to confirm the presence and quality of sand off Walton County. The borrow area investigation locations and selected borrow area are shown in Figure 4.

The proposed borrow area sediments are typically well sorted medium sand 0.25 - 0.50 mm (1-2 phi). Monitoring of the borrow discharges will be a constant requirement for compliance with color and grain size criteria. Borrow area B-4 shown on Figure 4 is the borrow site that was selected with some 10,000,000 cy proven by these initial investigations. This volume covers the recommended locally preferred plan placement and the four planned subsequent re-nourishments for the next 50 years. The B-4 borrow area is most centrally located and offers the best source for the initial project construction and future re-nourishments. Based on the extensive geotechnical investigations, this borrow site has been demonstrated to be the most suitable source, and has sand of color, size, and composition generally similar to that of the native beach. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and pumped into the beach template. Small bulldozers will be used on land to shape the material to the prescribed template.

Analysis of Effects:

Congress defines Essential Fish Habitat (EFH) as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity," the designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities. The National Marine Fisheries Service (NMFS) has identified EFH habitats for the Gulf of Mexico in its Fishery Management Plan Amendments. These habitats include estuarine areas, such as estuarine emergent wetlands, seagrass beds, algal flats, mud, sand, shell, and rock substrates, and the estuarine water column. In addition, marine areas, such as the water column, vegetated and non-vegetated bottoms, artificial and coral reefs, geologic features, continental shelf features, and the Mississippi shelf, have also been identified. **Table 1** lists the species managed by the Gulf of Mexico Fishery Management Council.

Material would be removed from the designated borrow area via hopper dredge and pumped onto the beach to create the desired template. This method is preferable in terms of turbidity reduction and minimizing the potential impact to fish and wildlife. Most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should able to avoid the disturbed area and should recover shortly after the activity is completed. The selected borrow area is characterized as sandy bottom and does not contain any hard-bottoms, coral reefs, oyster beds, or seagrasses. No long-term direct impacts to managed species are anticipated. However, it is reasonable to anticipate some non-motile and motile invertebrate species will be physically affected through the dredging and placement operations. These species are expected to recover rapidly soon after the dredging and disposal operations are complete.

The Corps has taken extensive steps to reduce and avoid potential impacts to EFH as well as other significant area resources. The Corps will be adhering to water quality requirements under the conditions specified by the Florida Department of Environmental Protection (DEP) to further reduce impacts to EFH.

Based on the above assessment of the project in relation to impacts to fisheries resources, the overall impact to identified species is considered negligible given the relatively small area. Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265), we request your concurrence with our assertion that the project will not result in significant impacts to EFH.

If we can be of any further assistance to you, please call Mr. Larry Parson at (251) 690-3139 or e-mail him at larry.e.parson@usace.army.mil.

Sincerely,

Jennifer Jacobson

Jennifer L. Jacobson
Chief, Coastal Environment Team

Enclosures

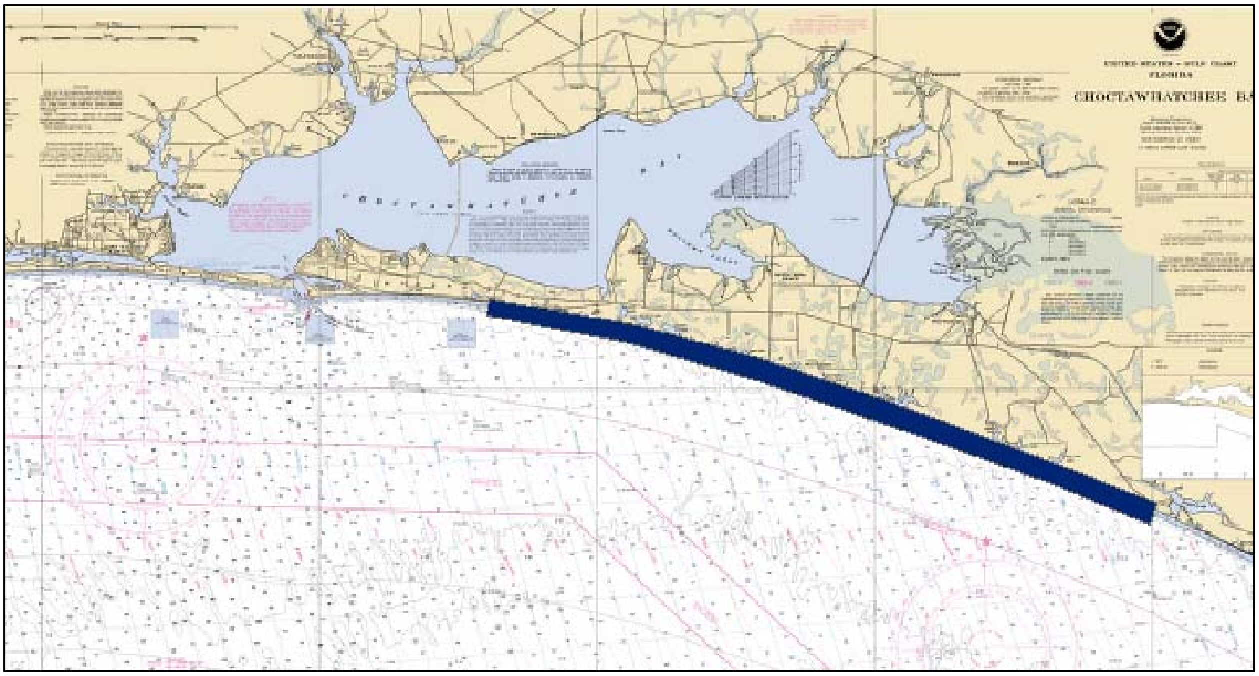


Figure 1. Location of Walton County project area

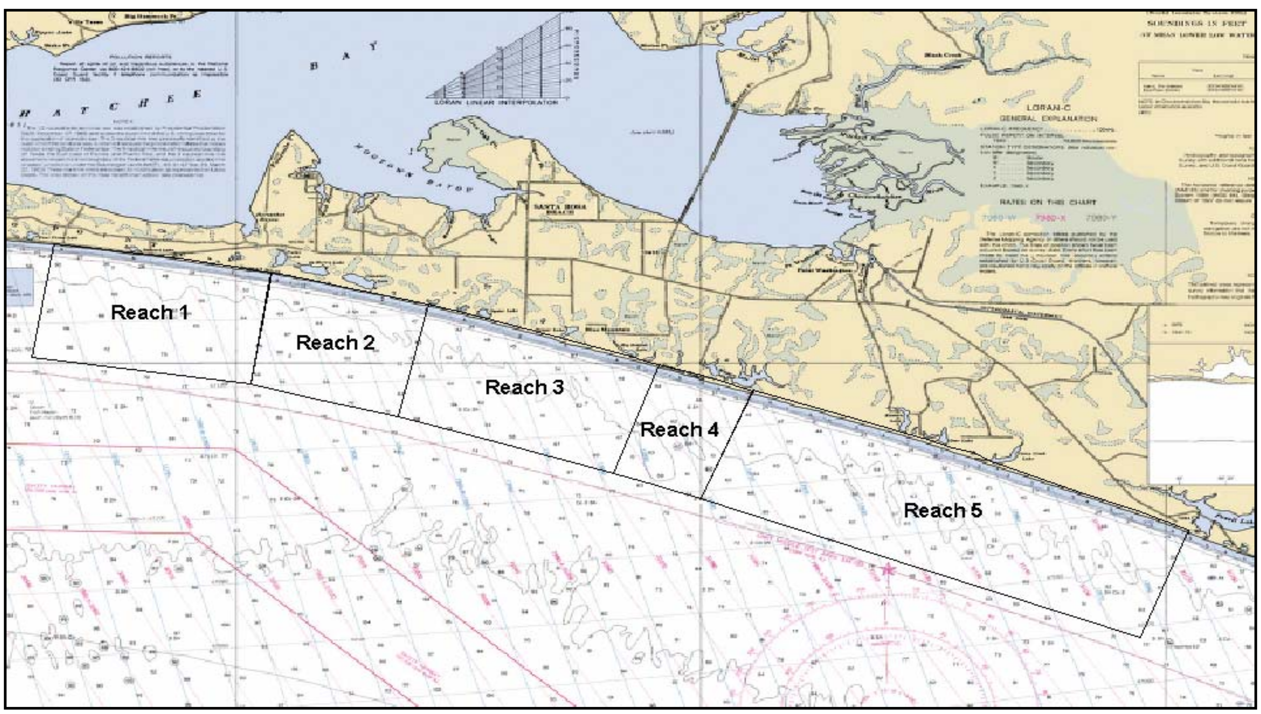


Figure 2. Location of the 5 construction reaches within the project area.

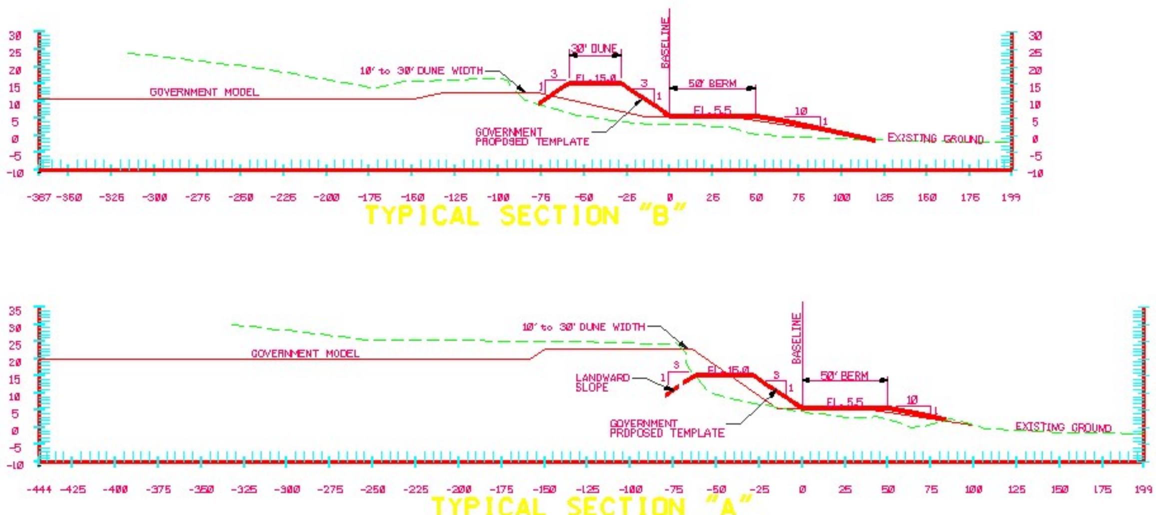


Figure 3. Selected plan typical cross sections to be constructed

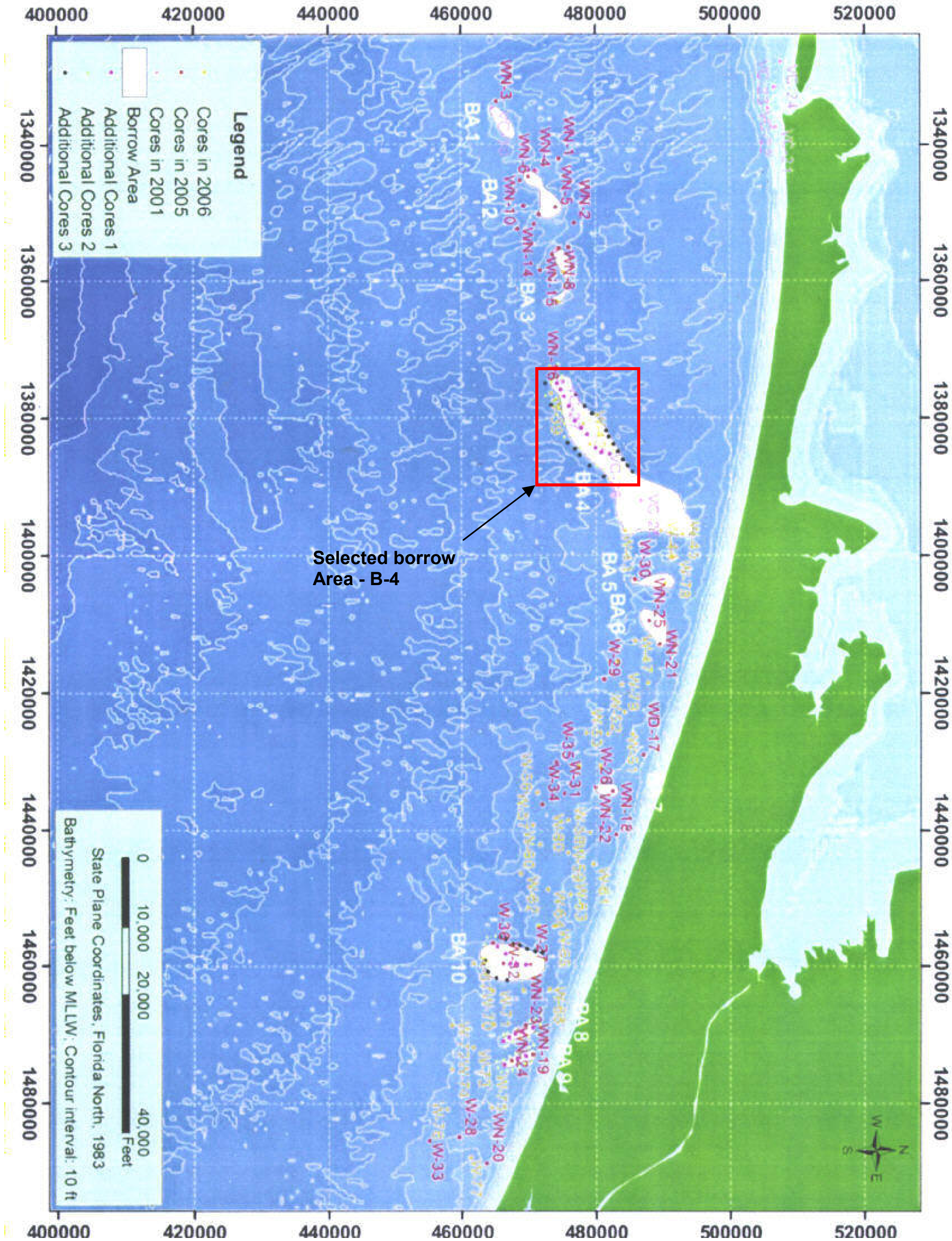


Figure 4. Borrow area investigation locations and selected borrow site.

Table 1: Fishery Management Plans and Managed Species for the Gulf of Mexico area.

GULF OF MEXICO FISHERY MANAGEMENT COUNCIL (NMFS 2008)

Shrimp Fishery Management Plan
brown shrimp - *Farfantepenaeus aztecus*
pink shrimp - *F. duorarum*
royal red shrimp - *Pleoticus robustus*
white shrimp - *Litopenaeus setiferus*

Red Drum Fishery Management Plan
red drum - *Sciaenops ocellatus*

Reef Fish Fishery Management Plan
almaco jack – *Seriola rivoliana*
anchor tilefish - *Caulolatilus intermedius*
banded rudderfish – *S. zonata*
blackfin snapper - *Lutjanus buccanella*
blackline tilefish - *Caulolatilus cyanops*
black grouper- *Mycteroperca bonaci*
blueline tilefish – *C. microps*
cubera snapper – *L. cyanopterus*
dog snapper – *L. jocu*
dwarf sand perch - *Diplectrum bivittatum*
gag grouper - *M. microlepis*
goldface tilefish – *C. chrysops*
goliath grouper - *Epinephelus itajara*
gray snapper – *L. griseus*
gray triggerfish - *Balistes capriscus*
greater amberjack – *S. dumerili*
hogfish - *Lachnolaimus maximus*
lane snapper - *Lutjanus synagris*
lesser amberjack - *S. fasciata*
mahogany snapper – *L. mahogoni*
marbled grouper – *E. inermis*
misty grouper – *E. mystacinus*
mutton snapper – *L. analis*
Nassau grouper – *E. striatus*
queen snapper - *Etelis oculatus*
red hind - *Epinephelus guttatus*
red grouper – *E. morio*
red snapper - *L. campechanus*
rock hind – *E. adscensionis*
sand perch - *Diplectrum formosum*
scamp grouper - *M. phenax*
schoolmaster – *L. apodus*
silk snapper – *L. vivanus*
snowy grouper – *E. niveatus*
speckled hind - *E. drummondhayi*
tilefish - *Lopholatilus chamaeleonticeps*
vermilion snapper - *Rhomboplites aurorubens*
Warsaw grouper – *E. nigritus*
wenchman - *Pristipomoides aquilonaris*
yellowedge grouper *E .lavolimbatus*
yellowfin grouper – *M. venenosa*
yellowmouth grouper – *M. interstitialis*
yellowtail snapper - *Ocyurus chrysurus*

Stone Crab Fishery Management Plan FL
stone crab - *Menippe mercenaria*
gulf stone crab – *M. adina*

Spiny Lobster Fishery Management Plan
spiny lobster - *Panulirus argus*
slipper lobster - *Scyllarides nodife*

Coral and Coral Reef Fishery Management Plan
varied coral species and coral reef communities
comprised of several hundred species

Coastal Migratory Pelagic Fishery Management Plan
cobia - *Rachycentron canadum*
king mackerel – *Scomberomorus cavalla*
Spanish mackerel - *S. maculatus*

Table 1:

Fishery Management Plans and Managed Species for the Gulf of Mexico. (NMFS 1999)

Shrimp Fishery Management Plan
- Brown shrimp (*Penaeus aztecus*)
- Pink shrimp (*P. duorarum*)
- Royal Red Shrimp (*Pleoticus robustus*)
- White Shrimp (*P. setiferus*)

Red Drum Fishery Management Plan
- Red drum (*Sciaenops oellatus*)

Stone Crab Fishery Management Plan
- Stone crab (*Menippe spp.*)

Reef Fish Fishery Management Plan
- Black grouper (*Mycteroperca bonaci*)
- Gray snapper (*Lutjanus griseus*)
- Greater amberjack (*Seriola dumerili*)
- Lesser amberjack (*S. fasciata*)
- Red snapper (*L. campechanus*)
- Tilefish (*Lopholatilus chamaeleonticeps*)
- Vermillion snapper (*Rhomboplites aurorubens*)
- Gag grouper (*M. microlepis*)
- Gray triggerfish (*Balistes capriscus*)
- Lane snapper (*L. synagris*)
- Red grouper (*Epinephelus morio*)
- Scamp grouper (*M. phenax*)
- Yellowtail snapper (*Ocyurus chrysurus*)

Coastal Migratory Pelagics Fishery Management Plan
- Bluefish (*Pomatomus saltatrix*)
- Dolphin (*Coryphaena hippurus*)
- Cobia (*Rachycentron canadum*)
- King mackerel (*Scomberomorus cavalla*)
- Little tunny (*Euthynnus alleteratus*)
- Spanish mackerel (*S. maculatus*)

Spiny Lobster Fishery Management Plan
- Spiny lobster (*Panulirus argus*)

Coral and Coral Reef Fishery Management Plan
- Varied coral species and coral reed communities
- Comprised of several hundred species

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF

January 12, 2010

Coastal Environment Team
Planning and Environmental Division

Mr. Scott M. Stroh III
State Historic Preservation Officer
Attention: Ms. Laura Kammerer
R.A. Gray Building
500 South Bronough Street
Tallahassee, Florida 32399-0250

Dear Mr. Stroh:

The U.S. Army Corps of Engineers, Mobile District is proposing to perform beach restoration along approximately 26 miles of beaches in Walton County, Florida using an off-shore borrow area measuring 10,200 feet by 5,300 feet (approximately 1,241 acres). The beach restoration project is part of an ongoing program to reclaim beaches lost through natural erosion and recent storm events. As per requirements outlined in Section 106 of the National Historic Preservation Act, the Mobile District must consider the effects of the proposed action on historic properties.

The area of potential effect includes the deposition area along 26 miles of Walton County shoreline. The borrow source is located in open water approximately 5.8 miles south of the beach, 1.3 miles east of the Walton/Okaloosa County border. Enclosure 1 contains the tentatively selected Federal plan including maps and volumes.

The borrow area was surveyed for cultural resources in May and June of 2007 by Sonographics, Inc. in anticipation of a re-nourishment project to be undertaken by the County (Enclosure 2). The survey found no cultural resources eligible for or listed on the National Register of Historic Places (Historic Properties). The report was coordinated with your office and the results concurred with on December 11, 2008 (DHR Project File No.2008-02705-B)(Enclosure 3).

The shoreline will be reconstructed to historic dimensions. The nature of the work is such that the deposition will have no effect on historic properties. In addition, the nature of the project precludes any visual effects to historic properties.

The Mobile District has reviewed the aforementioned cultural resources survey and review by your office. Based on this information, and the nature of the project, the Mobile District, as lead Federal agency, has determined that the project will have no effect on historic properties as per 36 CFR 800.4(d)(1).

The Mobile District asks that you concur with our finding of **no historic properties affected** by the proposed action as per 36 CFR 800.4(d)(1). If you have further questions, please contact Mr. Joe Giliberti at (251)-694-4114 or via email at joseph.a.giliberti@usace.army.mil or Mr. Larry Parson at (251)-690-3139 or via email at larry.e.parson@usace.army.mil. As always, your input is valuable and greatly appreciated. Thank you for supporting the Mobile District cultural resources program.

Sincerely,

Kenneth P. Bradley

Kenneth P. Bradley,
Chief, Environment and Resources
Branch

Project Description
Walton County, Florida Hurricane and Storm Damage Reduction Project

The U.S. Army Corps of Engineers, Mobile District (Corps) is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County's shoreline located in the Florida's panhandle is receding; the protective dunes and high bluffs are being destroyed by hurricane and storm forces that are occurring more frequently than before. During the late 1990s, the area endured several strong hurricanes resulting in extensive shoreline erosion (Taylor Engineering, 2003). In 2004, the area was affected severely by Hurricane Ivan (Sep 04) and early into the 2005 hurricane season it was impacted by Hurricanes Arlene (June 05) and Dennis (July 05). The impacts of these storms to property and infrastructure are considerable and can possibly be reduced through a beach restoration and stabilization project, which also includes environmental restoration opportunities associated with the beach and dune system.

A feasibility study was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida.

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The non-Federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council (TDC).

Project Location

Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 11.9 miles of state-designated critically eroding areas and three State of Florida park areas that cover approximately six miles of the 26-mile shoreline.

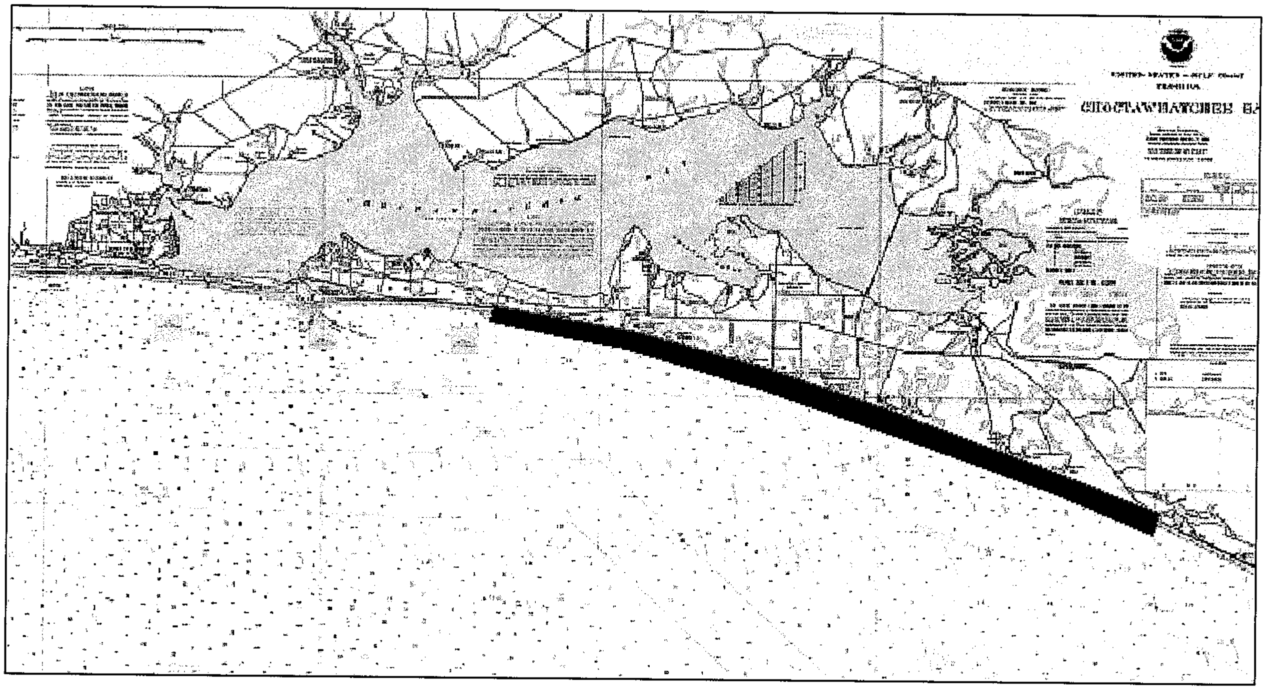


Figure 1. Location of Walton County project area

Project Dimensions

The study region was divided into five study reaches based on structural development and state park areas as illustrated in Figure 2. Representative beach profiles were identified based on similarity in shape of the upper beach profile (dune height and width, berm width, foreshore beach slope, and profile volume) and shape of the offshore profile.

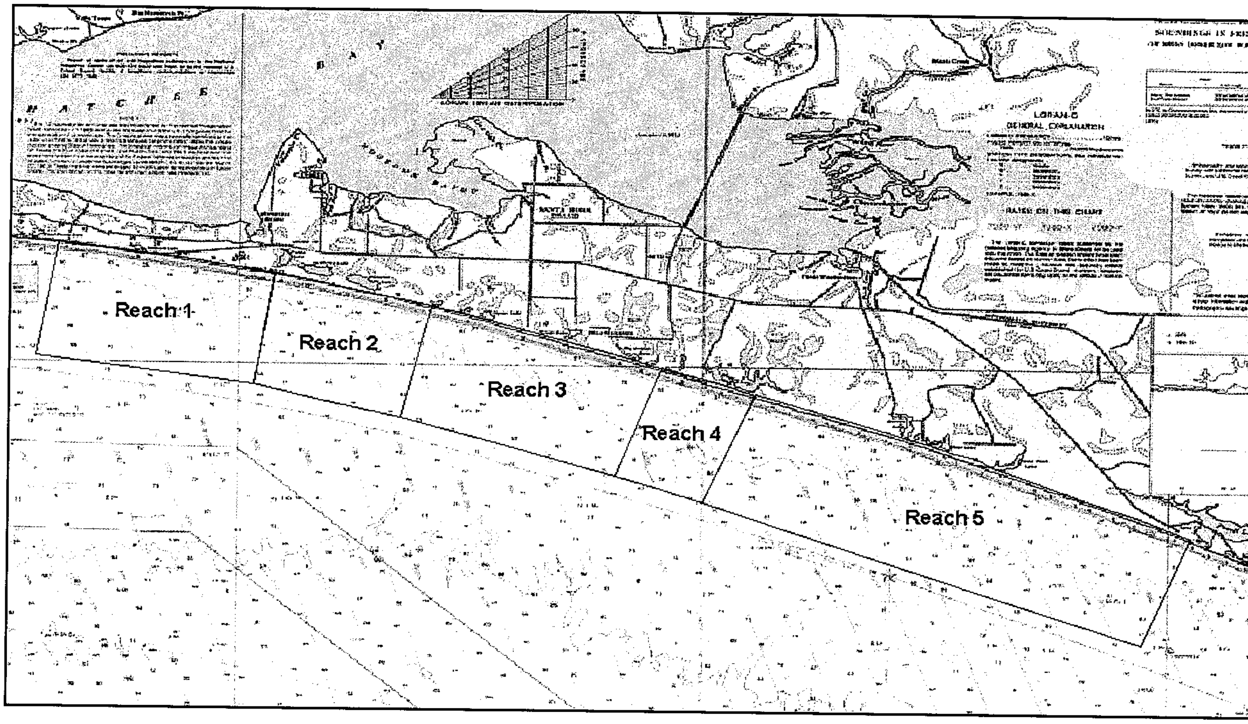


Figure 2. Location of the 5 construction reaches within the project area.

The selected plan recommended for construction consists of the five construction reaches (Figure 2). The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The necessary beach fill requirements will be 3,350,000 cy. Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters. The typical cross-sections for the selected plan illustrated in Figure 3. When dune construction is complete, the dune will be planted with at least three species of dune vegetation to create a dune that matches the surrounding natural dune patterns in the area. Upon reconstruction immediate steps will be taken to plant and stabilize the dune for rapid stabilization. This will be accomplished through the use of sand fences and dune plants. The dune plants will be planted to cover 60-80% of the total area.

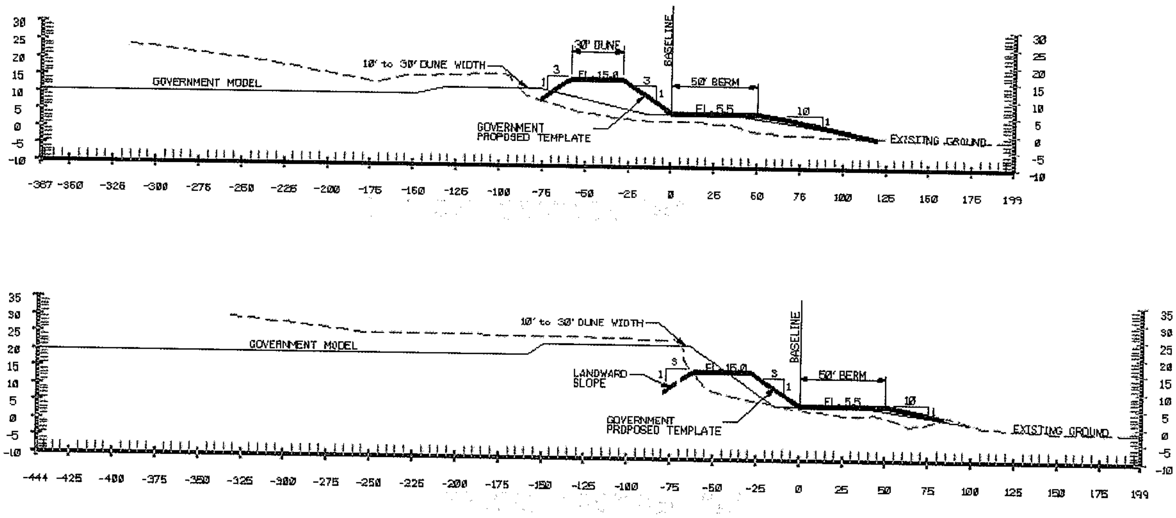


Figure 3. Selected plan typical cross sections to be constructed

Borrow Area

Recent offshore studies including geological and geophysical interpretation to identify a suitable offshore borrow area has been performed by Taylor Engineering, Inc. (2003) in the Walton County Destin Beach Management Feasibility Study Final Report under contract to the local sponsor. The investigations looked at the entire coastline to assess locations with sufficient quantities for borrow development for the initial beach placement and future re-nourishments.

A large scale reconnaissance level geophysical, lithological and granulomteric investigation was undertaken off Walton County, Florida. Sub-bottom profiles were used to locate prospective core locations to identify high quality sand sources for beach nourishment. Vibracores and selected seismic records were interpreted to confirm the presence and quality of sand off Walton County. The borrow area investigation locations are shown in Figure 4.

The proposed borrow area sediments are typically well sorted medium sand 0.25 - 0.50 mm (1-2 phi). Monitoring of the borrow discharges will be a constant requirement for compliance with color and grain size criteria. Borrow area B-4 shown on Figure 4 is the borrow site that was selected with some 10,000,000 cubic yards proven by these initial investigations. This volume covers the recommended plan placement and the four planned subsequent re-nourishments for the next 50 years. The B-4 has been demonstrated to be the most suitable source, has sand of color, size, and composition generally similar to that of the native beach. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and pumped into the beach template. Small bulldozers will be used on land to shape the material to the prescribed template.

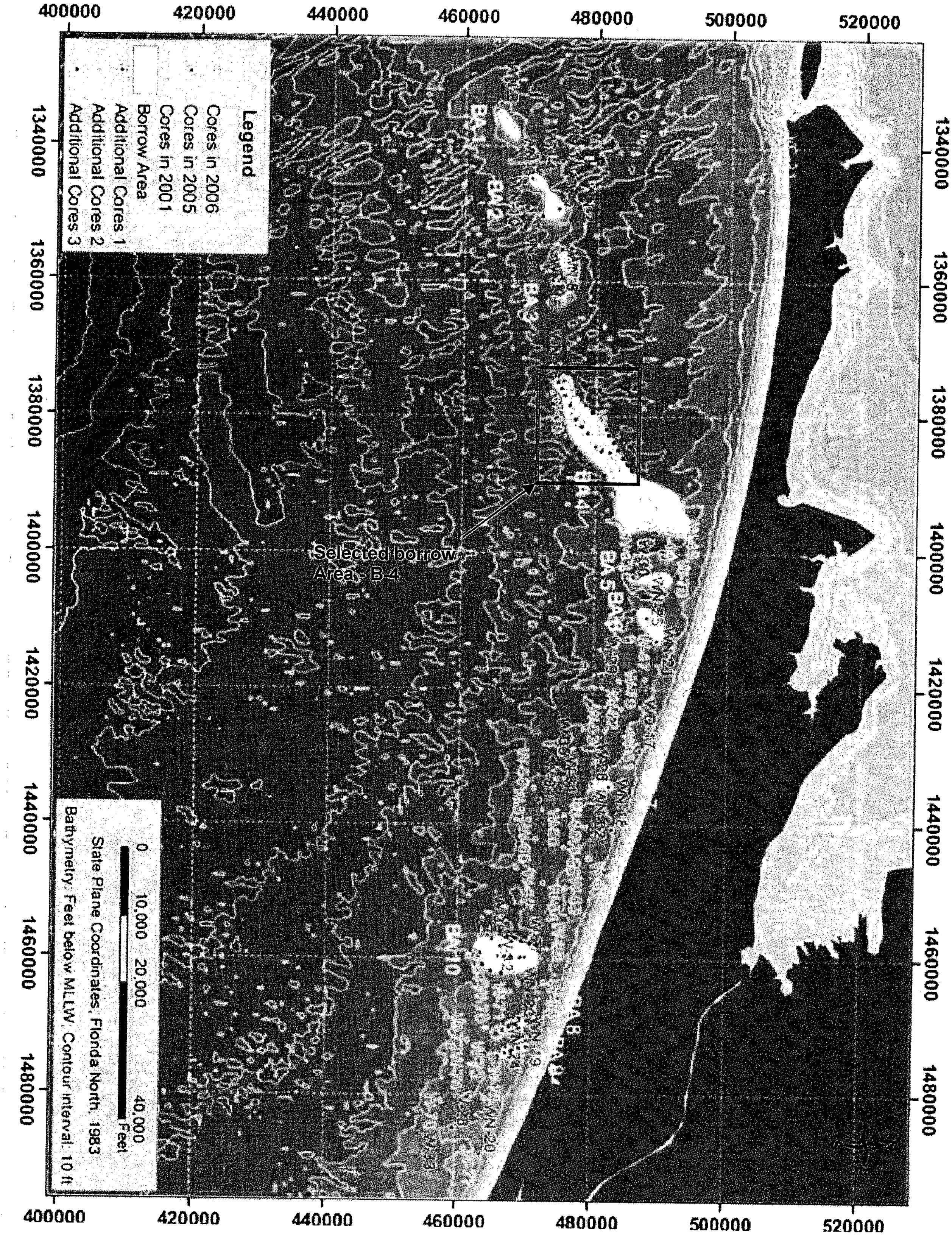


Figure 4. Borrow area investigation locations and selected borrow site.

Cultural Resources Survey Report

A Submerged Cultural Resource Remote Sensing Survey

Of A

Borrow Area

Proposed For Beach Restoration

Offshore Of

Walton County, Florida

By

Robert H. Baer
Registered Professional Archaeologist

Robert H. Baer

DHR Permit No. 0607.76

Report Prepared For

Mr. Michael Trudnak, P.E.
Taylor Engineering, Inc.
9000 Cypress Green Drive, Suite 200
Jacksonville, Florida, 32256

Revised October 2008

Table of Contents

Abstract
*
Executive Summary

During the permit period 5/30/2007 - 6/30/2007 a remote sensing survey was performed of a single borrow area designated for shoreline nourishment offshore of Walton County, Florida (Figure 1). The remote sensing survey consisted of a magnetometer survey, side-scan sonar survey and a sub-bottom profile survey. The survey was performed by Sonographics, Inc. under contract with Taylor Engineering, Inc.

In the course of the survey, thirty - nine (39) magnetic anomalies, and two (2) side-scan sonar targets were recorded. The thirty - nine magnetic anomalies and two side-scan sonar targets were widely distributed over the bottom area. No concentrated pattern or scatter pattern of magnetic anomalies and side scan sonar targets were recorded that suggested the presence of shipwreck resources in the borrow area, nor did the sub-bottom profiler data indicate the presence of areas that would indicate prehistoric midden sites or other inundated habitation sites.

Based on the analysis of the remote sensing data it was the conclusion of the principal investigator that there are no sunken shipwreck resources, or other sunken cultural sites within the proposed borrow area. Based on this analysis it is the recommended that the Walton County shoreline nourishment project be authorized to proceed.

A Submerged Cultural Resource Remote Sensing Survey of a Borrow Area

Proposed for Beach Restoration

Offshore of Walton County, Florida

Introduction

Walton County has requested a State of Florida Joint Coastal Permit and Sovereign Submerged Lands Authorization for an offshore borrow area to serve future beach nourishment operations within the county. The proposed borrow area lies in the Gulf of Mexico approximately 5.8 miles south of the Walton County shoreline and 1.3 miles east of the Walton/Okaloosa County border (Figure 1). Walton County's borrow area evaluation process included a cultural resource remote sensing survey to identify and determine if any objects within the borrow area are eligible for listing on the National Register of Historic Places (NRHP). This report presents the results of the remote sensing survey.

The remote sensing survey consisted of combined magnetometer, side-scan sonar, and sub-bottom profile surveys. The remote sensing survey complies with the National Historic Preservation Act of 1966, as amended (PL 89-665); the Archeological and Historic Preservation Act, as amended (PL 93-291); the Abandoned Shipwreck Act of 1987; the Advisory Council on Historic Preservation revised 36 CFR Part 800 Regulations; and Section 276.12, *Florida Statutes*, Chapter 1A-32 and 46 of the *Florida Administrative Code*. The State of Florida Division of Historical Resources approved the scope of work for the remote sensing survey as submitted in a Florida Bureau of Archaeological Research Permit (Chapter 1A-32) application prior to field operations; Appendix A contains Permit No. 0607.06. Field operations occurred between 5/30/2007 and 6/30/2007. The project staff, subcontracted by Taylor Engineering, Inc., included Robert H. Baer, RPA as project principal investigator and Rick Horgan as remote sensing specialist. Mr. Horgan owns and operates Sonographics Inc., Marine Geophysical Services, Wilton Manors, Florida.

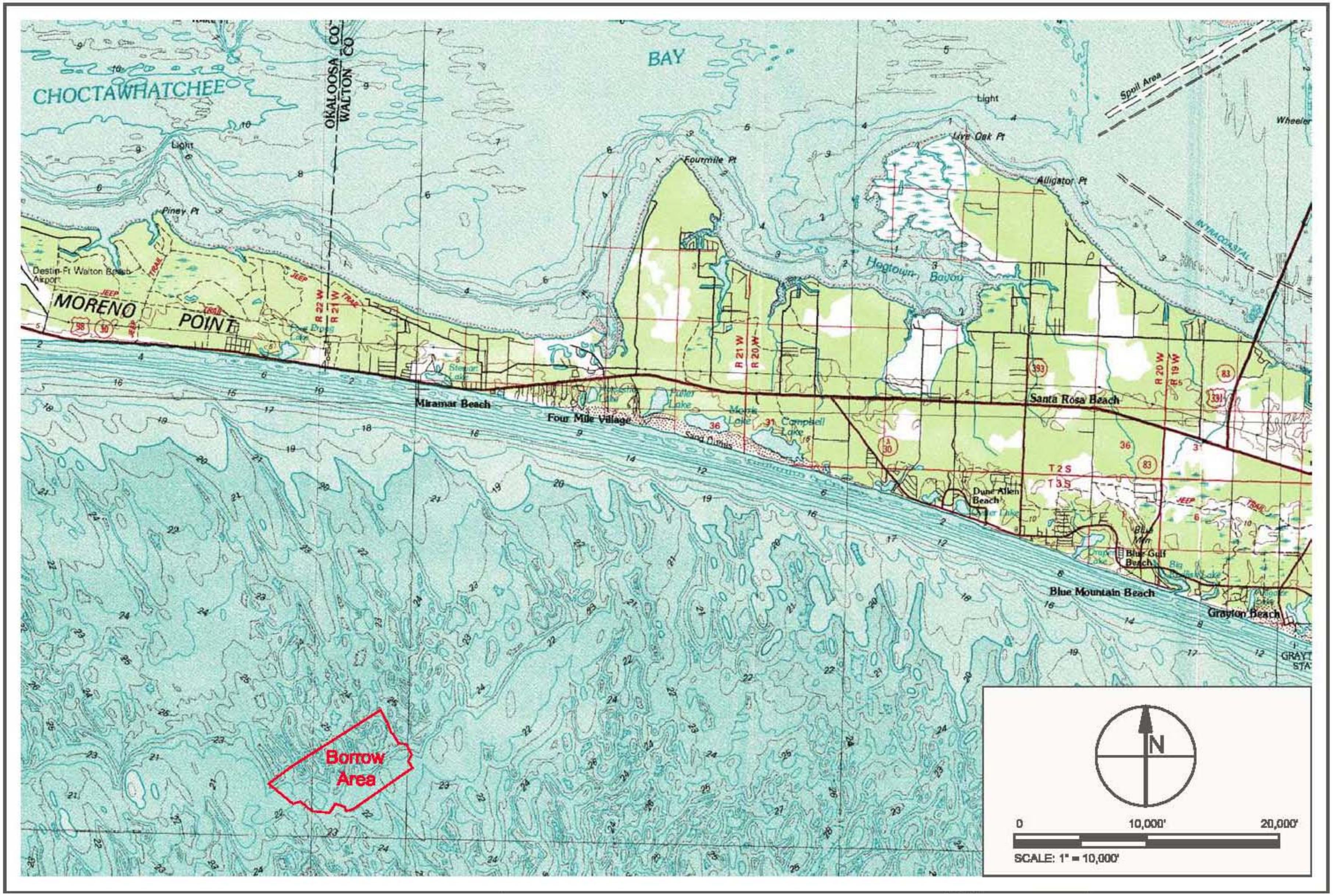


Figure 1 Proposed Borrow Area Location Map

Project Location

The center of the proposed borrow area lies approximately 5.8 miles offshore Walton County and 1.3 miles east of the Walton/Okaloosa County border. Walton County lies on the northwest coast of Florida approximately 60 miles east of Pensacola, 100 miles west of Apalachicola and 115 miles southwest of Tallahassee. The county seat is De Funiak Springs. Walton County adjoins Okaloosa County to the west and Bay, Holmes and Washington Counties to the east. Figure 1 shows the position of the proposed borrow area in relation to the Walton County shoreline.

Project Research Objectives

The Submerged Cultural Resources survey aimed to identify and determine if any objects within the borrow area are eligible for listing on the National Register of Historic Places (NRHP). The survey utilized instruments specifically designed to identify shipwrecks, ferrous material, and geological anomalies such as submerged river beds and former terrestrial sites, both prehistoric and historic.

Potential for Cultural Resources in the Survey Area

The northwest Florida Gulf Coast has been settled since the middle of the seventeenth century. Pensacola, the oldest city on the northwest Florida Gulf coast, has had strategic importance since the Spanish first settled there in 1698. Pensacola and Apalachicola Bays and the barrier island estuary system that separates the Gulf of Mexico from the Florida peninsula have formed an essential commercial transit route for the Spanish, English, and later the citizens of the United States following the admittance of Florida to the Federal Union in 1845.

Over the long period of recorded history numerous ships have sunk in the waters of the northwest Florida Gulf Coast. The historic importance of the northwest Florida coastal zone is well documented. Early exploration, trade, commerce, warfare vicissitudes of weather and navigation error has generated numerous recorded shipwrecks. Due to sea level rise and the associated coastal erosion, the coastal waters also contain sites of both prehistoric and historic settlement. Based on three centuries of coastal navigation and settlement of the northwest Florida coastal zone the potential exists for the discovery of cultural materials in the proposed project area. To better understand the potential for the discovery of sunken cultural resources in the survey area a short review of northwest Florida geology, weather, and history follows. This review intends to document the importance of the Walton County coastal zone within the wider context of the northwest Florida Gulf Coast.

Archaeological Sites – Walton County Coastal Zone

Florida Master Site File Information

The State of Florida Division of Historical Resources has identified a number of archaeological master sites in the Walton County upland area and the coastal zone, including some dating between 7000 BC and 1500 AD. Older sites are found particularly along the Choctawhatchee River, its primary tributary creeks, and the littoral zone of Choctawhatchee Bay. Listed sites include Point Washington, Four Mile Point, Alaqua Bayou, Horseshoe Bayou, and Hogtown Bayou. These have occupation ranges from the Prehistoric Period to the Historic Period of settlement. Many of the Walton Coastal Zone archaeological sites in the south portion of the county contain shell middens, including the Destin Midden near the towns of Destin and Sandestin.

Environmental Background

The project area lies in the temperate region of Florida, characterized by mild winters and warm to hot summers. Associated seasonal temperatures average 54°F in winter and 81°F in summer. Walton County contains Florida's highest elevation: it rises to 345 ft near Lakewood in the northwest sector of the county. The county experiences a storm season between the months of June and October and experiences its highest annual rainfall in this period. Conversely, the months between December and February usually experience little rain. The annual average rainfall equals 57 inches. The growing season in north Florida averages 200 days as compared with 300 days in south Florida. Tidal fluctuations are moderate and average between 1.5 and 2 ft. According to a 1998 soil survey, the county has a total area of 1,338 square miles, including 90 square miles of water and 1,045 square miles of land. South Walton County has approximately 26 miles of sand beaches and associated dune systems. Approximately half of the beach and dune system lie between Choctawhatchee Bay and the Gulf of Mexico (Continental data base – facts on File 2007; Winsberg 2003:66, KH & Associates 2003).

Historic Weather Dynamics

The northwest Florida Gulf Coast is susceptible to the power of hurricanes and lesser tropical storms. Tropical storm activity in the Gulf of Mexico normally occurs during the period from June through October, reaching maximum frequency during the month of September. These common weather anomalies have affected shipping patterns in the vicinity of the survey area throughout recorded history. Thus, this study benefits from a brief summary of historic weather dynamics, including the depth and temperature of the Gulf of Mexico, the flow of the Loop Current, and the wind conditions within the unique hydrographic constraints of the wider Gulf of Mexico.

Hurricanes passing through the Gulf of Mexico generally originate in the southern Caribbean or off the west coast of Africa. The rotation of the earth sets these warm weather systems spinning counter clockwise and they create their own powerful micro weather systems. These circular rotating storms typically move across the Atlantic (west to east) or north through the Caribbean traveling along the routes of natural wind patterns. Two principal wind regimes prevail along the northwest Florida coast: southerly winds with an average annual velocity for the Walton County coastal zone of 16 – 17 kph and short lived but often strong northerly winds generally associated with winter weather conditions which may occasionally reach velocities of 38 to 40 kph. In the late winter and spring months, strong southerly winds emanate from low-pressure systems in east Texas and the plains states, often generating tornados. Wind velocities along the northwest Florida Gulf coast are generally constant throughout the year, ranging from a monthly average of 14.5 kph in September to 22.2 kph in April (Gore 1994: 102-107).

The northwest Florida Gulf coast has experienced hurricanes originating in the Atlantic and Caribbean. Hurricane Ivan, which made landfall north of Pensacola on September 16, 2004, was a serious Caribbean and Gulf Hurricane. Hurricane Katrina (2005) was the most devastating hurricane to reach the Gulf coast of the United States since the Galveston Hurricane of 1929. Katrina was an Atlantic hurricane that crossed Florida as a category 1 storm on August 25 and 26, then picked up speed and force in the warm shallow waters of the Gulf of Mexico before making landfall on the Gulf coast of Mississippi and striking New Orleans as a category 5 hurricane on August 29, 2005. In 2004, two hurricanes passed within fifty miles of the survey area; these included Hurricanes Jeanne and Francis (United States Weather Bureau Data Base 2007).

Little is known about the pattern of storms and hurricanes during the Colonial Era. However, in 1559 six vessels of the De Luna expedition to North Florida were lost in a storm in Pensacola Bay (Singer 1992: 22). Since the middle of the 19th Century at least 23 hurricanes and 28 tropical disturbances have passed within 100 miles of the survey area. Since 1990 at least one severe tropical storm or depression has crossed the northwest Florida coastal zone every five years (USWB 2006). Any serious anomaly of weather could prove fatal to a sailing vessel navigating within the confines of the Gulf of Mexico.

Geology & Barrier Island Development

Coastal geologists have classified barrier islands and coastal shorelines into a number of different categories based on their structure, geological attributes, and method of formation. Generally, all coastal barriers lie parallel to the shores that they protect. When they trend into or away from the shoreline, barrier islands may eventually develop into headlands that may form capes or gradually coalesce with the shore. The south Walton County shoreline of approximately 26 miles has a unique geological formation and ecosystem. Approximately 13 miles of the shoreline is located between Choctawhatchee Bay and the Gulf of Mexico, and the remainder consists of dunes with a lake system that is found only in Walton County, Florida (Walton County Board of County Commissioners Report 2003).

The northwest Gulf coast and barrier island systems consist of a drowned delta that Paleo-Indians inhabited 12,000 years ago before they gradually migrated into the Florida peninsula and continental southeast. At that time, the present barrier island systems were upland regions, and the Gulf of Mexico shoreline west of the Florida peninsula extended approximately 75-100 miles seaward of the present shoreline (Milanich 1995: 17). As sea levels rose and shorelines assumed their present configuration, these prehistoric peoples withdrew to the upland regions. However, the Gulf coast shoreline continues to naturally erode, fragment, and prograde. Core analysis suggests that the northwest Florida to Texas Gulf coast was unbarred during the Middle to Late Holocene Transgression and that the present barrier island system did not originate seaward of their present locations. In other words, although the shoreline was substantially lower during the last Ice Age and inhabited during the latter stages of that period, the coastline as found today emerged from the shoals practically in place and has migrated shoreward and seaward as the result of coastal currents and other natural dynamics (Leatherman 1979: 315-16). During the Holocene Period, the late Archaic and Formative periods, native cultures of the northwest Florida and Gulf region developed and ninety percent of the archaeological sites in the present (upland) coastal zone were inhabited (Gagliano in Davis 1984: 17).

Survey Area History

The northwest Gulf coast and particularly the estuary areas and embayment areas from Apalachicola Bay to Pensacola Bay have a varied prehistoric and historic past. The native peoples who inhabited this coastal area exhibited a pattern of cultural continuity that evolved slowly over the past 10,000 years; then in the period 3000 BC, the culture of these peoples experienced a period of elaboration and diversification. This period of cultural development continued until the 16th century with the arrival of European explorers and settlers who established a permanent presence on the Gulf coast at Pensacola Bay in 1698.

The 160 miles of coastal zone between Pensacola Bay and Apalachicola Bay consist of a mixed bay and estuary system fed by rivers that flow to the southwest through the Florida peninsula. During the prehistoric period the native people that live in the Pensacola Bay-Apalachicola Bay drainage maintained contact with the cultures that lived in the lower Mississippi Valley and Central and South Georgia, most notably the people that lived in the Kolomoki Mound complex in southwest Georgia near present Blakely, Georgia. At the time of the European exploration and during the contact period the natives of the northwest gulf were encountered by Tristan de Luna in 1559 - 60 who sailed the northwest coast before landing in Pensacola Bay (Milanich 1994: 180 – 185).

At the beginning of the European Contact period, in the 16th Century, the native populations of Florida extending north and west around the littoral of the Gulf of Mexico exhibited little cultural uniformity. According to anthropologist Vernon Knight, the native peoples of the pre-contact period exhibited a mixture of social and economic traits, from the stratified, but non agricultural Calusa of the southwest Florida coast to the partially agricultural chiefdoms of the Fort Walton and Weeden Island cultures of the northern Gulf, to the egalitarian hunter-gatherers of the Texas coast. The chiefdoms from Pensacola Bay (the Penzacola) to Apalachicola Bay (the Apalachee) became distinguished by the integration of their specialized delta horticulture into a traditional estuary oriented hunter-gatherer mixed economy. This led to a more balanced intake of nutrients and the possibility of higher and healthier population levels (Knight in Davis 1984: 199).

Spanish Colonial Period

In the early 16th Century, Spanish explorers began to investigate the northwest Florida coast. Pre-1520 voyages along the central coast of Florida include those of Diego Miruelo (1616) and Francis Hernandez de Cordova (1517). In 1519 Alonzo Alvarez de Pineda is believed to have sailed the entire coast of northwest Florida and landed in what was either Pensacola or Apalachicola Bay. Later in 1528 Panfilo de Narvaez and Alvar Nunez de Vaca entered the area in an unsuccessful attempt to trade with the natives. In 1528 Narvaez landed at what is believed to be Tampa Bay. After landing, Narvaez and a force of Spaniards marched north along the Gulf coast crossing the Withlacoochee and Suwannee rivers. After reaching an Apalachee village named Aute, Narvaez sent a lieutenant, Cabeza de Vaca, and a force of soldiers to locate the coast and the expedition ships that had been sent north from Tampa Bay. It has been suggested that Aute was near the Wakulla River which flows into the St. Marks River that in turn flows into Apalachee Bay. From the village of Aute, de Vaca and a force of soldiers were sent to locate the Gulf of Mexico, which they located a day's march to the west. Shortly thereafter Narvaez, along with de Vaca and the troops, constructed rafts at a location they named the 'Bay of Horses' and began to travel along the coast in an attempt to reach Mexico. The Spanish crossed Apalachee Bay and continued west along the littoral zone of northwest Florida. After an arduous journey in which the Spanish lost most of their party through hunger, disease and hostile Indians they eventually arrived in Vera Cruz. (Lopez – Morillas 1993: 12).

In 1559 the Tristan de Luna expedition sailed the coast of northwest Florida seeking to establish a base from which to explore a route across the southeast from the Gulf of Mexico to the Atlantic. Sailing east along the northern gulf coast the expedition apparently missed the entrance to Mobile and Pensacola Bays then made landfall west of Apalachee Bay between Cape San Blas and present Walton County. Eventually they retraced their course to Pensacola Bay; while anchored in the bay the fleet was struck by a hurricane and nine ships were lost. The de Luna expedition failed in the attempt to traverse the southeast (Lopez – Morillas: 1993: 12).

In 1698, Andreas de Arriola was appointed the Governor of West Florida. With the establishment of the town of Pensacola, west Florida became connected by a series of missions to St. Augustine on the Atlantic coast – the Capitol of East Florida.

Walton County History

Documented European and American settlement in what is now Walton County began in the early 19th Century in the area known as the Euchee Valley generally located between present U.S. Highway 90 (Rock Hill Road), U.S. Highway 331, and the Choctawhatchee River. Another area of pioneer settlement was the Alaqua Creek basin that is now primarily located on the Eglin Air Force Reservation. Since the arrival of the Spanish in the 16th Century the rich natural resources of Choctawhatchee Bay and the Gulf of Mexico were harvested by Spanish fisherman that traveled the littoral zone of the Gulf of Mexico from Havana, Cuba, occasionally establishing fishing camps on the barrier system and in the bays and estuaries.

The first fully documented settlers of what is now Walton County were the McLendon brothers, who migrated to the area from North Carolina and settled along Bruce Creek near present Eucheeanna. The McLendons' successful homesteading influenced other North Carolinians to settle in the area. Walton County was created in 1824, shortly after the United States acquired West Florida from the Spanish. Originally Walton County consisted of 2,900 square miles, however the county lost a large portion of territory when Washington, Holmes, and Okaloosa counties were formed; the county now consists of 1,338 square miles. The first county census was carried out in 1830 and a population of 1,207 was recorded (Kimley Horn Inc., 2003).

The first settlers engaged in farming and fishing the rich natural resources of Choctawhatchee Bay. During the period of pioneer settlement the residents of the area navigated in short draft vessels out of what is now East Pass at Destin, to the port of Pensacola Bay and Escambia Bay 60 miles to the west and Apalachicola Bay 100 miles to the east. However, Pensacola became the primary port of coastal trade up to and through the era of the Civil War. Later, after the Civil War, Walton County became a prime timber growing area which supplied the timber and turpentine (naval stores) industries in Florida and the wider southeast through a widely expanding coastal trade (Walton County Historical Society).

Steamboat and barge landings on the Choctawhatchee River that included Moss Bend (Story's Landing) and Millers Ferry provided interior settlements with access to Choctawhatchee Bay and Gulf of Mexico shipping lanes. The upriver landings were often closed through low water and silting, thus Mallet's Landing and LaGrange, now Freeport were the first towns along the bay to develop as successful port communities. Present Portland where Alaqua Creek enters Choctawhatchee Bay, a few miles west of Freeport, became the site of a thriving sawmill that operated prior to and after the Civil War and was a major source of lumber production in northwest Florida (Walton County Historical Society).

During the period of the Civil War in Florida, 1861 – 1865, Walton County and the Choctawhatchee Bay area was affected by the Federal Blockade. For all practical purposes, this closed ports in the Gulf of Mexico to the normal commerce and trade that had grown over the first half of the 19^{th} Century. There were no recorded engagements in Walton County during the five years of the Civil War, however, the Federal invasion of Pensacola in 1864 and the burning of the Port of Pensacola negatively influenced the economy of the entire northwest Gulf Region (Walton County Library Resources).

Walton County experienced an economic boom in 1884 with the completion of the Louisville & Nashville Railway line from Tallahassee to Pensacola with a link to DeFuniak Springs located in north central Walton County. This railway line opened the interior of the county to additional logging and then to the agriculture that began to flourish in the previously forested areas. The arrival of the railway decreased the amount of river traffic on the Choctawhatchee River, except for Freeport that continued to thrive as a port (Walton County Historical Society).

The beginning of what would become a flourishing tourism industry in Walton County began during the Civil War Reconstruction Era when the Florida Chautauqua opened in February of 1885 in DeFuniak Springs. The Florida Chautauqua consisted of educational and entertainment activities with a religious theme presented in a 'camp meeting' atmosphere. The Florida Chautauqua continued until the turn of the century and is credited with the bringing of the first motion pictures to Florida audiences. This advent of mass entertainment brought the end to Chautauqua in 1920 when radio and the widening Florida highway system offered other cultural opportunities for citizens and tourists alike (Walton County Historical Society).

After the Spanish American War of 1898 – 1899 additional settlers arrived in the area and the Walton County coastal zone became the site of towns that now line the 26 miles of Walton County coastline; these towns include from west to east – Destin, Sandestin, Santa Rosa Beach, Grayton Beach, Seagrove Beach and the unique architectural municipality that was incorporated as Seaside.

Historic Period Currents and Navigation

Geographically situated on the northwest Florida coast, the Walton County shoreline is strategically located at about the mid-point along the historic route of vessels departing the Mexico port of Vera Cruz for ports along the southeastern Gulf Coast or Havana, Cuba. A review of standard shipwreck resources (see below) confirms that at least a dozen vessels may have been lost in the waters offshore of Walton County or in Choctawhatchee Bay. The standard shipwreck lists document far more shipwreck sites in Apalachicola Bay to the east and Pensacola Bay to the west. However, the narrow entrance to Choctawhatchee Bay was known to be hazardous to coastal trading vessels. Due to the shallow waters in the area of the bay, navigation into the estuary was limited to shallow draft fishing vessels and coastal trading vessels. This section of the Cultural Resources Management report describes prevailing gulf currents, hazards to navigation, and a shipwreck history of the Walton County area.

The Loop Current is the primary current system in the Gulf of Mexico, utilized by Historic Era sailing vessels. This is the physical product of two major trans-Atlantic currents: the Equatorial Current and the Guiana Current. These combine and enter the Gulf of Mexico through the Yucatan Channel, north of the Yucatan Peninsula. The constriction of this narrow channel pushes masses of water into the gulf. Seasonal water mass velocities may exceed four nautical miles per hour in the summer, although they fall to a low speed of one mile per hour in the winter (Gore 1994: 67).

Once in the Gulf of Mexico the Loop Current divides into two components: a Gulf Basin component and a northern component. The Gulf Basin component arcs to the west, passing the Campeche banks, in a broad band of water 56 – 93 miles wide. This segment of the current did not provide easy navigation for sailing vessels and threatened to drive them onto the reefs and submerged rocks along the northern shoreline of the Yucatan peninsula. The northern half of the current is not of great importance to gulf shipping until a vessel attempts passage out of the gulf proper into the Straits of Florida. This segment of the Loop Current flows eastward along the northern coastline of Cuba that empties into the Florida Current separating the eastern seaboard of the Florida peninsula and the Bahamas Banks (Steinmiller 1984: 26).

The Loop Current is not a predictable physical system like the Florida Current (Gulf Stream), flowing northward in relatively the same position and at the same speed. The Loop Current is not so much a clearly defined unchangeable hydrographic entity, but rather the sum total of all the highly variable current patterns occurring offshore in the northern Gulf over a given period. Physical factors affecting the current are variations of wind, wave, and tide, along with the continual outflow of water from the Mississippi and other rivers that empty into the Gulf. Gyres may form anywhere at any time, but only those forming in the northeastern Gulf east of the Mississippi Delta and the west coast of Florida are pertinent to this investigation. These anomalies in the current affect short term weather patterns because they transport fresh supplies of warm Gulf water into cooler, faster moving coastal currents. Such anomalies often produce storms that form and dissipate quickly, and together with high seas and darkened shorelines often proved hazardous to vessels under sail (Gore 1994:89).

Navigators in the historic period followed the Loop Current when sailing from Mexican Ports and other Gulf Ports in North America to Havana in the first leg of their return voyage to Spain. A number of such voyages have ended in shipwreck. Most notable are the Padre Island shipwrecks of 1554, located near the mouth of present Port Mansfield Channel that leads into contemporary Galveston Bay, Texas. Another representative Gulf Coast shipwreck is the *El Nuevo Constante* that foundered in shallow water off the coast of Louisiana in September, 1766. In 1980 the shipwreck site was discovered by commercial fisherman working in the offshore area (Pearson & Hoffman 1995: 1 – 7).

Area Shipwreck Research

The location of the borrow area offshore of Walton County, Florida and the long history of exploration and navigation along the northwest Florida coastal zone support the potential that historic shipwreck sites may exist in its coastal waters. Pursuant to this study, the principal investigator conducted a literature and records search to identify known shipwrecks and other historic data pertinent to the wider survey area.

The archival survey included communication with individuals and agencies at the state, county and local levels of government. The survey analyzed databases of prehistoric and historic archaeological sites that have been identified in the vicinity of the survey area. The survey focused on the documentation of activities that might have been contributing factors in the loss of vessels; such activities included exploration, colonization, agriculture, industry, trade, ship-building, commerce, warfare, transportation, and fishing.

The literature survey included the following sources: *The Encyclopedia of American Shipwrecks* (Berman 1972); *Merchant Steam Vessels of the United States 1909 – 1865* (Lyle and Holdcamper 1952); *Disasters of American Vessels, Sail and Steam 1841 – 1846* (Lockhead 1954); *Shipwrecks of the American Civil War, The Encyclopedia of Union and Confederate Naval Losses* (Schomette 1973); *Shipwrecks of the Western Hemisphere* (Marx 1971); *The Treasure Hunters Guide* (Potter 1972); *Shipwrecks of Florida* (Singer 1998); *Shipwrecks in Florida Waters* (Marx 1985). Other reference sources included the National Oceanic and Atmospheric Administration (NOAA) Historic Chart Database; The Florida State University Shipwreck Database, as well as The United States Coast Guard and recreational boating charts of the waters of northwest Florida. Other archival charts utilized in a review of coastal waters were the Bernard Romans charts of 1775, and the Romans, *Natural History of Florida*. According to the Florida Master Site File, a number of Paleo-Indian terrestrial sites existed along the coastal zone northeast of the survey area.

Shipwrecks in the NW Florida – Walton County Coastal Waters

Shipwrecks represent the primary motivation for undertaking remote sensing surveys as part of the cultural resource assessment process. The location of some shipwrecks on the northwest Florida coast are known and documented such as the 'Six Ships of the De Luna expedition lost in a storm in Pensacola Bay in 1559 and an 'American Schooner' lost off the mouth of the Suwannee River in 1820. Potter refers to the 'The American Gulf Coast Wrecks', however, no specific locations are given. Potter does write that, "at least a dozen treasure laden vessels have been reported and rumored sunk along the American Gulf Coast" (Potter 1960: 167).

Vessels Lost Near Choctawhatchee Bay

* 1875: The *Three Sisters*, a 154 ton schooner bound from Pensacola to Apalachicola foundered in a storm before reaching port.

* 1892: The *J.P. Allen* – a schooner from Pensacola, 27 tons sand in a storm 60 miles east of Pensacola in the Gulf of Mexico.

* 1906: The *Gus Schammel*, a schooner of 42 tons, built in 1904, lost near Choctawhatchee Bay.

* 1909: The *James C. Clifford* a schooner of 377 tons abandoned 60 miles southwest of Pensacola Bay.

* 1911: The *Belle*, a side wheel schooner of 74 tons built in 1904 at Vernon, Florida was burned at pass into Choctawhatchee Bay.

* 1922: The Rollo a side-wheel schooner of 33 tons built in 1908 at Pinewood, Florida, sank in Choctawhatchee bay on March 30, 1922.

* The Miss. Becky, a 26 ton steel vessel lost in a collision off of Destin in the Gulf of Mexico.

Archival Research Summary

The above review of some credible and thorough archaeological reports indicates that the waters offshore Walton County contain very few of the known shipwreck sites off the Gulf Coast of Florida. None of the wrecks listed in the above references are found within the borrow area vicinity. Given the comprehensive nature of the above references, it is highly unlikely that the researchers overlooked any wreck sites in the study area; thus, the current study did not conduct additional interviews. Information gained from this archival review will aid the understanding of the remote sensing survey results and will help the principal investigator determine the existence of any significant cultural resources within the study area.

Field Investigations
Magnetometer, Side-scan Sonar, Seismic Survey
Methodology

The Florida Division of Historical Resources approved the methodology and equipment for the remote sensing survey before it began. The remote sensing, magnetometer, side-scan sonar, and sub-bottom surveys of the borrow area were conducted between 5/30/2007 and 6/30/2007. The purpose of these surveys was to ascertain if any submerged cultural resources were located within the borrow area.

Magnetometer

The magnetometer survey utilized a Geometrics Model G-882 Digital Cesium System with a built in depth sensor and altimeter. The G-882 sampled the earth's magnetic field at the rate of 10 samples per second. The magnetometer delivered total field, depth, and altimeter data to a Hypack Navigation Computer. The Hypack software recorded the magnetometer tow-fish position with each incoming magnetometer reading. The surveyors monitored the display of the magnetometer throughout the survey to ensure that the equipment remained at the proper elevation. The survey collected data along straight lines spaced at 100 foot intervals.

Side-scan Sonar

The side-scan sonar survey utilized an Edge Tech Model 4200-FS digital CHIRP system. Once again, the side-scan sonar delivered imagery to the Hypack Navigation Computer, which geo-encoded it using the tow-fish position and stored it in the Edge Tech native (jsf) format. The survey followed the same tracklines as the magnetometer survey and occurred simultaneously. It collected dual frequency data at 120 kHz and 400 kHz and used a range scale of 50 m per side for a total swath of 100 m and 250% coverage.

Sub-Bottom Profiler

The sub-bottom survey utilized an Edge-Tech SB 424, which emits a high frequency CHIRP pulse. This X-Star Full Spectrum Sonar has a versatile wide-ban FM profiler that generates cross-sectional images of the seabed and collects digital normal incidence reflection data over many frequency ranges. The tapered wave form spectrum results in images that have virtually constant resolution with depth.

Electronic Navigation

Throughout the survey, a Trimble DSM 232-L – Real Time Differential Global Positioning System (GPS) fed navigation data into the Coastal Oceanographic (Hypack) Hydrographic Data Collection and Processing System. The DSM 212-L has a differential (GPS) beacon receiver which uses the U.S. Coast Guard Differential Correction Signal to send accurate differential GPS corrections to the onboard GPS receiver. The U.S. Coast Guard Pensacola Beacon provided the differential correction signal for this survey.

The DSM-232 provides moderate precision static and dynamic position and velocity data at a rate of one reading per second. Accounting for the differential correction, it has an accuracy of approximately 1 meter. All data references the Florida State Plane Traverse Mercator – Projection Coordinate System, North Zone (NAD 83).

Survey Area Parameters

Figure 1 shows the position of the borrow area, centered approximately 5.8 miles offshore Walton County. The borrow area has a roughly rectangular shape and measures approximately 10,200 ft (1.9 miles) by 5,300 ft (1.0 miles). The average water depth in the borrow area equals 70 ft.

Figure 2 shows the remote sensing tracklines and the positions of the 39 magnetic anomalies and 2 side-scan sonar targets. Side-scan target S1 corresponds to magnetometer anomaly M5 and side-scan target S2 corresponds to magnetometer anomaly M39. Table 1 presents pertinent data associated with each magnetometer anomaly. The table includes latitude, longitude, easting, and northing data, along with the intensity of each anomaly and an estimated ferrous weight. Estimated weights were computed using formula and techniques from the *Geometrics Applications Manual for Portable Magnetometers* by Sheldon Brenier (1973). Figures 3 – 5 show images of side-scan sonar target S1, and Figures 6 – 8 show images of S2.

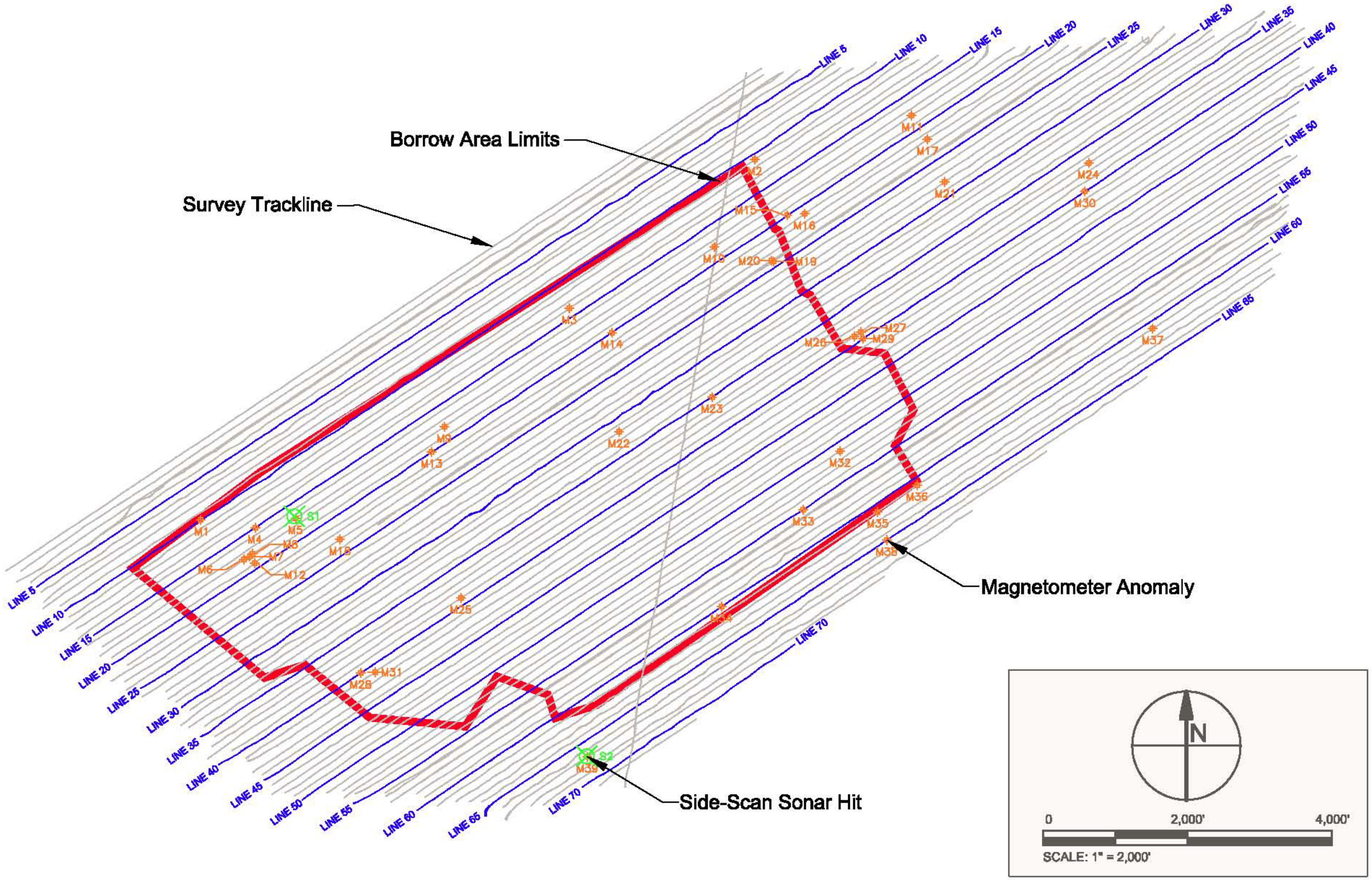


Figure 2 Seismic Tracklines with Magnetometer and Side-Scan Sonar Hits

Table 1 Magnetometer Survey Results

Number	Location (ft-NAD83, FL-N)		Survey Line No.	Intensity (gammas)	Range (ft)	Horizontal Range (ft)	Estimated Mass (lb)
	Easting	Northing					
M1	1371724.120	475229.610	10	13.0	28	13	250
M2	1379397.450	480217.850	11	23.0	26	9	350
M3	1376827.890	478156.820	14	16.0	31	23	400
M4	1372475.520	475122.080	15	7.4	15	0	24
M5, S1	1373035.190	475251.600	17	25.1	35	32	500
M6	1372324.000	474681.600	18	1.1	18	0	5
M7	1372394.500	474724.900	18	1.1	19	0	9
M8	1372444.300	474761.000	18	0.2	14	18	0
M9	1375092.700	476516.330	18	1.5	30	22	42
M10	1378831.820	479006.050	18	1.3	16	0	10
M11	1381567.590	480829.520	18	1.1	23	0	14
M12	1372467.860	474635.210	19	1.0	14	0	3
M13	1374918.530	476170.220	20	2.0	21	0	19
M14	1377418.640	477825.400	20	1.0	24	10	12
M15	1379842.650	479443.980	20	0.1	25	14	23
M16	1380085.530	479465.370	21	1.0	21	0	10
M17	1381788.350	480499.520	22	1.0	13	0	2
M18	1373651.390	474961.920	23	1.2	15	0	5
M19	1379651.540	478807.810	24	0.2	17	0	10
M20	1379622.550	478815.690	24	3.0	22	0	28
M21	1382025.100	479905.930	28	1.0	19	0	8
M22	1377515.530	476447.230	32	2.0	30	11	55
M23	1378802.230	476930.560	35	0.1	23	20	14
M24	1384019.470	480173.670	37	2.0	16	0	9
M25	1375325.700	474149.060	39	1.0	24	0	12
M26	1380776.830	477771.410	39	1.1	16	0	6
M27	1380865.480	477829.810	39	1.1	10	0	8
M28	1373939.230	473112.100	40	2.2	29	15	46
M29	1380893.830	477737.390	40	3.1	11	0	4
M30	1383967.320	479775.770	40	0.3	35	26	109
M31	1374136.850	473123.070	41	2.0	11	0	2
M32	1380577.750	476184.750	51	1.0	17	0	7
M33	1380068.420	475371.510	55	0.2	25	0	22
M34	1378938.070	474031.320	60	0.2	26	0	27
M35	1381097.910	475343.880	61	3.0	32	16	87
M36	1381644.310	475714.210	61	2.2	26	0	29
M37	1384907.870	477876.720	61	1.0	16	0	27
M38	1381224.030	474951.970	65	3.3	11	0	5
M39, S2	1377074.960	471949.970	67	4.0	31	12	119

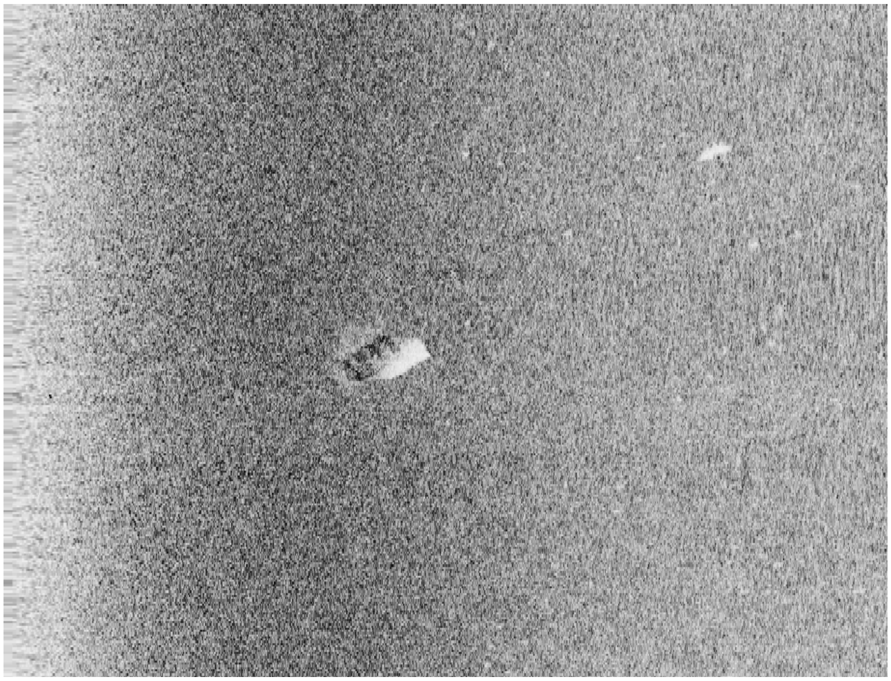


Figure 3 Sonar Target S1 at Range 62 ft on Survey Line 16NE, Heading 054T, Sweeping Left to Right

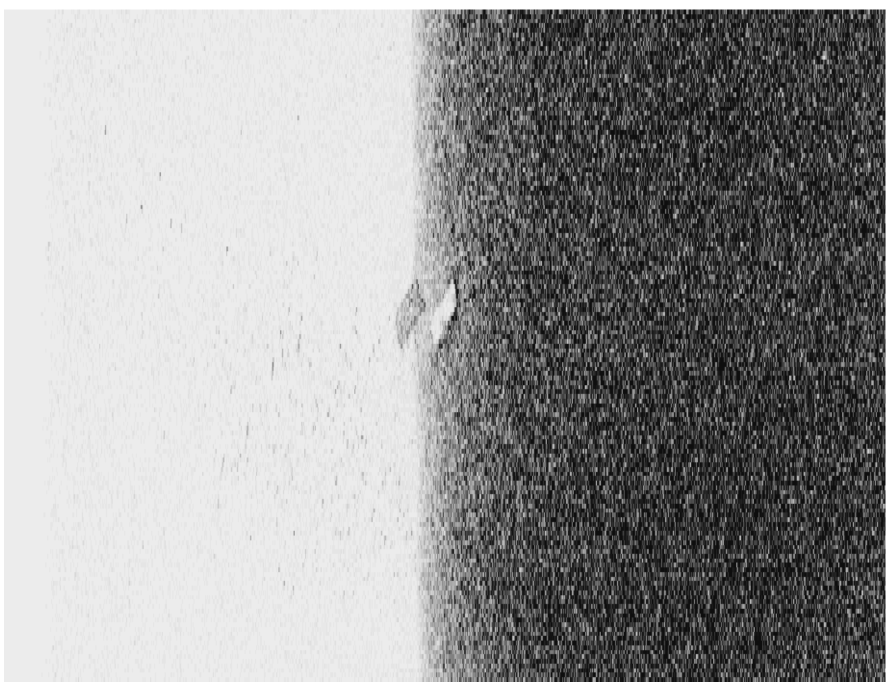


Figure 4 Sonar Target S1 at Range 16 ft on Survey Line 17SW, Heading 234T, Sweeping Left to Right. Image is zoomed with water column not removed as target was almost under the towfish. The top of the target appears suspended. However, very faint supports are visible on two corners. Small fish are visible in the water column, apparently attracted to this target.

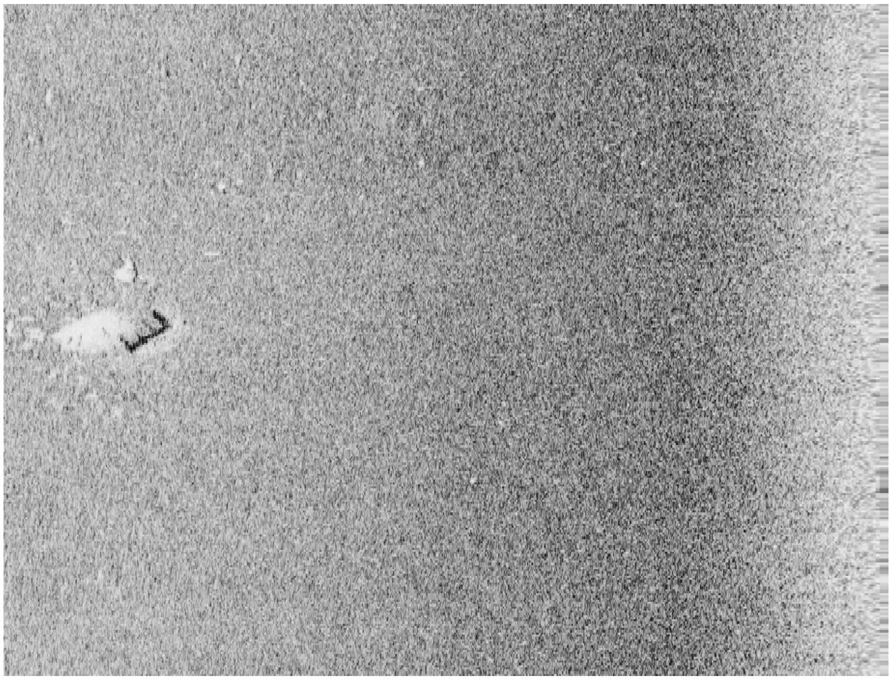


Figure 5 Sonar Target S1 at Range 127 ft on Survey Line 18NE, Heading 054T, Sweeping Right to Left

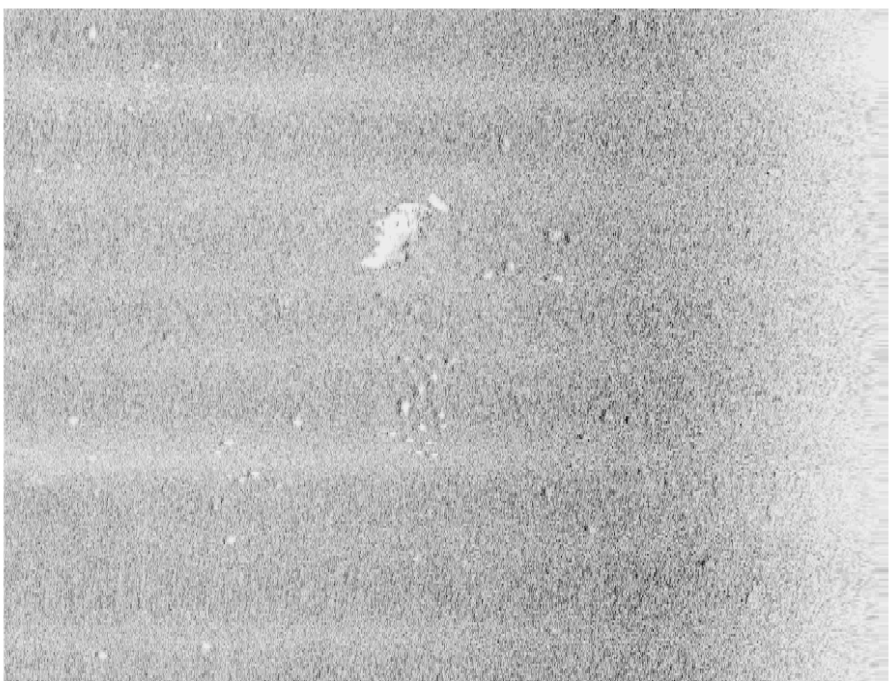


Figure 6 Sonar Target S2 at Range 80 ft on Survey Line 66SW, Heading 251T, Sweeping Left to Right. Note holes (targets with white in front) in the seafloor. These are unique to the area surrounding this target. They likely are habitat for creatures attracted to this target.

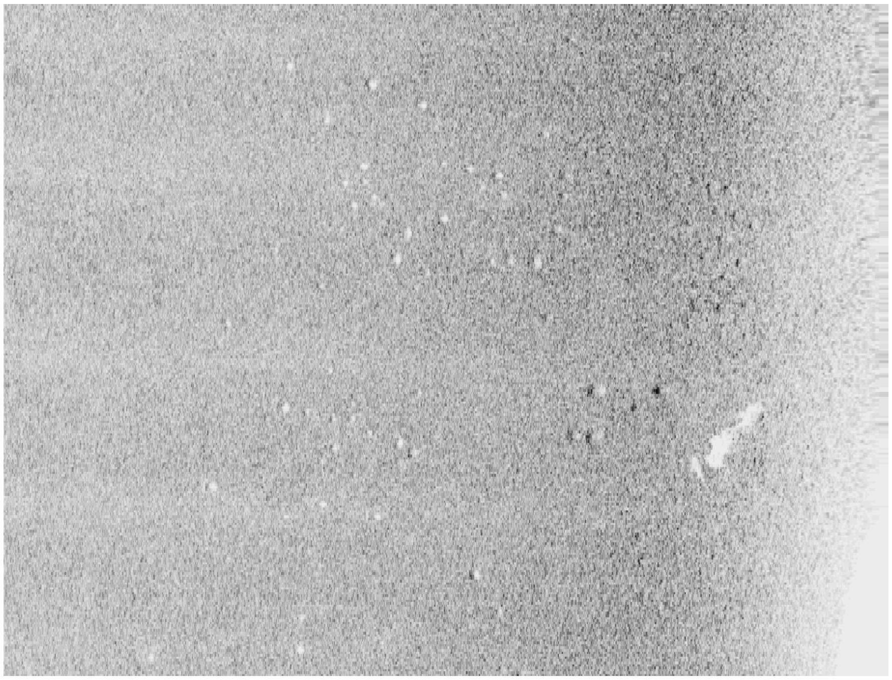


Figure 7 Sonar Target S2 at Range 24 ft on Survey Line 67NE, Heading 049T, Sweeping Left to Right.

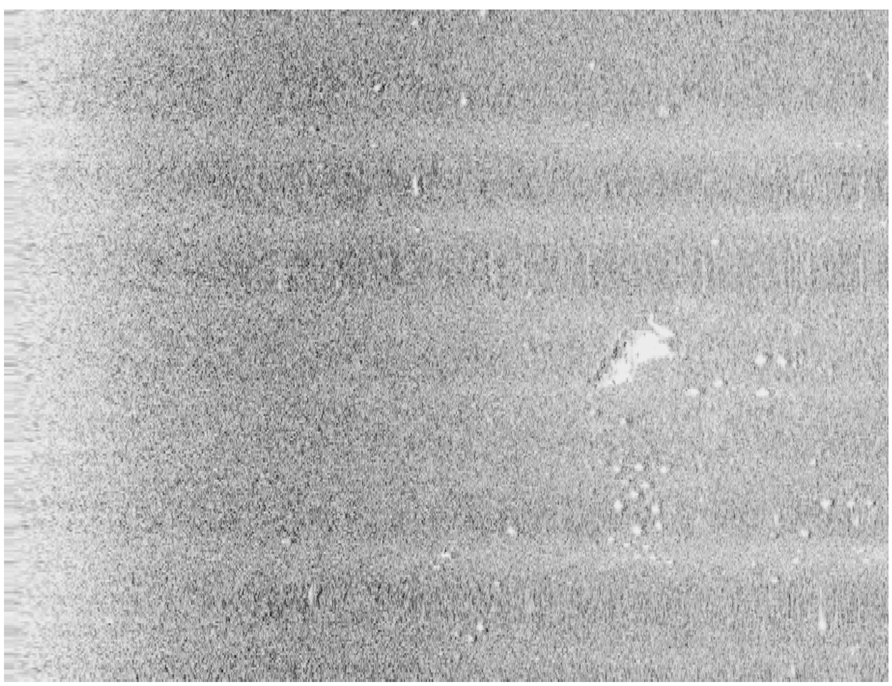


Figure 8 Sonar Target S2 at Range 105 ft on Survey Line 68SW, Heading 250T, Sweeping Right to Left.

Data Analysis

Following the investigation in the field, the survey team conducted initial data analysis of the recorded magnetometer data, side-scan sonar data, and sub-bottom profile data, and then submitted everything to the principal investigator. The role of the principal investigator was to determine the absence or presence of anomaly patterns and side-scan sonar images that would indicate the possibility of sunken cultural resources in the borrow area.

Sub-Bottom Profile Data

The principal investigator reviewed all of the sub-bottom profile data for geologic structures such as prehistoric creek and river beds that might include features that suggest aboriginal habitation sites. The data revealed no evidence of any such sites and no indication of shell midden material on the seabed. The side-scan sonar data, which would have registered such material, confirmed its absence in the project area.

Survey Results

Magnetometer and Side-Scan Sonar Survey

****

Discussion

The remote sensing survey identified 39 magnetic anomalies and 2 side-scan sonar targets within the survey area. The anomalies primarily lie isolated from other anomalies, have low intensity and weight, and do not suggest the existence of any object of significance. Two exceptions warrant further analysis; the side-scan sonar target S1 and the cluster of anomalies including M4 – M8 and M-12 in the southwest corner of the proposed borrow area and the cluster of anomalies including M26, M27, and M29 just outside the borrow area boundary to the northeast suggest the possibility of submerged cultural resources. Note that side-scan sonar target S2 and the associated magnetic anomaly M39 lie approximately 600 ft outside of the borrow area and, thus, were excluded from further analysis.

Analysis

The first of the two areas identified for further analysis lies in the southwest corner of the proposed borrow area and contains magnetometer anomalies M4, M5, M6, M7, M8, M12, and side-scan sonar target S1. Although located in close proximity to one another, anomalies M6, M7, M8, and M12 each have very low intensity suggesting a submerged mass of no more than 9 ferrous pounds. However, magnetometer anomaly M5 recorded high intensity and has a computed mass of approximately 500 ferrous pounds. Figures 3 – 5 contain images from the associated side-scan sonar target S1. The article in these figures exhibits low relief and modest weight. It measures approximately 8 ft by 5 ft and appears to be acoustically transparent except for its rectangular top and bottom surfaces. It likely derives from local fishing activity and conforms to a ferrous object such as a steel fish trap.

The second of the two areas identified for further analysis lies just outside the proposed borrow area to the northeast but close enough to the boundary to potentially affect dredging activities. The cluster contains magnetic anomalies M26, M27, and M29. Each of these has very low intensity suggesting a submerged mass of no more than 8 ferrous pounds. Since the borrow area lies in a well populated coastal zone near a well used pass (East Pass), the low weight and low intensity ferrous anomalies are likely related to modern fishing and boating activities and have no historical significance.

Conclusions and Recommendations

The principal investigator concludes after an analysis of the remote sensing data that no shipwreck resources exist in the survey area. This conclusion is supported by the relatively few clusters of anomalies in the borrow area and the widely dispersed pattern of the remaining anomalies. Further, the lack of side-scan images does not suggest the presence of any raised area that would indicate inundated midden sites from a prehistoric terrestrial environment. The principal investigator recommends that the borrow area be utilized for the proposed beach re-nourishment project.

While this study did not identify any significant cultural resources, significant shipwrecks can go unrecognized even with the application of modern remote sensing methods. If any project activities encounter significant cultural resources, all work should cease at the site and the project state and/or federal agencies should be contacted.

Project Curation

All project records will be maintained by Taylor Engineering Inc, Jacksonville, Florida as well as in the archives of the Florida Division of Historical Resources, Tallahassee, Florida.

References

Anderson, Bern (1989) *By Sea and River: The Naval History of the Civil War*. New York: De Capo Press

Brenier, Sheldon (1973) *Geometrics Applications Manual*. EG&G Magnetometers: San Jose California

Davis, David D. (1984) *Perspectives on Gulf Coast Prehistory*. Gainesville: University of Florida Press.

Gore, Robert H. (1994) *The Gulf of Mexico*. Sarasota: Pineapple Press.

Lopez–Morillas, Francis (1993) *Cabeza de Vaca: Castaways*. Berkeley: University of California Press.

Milanich, Jerald T. (1994) *Archaeology of Precolumbian Florida*. Gainesville: University of Florida Press.

…. (1995) *The Florida Indians and the Invasion From Spain*. Gainesville: University of Florida Press.

Pearson, Charles & Hoffman, Paul (1995) *The Last Voyage of the El Nuevo Constante*. Baton Rouge: Louisiana State University Press.

Potter, John S. (1988) *The Treasure Hunters Guide*. Port Salerno FL: Florida Classics Press.

Singer, Stephen (1992) *Shipwrecks of Florida*. Sarasota: Pineapple Press.

Winsberg, Morton D. (2003) Florida Weather. Gainesville: University of Florida Press.

Reports

Kimley Horn Assoc., Evaluation Appraisal report, Walton County, Florida.

Other Sources

Continental data Base – Facts on File

United States Weather Bureau

Walton County Florida Chamber of Commerce

Walton County Florida Historical Society

Appendix – A

Permit: 1-A-32 Correspondence

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

June 05, 2007

Robert H. Baer
Taylor Engineering, Inc.
9000 Cypress Green Drive, Ste. 200
Jacksonville, Florida, 32256

Re: 1A-32 Archaeological Research Permit Number 0607.76
Walton County Sand Survey

Dear Mr. Baer:

Please find the enclosed 1A-32 Archaeological Research permit. In an effort to streamline the permitting process, the permit format and conditions have changed, so please read the document carefully. In particular, please note that there are six lines for your initials under General Condition 3 and that there is a line for the land manager's (if applicable) signature.

To execute this permit, please send the signed permit to the Bureau of Archaeological Research, Permit Administrator, at the address below. If you have any questions about the permit process or about requirements, please contact me at (850) 245-6301 or via email at rjwheeler@dos.state.fl.us. Please refer to the permit number in all such contacts.

Sincerely,

RJ. Wheeler

Ryan J. Wheeler, Ph.D.
Chief, Bureau of Archaeological Research

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

ARCHAEOLOGICAL RESEARCH PERMIT

Permit No. 0607.76 Field Begin Date: 5/30/2007 Field End Date: 6/30/2007

PERMITTEE/AUTHORIZED ENTITY:
Taylor Engineering, Inc.
c/o Robert H. Baer
9000 Cypress Green Drive, Ste. 200
Jacksonville, Florida 32256

Report/Artifact Due Date: 6/30/2007
Project: Walton County Sand Survey

This permit is issued under the authority of Chapters 267.031 (1) and 267.12, Florida Statutes (F.S.) and Rule 1A-32, Florida Administrative Code (F.A.C.), and is administered by the Florida Bureau of Archaeological Research (BAR), Florida Division of Historical Resources (DHR).

ACTIVITY DESCRIPTION:
Submerged remote sensing survey for archaeological resources, pursuant to Rule 1A-46, F.A.C.

LOCATION DESCRIPTION:
offshore Walton County, FL
DEP, Sovereignty Submerged Lands

GENERAL CONDITIONS:

1. The Principal Investigator listed above or another qualified archaeologist designated by the applicant shall be responsible for all archaeological investigations, production of a final report, and be on site during all fieldwork.

2. A copy of this permit shall be provided to the land managing agency (when applicable) and field personnel shall carry a copy during fieldwork.

3. The permittee shall (initial each item as indicated):
   a. prepare a final report that meets standards and guidelines required by Rule 1A-46, F.A.C., including the necessary Florida Master Site File forms; RHB
   b. inform the BAR permit administrator that a report has been completed and submitted to the Division of Historical Resources; or submit a copy of the final report to the BAR permit administrator; ________
   c. provide proper curation and conservation of recovered artifacts and other recovered site materials until such time as those artifacts and other site materials are conveyed to the BAR for curation; ________
   d. convey all artifacts and related materials obtained from state-owned or controlled land to the BAR permit administrator for permanent curation or processing for loan; RHB

e. convey copies of all notes, maps, photographs, videotapes, and other field records pertaining to research conducted under this permit to the BAR permit administrator following completion of the project OHB ;

f. and not remove from a stable environment artifacts and materials which the permit recipient is unable to properly curate and conserve before conveying to BAR. OHB

4. The effective field investigation dates are subject to receipt of permission from the land management agency and, in some instances, State/Federal dredge-and-fill permitting programs. Those agencies may also require work performance conditions relevant to their natural resource management and permitting responsibilities. A representative of the land managing agency (if one exists) will need to sign this permit document prior to BAR executing this permit (see page 3).

5. Unless approved in writing by BAR, no work beyond that described in the "ACTIVITY DESCRIPTION" and attached to your application shall be performed.

6. This permit is valid for up to one year following the requested report due date. Requests for approval for amendments to fieldwork, fieldwork end date and report/artifact due date are required during this time. Such requests may be made and approved by phone, email, or in writing during this time and do not require amendments to this document.

7. In any release of information, including public presentations, media contacts, and the final written report, there shall be acknowledgement that the portion of the project involving state-owned and controlled land was conducted under the terms of an archaeological research permit issued by the Florida Department of State, Division of Historical Resources, Bureau of Archaeological Research.

8. If Unmarked Human Burials are discovered, permit recipient shall comply with the provisions of 872.05, F.S., and when appropriate, Rule 1A-44, F.A.C. Specifically, upon discovery of unmarked human remains, all activities that might further affect those remains shall be halted and the remains protected from further disturbance until an appropriate course of action has been determined by the local medical examiner or by the State Archaeologist, as appropriate.

9. In issuing this permit, the State assumes no liability for the acts, omissions to act or negligence of the permittee, its agents, servants or employees; nor shall this permittee exclude liability for its own acts, omissions to act or negligence to the State.

10. The permittee, unless the permittee is an agency of the State, agrees to assume all responsibility for, indemnify, defend and hold harmless the Division of Historical Resources from and against any and all claims, demands, or liabilities, or suits of any nature whatsoever arising out of, because of, or due to any act or occurrence of omission or commission arising out of the permittee's operations pursuant to this permit and shall investigate all claims at its own expense. In addition, the permittee hereby agrees to be responsible for any injury or property damage resulting from any activities conducted by the permittee.

11. The parties hereto agree that the permittee, its officers, agents and employees, in performance of this permit, shall act in the capacity of an independent contractor and not as an officer, employee, or agent of the State.

The undersigned, as representative of the Permittee/Authorized Entity, understands and accepts the terms of this 1A-32 Archaeological Research Permit.

Robert H Bag ______________________ Date: 6/14/2007

Signature

The undersigned, as representative of the land managing agency for the managed area/state property described in the "LOCATION DESCRIPTION" section of this document, hereby permits the activity described above.

______________________ Date: ______________

n/a

Title: ______________________

This permit will not become effective until it has been executed by the Chief of BAR. Before BAR can execute this permit, the Permittee must have a land management representative (if applicable) sign in the space provided above. Please send the signed permit to the Permit Administrator at the address above.

A copy of the executed permit will be sent to you prior to commencing fieldwork.

Executed in Tallahassee, Florida

STATE OF FLORIDA
DEPARTMENT OF STATE

____

RJW/apw

Ryan J. Wheeler, Ph.D.
Chief, Bureau of Archaeological Research

Date of Issue ______________

Enclosures:
Rule 1A-46, F.A.C.
BAR Collections and Curation Guidelines
How to Package Documents, Florida Master Site File

Copies furnished to:

Appendix – B

Master Site File Form

Ent D (FMSF only)___/___/___

Survey Log Sheet

Florida Master Site File
Version 4.1 1/07

Survey # (FMSF only)________

Consult *Guide to the Survey Log Sheet* for detailed instructions.

Identification and Bibliographic Information

Survey Project (name and project phase) **Walton County Sand Survey**

Report Title (exactly as on title page) **A Submerged Cultural Resource Remote Sensing Survey of a Borrow Area Proposed For Beach Restoration Offshore of Walton County, Florida**

Report Author(s) (as on title page— individual or corporate; last names first) **Robert H. Baer, Registered Professional Archaeologist**

Publication Date (year) **4/20/08** Total Number of Pages in Report (count text, figures, tables, not site forms) **28 pages**

Publication Information (Give series and no. in series, publisher and city. For article or chapter, cite page numbers. Use the style of *American Antiquity*.)
N/A

Supervisor(s) of Fieldwork (whether or not the same as author(s); last name first) **Robert Baer, RPA**

Affiliation of Fieldworkers (organization, city) **Taylor Engineering, Jacksonville, FL, 32256**

Key Words/Phrases (Don't use the county, or common words like *archaeology, structure, survey, architecture*. Limit each word or phrase to 25 haracters.)
Choctawhatchee Bay, Choctawhatchee River, Freeport, McLendon Brothers

Survey Sponsors (corporation, government unit, or person who is directly paying for fieldwork)
Name **Mr. Michael Trudnak, P.E.**
Address/Phone **Taylor Engineering 9000, Cypress Creek Drive, Jacksonville, Fl, 32256 (904) 256 - 1342**

Recorder of *Log Sheet* **Robert H. Baer, RPA** Date *Log Sheet* Completed **04/20/08**

Is this survey or project a continuation of a previous project? **X No** ☐ Yes: Previous survey #(s) (FMSF only)________

Mapping

Counties (List each one in which field survey was done - do not abbreviate; use supplement sheet if necessary) **Walton County, Florida**

USGS 1:24,000 Map(s) : Map Name/Date of Latest Revision (use supplement sheet if necessary): **N/A**

Description of Survey Area

Dates for Fieldwork: **Start 5/30/0 End 6/30/07** Total Area Surveyed (fill in one) 640 hectares 1585 acres
Number of Distinct Tracts or Areas Surveyed 1

If Corridor (fill in one for each): **N/A**
Width ______ meters ______ feet Length __________ kilometers __________ miles

Survey Log Sheet

Survey # __________

Research and Field Methods

Types of Survey (check all that apply): **X archaeological** ☐ architectural ☐ historical/archival **X underwater** ☐ other: __________

Preliminary Methods (✓ Check as many as apply to the project as a whole.)

☐ Florida Archives (Gray Building)
☐ Florida Photo Archives (Gray Building)
☐ Site File property search
☐ Site File survey search
X library research- *local public*
☐ library-special collection - *nonlocal*
☐ Public Lands Survey (maps at DEP)
X local informant(s)
☐ local property or tax records
☐ newspaper files
☐ literature search
☐ Sanborn Insurance maps
X other historic maps
☐ soils maps or data
☐ windshield survey
☐ aerial photography
☐ other (describe) __________

Archaeological Methods (✓ Check as many as apply to the project as a whole.)
☐ Check here if **NO** archaeological methods were used.

☐ surface collection, controlled
☐ surface collection, uncontrolled
☐ shovel test-1/4"screen
☐ shovel test-1/8" screen
☐ shovel test 1/16"screen
☐ shovel test-unscreened
☐ other screen shovel test (size: ____)
☐ water screen (finest size: ____)
☐ posthole tests
☐ auger (size: ____)
☐ coring
☐ test excavation (at least 1x2 M)
☐ block excavation (at least 2x2 M)
☐ soil resistivity
X magnetometer
X side scan sonar
X sub-bottom profiler
☐ other (describe): __________

Historical/Architectural Methods (✓ Check as many as apply to the project as a whole.)
X Check here if **NO** historical/architectural methods were used.

☐ building permits
☐ commercial permits
☐ interior documentation
☐ demolition permits
☐ exposed ground inspected
☐ local property records
☐ neighbor interview
☐ occupant interview
☐ occupation permits
☐ subdivision maps
☐ tax records
☐ unknown
☐ other (describe): __________

Scope/Intensity/Procedures **N/A** __________

Survey Results (cultural resources recorded)

Site Significance Evaluated? ☐ Yes **X No** If *Yes*, circle NR-eligible/significant site numbers below.
Site Counts: Previously Recorded Sites **N/A** __________ Newly Recorded Sites **N/A** __________
Previously Recorded Site #'s with Site File Update Forms (List site #'s without "8." Attach supplementary pages if necessary) **N/A** __________

Newly Recorded Site #'s (Are you sure all are originals and not updates? Identify methods used to check for updates, i.e., researched Site File records. List site #'s without "8." Attach supplementary pages if necessary.) **N/A** __________

Site Form Used: ☐ Site File Paper Form **X Smart Form II Electronic Recording Form**

REQUIRED: ATTACH PLOT OF SURVEY AREA ON PHOTOCOPIES OF USGS 1:24,000 MAP(S)

DO NOT USE SITE FILE USE ONLY DO NOT USE

Appendix – C

Figure B - Fold Out

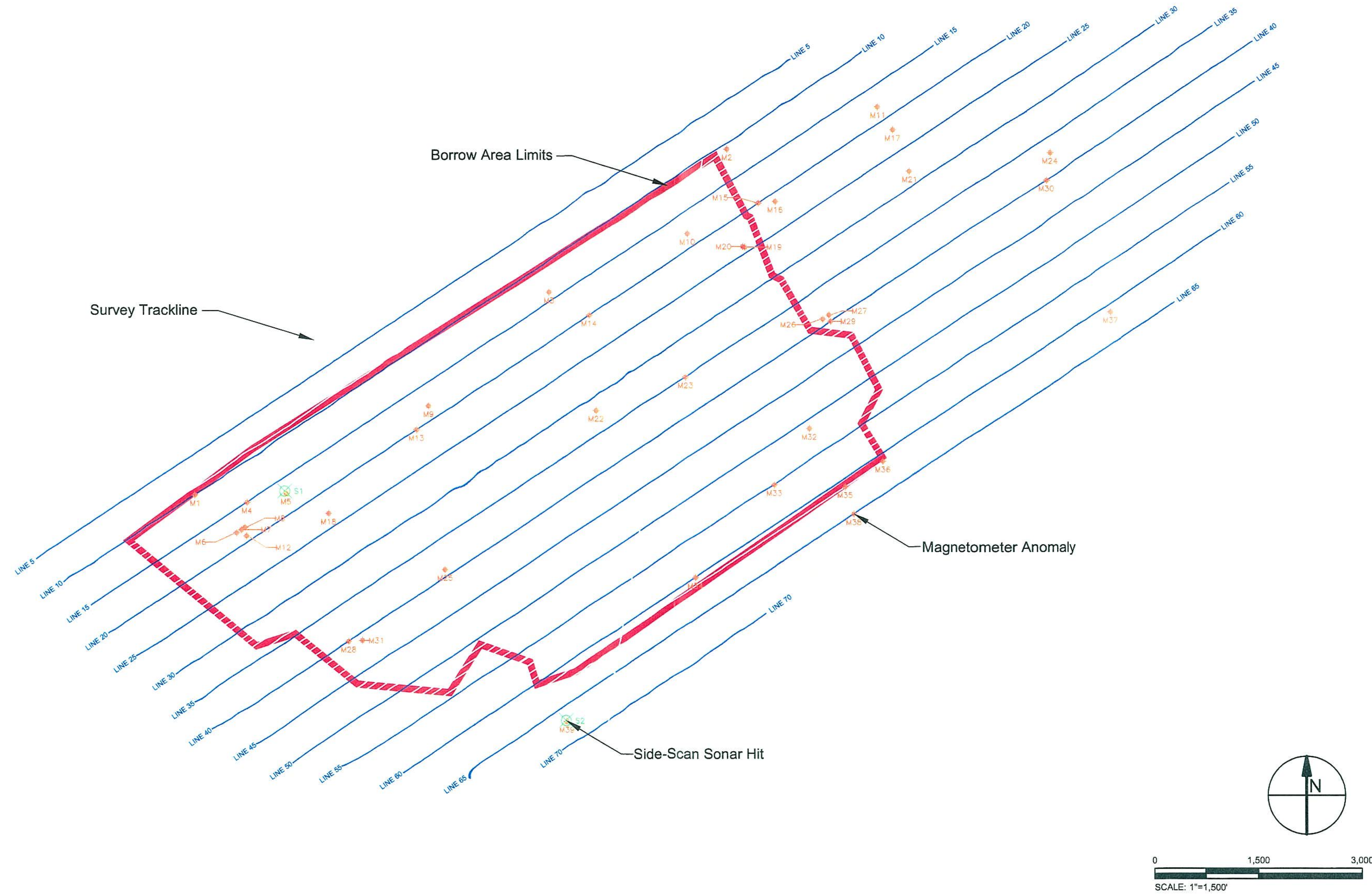


Figure 2
Seismic Tracklines with Magnetometer & Side-scan Hits
Walton County, Florida

TAYLOR ENGINEERING INC.
10151 Deerwood Park Blvd., Bldg. 300, Suite 300
Jacksonville, Florida 32256
CERTIFICATE OF AUTHORIZATION # 4815

PROJECT	C2005-085
DRAWN BY	JCH
SHEET	1 of 1
DATE	OCT 2008

Coordination Letter for Local Project

C2007-009

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

Mr. Michael Trudnak
Taylor Engineering, Inc.
10151 Deerwood Park Blvd., Bldg. 300, Suite 300
Jacksonville, Florida 32256

December 11, 2008

Re: DHR Project File No.: 2008-02705-B / Received by DHR: April 28, 2008
Additional Information Received: October 30, 2008
1A-32 Permit No.: 0607.006
A Submerged Cultural Resource Remote Sensing Survey of a Borrow Area Proposed for Beach Renourishment Offshore of Walton County, Florida

Dear Mr. Trudnak:

We note that in May and June 2007, Sonographics, Inc. (SI) conducted the above referenced survey for Taylor Engineering, Inc. in anticipation of a request by the Florida Division of Historical Resources (DHR) for a cultural resource assessment survey. Our office proceeded to review this report with the expectation that Taylor Engineering, Inc. will be engaging in permitting processes that will require this office to comment on possible adverse impacts tot cultural resources listed or eligible for listing in the National Register of Historic Places, or otherwise of historical, architectural, or archaeological significance. We recommend at the time such actions are taken, a copy of this letter be forwarded to the permitting agency(ies) with the application. This may eliminate the permitting agency(ies) from having to submit an application to the Division of Historical Resources for review, or, if applications are forwarded to the Division with this letter, it would facilitate our review.

SI identified thirty-nine magnetic anomalies and two side-scan sonar targets within the surveyed area during the investigation. SI determined that none of the anomalies within the proposed borrow area appears to represent significant cultural resources.

SI determined that the proposed sand borrow activities are unlikely to affect cultural resources. SI recommends no further investigation of the project area.

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

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

❒ Director's Office (850) 245-6300 • FAX: 245-6436
❒ Archaeological Research (850) 245-6444 • FAX: 245-6452
☑ Historic Preservation (850) 245-6333 • FAX: 245-6437

For any questions concerning our comments, please contact April Westerman, Historic Preservationist, by electronic mail at amwesterman@dos.state.fl.us, or by phone at (850) 245-6333. We appreciate your continued interest in protecting Florida's historic properties.

Sincerely,

Frederick P. Gaske

Frederick P. Gaske, Director, and
State Historic Preservation Officer

XC: Louis Tesar, Bureau of Archaeological Research

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF

January 15, 2010

Coastal Environment Team
Planning and Environmental Division

Ms. Gail Carmody
U.S. Department of Interior
Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Carmody:

As you are aware, the U.S. Army Corps of Engineers (Corps), Mobile District is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. The project is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet as indicated by the map included in Enclosure 1.

The study region was divided into five study reaches based on structural development and state park areas as illustrated in Enclosure 1. The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The typical cross-sections for the selected plan are illustrated in Enclosure 2. When dune construction is complete, the dune will be planted with at least three species of dune vegetation to create a dune that matches the surrounding natural dune patterns in the area. The necessary beach fill requirements will be 3,350,000 cubic yards (cy). Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters. The non-federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council.

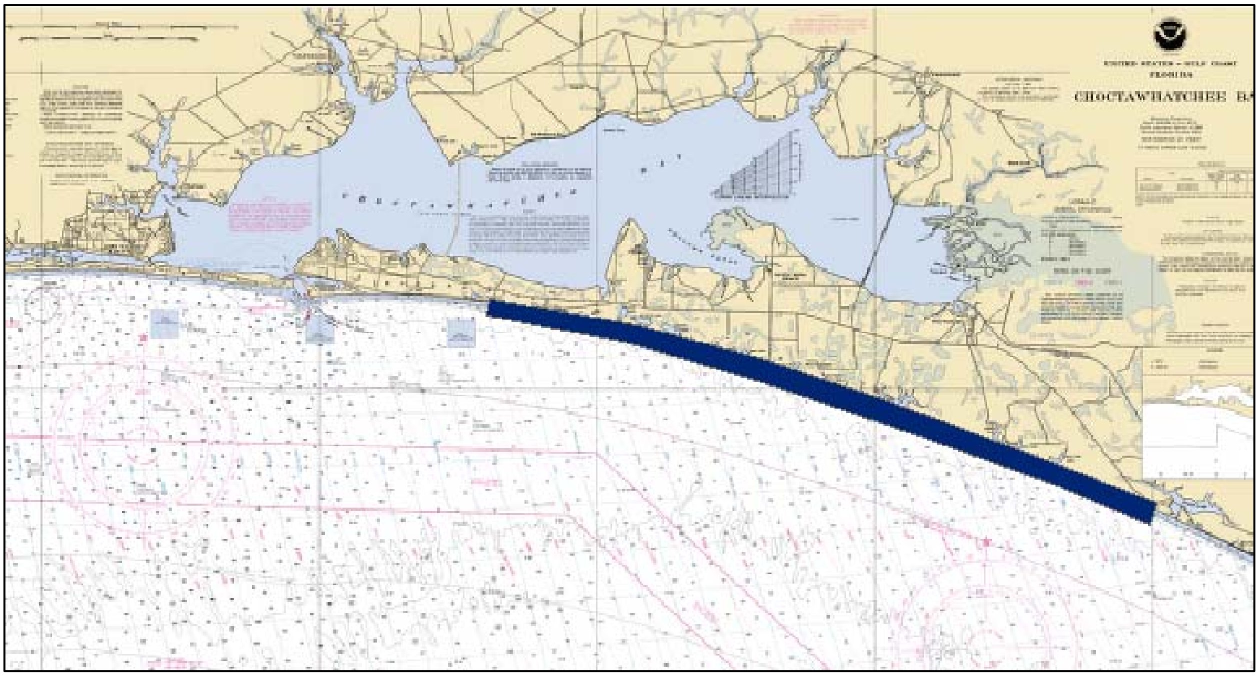
Based on previous discussions with your office, we are requesting initiation of formal coordination for the generation of the Fish and Wildlife Coordination Act (FWCA) Report according to the requirements of the FWCA of 1958, regarding impacts to significant fish and wildlife resources and impacts to federally listed or proposed species or their designated or proposed critical habitat, which is in accordance with Section 7 of the Endangered Species Act of 1973. It is understood that your office would undertake these activities through a transfer of funds agreement. Our staff is prepared to work with your office to prepare a scope of work for these required efforts. Such a scope would include a project description, schedule, and level of funding. The schedule will be based on submitting the feasibility report in June of this year.

Coordination for this effort should be directed to Mr. Larry Parson at (251) 690-3139 or email at larry.e.parson@usace.army.mil. Thank you for your assistance in this project.

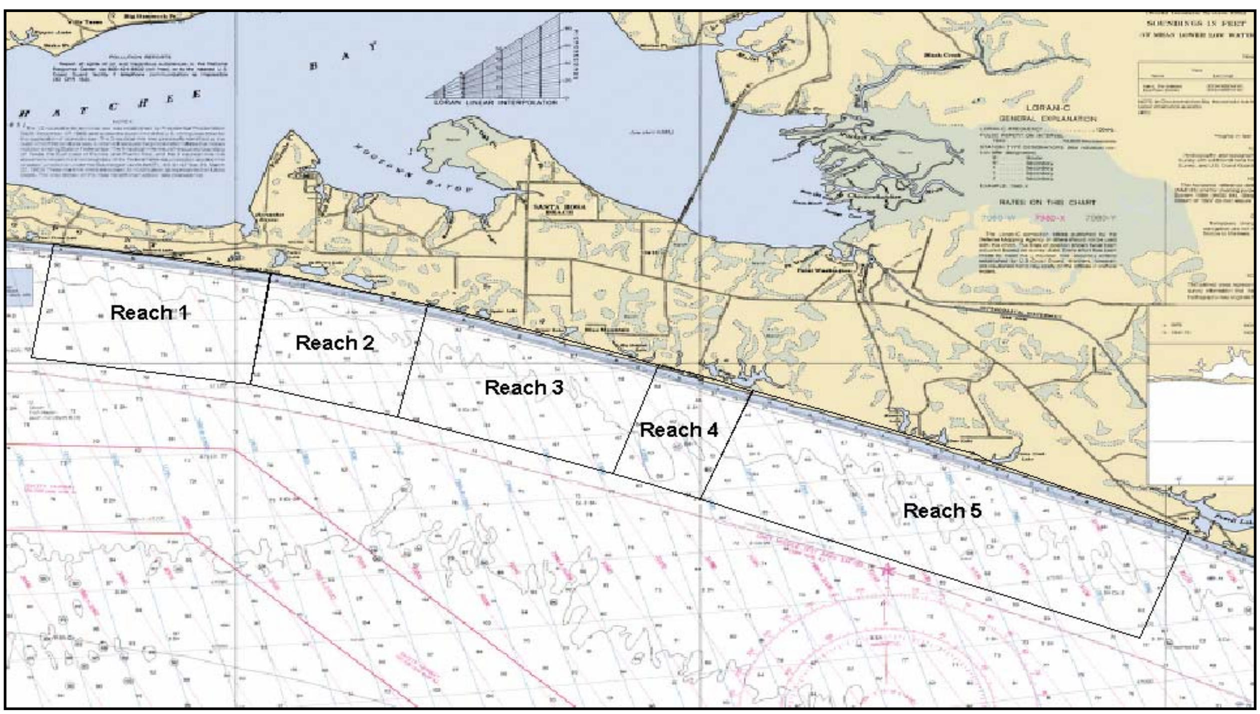
Sincerely,

Kenneth P. Bradley
Chief, Environment and Resources
Branch

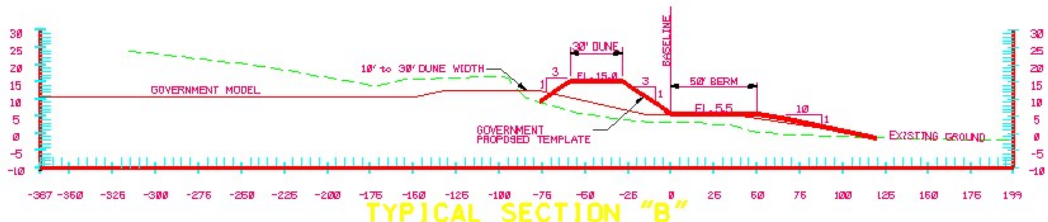
Enclosures

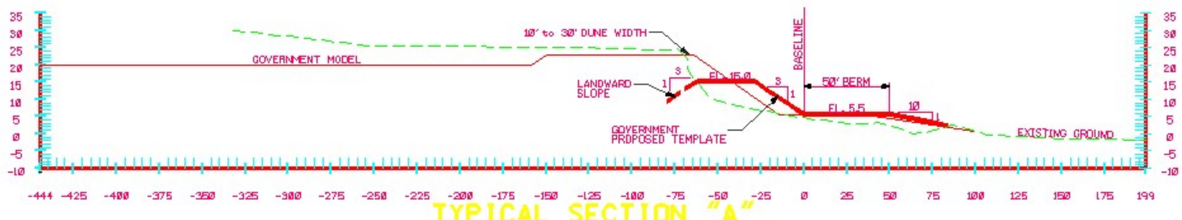


Location of Walton County project area



Location of the 5 construction reaches within the project area.





Selected plan typical cross sections to be constructed

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF:

PUBLIC NOTICE NO. FP10-WC01-10 **DRAFT**
CESAM-PD-EC

JOINT PUBLIC NOTICE
U.S. ARMY CORPS OF ENGINEERS
AND
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
FOR
WALTON COUNTY, FLORIDA

Interested persons are hereby notified that the U.S. Army Corps of Engineers, Mobile District (Corps) is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County's shoreline located in the Florida's panhandle is receding; the protective dunes and high bluffs are being destroyed by hurricane and storm forces that are occurring more frequently than before. The impacts of these storms to property and environmental resources are considerable and can possibly be reduced through a beach restoration and stabilization project which also includes environmental restoration opportunities associated with the beach and dune system. A feasibility study was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows:

Resolution Adopted July 15, 2002, by The United States Senate:

> *"Resolved by the Committee on Environment and Public Works of the United States Senate, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental recourses on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida.*

Resolution Adopted July 24, 2002, by The United States House of Representatives:

> *"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida.*

The non-Federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council (TDC).

This public notice is issued in accordance with rules and regulations published in the Federal Register on 26 April 1988. These laws are applied whenever dredged or fill materials may enter waters of the United States, or for the transportation of dredged material for the purpose of placement into ocean waters. The recipient of this notice is requested specifically to review the proposed action as it may have impact on water quality, relative to the requirements of Section 404(b)(1) of the Clean Water Act. Review of any other potential impacts is also requested.

WATERWAY AND LOCATION: Walton County, Florida

PROJECT AREA LOCATION: Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet (Figure 1). The western two-thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Walton County includes 11.9 miles of state-designated critically eroding areas and three State of Florida park areas that cover approximately six miles of the 26-mile shoreline.

PROPOSED ACTION: The Walton County upland cross-section is defined by dune elevations ranging from +9.5 to + 33 feet NAVD88 and a natural berm elevation of +5.5 feet NAVD88. The study region was divided into five study reaches based on structural development and state park areas as illustrated in Figure 2. The historical and 2004 beach surveys were used to develop 11 representative profiles which characterize the existing condition for the five study reaches. The representative profiles were identified based on similarity in shape of the upper beach profile (dune height and width, berm width, foreshore beach slope, and profile volume) and shape of the offshore profile.

The selected plan recommended for construction consists of the five construction reaches (Figure 2). The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. It is estimated that the necessary beach fill requirements will be 3,350,000 cubic yards (cy). Re-nourishments will be on a 12-year cycle with predicted volumes to be approximately 2,000,000 cy. Approved borrow sources lie offshore within the State of Florida waters. The typical cross-sections for the selected plan are illustrated in Figure 3. When dune construction is complete, the dune will be planted with at least three species of dune vegetation to create a dune that matches the surrounding natural dune patterns in the area. Upon reconstruction immediate steps will be taken to plant and stabilize the dune for rapid stabilization. This will be accomplished through the use of sand fences and dune plants. The dune plants will be planted to cover 60-80% of the total area. The vegetation will consist of local dominant species that populate nearby natural dune systems. The selection of the dune vegetation will consist of species that are most widely used for dune restoration and are readily available from local nurseries and suppliers. The selection will be coordinated with local experts familiar with dune ecosystems in the immediate area.

A large scale reconnaissance level geophysical, lithological and granulomteric investigation was undertaken off Walton County, Florida. Sub-bottom profiles were used to locate prospective core locations to identify high quality sand sources for beach nourishment. Vibracores and selected seismic records were interpreted to confirm the proposed borrow contains suitable beach compatible sediment. The borrow sediments are characterized as well sorted medium sand 0.25 - 0.50 mm. Borrow area B-4 shown on Figure 4 is the borrow site that was selected with some 10,000,000 cy proven by these initial investigations. This volume covers the recommended plan placement and the four planned subsequent re-nourishments for the next 50 years. The B-4 borrow area is most centrally located and offers the best source for the initial project construction and future re-nourishments. Based on the extensive geotechnical investigations, this borrow site has been demonstrated to be the most suitable source and has sand of color, size, and composition generally similar to that of the native beach. All materials used for beach nourishment will be excavated by hopper dredge, transported to the placement area offshore and pumped into the beach template. Small bulldozers will be used on land to shape the material to the design template (Figure 3).

WATER QUALITY CERTIFICATION: Pursuant to the requirements of the Clean Water Act, State Water Certification is required for the proposed action. Water quality certification is being requested for a period of ten (10) years. Upon completion of the required comment period and the State of Florida permitting requirements, a decision relative to water quality certification will be made by Florida Department of Environmental Protection (DEP).

COASTAL ZONE CONSISTENCY: Pursuant to the Coastal Zone Management Act, the proposed action is consistent with the Florida Coastal Management Program to the maximum extent practicable. Upon completion of the required comment period and the State of Florida permitting requirements, a decision relative to coastal zone consistency will be made by DEP.

USE BY OTHERS: The proposed action is not expected to create significant impacts on land and water use plans.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) CONSIDERATIONS:
The impacts associated with the dredging of the borrow site and beach placement activities have been addressed in the recent Draft 2010 Environmental Assessment (EA) for the Walton County, Florida Hurricane and Storm Damage Reduction Project, Walton County, Florida. A copy of the Draft EA is available for review at the following website: www.sam.usace.army.mil/Pd1.htm

SECTION 404(b)(1) EVALUATION REPORT: An evaluation of water quality impacts associated with the proposed action was prepared in accordance with guidelines promulgated by the Environmental Protection Agency under Section 404(b)(1) of the Clean Water Act. Impacts associated with this action include a temporary increase in turbidity and suspended solids concentrations in and adjacent to the disposal areas, short-term elimination of benthic organisms and localized short-term degradation of esthetics near the disposal area. A Draft 404(b)(1)

Evaluation Report has been prepared is available for review at the follow website: www.sam.usace.army.mil/Pd1.htm.

ENDANGERED/THREATENED SPECIES: There are several listed endangered and/or threatened species that would be affected by the proposed action. The known list of threatened or/and endangered species (T/E) and their critical habitats in the vicinity of the project include: sea turtles, Gulf sturgeon and associated critical habitat, piping plover, Choctawhatchee beach mouse (CBM) and associated critical habitat, and West Indian manatee. Previous coordination by the local sponsor (Walton County) has been conducted for the local Walton County Beach Nourishment Project in the same area, with the U.S. Department of the Interior, Fish and Wildlife Service (FWS). This coordination resulted in the preparation of a biological opinion (BO), which indicated that although the action may affect sea turtles, piping plover, and the CBM, it is their opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of these species and not likely to destroy or adversely modify designated critical habitat for the CBM. It has also been determined that the action is not likely to affect the West Indian manatee.

The Gulf sturgeon and their associated critical habitat fall under the jurisdiction of the U.S. Department of Commerce, National Marine Fisheries Service (NMFS). Previous consultation with NMFS for the local Walton County plan has indicated that similar actions were not likely to adversely affect Gulf sturgeon and is not likely to adversely affect Gulf Sturgeon critical habitat.

The Corps has initiated coordination with these agencies for the selected Federal plan to assure avoidance of any conflicts with these or other known threatened and endangered species and their critical habitats. Areas where the known species are suspected will be monitored before, during and after dredged disposal activities.

ESSENTIAL FISH HABITAT: Essential Fish Habitat (EFH) is defined as waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity, the designation and conservation of EFH seeks to minimize adverse effects on habitat caused by fishing and non-fishing activities. The NMFS has identified EFH habitats for the Gulf of Mexico in its Fishery Management Plan Amendments. These habitats include estuarine areas, such as estuarine emergent wetlands, seagrass beds, algal flats, mud, sand, shell, and rock substrates, and the estuarine water column.

During dredging and placement activities most of the motile benthic and pelagic fauna, such as crab, shrimp, and fish, should be able to avoid the disturbed area and should recover shortly after the activity is completed. The selected borrow area is characterized as sandy bottom and does not contain any hard-bottoms, coral reefs, oyster beds, or seagrasses. No long-term direct impacts to managed species are anticipated. However, it is reasonable to anticipate some non-motile and motile invertebrate species will be physically affected through the dredging and placement operations. These species are expected to recover rapidly after the dredging and disposal operations are complete.

Based on the above assessment of the project in relation to impacts to fisheries resources, the overall impact to identified species is considered negligible given the relatively small area. This action is being coordinated with the NMFS, Habitat Conservation Division pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265).

CULTURAL RESOURCES CONSIDERATION: In accordance with Section 106 of the National Historic Preservation Act and other relevant cultural resource laws, recommendations and actions are being coordinated with the Florida State Historic Preservation Officer (FLSHPO). The borrow area was surveyed for cultural resources in May and June of 2007 in which the survey found no cultural resources eligible for or listed on the National Register of Historic Places (Historic Properties). The shoreline will be reconstructed to historic dimensions. The nature of the work is such that the deposition will have no effect on historic properties. In addition, the nature of the project precludes any visual effects to historic properties. Based on this information, and the nature of the project, the Mobile District, as lead Federal agency, has determined that the project will have no effect on historic properties as per 36 CFR 800.4(d)(1).

CLEAN AIR ACT: Air quality in the vicinity of the proposed action would not be significantly affected with the proposed action. The equipment and machinery would generate some air pollution during construction activities, such as increased particulate levels from the burning of fossil fuels. However, these impacts would be minor and temporary in nature. The proposed action is in compliance with the Clean Air Act, as amended. The project area is in attainment with the National Ambient Air Quality Standards parameters. The proposed action would not affect the attainment status of the project area or region. A State Implementation Plan conformity determination (42 United States Code 7506(c)) is not required since the project area is in attainment for all criteria pollutants.

EVALUATION: The decision whether to proceed with the proposed action would be based on an evaluation of the overall public interest. That decision would reflect the national concerns for both protection and utilization of important resources. The benefits that may be expected to accrue from this proposal must be balanced against its reasonably foreseeable detriments. The decision whether to proceed, and the conditions under which the activity would occur, would be determined by the outcome of this general balancing process. All factors that may be relevant to the proposal would be considered. Among these are conservation, economics, esthetics, general environmental concerns, wetlands historic properties, 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, considerations of property ownership, and in general, the needs and welfare of the public.

The proposed action would proceed unless it is found to be contrary to the overall public interest. Inasmuch as the proposed work would involve dredging and discharge of materials into navigable waters, specification of the proposed placement sites associated with this Federal project is being made through the application of guidelines promulgated by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army. If these guidelines alone prohibit the specification of any proposed disposal site, any potential impairment of the maintenance of navigation, including any economic impacts on navigation and anchorage that would result from the failure to use this site would also be considered.

<u>COORDINATION</u>: Among the agencies receiving copies of this public notice are:

Region 4, U.S. Environmental Protection Agency
Field Representative, Fish and Wildlife Service
Regional Director, National Park Service
Regional Director, National Marine Fisheries Service
Commander, Eighth Coast Guard District
Florida State Historic Preservation Officer
Florida Department of Environmental Protection
Gulf of Mexico Fishery Management Council
Federal Emergency Management Agency

Other Federal, State, and local organizations, affiliated Indian Tribe interests, and U.S. Senators and Representatives of the State of Florida are being sent copies of the notice and are being asked to participate in coordinating this proposed work.

<u>CORRESPONDENCE</u>: Any person who has an interest that may be affected by the proposed activity may request a public hearing. Any comments or requests for a public hearing must be submitted in writing to the District Engineer within 30 days of the date of this public notice. A request for a hearing must clearly set forth the interest that may be affected and the manner in which the interest may be affected. You are requested to communicate the information contained in this notice to any other parties who may have an interest in the proposed activities. Correspondence concerning the public notice should refer to Public Notice No. FP10-WC01-10 and should be directed to the Commander, U.S. Army Engineer District, Mobile, P.O. Box 2288, Mobile, Alabama 36628-0001, ATTN: CESAM-PD-EC. For additional information please contact Larry Parson at (251) 690-3139.

CURTIS M. FLAKES
U.S. Army Corps of Engineers
Mobile District

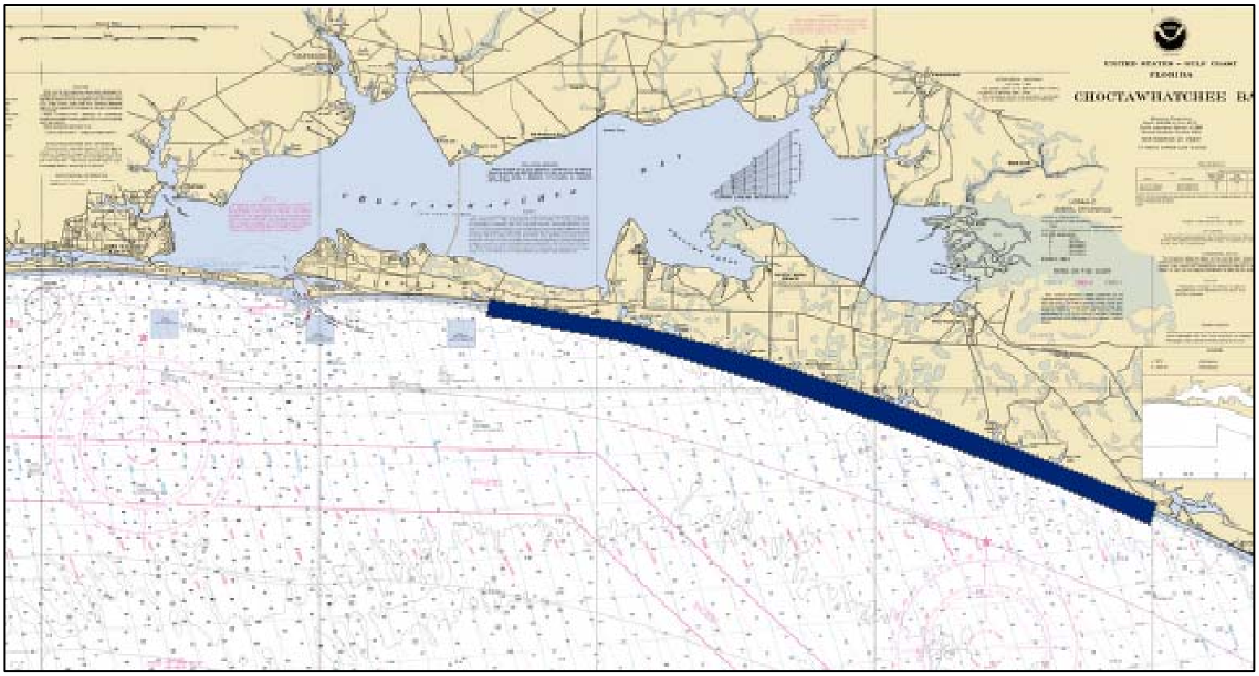


Figure 1. Location of Walton County project area

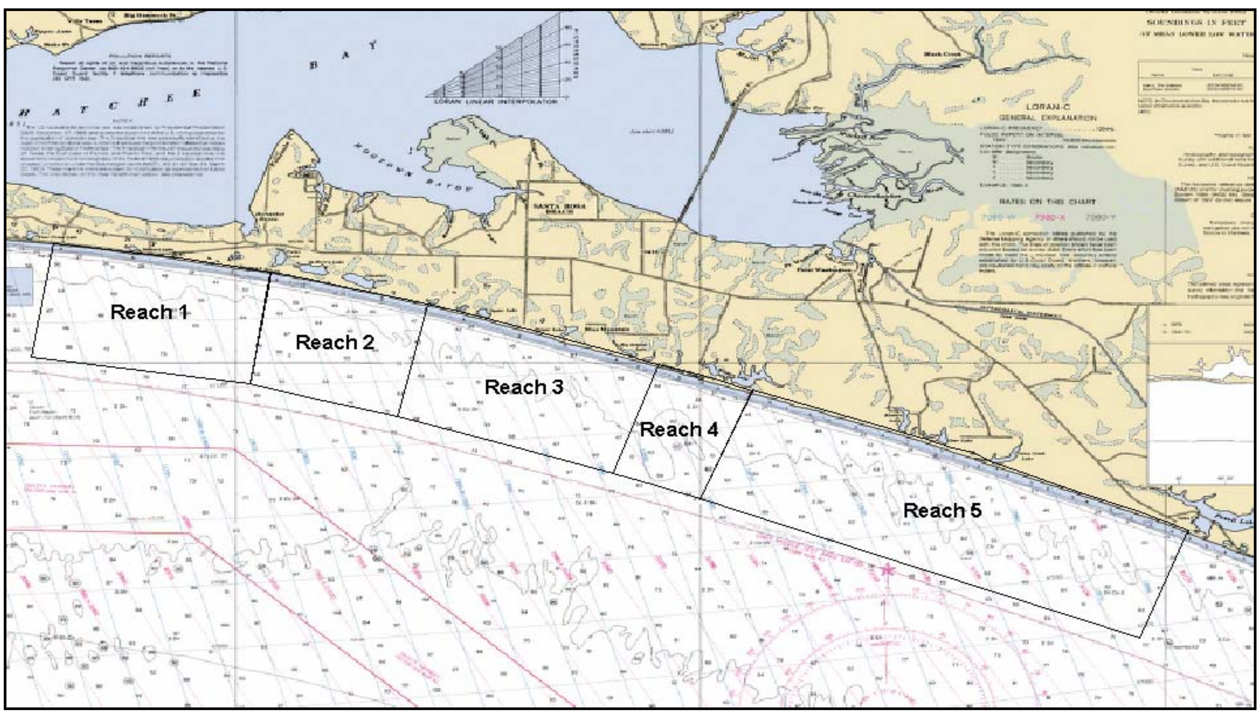


Figure 2. Location of the 5 construction reaches within the project area.

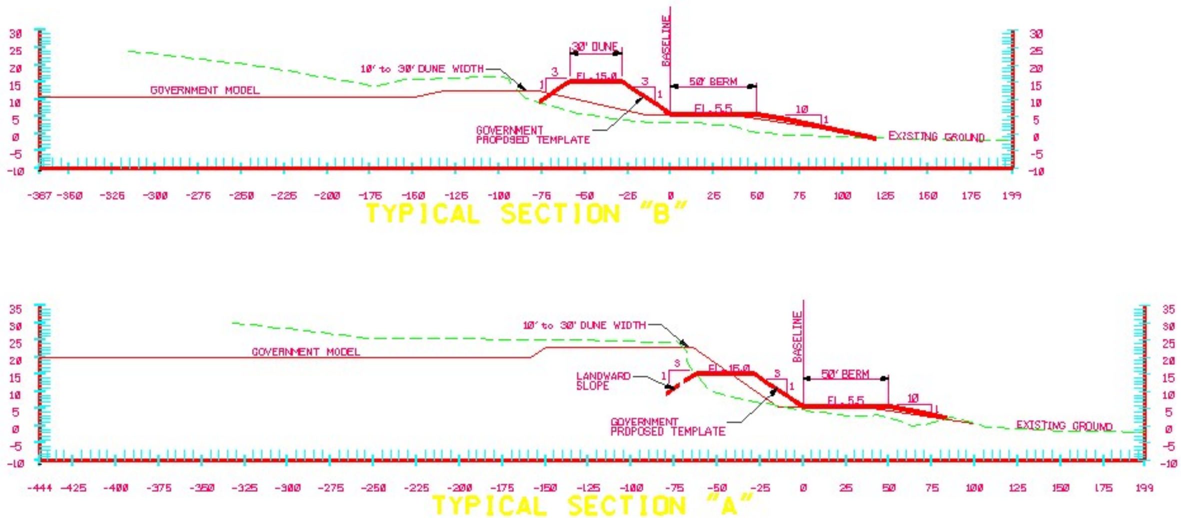


Figure 3. Selected plan typical cross sections to be constructed

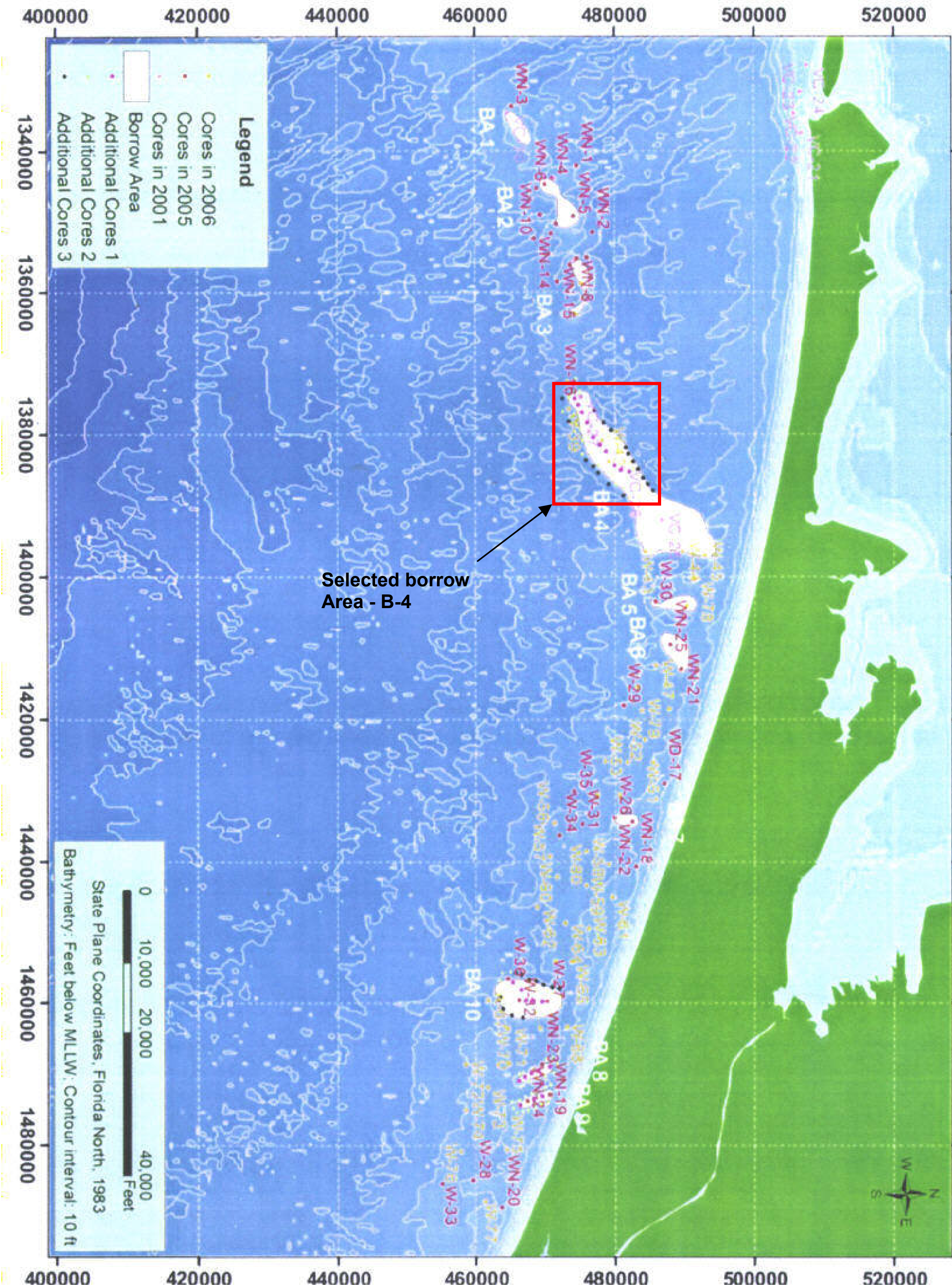


Figure 4. Borrow area investigation locations and selected borrow site.

Parson, Larry E SAM

From: Ryan Hendren [Ryan.Hendren@noaa.gov]
Sent: Monday, March 01, 2010 2:52 PM
To: Parson, Larry E SAM
Subject: Walton County Hurricane Damage Reduction Project

Larry:

Upon review of your project, it looks like the Walton County Hurricane Damage Reduction Project (T/SER/2010/00241) would be covered by a previously issued informal consultation letter for Walton County Board of County Commissioners (I/SER/2007/06965). This consultation reviews the effects of a project that is essentially the same as the current proposed project, with a larger scope than the current one proposed by the USACE. It is understood that the effects of the current project would be less than that of the previously issued project and would be subject to the same conditions listed in the previous consultation letter (I/SER/2007/06965). If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action, consultation will need to be reestablished.

Please contact me if you have any additional questions. -rH

--
Ryan Hendren
Office of Protected Resources
National Marine Fisheries Service
263 13th Ave S
St. Petersburg, FL 33701
PH: (727) 824-5312
FX: (727) 824-5309
Email: ryan.hendren@noaa.gov
Web: http://sero.nmfs.noaa.gov/pr/pr.htm

KPB
ME

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

Mr. Kenneth P. Bradley
Mobile Planning and Environmental Division
Mobile USACE
Post Office Box 2288
Mobile, Alabama 36628-0001

March 11, 2010

Re: DHR Project File No. 2010-529/ Received by DHR: January 26, 2010
U.S. Army Corps of Engineers, Mobile District
Florida Hurricane and Storm Damage Reduction Project
Walton County

Dear Mr. Bradley:

This office reviewed the referenced project for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places. The review was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, 36 CFR Part 800: Protection of Historic Properties, and the National Environmental Policy Act of 1969, as amended.

We note that the project area has previously been subjected to a cultural resource assessment, reviewed by our office in December 2008 (DHR Project File No. 2008-2705). The results of this survey indicate that there are no historic properties located within the area of potential effect for this project. Therefore, this office concurs with your determination that the proposed undertaking will have no effect on historic properties.

If you have any questions concerning our comments, please contact Samantha Earnest, Historic Preservationist, by electronic mail *swearnest@dos.state.fl.us*, or at 850.245.6333.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

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 824-5300
http://sero.nmfs.noaa.gov

October 6, 2010 F/SER46:MT/mt

Ms. Jennifer L. Jacobson
Chief, Coastal Environment Team
Mobile District, Corps of Engineers
P.O. Box 2288
Mobile, Alabama 36628-0001

Dear Ms. Jacobson:

NOAA's National Marine Fisheries Service (NMFS), Habitat Conservation Division, has received your letter dated January 13, 2010, initiating essential fish habitat (EFH) consultation and providing an EFH Assessment for beach nourishment, shore protection and related improvements in the Gulf of Mexico and Walton County, Florida. This request was initiated pursuant to the consultation provisions of the Magnuson-Stevens Conservation and Management Act (Magnuson-Stevens Act).

Based on today's conversation between our staff and the information provided in your January letter and today, via email, it is the Corps of Engineers position the borrow sites are designed to avoid post-dredging negative impacts and the placement of the material along the shore would not adversely affect EFH for any species managed under the Magnuson-Stevens Act. We have reviewed the EFH Assessment and subsequent information and determined the NMFS does not have any EFH conservation recommendations to offer.

Thank you for you effort to comply with the EFH provisions of the Magnuson-Stevens Act. If you have any questions, please contact Mark Thompson at our Panama City, Florida office. His telephone number is 850-234-5061.

Sincerely,

W. Mark Thompson

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc:
F/SER4
F/SER3

Larry -

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721
Tel: (850) 769-0552
Fax: (850) 763-2177

IN REPLY REFER TO:

February 22, 2010

Kenneth P. Bradley
Department of the Army
Mobile District, Corps of Engineers
Coastal Environment Team
Mobile, AL 36628

Re: Walton County Beach Nourishment
Coastal Barrier Resources Act
Walton County, Florida

Dear Mr. Bradley:

Thank you for your letter to the Fish and Wildlife Service (Service) dated January 15, 2010, requesting consultation under the Coastal Barrier Resources Act (CBRA) for the Walton County, Florida, hurricane and storm damage reduction project. The proposed project will occur along approximately 26 miles of Walton County shoreline. Portions of the project area are located within the following units of the Coastal Barrier Resources System (CBRS): P32 (Moreno Point), P31A (Four Mile Village), FL-96 (Draper Lake), FL-95P (Grayton Beach), FL-94 (Deer Lake Complex), and FL-93P (Phillips Inlet). The U.S. Army Corps of Engineers has determined that the project would qualify for an exception under Section 6 of CBRA.

In order to qualify for such an exception, a project must first be established as consistent with the purpose of CBRA, which is to minimize 1) loss of human life, 2) wasteful expenditure of Federal revenues, and 3) the damage to fish, wildlife and other natural resources. To achieve this purpose, CBRA restricts Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers, and "by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved." When an area is located in the CBRS, CBRA prohibits most new Federal assistance, including subsidies for shoreline stabilization, flood insurance, road construction, channel dredging, and other coastal projects in that area. The Service has determined that this project is not consistent with the purpose of CBRA.

Coastal barriers are dynamic systems that include an ever changing mosaic of habitats and that have been on the move through the millennia due to sea level changes. Erosion and accretion are natural processes that continually change their profile, especially during storms. Together with their adjacent wetland, marsh, estuarine, inlet, and nearshore water habitats, coastal barriers support a variety of organisms. The geomorphic characteristics of barrier islands, peninsulas, beaches, dunes, overwash fans, and inlets are critical to a variety of fish and wildlife resources, and they influence a barrier beach's ability to respond to wave action, including natural storm resources that shape and re-shape themselves over time and through the natural disturbance caused by storms. The fish and wildlife that live in and around them have adapted to, and thrive on, this constant, natural change.

Today, large-scale coastal development disrupts natural coastal processes and dynamics. Since the 1980s beach nourishment has been used in Florida as the preferred solution to the conflict between dynamic beaches and development. While nourishment technology and environmental safeguards have improved, the negative effects to coastal dependent species outweigh the potential benefits.

Even under the best circumstances (e.g., when high quality materials are used, and project design and implementation are sound) the purpose of beach nourishment is typically for structure protection and not restoration of species habitat. As long as there are immovable structures along the shoreline, species habitat cannot be fully restored. For example, sea turtles nest on oceanfront beaches even when they are eroding. The placement of sand on a beach with reduced dry foredune habitat may support sea turtle nesting habitat if that sand is highly compatible (in terms of grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project. However, even with these safeguards, sea turtle nesting continues to be negatively affected for the first few years after nourishment, as evidenced by reduced nesting and nest emergence success.

Coastal dune lakes are lakes that occur in coastal communities along the Gulf of Mexico. The lakes are separated from the Gulf by a barrier beach and dune system which may be intermittent with or without a meandering tidal outlet. The lakes are important breeding areas for insects and crustaceans. Many birds and mammals also utilize the lakes for food and habitat. They are considered "imperiled globally because of rarity" by the Florida Natural Areas Inventory (FNAI) (FNAI and Florida Department of Natural Resources (FDNR), 1990). Water is generally from lateral ground water seepage through well-drained coastal sands (Griffith et al., 1995). Dune lakes fluctuate in water level and vary in salinity due to tidal exchange from the lake outflow, storm surge events, rainfall, evaporation, and wetland drainage (FNAI and FDNR, 1990). The 16 dune lakes that occur in Walton County vary in the amount of shoreline development. All lakes are subject to flooding. Breaching of the outlets allows the lakes to function naturally, draining and filling. To date, no reports indicate that nourishment would improve the natural function of the coastal dune lake system.

In its 2009 report on beach erosion, the Florida Department of Environmental Protection (FDEP) designates seven critically eroded areas in Walton County, comprising a total of 15.7 miles (FDEP 2009). The report defines a critically eroded area as "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." The critically eroded portions in Walton County were so designated because the erosion primarily threatens development in the county, though it may also threaten recreational interests and/or roads. The report further notes that a beach nourishment project for the western 5 miles of Walton County's beaches, partially in CBRS Unit P32, was completed in 2007. Given that erosion is a naturally occurring and recurring process, and that more than half the project area is considered critically eroded by the state, the request for Federal authorization to fund this project is a strong indicator that additional requests will be made for beach nourishment on a routine basis. CBRA recognizes the inherent nature of shifting shores and attempts to preserve that characteristic by preventing Federal funding for shoreline protection that could have the effect of shoreline stabilization. The very nature of beach restoration/nourishment requires regular replenishment of sand, in this case, using Federal expenditures. Thus, we cannot conclude that regularly adding sand into that system is not a wasteful expenditure.

Beach replenishment frequently leads to more development in greater density within shorefront communities, which are then faced with the need for future replenishment or more drastic stabilization measures (Pilkey and Dixon 1996). The very existence of a beach nourishment project can encourage more development in coastal areas (Dean 1999, Ruppert et al. 2008), especially if Federal funds subsidize each future erosion control event. This happens even within public lands due to such things as increased camp sites, parking areas, etc. We recognize that not nourishing the beaches within the CBRS may decrease the longevity and durability of the proposed Federal project on the adjacent developed lands. For that reason, we understand that the intent of inclusion of those CBRS beaches in the nourishment project is to support the adjacent developed beaches, not to improve the habitat for natural resources. Further development within public lands and the properties adjacent to CBRS units will not serve to minimize future loss of human life or damage to fish and wildlife resources.

Since the proposed project is not consistent with the purposes of CBRA, a request for an exception under Section 6 is not appropriate. However, we also note that the law further prohibits financial assistance from being made available for "the carrying out of any project to prevent the erosion of, or to otherwise stabilize, any inlet, shoreline, or inshore area" unless it meets the criteria for an exception under section 6. To qualify under section 6, a nonstructural shoreline stabilization project must be "designed to mimic, enhance, or restore a natural stabilization system." This project has not been designed to do this, or to provide significant enhancement to the fish and wildlife resources of the CBRS unit aside from adding sand to the dynamic system. It is designed to provide stability to the lands adjacent to the CBRS units that are developed. We do not identify a need for adding sediment to the beaches at this time for the benefit of fish and wildlife resources.

If you have any questions, please contact Melody Ray-Culp of this office at extension 232.

Sincerely,

Donald W. Imm, PhD
Assistant Project Leader

cc: Cynthia Bohn, FWS, Regional Office, Atlanta, GA
Katie Niemie, FWS, 4401 N. Fairfax Dr., Room 860A, Arlington, VA 22203

Citations

Dean, C. 1999. Against the tide: the battle for America's beaches. Columbia University Press; New York, NY.

Florida Department of Environmental Protection. 2009. Critically eroded beaches in Florida. 75 pages.

Florida Natural Areas Inventory (FNAI) and Florida Department of Natural Resources (FDNR). 1990. Guide to the natural communities of Florida.

Griffith, G.E., D.A. Canfield, Jr., J.M. Omernikm. 1995. Lake Regions of Florida. USEPA, Environmental Research Laboratory. Corvallis, Oregon.

Pilkey, O.H. and K.L. Dixon. 1996. The Corps and the shore. Island Press; Washington, D.C.

Ruppert, T.K., T. Ankersen, C. Covington, R. Feinberg, Y. Huang, M. McDonnell, and A. Miller. 2008. Eroding long-term prospects for Florida's beaches: Florida's coastal management Policy. University of Florida Institute for Food and Agricultural Sciences, report to Sea Turtle Grant Program (Contract #07-019E). 157 pages.

Parson, Larry E SAM

From: Melody_Ray-Culp@fws.gov
Sent: Friday, April 20, 2012 10:09 AM
To: Parson, Larry E SAM
Cc: Newell, David P SAM; Jacobson, Jennifer L SAM; Creswell, Michael W. SAM
Subject: Re: CBRA - Walton County Hurricane and Storm Damage Reduction Project (UNCLASSIFIED)

Hello Larry,

Your email states that the Corps will ensure that no federal funding will be used to pay for the portions of this project that occur in any CBRA units. Federal funding will only pay for portions of the project that occur outside of CBRA units.

Given this assurance, I am confirming with this email that the Corps' obligations under CBRA are satisfied for this project.

Thank you for your efforts in support of CBRA.

Melody

~~~~~~~~~~~~~~~~~~~~~~~~
Melody Ray-Culp
Florida Panhandle Coastal Program
U.S. Fish & Wildlife Service
1601 Balboa Avenue
Panama City, FL 32405
850-769-0552 ext. 232
Melody_Ray-Culp@fws.gov
~~~~~~~~~~~~~~~~~~~~~~~~

Inactive hide details for "Parson, Larry E SAM" <Larry.E.Parson@usace.army.mil>"Parson, Larry E SAM" <Larry.E.Parson@usace.army.mil>

"Parson, Larry E SAM" <Larry.E.Parson@usace.army.mil>

04/18/2012 10:34 AM

To

"Melody Ray-Culp (melody_ray-culp@fws.gov)" <melody_ray-culp@fws.gov>

cc

"Newell, David P SAM" <David.P.Newell@usace.army.mil>, "Creswell, Michael W. SAM" <Michael.W.Creswell@usace.army.mil>, "Jacobson, Jennifer L SAM" <Jennifer.L.Jacobson@usace.army.mil>

Subject

CBRA - Walton County Hurricane and Storm Damage Reduction Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Melody,

As per our phone conversation yesterday, the Corps is going out for public review of the Walton County Hurricane and Storm Damage Reduction Project Draft Report and would like to provide information on how we anticipate proceeding with this project regarding the Coastal Barrier Resources Act (CBRA). We initially requested CBRA consultation regarding this project by letter dated January 15, 2010 (attached) requesting concurrence that the project would qualify for an exemption under Section 6 exemptions for CBRA units P31A, FL-96, and FL-94. By letter dated February 22, 2010 (attached) your agency responded with the determination that the Walton County project is not consistent with the purposes of CBRA under the Section 6 Exemption. In order to resolve this issue, the Corps has taken steps to ensure that all work within the concerning CBRA zones will be 100% funded by the local sponsor so that no federal funding will be used towards construction within the CBRA areas. Our March 2011 version of the Draft Report contains language stating that work within the CBRA zones will be funded by the non-federal sponsor and, as a result, CBRA is no longer applicable.

Our next step in the planning process is the public review of the Draft Report. We are providing this information to ensure that the FWS is aware of our position and how we are planning to proceed regarding this issue. Your response to this email regarding your position on this matter is greatly appreciated. Please let me know if you have any questions or need any other information on this.

Sincerely,

Lp

Larry Parson
U.S. Army Corps of Engineers, Mobile
Coastal Environment Team
(251)690-3139

Larry Parson
U.S. Army Corps of Engineers, Mobile
Coastal Environment Team
(251)690-3139

Classification: UNCLASSIFIED
Caveats: NONE

[attachment "Walton Co CBRA Letter - 1-15-10.pdf" deleted by Melody Ray-Culp/R4/FWS/DOI] [attachment "FWS - CBRA Letter 2-22-10.pdf" deleted by Melody Ray-Culp/R4/FWS/DOI]

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721
Tel: (850) 769-0552
Fax: (850) 763-2177

IN REPLY REFER TO:

October 14, 2012

Mr. Kenneth P. Bradley, Chief
U.S. Army Corps of Engineers
Mobile District, Corps of Engineers
Environment and Resources Branch
Mobile, Alabama 36628-0001

Attn: Mr. Larry Parsons

Re: FWS Log No. 41410-2011-CPA-0015 and
04EF3000-2012-CPA-0112
Date Started: February 2, 2010; July 11, 2012
U.S. Army Corps of Engineers, Mobile District
Project Title: Hurricane and Storm Damage
Reduction Project, Walton County, Florida
Location: Gulf of Mexico
Ecosystem: NE Gulf
County: Walton County, Florida

Dear Mr. Bradley:

Enclosed is the Fish and Wildlife Service's (Service) final Fish and Wildlife Coordination Act report (Report) concerning the feasibility of a federal Hurricane and Storm Damage Reduction project in Walton County, Florida. The report is submitted in accordance with the Fiscal Year 2010 funding agreement between the Service and the U.S. Army Corps of Engineers (Corps) Mobile District. This report is prepared in accordance with the requirements of the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661 et seq.).

The Report provides a description of the natural resources including federally protected species and other resources under the Service's responsibility, potential affects of the project, and recomendations to avoid or minimize potential impacts of the project. We appreciate the coordination of the Corps in completing this report.

Please contact Ms. Patty Kelly of this office concerning this project. She may be reached at ext. 228 at the above telephone number.

Sincerely,

Dr. Donald W. Imm
Project Leader

Enclosure:
Final FWS FWCA Report

Panama City FOS:pkelly\Section7\biologicalopinions\Walton County Beach Nourishment\ Corps Federal Project|20121014_ltr_FWS_to_Coprs_finalFWCArpt_WaltonCo_FL.doc

FISH AND WILDLIFE COORDINATION ACT REPORT WALTON COUNTY, FLORIDA HURRICANE AND STORM DAMAGE REDUCTION PROJECT WALTON COUNTY, FLORIDA

FINAL

SUBMITTED TO
U.S. ARMY CORP OF ENGINEERS
MOBILE DISTRICT
MOBILE, ALABAMA

PREPARED BY:
U.S. FISH AND WILDLIFE SERIVCE
PANAMA CITY FIELD OFFICE, FLORIDA
October 14, 2012

TABLE OF CONTENTS

INTRODUCTION

The Walton County, Florida Hurricane and Storm Damage Reduction project was authorized by a resolution of both the United States Senate and House of Representatives, which reads as follows: Resolution Adopted July 15, 2002, by The United States Senate:

> "Resolved by the Committee on Environment and Public Works of the United States Senate, that in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and related improvements in Walton County, Florida, in the interest of protecting and restoring the environmental resources on and behind the beach, including the feasibility of providing shoreline and erosion protection and related improvements consistent with the unique characteristics of the existing beach sand, and with consideration of the need to develop a comprehensive body of knowledge, information, and data on coastal area changes and processes as well as impacts from federally constructed projects in the vicinity of Walton County, Florida."

Resolution Adopted July 24, 2002, by The United States House of Representatives:

> "Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, that in accordance with Section 110 of the Rivers and Harbors Act of 1962, the Secretary of the Army is requested to review the feasibility of providing beach nourishment, shore protection and environmental restoration and protection in the vicinity of Walton County, Florida."

A draft General Reevaluation Report and Environmental Assessment was prepared by the U.S. Army Corps of Engineers (Corps) in January 2010 (U.S. Army Corps of Engineers 2010).

The non-Federal sponsor is the Walton County Board of Commissioners. Their central point of contact is the Director of Beach Management for the Walton County Tourist Development Council.

PROJECT DESCRIPTION (taken almost verbatim from the Corps Draft Environmental Assessment—January 2012)

The proposed action is to create a shore protection project for Walton County, Florida, which would reduce the damaging effects of hurricanes and severe storms to properties and environmental resources along the coast and stabilize or restore the shoreline by reducing long-term erosion. The entire coastline is being assessed for borrow sites. Searches for offshore borrow locations require sufficient quantities of beach quality material for the initial beach placement and future re-nourishments.

In addition to storm damage protection the proposed action is stated to provide environmental restoration opportunities. Such an action could provide restoration opportunities to valuable dune and beach habitat supporting general beach ecosystem functions. Restoring the beach habitat that historically supported a variety of associated flora and fauna that naturally occur in the immediate vicinity could provide continued sustainability to the fragile ecosystems of the dune lakes that exists in the area. With development on or adjacent to coastal areas future conditions associated with not restoring the beach and dune system would result in the continued absence of a valuable beach ecosystem and loss of these types of habitats and associated benefits.

DESCRIPTION OF THE PROJECT AREA

The beaches of Walton County, Florida encompass approximately 26 miles of shoreline extending from the Okaloosa/Walton County line, to the Walton/Bay County line. The western two thirds of Walton County are comprised of a coastal peninsula extending from the mainland, and the eastern third is comprised of mainland beaches. Choctawhatchee Bay lies north of the peninsula. Three State of Florida parks cover approximately 6 miles of the 26-mile shoreline with the remaining 20 miles of beach being developed. Walton County includes 11.9 miles of state-designated critically eroding areas.

The proposed plan recommended for selection to construct is the Local Preferred Plan identified in the feasibility report which consists of five of the construction reaches. The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The modeling efforts have predicted fill requirements of 2,400,000 cubic yards (cy). This plan extends the coverage area to the westernmost limits of the county where the National Economic Development Plan could not justify the coverage. The model assumes an annual erosion rate of 100,000 cy annually lost to the system, thereby creating a re-nourishment cycle every 12 years requiring 1,200,000 cy of placement. However, recent surveys have shown that the erosion during a period of non-storm event activity has produced an initial placement of 2,980,000 cy. If this condition can be extrapolated to the predicted construction timeframe over a two year period, then the necessary beach fill requirements may be 3,350,000 cy. Re-nourishments will still be on a 12-year cycle but the re-nourishment volumes will increase to approximately 2,000,000 cy. When dune construction is complete, the dune will be planted with at least three species of dune vegetation.

FISH AND WILDLIFE RESOURCES

Florida has over 825 miles of sandy beaches; 26 of those miles occur along the Gulf of Mexico beachfront in Walton County. The Corps project would cover 20 of those miles outside of State owned lands. While the project is centered on the sandy beach, the beach is part of the coastal ecosystem that includes the nearshore, swash zone (wet and dry beachface), foredunes, primary, secondary, and scrub dunes, interdunal swales, coastal dune lakes, and offshore borrow sites. Collectively these coastal ecosystems are dynamic and experience erosional and accrectional fluctuations from sedimentary exchange between dune, beach, and offshore sand sources.

The exposed sandy beach portion of the ecosystem is physically dynamic, inhabited by specialized biotic assemblages that are structured mainly by physical forces (Defeo and McLachlan 2005). The beach is in a constant state of flux, accreting and eroding in response to waves, currents, winds, storms, and sea-level change. A natural beach represents a productive habitat supporting dense concentrations of benthic invertebrates that feed surf fish, resident and migrating shorebirds, and the nesting of sea turtles (Brown and McLachlan 1990). The intertidal areas of beaches provide habitats for a diversity of fauna. The environment between the grains of sand harbors interstitial organisms (bacteria, protozoans, microalgae and meiofauna), forming a distinct food web. Larger macrobenthic invertebrates burrow actively and include representatives of many phyla, but crustaceans, mollusks and polychaete worms are usually dominant and encompass predators, scavengers, and filter and deposit feeders. Most beach species are found in no other environment, their unique adaptations for life in these dynamic systems include: mobility, burrowing ability, protective exoskeletons, rhythmic behavior, orientation mechanisms and behavioral plasticity (Chelazzi and Vannini 1988; Scapini et al. 1995; Brown 1996; Scapini 2006).

The most distinctive feature of coastal dunes is their border with the sea and landward migration and the resultant physical, chemical and vegetation gradients that are more biologically than physically structured (McLachlan 1991). They have well drained sands, subject to desiccating effects of salt spray and low nutrients (van Heerdt & Morzer Bruyns 1960; Callan 1964; Skiba & Wainwright 1984). They are, however, relatively well supplied with moisture because of their location adjacent to the ocean and exhibit more predictable and moderate conditions. Coastal dunes are not marked by pulses, although, wrack inputs from the sea may be erratic following storms, and rainfall may be seasonal. Rather they have more constant climates and organic inputs, and often exhibit marked succession in their vegetation (Noy-Meir 1980). The ultimate control of the gradient across coastal dunes and the resulting vegetation succession is by wind. By its strength, frequency and prevailing direction, especially in terms of the land/sea interface, it controls (1) sand movement, (2) dune forms, (3) microclimate, (4) seed and detritus dispersal, and (5) salt spray load and the form of the gradient inland from the beach, thereby influencing both vegetation and fauna. Vegetation within the project area consists of sea oats in the lower elevation dunes. Other vegetation includes panic grass, morning glory, railroad vine, sand spur, and other grasses and sedges. Higher elevation dune contains additional species such as scrub oaks, briers, saw palmetto, rosemary, lupine, goldenrod, salt bush, and groundsel tree.

Beaches, swash zone, and dunes are closely linked through the storage, transport and exchange of sand. Sand transport, driven by waves on the wet side and wind on the dry side, is highest in exposed surf zones, whereas sand storage is often greatest in well-developed dunes. Sand tends to move rapidly seawards across the beach and surf zone during storms and to return more slowly landwards during calm periods (Short 1999; Nordstrom 2000). Besides sediment, climatic interactions and moisture, three materials are exchanged across the dune/ beach interface: (1) groundwater; (2) salt spray; and (3) living and dead organic materials (McLachlan 1988). Animals from both habitats move across the dune/beach interface to feed.

The beach and dune ecological community provides a wide range of ecosystem services, many of which are essential to support human uses of sandy coasts. The most important ecosystem services include: (1) sediment storage and transport; (2) wave dissipation and associated buffering against extreme events (storms); (3) dynamic response to sea-level rise (within limits); (4) breakdown of organic materials and pollutants; (5) water filtration and purification; (6) nutrient mineralization and recycling; (7) water storage in dune aquifers and groundwater discharge through beaches; (8) maintenance of biodiversity and genetic resources; (9) nursery areas for juvenile fishes; (10) nesting sites for turtles and shorebirds, and rookeries for pinnipeds; (11) prey resources for resident and migratory birds and terrestrial wildlife; (12) scenic vistas and recreational opportunities; (13) bait and food organisms; and (14) functional links between terrestrial and marine environments in the coastal zone.

Development on or adjacent to coastal areas continues to be a problem as more and more people are moving to or visiting coastal areas. Coastal development may include, but is not limited to, the construction of roads, highways, public infrastructure, hotels, condominiums, houses, harbors, and the need for associated shoreline protection. The development becomes a fixed landward boundary that prevents or disrupts the dynamic coastal processes and sedimentary exchanges. These pressures, collectively termed coastal squeeze (Doody 2001), lead to the reduction of habitat for coastal dependent species.

Coastal dune lakes are lakes that occur in coastal communities that have outlets to the ocean and are documented from only a few places throughout the world (Madagascar, Australia, and New Zealand, Texas, Florida panhandle) (Timms 1997; Norris et al. 1993; Wones and Larson 1991). The lakes are important breeding areas for insects and crustaceans. Many birds and mammals also utilize the lakes for food and habitat.

There are 16 dune lakes in Walton County. The coastal dune lakes in the Florida panhandle are considered unique in that a single, intermittent, connection between the lake and the Gulf of Mexico permits water exchange (FNAI and FDNR 1990). These intermittent connections to the Gulf distinguish these lakes as rare and are considered "imperiled globally due to extreme rarity" by the Florida Areas Natural Inventory (FNAI).

Some of the coastal dunes lakes have a dune system 500 feet wide and ridges extending 10 to 30 feet in height. The lakes are generally shallow irregularly shaped (sometimes elliptical) depressions that are permanent water bodies (FNAI and FDNR 1990). Water is generally from lateral ground water seepage through well-drained coastal sands (Griffith et al. 1995). Dune lakes fluctuate in water level and vary in salinity due to tidal exchange from the lake outflow, storm surge events, rainfall, evaporation, and wetland drainage into the lakes from the Gulf of Mexico (FNAI and FDNR 1990). Shoreline vegetation of dune lakes within the Gulf Coast Lowlands Lake Region generally consists of xeric coastal strand and pine scrub vegetation (Griffith et al. 1995). Aquatic vegetation is typically restricted to a narrow band along the shore (FNAI and FDNR 1990). The bottom sediments of coastal dune lakes typically consist of sands with organic deposits (FNAI and FDNR 1990) and a variety of different formations of clay. Water chemistry of coastal dune lakes is generally acidic, tannic and low in nutrients, with varying salinity (Griffith et al. 1995).

Coastal dune lakes are the central and terminal feature of small coastal watersheds. They result from the drainage of an immediate area to a small catchment basin. For this reason, each lake has the potential and likelihood to possess unique characteristics that reflect this small drainage through unique land use combinations. However, this attribute (small watershed scale) also makes these waterbodies susceptible to water quantity and quality changes that will result from relatively small changes in their respective watersheds. In other words, watershed land use changes of typical scale have the potential to have a larger and more profound effect on resulting water quality and quantity.

SPECIES AT RISK

Solitary Bee

The project occurs within the range of the solitary bee (*Hesperapis oraria*) (**Figure 1**). The Service has been reviewing its status to determine the need to protect it under the federal Endangered Species Act. Very little is known of the biology and population size of this species. What is known is that it has only been found in coastal regions and may be obligated to collecting pollen from only one species of plant, the coastal plain honeycombhead (*Balduina angustifolia*) (Cane 1995).

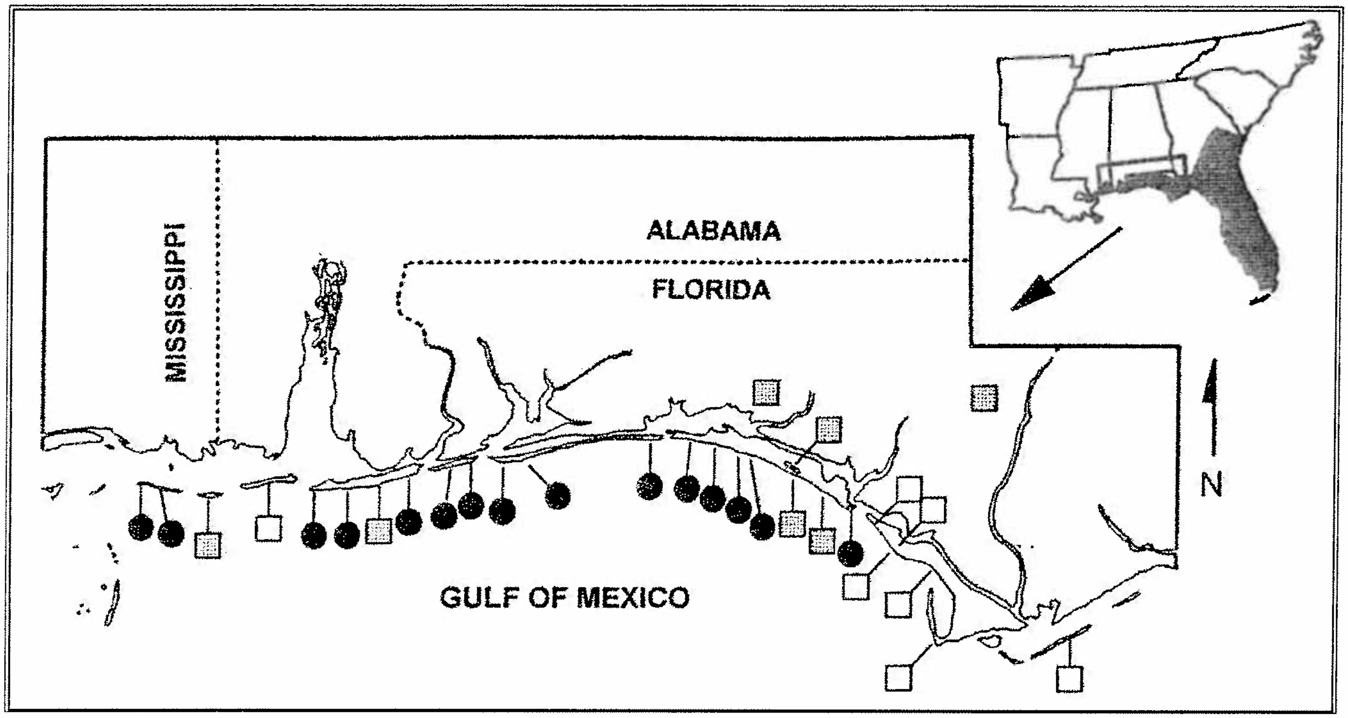


Figure 1. Map of the northern coast of the Gulf of Mexico. Adult *H. oraria* and its floral host were found at sites marked with solid black circles. Sites with blooming *B. angustifolia* that lacked *H.oraria* are marked with shaded squares. Seemingly suitable dune habitats that lacked both the bee and its floral host are marked with unshaded squares. The range of *B. angustifolia* is shaded on the inset map (Cane et al. 1996) which shows that presence of the plant is not the limiting factor.

FEDERALLY LISTED SPECIES

Sea Turtles

Four species of sea turtle occur in the waters of the Gulf of Mexico offshore of Walton County, Florida: loggerhead, green, leatherback, and Kemp's ridley sea turtles. All four species are federally listed and have been documented to nest on the beaches in Walton County.

The production of the next generation of sea turtles results from a synergism of the effects of the ecological conditions in the foraging area on the energetics of the female and of the beach environmental conditions on development of the embryos. To be successful, reproduction must occur when environmental conditions support adult activity (e.g., sufficient quality and quantity of food in the foraging area, suitable beach structure for digging, nearby inter-nesting habitat) (Georges et al. 1993). The environmental conditions of the nesting beach must favor embryonic development and survival (i.e., modest temperature fluctuation, low salinity, high humidity, well drained, well aerated) (Mortimer 1990, 1995). Additionally, the hatchlings must emerge to onshore and offshore conditions that enhance their chance of survival (e.g., less than 100% depredation, appropriate offshore currents for dispersal) (Georges et al. 1993).

Loggerheads nest on ocean beaches and occasionally on inlet, bay, or 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). A review of nest site selection studies found no consistency among factors analyzed and preference exhibited by loggerhead females for particular nest locations (Miller et al. 2003).

Between 1995 and 2008, 607 loggerhead sea turtle nests were documented on Walton County beaches. There were 490 nests on the 20 miles of beach with development and 117 nests on the 6 miles of State Park beaches (FWC-FWRI sea turtle nesting database). Nesting densities on the developed beaches and State Park beaches in Walton County are similar, 1.5 and 1.4 nests per mile, respectively.

Of the 253 green sea turtle nests documented in northwest Florida between 1995 and 2008, 41 nests or 16% were located on Walton County beaches. Sixty-one percent (61%) of those green nests were found on State Park beaches and all but one of those nests were found at Topsail Hill Preserve State Park.

Of the 53 leatherback nests documented in northwest Florida between 1993 and 2008, two nests or 4% were confirmed from Walton County beaches. The leatherback nests were located on the developed beach.

Of the 26 confirmed Kemp's ridley nests documented in northwest Florida between 1998 and 2008, two or 8% have been confirmed from Walton County beaches. The Kemp's ridley nests were located on the developed beach.

There is a statistically significant decreasing trend in the number of sea turtle nests present on Walton County beaches between the years 1995 and 2008 (FWC-FWRI sea turtle nesting database) (Pearson Parametric Correlation Analysis, $p=0.0338$, $r= -0.5688$). The decline in nesting was prominent on the developed beaches in the County (Pearson Parametric Correlation Analysis, $p=0.0053$, $r= -0.7003$), and was not statistically significant on State Parks (Spearman Non-Parametric Correlation Analysis, $p=0.7688$).

Choctawhatchee Beach Mouse

The Choctawhatchee beach mouse (CBM) is one of seven extant subspecies of the oldfield mouse (*P. polionotus*) that occur on barrier islands and other coastal areas of Florida and Alabama (an eighth subspecies is extinct). The CBM was listed as endangered in 1985, and critical habitat was designated in 1987 and revised in 2006. This subspecies is also listed as endangered by the FWC.

The historic range of the CBM extended 53 miles between the Destin Pass, Choctawhatchee Bay in Okaloosa County and East Pass in St. Andrew Bay, Bay County in Florida (50 FR 23872). Habitat loss and fragmentation associated with residential and commercial real estate development has reduced the distribution of the CBM to a portion of its historic range, and is the primary threat contributing to the endangered status of beach mice (Holler 1992). CBM now occur in four disjunct populations between Choctawhatchee Bay and St. Andrew Bay (Topsail Hill Preserve State Park, Shell Island, Grayton Beach State Park, and West Crooked Island). CBM occur within, adjacent to, and outside the Park boundaries.

Much of the historic range of CBM has been heavily developed. Approximately 2,500 acres of CBM habitat currently exists. While approximately 96 percent of the subspecies' remaining habitat is public land, due to storm events and increasing recreational pressure on public lands, the quality and protection of this habitat may be threatened. Maintaining habitat on private lands continues to be imperative to preserve connectivity and allow for beach mouse population expansion from and between public lands.

Topsail Hill Preserve State Park (Topsail), Walton County consists of 1,637 acres of which 277 acres provide CBM habitat. Private and county lands on the east side consist of approximately 10 acres. Topsail has been routinely surveyed as a part of its participation in a CBM translocation project, and with the exception of declines from hurricanes and flooding, has maintained a relatively stable CBM population in recent years.

The Grayton Beach area in Walton County consists of two units in Grayton Beach State Park. The Park is divided into a central and western unit and is connected by a narrow band of primary dunes. Total acreage of the Park is 2,236 acres with 162 acres providing suitable CBM habitat. Beach mice were extirpated from this area prior to listing, and translocations to Grayton Beach State Park have yielded mixed success. The status of CBM in this area is unknown; latest accounts indicate a declining population. Tracks in the sand were observed by FWC (2008) at

Grayton Beach State Park in 2005 and mice have been recorded by others in recent years in the Park (Service 2007). Portions of private lands (WaterColor and Seaside developments) on the east side of the central unit are occupied by CBM or provide suitable habitat.

Translocations to establish a fifth population of CBM occurred in March of 2003 and 2005. Twenty-six CBM from Topsail Hill Preserve State Park were moved to private lands at Camp Creek/WaterSound in Walton County, Florida (Service 2003; Service 2005a, 2005b, 2005c, 2005d). The reestablished population at WaterSound appears to be relatively stable (Moyers 2010). FWC (2008) observed tracks in the sand at Deer Lake State Park in 2005 and 2006 adjacent to Camp Creek/WaterSound.

The effects of the 2004-2005 hurricanes, subsequent post-storm response activities, and although mild storm seasons of 2006-2009 shoreline erosion continued that has resulted slow habitat recovery. This continues to depress beach mouse population numbers. Based on this, we would anticipate that CBM are found in suitable habitat but in reduced numbers throughout Walton County. Areas with recovering or intact dune habitat remain especially important habitat for the CBM. While the current status of CBM is unknown, their general distribution is known.

Piping Plover

The piping plover is a small, pale sand-colored shorebird, about seven inches long with a wingspan of about 15 inches (Palmer 1967). On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (50 FR 50726). Piping plovers were listed principally because of habitat destruction and degradation, predation, and human disturbance. Protection of the species under the Act reflects the species' precarious status range-wide. Three separate breeding populations have been identified, each with its own recovery criteria: the northern Great Plains (threatened), the Great Lakes (endangered), and the Atlantic Coast (threatened). The piping plover winters in coastal areas of the U.S. from North Carolina to Texas, and along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the Bahamas (Haig and Elliott-Smith 2004). Information from observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a degree.

Plovers depart their breeding grounds for their wintering grounds from July through late August, but southward migration extends through November. Piping plovers use habitats throughout the Florida coast, including the northwestern Florida coast, from July 15 through May 15. Both spring and fall migration routes of Atlantic Coast breeders are believed to occur primarily within a narrow zone along the Atlantic Coast (Service 1996). Some mid-continent breeders travel up or down the Atlantic Coast before or after their overland movements (Stucker and Cuthbert 2006). Use of inland stopovers during migration is also documented (Pompei and Cuthbert 2004). Migration stress may substantially affect survival rates of this species (Hecht 2006). Winter ranges of the breeding populations overlap to a significant degree. Confirmed sightings from all three breeding populations have been documented in northwest Florida. In addition, this species exhibits a high degree of intra- and inter-annual wintering site fidelity (Nicholls and Baldassarre 1990; Drake et al. 2001; Noel et al. 2005; Stucker and Cuthbert 2006).

Suitable piping plover habitat appears to be present at and near all of the coastal dune lake outlets and lakeside sand and mud flats and along ocean shorelines. The number of migrating or wintering piping plover within Walton County is difficult to assess. Regular surveys have not been conducted for non-breeding (including migrating and overwintering) plovers within this area. Surveyors reported no piping plovers in the project area during either the 2001 or 2006 International Piping Plover Census, a one day winter survey (Ferland and Haig 2002; Elliott-Smith et al. 2009).

COASTAL BARRIER RESOURCES ACT

The purpose of Coastal Barrier Resources Act (CBRA), is to minimize: 1) loss of human life, 2) wasteful expenditure of Federal revenues, and 3) the damage to fish, wildlife and other natural resources. To achieve this purpose, CBRA restricts Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers, and "by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved." When an area is located in the Coastal Barrier Resources System (CBRS), CBRA prohibits most new Federal assistance, including subsidies for shoreline stabilization, flood insurance, road construction, channel dredging, and other coastal projects in that area.

Portions of the project area are located within the following units of the Coastal Barrier Resources System (CBRS): P32 (Moreno Point), P31 A (Four Mile Village), FL-96 (Draper Lake), FL-95P (Grayton Beach), FL-94 (Deer Lake Complex), and FL-93P (Phillips Inlet).

Units FL-95P and FL-93P are considered Otherwise Protected Units and only prohibition of federally subsidized flood insurance applies. For the portions of the project in units P32, P31A, FL-96, and FL-94, the Service responded to the Corps' request for consultation under CBRA on February 22, 2010 (Appendix A). The Service determined the project is not consistent with the purpose of CRBA.

POTENTIAL IMPACTS TO FISH AND WILDLIFE RESOURCES

Coastal counties within the U.S. occupy a land area of approximately 888 thousand square miles, 262 thousand square miles of which represents counties that bound the Atlantic Ocean and Gulf of Mexico. Since 1960, the population in the Atlantic Ocean and Gulf of Mexico has increased by 45 percent. In 1960, an average of 204 people was living on each square mile of coastal land in the counties bordering the Atlantic and Gulf coastlines. By 2000, this density increased to 296 persons per square mile. By contrast, in 2000 the average population per square mile nationally equaled 80 persons per square mile. The population density along the Atlantic Ocean and Gulf of Mexico coastal counties is almost four times higher than the national population density (NOAA Coastal Services Center 2010).

Florida's beaches provide recreational and aesthetic value to residents of the State and attract millions of national and international tourists each year. An estimated $1 trillion of coastal property in Florida contributes to the tax base of local governments (FDCA 2006). In 2005, 86 million tourists visited Florida, spending around $62 billion – the vast majority of which was spent visiting coastal and aquatic resources.

Artificial beach nourishment, commonly referred to as beach nourishment or restoration, is the mechanical placement of sand on a beach to advance the shoreline seaward or to build up a dune (Dean 2002). Nourishment has become the dominant shoreline protection alternative in Florida since the 1980s. Property owners like that it protects their property, tourists enjoy large beaches, and proponents of environmental protection believe it is the best option available second to coastal retreat.

Beach nourishment results in an engineered beach that may or may not restore natural processes. Artificial beach nourishment projects may modify ecosystem components (sand grain size, shape and color, silt-clay and moisture content, beach hardness, mineral content, water potential, structure, less habitat features (loss of ephemeral pools and washovers), and porosity/gas diffusion) and potentially cause detrimental changes to the biota in the area (Dean 2002).
Potential environmental effects from the proposed project could include:

- increased turbidity during dredging and placement of beach material, and the loss of, or change in, benthic macroinvertebrates at the dredging and placement locations,

- burial of dune vegetation,
- alteration and permanent loss of wintering and breeding habitat features preferred by resident and migratory birds,
- increase in predator density, and
- direct and indirect impacts to endangered species (sea turtles, piping plover, Choctawhatchee beach mouse).

Benthic Communities

Because intertidal sandy beaches frequently experience erosion, transport, and deposition of the sediments that constitute the habitat for benthic invertebrates, these organisms are often assumed to be adapted to disturbances that mobilize sediments (NRC 1995). A limited literature supports this presumption of adaptation to sediment dynamics by showing little change in abundances of sandy beach macroinfauna after intense storms (e.g., Saloman and Naughton 1977). Most studies have led to a common assumption that recovery following any disturbance of the sediments should be rapid (NRC 1995). However, additional studies indicate the recovery is dependent upon quantity of sedimentation, the seasonal timing of disturbance, and the physical nature of the added sediments, and the rate of long shore sediment transport. Studies that have shown no substantial and long lasting impacts of beach filling on the benthic invertebrates (Hayden and Dolan 1974, Naqvi and Pullen 1982; Gorzelany and Nelson 1987; Burlas et al. 2001) appear not only to have used more compatible sediments but also to have been done on beaches characterized by high rates of long-shore sediment transport. In contrast, examples of large and long-lasting impacts (Reilly and Bellis 1983; Rakocinski et al. 1996; Peterson et al. 2000; Manning 2003; Versar 2003) come from sites of low long shore transport. Overwhelmingly, it is important that a beach fill project is designed to match the natural conditions to which the sandy beach biota has adapted (sediment characteristics, shoreline profile).

Dune Vegetation

Sea oats and other dune vegetation provide habitat and food for animals. They also stabilize sediments and promote the development of a natural dune system. Burial of significant areas of dune vegetation could destabilize the existing dune structure, bury emerging vegetation, smother animals, and therefore should be avoided. Potential benefits to the resources from the sand placement could result from the re-establishment and enhancement of the natural dune system if done properly. Re-establishment and protection of the resulting dune system would also protect the plant and animal species that reside or temporarily use the habitat. Planting of the created dune could increase the biodiversity in the dune vegetation community and support the fauna of the dune ecosystem. For example since the solitary bee is thought to be obligated to collecting pollen from only the coastal plain honeycombhead, planting this species could support the status of the bee if the sand structure can support their inground nesting habitat. Planting multiple species of dune plants that provide seeds for the CBM could also support the recovery of this subspecies.

Shorebirds

Almost 40 species of shorebirds are present during migration and wintering periods in the Gulf of Mexico region (Helmers 1992). Beach nourishment reduces the number of natural overwash areas and ephemeral pool formations which are prime nesting (nearby), brood rearing, roosting, and foraging habitats. Continual degradation and loss of habitats used by wintering and migrating shorebirds may cause an increase in intra-specific and inter-specific competition for the remaining food supplies and roosting habitats. In Florida, for example, approximately 825 miles of coastline and parallel bayside flats were present prior to the advent of high human densities and beach hardening projects. We estimate that only about 35% of the Florida coastline continues to support natural coastal formation processes, thereby concentrating foraging and roosting opportunities for all shorebird species and forcing some individuals into suboptimal habitats. Thus, intra- and inter-specific competition most likely exacerbates threats from habitat loss and degradation.

An indirect effect of beach nourishment is an increase in density of human populations along the coastal areas (NOAA Coastal Services Center 2010). An increase in the density of humans causes an increase in disturbance to shorebirds. Intense human disturbance in shorebird habitat can be functionally equivalent to habitat loss if the disturbance prevents birds from using an area (Goss-Custard et al. 1996). Pfister et al. (1992) implicate anthropogenic disturbance as a factor in the long-term decline of migrating shorebirds at staging areas. Disturbance can cause shorebirds to spend less time roosting or foraging and more time in alert postures or fleeing from the disturbances (Burger 1991, 1994; Elliott and Teas 1996; Lafferty 2001a, 2001b; Thomas et al. 2003). Shorebirds that are repeatedly flushed in response to disturbance expend energy on costly short flights (Nudds and Bryant 2000).

Many species of Florida's water birds, including gulls, terns, skimmers, plovers, willets and oystercatchers nest on the beach. When these beach-nesting birds are disturbed and flushed off their nests by people or dogs, eggs and chicks in the nests are exposed to temperature extremes and predators like crows, raccoons and dogs. Beaches and islands that were once isolated are now inundated with boats, beach goers and their pets. It is easy for unknowing beach goers to crush the eggs or kill young chicks accidentally. Eggs and chicks of beach-nesting birds blend in with their surroundings and are nearly invisible on the ground.

Predators

An indirect effect of beach nourishment is an increase in density of human populations along the coastal areas (NOAA Coastal Services Center 2010). This can cause an increase in predators that may considerably decrease wildlife populations through depredation or competition especially if the non-native species are able to occupy the same habitats and use similar resources for breeding, feeding, and resting. Invasive plant species are also a product of human settlement can replace plant foods or wildlife or compete for space with native vegetation but to date has not been an issue in northwest Florida beaches.

Depredation and harassment of wildlife by native and non-native species, such as raccoon, coyote, fox, feral hog, cats, birds (specifically laughing gulls) and ghost crab, have been documented on the Atlantic and Gulf coasts of Florida (Daniel et al. 2002; Neuman et al. 2004; Northwest Florida Partnership 2000; Leland 1997; Maxwell 2002, 2006 pers. com., NOAA Fisheries and U.S. Fish and Wildlife Service 1991a, 1991b). As nesting habitat for sea turtles and shorebirds dwindle, it is essential that nest production be maximized so wildlife may continue to exist in the wild.

Federally Listed Species

The Corps requested by a letter dated January 12, 2010, to initiate formal consultation with the Service under Section 7 of the Endangered Species Act for this project (Appendix B). The Service concurred with the request for by a letter dated February 4, 2010 (Appendix C). The Service provided the Corps with a final biological opinion (BO) non-breeding piping plover on October 12, 2012 (FWS log number 04EF3000-2013-F-008). Consultation for nesting sea turtles, CBM, and CBM critical habitat is complete and provided in the separate Statewide Programmatic Biological Opinion (SPBO) finalized on August 22, 2011 (FWS log number 41910-2011-F-0170). The Service concurred that with the incorporation of the Standard Manatee Construction Conditions, manatees are not likely to be adversely affected by this project.

Sea Turtles

How coastal ecosystems are managed on sea turtle nesting beaches directly affects future generations of sea turtles and is essential for their recovery.
The beach restoration/nourishment is being proposed for protection of coastal development structures. The permanent line of structures created by development interfere with the natural dynamic coastal processes and may result in the loss or alteration of nesting habitat to one degree or another, typically making it less suitable for nesting female sea turtles, egg incubation, and hatchling emergence.

The proposed project will occur within habitat that is used by sea turtles for nesting and may be constructed during a portion of the sea turtle nesting season. Long-term and permanent impacts could include a change in the nest incubation environment from the sand placement activities. Short-term and temporary impacts to sea turtle nesting activities could result from project work occurring on the nesting beach during the nesting or hatching period, changes in the physical characteristics of the beach from the placement of the sand and change in the nest incubation environment from the material. Further analysis of the effects of beach nourishment on nesting and hatchling sea turtles is provided in the biological opinion.

Choctawhatchee Beach Mouse

The beach restoration/nourishment is being proposed for protection of coastal development structures. Development located along the beachfront causes destruction or change in the native dune vegetation usually by the placement of structures on the dunes or directly adjacent such that the dune system can no longer function naturally. Dunes naturally enhance beach stability and acts as an integral buffer zone between land and sea. Loss or destabilization of the dune system results in the loss of habitat for beach mice.

Generally, sand placement activities 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 sand placement activities 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. Sand placement 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. Further analysis of the effects of beach nourishment CBM is provided in the biological opinion.

Piping Plover

Piping plover are dependent on the ephemeral nature of the shoreline particularly areas with wrack, over wash, ephemeral pools, and other habitats devoid of significant amounts of emergent vegetation. While found in the Florida panhandle seasonally during migration and the cooler months of the year, piping plover can be observed 10 of the 12 months of the year.
Past and ongoing beach restoration projects fundamentally alter the naturally dynamic coastal processes that create and maintain beach strand and bayside habitats, including those habitat components that piping plovers rely upon.

Although impacts may vary depending on a range of factors, restoration projects directly degrade or destroy piping plover roosting and foraging habitat in several ways. Front beach habitat may be used to construct an artificial berm that is densely planted in grass, which can directly reduce the availability of roosting habitat. Over time, if the beach narrows due to erosion, additional roosting habitat between the berm and the water can be lost. Berms can also prevent or reduce the natural overwash that creates roosting habitats by converting vegetated areas to open sand areas. The vegetation growth caused by impeding natural overwash can also reduce the maintenance and creation of bayside intertidal feeding habitats. Nourished beaches are created in even formation, removing dips and ephemeral pools preferred by plovers. In addition, stabilization projects may indirectly encourage further development of coastal areas and increase the threat of human disturbance (vehicular, pets, people).

The borrow sites depending on their location may also have an effect on piping plovers. Removing sand from nearshore reduces the formation of sand bars and shoals. Formation of exposed ebb and flood tidal shoals are considered to be primary or optimal piping plover roosting and foraging habitat. Removing these sand sources can alter depth contours and change wave refraction as well as cause localized erosion (Hayes and Michel 2008). Further analysis of the effects of beach nourishment on wintering and migrating piping plover is provided in the biological opinion.

Other Issues Related to Natural Resource Conservation
Recreation

Recreational seashore activities are overwhelmingly concentrated on the sandy beach. Growing coastal populations, coupled with more leisure time and improved mobility, have escalated the intensity and spatial ambit of recreation over recent decades (De Ruyck et al. 1997; Caffyn and Jobbins 2003; Fanini et al. 2006). Being the prime sites for human recreation, beaches support many coastal economies (Klein et al. 2004). Beach management therefore customarily focuses on maximizing the recreational experience for beach users, which often results in the need for human interventions such as nourishment (Speybroeck et al. 2006), beach grooming (Llewellyn and

Shackley 1996; Dugan et al. 2003), coastal armoring (Dugan and Hubbard 2006; Dugan et al. 2008), destruction of dunes to construct tourism infrastructure (Nordstrom 2000), and light and sound pollution (Bird et al. 2004; Longcore and Rich 2004) that can be ecologically harmful. These interventions also result in attracting more people to the coast from a misperception that there's plenty of "beach" for building and it's permanent.

Impacts caused directly by recreational activities are emerging as significant environmental issues (Schlacher et al. 2008b). Defeo et al (2009) summarizes the effects of human recreation use related activities including dune habitat destruction for beach access from foot traffic trampling or vehicle access over the vegetation, intertidal- and supra-littoral faunal impacts from pedestrian use, vehicle traffic, beach cleaning/grooming, vendors, and off-road vehicle driving. Human activities disturb shorebirds, modifying key behavioral traits that are crucial to their survival and reproduction (Burger 1991, 1994; Lord et al. 2001; Verhulst et al. 2001) and beach grooming removes the wrack reducing food source or habitat, sifting the sand which disturbs or kills prey invertebrate species.

Climate Change

The varying and dynamic elements of climate science are inherently long term, complex and interrelated. Regardless of the underlying causes of climate change, glacial melting and expansion of warming oceans are causing sea level rise, although its extent or rate cannot as yet be predicted with certainty. At present, the science is not exact enough to precisely predict the time, location, or magnitude of climate impacts. These impacts may take place gradually or episodically in major leaps.

According to the Intergovernmental Panel on Climate Change Report (IPCC 2007a, 2007b), warming of the earth's climate is "unequivocal," as is now evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level. The IPCC Report (2007a, 2007b) describes changes in natural ecosystems with potential wide-spread effects on many organisms, including marine mammals and migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Climate change at the global level drives changes in weather at the regional level, although weather is also strongly affected by season and by local effects (e.g., elevation, topography, latitude, proximity to the ocean. Temperatures are predicted to rise from 2°C to 5°C for North America by the end of this century (IPCC 2007a, 2007b). Other processes to be affected by this projected warming include rainfall (amount, seasonal timing, and distribution), storms (frequency and intensity), and sea level rise. The 2007 IPCC report found a 90 percent probability of 7 to 23 inches of sea level rise by 2100.

Climatic changes in Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management. Florida is one of the most vulnerable areas in the world to the consequences of climate change. One of the most serious threats to Florida's coasts comes from the combination of elevated sea levels and intense hurricanes.

Florida has over 1,350 miles of coastline, low-lying topography, and proximity to the hurricane-prone subtropical mid-Atlantic Ocean and Gulf of Mexico. As a result, barrier islands and low-lying areas of Florida will be more susceptible to the effects of storm surge. Rising sea levels will result in pushing the high-water mark landward, causing beaches to migrate slowly inland. The primary result where development exists is increased erosion rates. This could particularly impact areas with low-lying beaches where sand depth is a limiting factor, (Daniels et al. 1993; Fish et al. 2005; Baker et al. 2006). These losses could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

Florida experiences more landings of tropical storms and hurricanes than any other state in the U.S. Storm surges due to hurricanes will be on top of elevated sea levels, tides, and wave action. An important element of adaptation strategy is how to protect beaches, buildings and infrastructure against the effects of rising seas and wind, wave action and storm surge due to hurricanes. Beach restoration or nourishment is one such alternative. Coastal retreat may prove more the best financial and environmental alternative, yet to be determined.

Deep Water Horizon Mississippi Canyon 252 Oil Spill 2010

The Mobile Offshore Drilling Unit Deepwater Horizon, located in the Gulf of Mexico about 51 miles southeast of Venice, Louisiana exploded and caught fire on April 20 and sank on April 22. Slurried (thickened) oil was documented on northwest Florida beaches beginning the week of June 14, 2010. Impacts to Walton County from the Deep Horizon MC 252 oil spill appears limited to tar balls, dispersants in the water, and increased human presence on the beaches during daytime and nighttime hours conducting oil spill response including clean-up and monitoring. The impacts of the oil spill to the shoreline and shoreline dependent species remain unknown.

DISCUSSION

The 20 mile stretch of beach included in the project area is a major asset of natural beauty and economic importance to the community in addition to habitat for coastal wildlife. Although many of its attributes have been compromised by development and the placement of numerous structures adjacent to the shoreline, it continues to provide significant aesthetic and ecological functions. In the best interest of wildlife resources the Service believes that the natural dynamics of the coast would have the greatest benefits to the wildlife resources. The Service also understands the economic importance of this project. This project through careful design and implementation can minimize the impact to wildlife resources. The following recommendations would provide additional measures necessary to offset potential negative impacts to fish and wildlife resources.

RECOMMENDATIONS

1. Implement the final biological opinion(s), specifically the terms and conditions, and abide by the Migratory Bird Treaty Act for the project to protect nesting sea turtles,

Choctawhatchee beach mice, and non-breeding piping plovers which will directly and indirectly protect a multitude of other species.

2. To alleviate the need for CBRA consultation or consistency determination, remove CBRA Units in the project area from the federal project.

3. Dune planting should contain a variety of species. One of the varieties should be the coastal plain honeycombhead to support the continuing existence of the solitary bee. In addition planting multiple species of dune plants that provide seeds for the CBM would also support the recovery of this subspecies.

4. Monitor and designate if appropriate disturbance free zones for migratory shorebirds and nesting shorebirds.

5. Discuss with the local project sponsor the following: implementation of a predator control program, reduction or removal of recreational driving, creation of driving corridors for vendors, emergency personal that routinely travel the beaches. Creation of a pet leash law or enforcement of existing pet ordinances would also reduce impacts to all species that rely on beach habitat.

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APPENDIX A

LETTER ADDRESSING

THE

COASTAL BARRIER RESOURCES ACT (CBRA)

FOR

WALTON COUNTY, FLORIDA

IN RESPONSE TO

THE HURRICANCE AND STORM DAMAGE REDUCTION PROJECT

United States Department of the Interior

FILE

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721
Tel: (850) 769-0552
Fax: (850) 763-2177

IN REPLY REFER TO:

February 22, 2010

Kenneth P. Bradley
Department of the Army
Mobile District, Corps of Engineers
Coastal Environment Team
Mobile, AL 36628

Re: Walton County Beach Nourishment
Coastal Barrier Resources Act
Walton County, Florida

Dear Mr. Bradley:

Thank you for your letter to the Fish and Wildlife Service (Service) dated January 15, 2010, requesting consultation under the Coastal Barrier Resources Act (CBRA) for the Walton County, Florida, hurricane and storm damage reduction project. The proposed project will occur along approximately 26 miles of Walton County shoreline. Portions of the project area are located within the following units of the Coastal Barrier Resources System (CBRS): P32 (Moreno Point), P31A (Four Mile Village), FL-96 (Draper Lake), FL-95P (Grayton Beach), FL-94 (Deer Lake Complex), and FL-93P (Phillips Inlet). The U.S. Army Corps of Engineers has determined that the project would qualify for an exception under Section 6 of CBRA.

In order to qualify for such an exception, a project must first be established as consistent with the purpose of CBRA, which is to minimize 1) loss of human life, 2) wasteful expenditure of Federal revenues, and 3) the damage to fish, wildlife and other natural resources. To achieve this purpose, CBRA restricts Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers, and "by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved." When an area is located in the CBRS, CBRA prohibits most new Federal assistance, including subsidies for shoreline stabilization, flood insurance, road construction, channel dredging, and other coastal projects in that area. The Service has determined that this project is not consistent with the purpose of CBRA.

Coastal barriers are dynamic systems that include an ever changing mosaic of habitats and that have been on the move through the millennia due to sea level changes. Erosion and accretion are natural processes that continually change their profile, especially during storms. Together with their adjacent wetland, marsh, estuarine, inlet, and nearshore water habitats, coastal barriers support a variety of organisms. The geomorphic characteristics of barrier islands, peninsulas, beaches, dunes, overwash fans, and inlets are critical to a variety of fish and wildlife resources, and they influence a barrier beach's ability to respond to wave action, including natural storm resources that shape and re-shape themselves over time and through the natural disturbance caused by storms. The fish and wildlife that live in and around them have adapted to, and thrive on, this constant, natural change.

Today, large-scale coastal development disrupts natural coastal processes and dynamics. Since the 1980s beach nourishment has been used in Florida as the preferred solution to the conflict between dynamic beaches and development. While nourishment technology and environmental safeguards have improved, the negative effects to coastal dependent species outweigh the potential benefits.

Even under the best circumstances (e.g., when high quality materials are used, and project design and implementation are sound) the purpose of beach nourishment is typically for structure protection and not restoration of species habitat. As long as there are immovable structures along the shoreline, species habitat cannot be fully restored. For example, sea turtles nest on oceanfront beaches even when they are eroding. The placement of sand on a beach with reduced dry foredune habitat may support sea turtle nesting habitat if that sand is highly compatible (in terms of grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project. However, even with these safeguards, sea turtle nesting continues to be negatively affected for the first few years after nourishment, as evidenced by reduced nesting and nest emergence success.

Coastal dune lakes are lakes that occur in coastal communities along the Gulf of Mexico. The lakes are separated from the Gulf by a barrier beach and dune system which may be intermittent with or without a meandering tidal outlet. The lakes are important breeding areas for insects and crustaceans. Many birds and mammals also utilize the lakes for food and habitat. They are considered "imperiled globally because of rarity" by the Florida Natural Areas Inventory (FNAI) (FNAI and Florida Department of Natural Resources (FDNR), 1990). Water is generally from lateral ground water seepage through well-drained coastal sands (Griffith et al., 1995). Dune lakes fluctuate in water level and vary in salinity due to tidal exchange from the lake outflow, storm surge events, rainfall, evaporation, and wetland drainage (FNAI and FDNR, 1990). The 16 dune lakes that occur in Walton County vary in the amount of shoreline development. All lakes are subject to flooding. Breaching of the outlets allows the lakes to function naturally, draining and filling. To date, no reports indicate that nourishment would improve the natural function of the coastal dune lake system.

In its 2009 report on beach erosion, the Florida Department of Environmental Protection (FDEP) designates seven critically eroded areas in Walton County, comprising a total of 15.7 miles (FDEP 2009). The report defines a critically eroded area as "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." The critically eroded portions in Walton County were so designated because the erosion primarily threatens development in the county, though it may also threaten recreational interests and/or roads. The report further notes that a beach nourishment project for the western 5 miles of Walton County's beaches, partially in CBRS Unit P32, was completed in 2007. Given that erosion is a naturally occurring and recurring process, and that more than half the project area is considered critically eroded by the state, the request for Federal authorization to fund this project is a strong indicator that additional requests will be made for beach nourishment on a routine basis. CBRA recognizes the inherent nature of shifting shores and attempts to preserve that characteristic by preventing Federal funding for shoreline protection that could have the effect of shoreline stabilization. The very nature of beach restoration/nourishment requires regular replenishment of sand, in this case, using Federal expenditures. Thus, we cannot conclude that regularly adding sand into that system is not a wasteful expenditure.

Beach replenishment frequently leads to more development in greater density within shorefront communities, which are then faced with the need for future replenishment or more drastic stabilization measures (Pilkey and Dixon 1996). The very existence of a beach nourishment project can encourage more development in coastal areas (Dean 1999, Ruppert et al. 2008), especially if Federal funds subsidize each future erosion control event. This happens even within public lands due to such things as increased camp sites, parking areas, etc. We recognize that not nourishing the beaches within the CBRS may decrease the longevity and durability of the proposed Federal project on the adjacent developed lands. For that reason, we understand that the intent of inclusion of those CBRS beaches in the nourishment project is to support the adjacent developed beaches, not to improve the habitat for natural resources. Further development within public lands and the properties adjacent to CBRS units will not serve to minimize future loss of human life or damage to fish and wildlife resources.

Since the proposed project is not consistent with the purposes of CBRA, a request for an exception under Section 6 is not appropriate. However, we also note that the law further prohibits financial assistance from being made available for "the carrying out of any project to prevent the erosion of, or to otherwise stabilize, any inlet, shoreline, or inshore area" unless it meets the criteria for an exception under section 6. To qualify under section 6, a nonstructural shoreline stabilization project must be "designed to mimic, enhance, or restore a natural stabilization system." This project has not been designed to do this, or to provide significant enhancement to the fish and wildlife resources of the CBRS unit aside from adding sand to the dynamic system. It is designed to provide stability to the lands adjacent to the CBRS units that are developed. We do not identify a need for adding sediment to the beaches at this time for the benefit of fish and wildlife resources.

If you have any questions, please contact Melody Ray-Culp of this office at extension 232.

Sincerely,

Donald W. Imm, PhD
Assistant Project Leader

cc: Cynthia Bohn, FWS, Regional Office, Atlanta, GA
Katie Niemie, FWS, 4401 N. Fairfax Dr., Room 860A, Arlington, VA 22203

Citations

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APPENDIX B

ARMY CORPS OF ENGINEERS

LETTER ADDRESSING

THE

ENDANGERED SPECIES ACT (ESA)

FOR

HURRICANCE AND STORM DAMAGE REDUCTION

IN

WALTON COUNTY, FLORIDA

RECEIVE

JAN 25 2010

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, AL 36628-0001

REPLY TO
ATTENTION OF

January 12, 2010

Coastal Environment Team
Planning and Environmental Division

Ms. Lorna Patrick
U.S. Department of Interior
Fish and Wildlife Service
1601 Balboa Avenue
Panama City, Florida 32405-3721

Dear Ms. Patrick:

The U.S. Army Corps of Engineers (Corps), Mobile District is seeking Federal authorization to conduct a hurricane and storm damage reduction project for Walton County, Florida. Walton County is located approximately 103 miles east of Pensacola, Florida and 98 miles west of Tallahassee, Florida. The beaches of Walton County encompass approximately 26 miles of shoreline extending from the City of Destin in Okaloosa County, Florida (about six miles to the east of East Pass) to the Walton/Bay County line near Phillips Inlet as illustrated in the enclosed biological assessment (BA). This area and the adjacent waters support federally protected species under the Service's purview such as sea turtles (loggerhead, green, leatherback, and Kemp's ridley), piping plover, West Indian manatee, and the Choctawhatchee beach mouse (CBM). Gulf sturgeon and associated critical habitat also exists within the project limits but fall under the purview of the National Marine Fisheries Service and will not be considered under this BA. Based on our evaluation of the selected Federal plan described in the BA, it is our assessment that the actions may have an adverse affect on sea turtles, piping plovers, and CBM. Upon further consideration of a previous biological opinion (BO) issued for the local Walton County Beach Nourishment Project, SAJ-2007-5152 (IP-DEB)/FWS 2008-F-0060 Walton County, Florida, BO, October 2, 2008, it is the U.S. Fish and Wildlife Service's opinion that the effects of the proposed activities are not likely to jeopardize the continued existence of these species and not likely to destroy or adversely modify designated critical habitat for the CBM.

Based on the above determinations, a formal consultation is being requested under Section 7 of the Endangered Species Act. Please find the enclosed BA associated with the proposed action. Please address any questions or concerns to Mr. Larry Parson at (251) 690-3139 or email at larry.e.parson@usace.army.mil.

Sincerely,

Jennifer Jacobson

Jennifer L. Jacobson
Chief, Coastal Environmental Team

Enclosure

APPENDIX C

UNITED STATES FISH AND WILDLIFE SERVICE

RESPONSE LETTER ADDRESSING

THE

ENDANGERED SPECIES ACT (ESA)

FOR

HURRICANCE AND STORM DAMAGE REDUCTION

IN

WALTON COUNTY, FLORIDA

United States Department of the Interior

FIL

FISH AND WILDLIFE SERVICE
Field Office
1601 Balboa Avenue
Panama City, FL 32405-3721
Tel: (850) 769-0552
Fax: (850) 763-2177

IN REPLY REFER TO:

February 4, 2010

Ms. Jennifer L. Jacobson, Chief
U.S. Army Corps of Engineers
Mobile District, Corps of Engineers
Coastal Environmental Team
Mobile, Alabama 36628-0001

Attn: Mr. Larry Parsons

Re: FWS Log No. 2010-F-0121
Date Started: February 2, 2010
Project Title: Hurricane and Storm Damage Reduction Walton County, Florida
Location: Gulf of Mexico
Ecosystem: NE Gulf
County: Walton County, Florida

Dear Ms. Jacobson:

This letter acknowledges the Fish and Wildlife Service's (Service) receipt of your letter dated January 12, 2010, requesting initiation of formal consultation in accordance with Section 7 of the Endangered Species Act for the potentially authorized federal project entitled Hurricane and Storm Damage Reduction in Walton County, Florida. We received the letter on January 25, 2010. The request for consultation concerns the proposed federal project to conduct beach restoration along 26.0 miles of Gulf of Mexico beachfront in Walton County, Florida, and the potential effects of the action on federally protected threatened and endangered species. The Mobile District (Corps) has determined that the project may adversely affect (MAA) nesting loggerhead, green, leatherback, and Kemp's ridley sea turtles and the Choctawhatchee beach mouse (CBM), non-breeding piping plover and not adversely modify designated critical habitat for the piping plover. Per a discussion between our agencies on February 2, 2010, the Corps has also determined that the project may adversely affect designated critical habitat for the CBM. Finally, the Corps has determined that the project would not likely adversely affect (NLAA) the West Indian manatee based on the incorporation of Standard Manatee Construction Conditions into the project plans. The Service concurs with your determination of MAA for nesting sea turtles, the CBM, and the piping plover and the likely to adversely modify critical habitat for the CBM and not likely to adverse modify designated critical habitat for the piping plover. The Service concurs with your determination of NLAA for the manatee. We have assigned log number FWS 2010-F-0121 to this consultation.

Service concurs with your determination of NLAA for the manatee. We have assigned log number FWS 2010-F-0121 to this consultation.

All the needed information to complete the consultation has been received by the Service. Therefore, all information required of you to initiate consultation has been provided and is adequate to prepare the biological opinion. Section 7 allows the Service up to 90 days to conclude formal consultation with your agency, and an additional 45 days to prepare our biological opinion (unless we mutually agree to an extension). Therefore, we anticipate providing our draft biological opinion by May 6, 2010. The Endangered Species Act requires that after initiation of formal consultation, the federal action agency make no irreversible or irretrievable commitment of resources that limits future options. This practice ensures agency actions do not preclude the formulation or implementation of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitats.

If you have any questions or concerns about this consultation, please contact Ms. Lorna Patrick at ext. 229.

Sincerely yours,

Donald W. Imm

Donald W. Imm, PhD
Assistant Field Supervisor

cc:
Ann Marie Lauritsen, FWS, St. Petersburg, FL (with incoming)
Robbin Trindell, FWC, Office of Imperiled Species Management, Tallahassee, FL
FDEP, Beaches and Coastal Systems, Tallahassee, FL
Sonny Mare, So. Walton County Tourist Development Council, Santa Rosa Beach, FL
Brad Pickel, Seahaven Consulting, Beaufort, SC

Panama City FO:L.Patrick:lap:lt:11-15-2010:850-769-0552x229: S:\Staff\Lorna\Walton County Beach Nourishment\ Corps Federal Project|20101112_rpt_FWS_to_Coprs_finalFWCArpt_WaltonCo_FL.doc

Walton County Beach
Hurricane and Storm Damage Reduction Project
FWS 04EF3000-2013-F-0008
Walton County, Florida

Final
Biological Opinion
October 16, 2012 (8:45am)

Prepared by:
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City, FL

TABLE OF CONTENTS

TABLE AND FIGURES

LIST OF FIGURES

Acronyms

Act	Endangered Species Act
BO	Biological Opinion
CAHA	Cape Hatteras National Seashore
Corps	U.S. Army Corps of Engineers
DNR	Department of Natural Resources
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FWC	Fish and Wildlife Conservation Commission
GOM	Gulf of Mexico
LAA	Likely to Adversely Affect
MBTA	The Migratory Bird Treaty Act
MHWL	Mean High Water Line
MLW	Mean Low Water
NAM	Not Adversely Modify
NAVD	North American Vertical Datum
NLAA	Not Likely Adversely Affect
NMFS	National Marines Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
ORV	Off Road Vehicles

PCE	Primary Constituent Elements
Service	U.S. Fish and Wildlife Service
USDA	United States Department of Agriculture

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Field Office
1601 Balboa Avenue
Panama City, Florida 32405

Tel: (850) 769-0552
Fax: (850) 763-2177

October 16, 2012

Ms. Jennifer L. Jacobsen, Chief
U.S. Army Corps of Engineers
Mobile District, Corps of Engineers
Coastal Environmental Team
P.O. Box 2288
Mobile, Alabama 36628-0001

Attn: Mr. Larry Parsons

Re: FWS Log No. Walton Co Project 04EF3000-2013-F-0008
FWS Log No. Programmatic 41910-2011-F-0170
Date Consult Initiated: January 12, 2010
Project Title: Beach Erosion Control and Storm Damage Reduction
Location: Gulf of Mexico
County: Walton County, Florida

Dear Ms. Jacobsen:

Enclosed is the Fish and Wildlife Service's (Service) final biological opinion (BO) for the potentially federally-authorized Hurricane and Storm Damage Reduction in Walton County, Florida and the effect of the project on piping plovers. The request for consultation concerns the proposed federal project to conduct beach restoration activities along 26.0 miles of Gulf of Mexico beachfront in Walton County, Florida. Per letter dated January 25, 2010, the Mobile District (Corps) determined that the project may adversely affect (MAA) nesting loggerhead, green, leatherback, and Kemp's ridley sea turtles and the Choctawhatchee beach mouse (CBM) and its critical habitat, and non-breeding piping plover but will not adversely modify designated critical habitat for the piping plover. Per a discussion between our agencies on February 2, 2010, the Corps has also determined that the project may adversely affect designated critical habitat for the CBM. Finally, the Corps has determined that the project would not likely adversely affect (NLAA) the West Indian manatee based on the incorporation of Standard Manatee Construction Conditions into the project plans.

The Service concurs with your determination of MAA for nesting sea turtles, the CBM, and the piping plover; and the likely to adversely modify critical habitat for the CBM and not likely to adverse modify designated critical habitat for the piping plover. The Service concurs with your determination of NLAA for the manatee. This opinion is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). We have assigned Service log number 04EF3000-2013-F-0008for this piping plover BO. Consultation for nesting sea turtles, CBM and CBM critical habitat is complete and provided in the separate Statewide Programmatic Biological Opinion (SPBO) finalized on August 22, 2011 and assigned Service log number 41910-2011-F-0170.

This biological opinion is based on the permit application file, environmental assessment, and information provided during meetings or discussions with the Corps. A complete administrative record of this consultation is on file in the Service's Panama City, Florida Field Office.

Table 1. Species and Critical Habitat Evaluated for Effects from the Proposed Action but not discussed further in this Biological Opinion.

SPECIES OR CRITICAL HABITAT	PRESENT IN ACTION AREA	PRESENT IN ACTION AREA BUT "NOT LIKELY TO ADVERSELY AFFECT" OR "NOT LIKELY TO ADVERSELY MODIFY"
West Indian manatee	Yes	Yes
Non-breeding piping plover critical habitat	No	No

Consultation History

January 12, 2010 — The Service receives a request for formal consultation from the Mobile Corps for the Walton County Florida Hurricane and Storm Reduction Project.

February 4, 2010 — The Service provides the Mobile Corps with concurrence for formal consultation for the Walton County Florida Hurricane and Storm Reduction Project.

May 6, 2010	The Service's Panama City Field Office provided a draft of the SPBO to the Mobile Corps for the Walton County Hurricane and Storm Reduction Project.
October 28, 2010	The Service's Panama City Field Office resubmitted a draft of the SPBO to the Mobile Corps for the Walton County Hurricane and Storm Reduction Project.
May 31, 2012	In a meeting with the Service, the Mobile Corps requested that we proceed with writing a biological opinion for the piping plover as a stand alone BO to complement the Statewide Programmatic Biological Opinion which covers the actions proposed by the Corps for nesting sea turtles and the CBM.
October 12, 2012	Via phone conversation, the Mobile Corps accepted the use of the terms and conditions for the piping plover required within the Walton County Beach Nourishment Project BO (FWS 2008-F-0060) as a Draft BO along with one condition that requires the Corp to recommend to the County that they apply other conditions that increase beach stability, post project. The Corp also accepted the use of the final SPBO (dated August 22, 2011) for all other species affected by the project.

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BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Corps propose to construct a dune, berm, and beach restoration project (dune, berm, and beach fill project) along a 26-mile stretch of the Gulf of Mexico (GOM) shoreline along the mainland of Walton County (**Figure 1**).

The project will be located between DNR monuments Walton R-01 and Walton R-127 (Figure 1). Specific to the selected plan recommended for construction is the Local Preferred Plan identified in the feasibility report which consists of five of the construction reaches. The project will be composed of a 50-foot berm width, a 25-foot berm and an additional 25 feet of advanced nourishment in all construction reaches. The project will also feature added dune width in all construction reaches of either 10 or 30 feet. The modeling efforts have predicted fill requirements of 2,400,000 cubic yards (cy). This plan extends the coverage area to the westernmost limits of the county where the National Economic Development Plan could not justify the coverage. The model assumes an annual erosion rate of 100,000 cy annually lost to the system, thereby creating a re-nourishment cycle every 12 years requiring 1,200,000 cy of placement. However, recent surveys have shown that the erosion during a period of non-storm event activity has produced an initial placement of 2,980,000 cy. If this condition can be extrapolated to the predicted construction timeframe of FY10 or FY11, then the necessary beach fill requirements will be 3,350,000 cy. Re-nourishments will still be on a 12-year cycle but the re-nourishment volumes will increase to approximately 2,000,000 cy. When dune construction is complete, the dune will be planted with at least three species of dune vegetation.

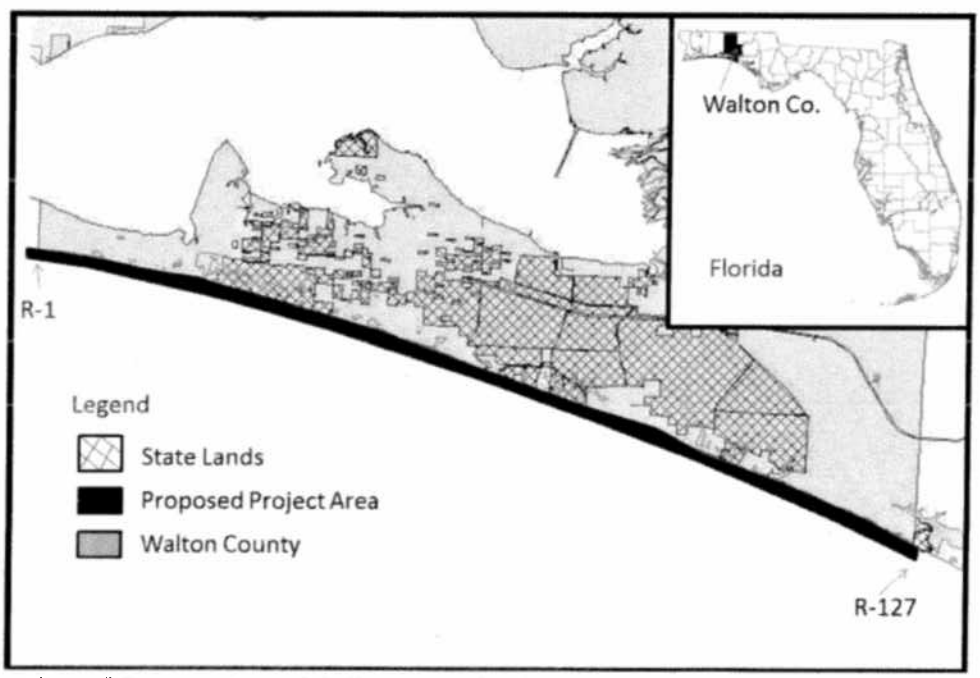

Figure 1. Location of the proposed Walton County storm damage reduction project, Walton County, Florida.

Action Area

The Project and Action Area for piping plovers is the 26.0 miles of shoreline proposed for nourishment in Walton County (**Figure 1**) and/or located in and along the Gulf of Mexico (GOM) shoreline demarcated by the following FDEP monuments: R -1 to R-127. It begins at MLW along the GOM and includes intertidal areas of the GOM and coastal dune lakes, wrack lines, ephemeral pools, inlets, and the upper sandy beach with sparse or no vegetation and coastal dune lakes sand and mud flats habitat as well as any overwash areas that occur adjacent or connecting the GOM and the coastal dune lakes.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The piping plover is a small, pale sand-colored shorebird, about seven inches long with a wingspan of about 15 inches (Palmer 1967). On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (Service 1985). Piping plovers were listed principally because of habitat destruction and degradation, predation, and human disturbance. Protection of the species under the Act reflects the species' precarious status range-wide. Three separate breeding populations have been identified, each with its own recovery criteria: the northern Great Plains (threatened), the Great Lakes (endangered), and the Atlantic Coast (threatened). The piping plover winters in coastal areas of the U.S. from North Carolina to Texas, and along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the Bahamas (Haig and Elliott-Smith 2004). Piping plover subspecies are phenotypically indistinguishable, and most studies in the nonbreeding range report results without regard to breeding origin. Although a recent analysis shows strong patterns in the wintering distribution of piping plovers from different breeding populations, partitioning is not complete and major information gaps persist. Therefore, information summarized here pertains to the species as a whole (i.e., all three breeding populations), except where a particular breeding population is specified.

Natural protection: Cryptic coloration is a primary defense mechanism for this species; nests, adults, and chicks all blend in with their typical beach surroundings. Piping plovers on wintering and migration grounds respond to intruders (pedestrian, avian and mammalian) usually by squatting, running, and flushing (flying).

Foraging/food: Behavioral observation of piping plovers on the wintering grounds suggests that they spend the majority of their time foraging (Nicholls and Baldassarre 1990a; Drake 1999a, 1999b). Feeding activities may occur during all hours of the day and night (Staine and Burger 1994; Zonick 1997), and at all stages in the tidal cycle (Goldin 1993; Hoopes 1993). Wintering plovers primarily feed on invertebrates such as polychaete marine worms, various crustaceans, fly larvae, beetles, and occasionally bivalve mollusks (Bent 1929; Cairns 1977; Nicholls 1989;

Zonick and Ryan 1996). They peck these invertebrates on top of the soil or just beneath the surface.

Roosting: Several studies identified wrack (organic material including seaweed, seashells, driftwood, and other materials deposited on beaches by tidal action) as an important component of roosting habitat for nonbreeding piping plovers. Lott et al. (2009) found >90% of roosting piping plovers in southwest Florida in old wrack with the remainder roosting on dry sand. In South Carolina, 45% of roosting piping plovers were in old wrack, and 18% were in fresh wrack. The remainder of roosting birds used intertidal habitat (22%), backshore (defined as zone of dry sand, shell, cobble and beach debris from mean high water line up to the toe of the dune)(8%), washover and ephemeral pools 2% and 1% respectively (Maddock et al. 2009). Thirty percent of roosting piping plovers in northwest Florida were observed in wrack substrates with 49% on dry sand and 20% using intertidal habitat (Smith 2007). In Texas, seagrass debris (bayshore wrack) was an important feature of piping plover roost sites (Drake 1999). Mean abundance of two other plover species in California, including the listed western snowy plover (*Charadrius alexandrinus nivosus*), was positively correlated with abundance of wrack during the nonbreeding season (Dugan et al. 2003).

Feeding areas: Plovers forage on moist substrate features such as intertidal portions of ocean beaches, washover areas, mudflats, sand flats, algal flats, shoals, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons, ephemeral pools and adjacent to salt marshes (Gibbs 1986; Zivojnovich 1987; Nichols 1989; Nicholls and Baldassarre 1990a; Nicholls and Baldassarre 1990b; Coutu et al. 1990; Hoopes et al. 1992; Loegering 1992; Goldin 1993; Elias-Gerken 1994; Wilkinson and Spinks 1994; Zonick 1997; Service 2001a). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986; Coutu et al. 1990; McConnaughey et al. 1990; Loegering 1992; Goldin 1993; Hoopes 1993). Cohen et al. (2006) documented more abundant prey items and biomass on Sound Island and sound beaches than the ocean beach. Ecological Associates, Inc. (2009) observed that during piping plover surveys at St Lucie Inlet, Martin County, Florida, intertidal mudflats and/or shallow subtidal grassflats appear to have greater value as foraging habitat than the unvegetated intertidal areas of a flood shoal.

Habitat: Wintering piping plovers prefer coastal habitat that include sand spits, islets (small islands), tidal flats, shoals (usually flood tidal deltas), and sandbars that are often associated with inlets (Harrington 2008). Sandy mud flats, ephemeral pools, and overwash areas are also considered primary foraging habitats. These substrate types have a richer infauna than the foreshore of high energy beaches and often attract large numbers of shorebirds (Cohen et al. 2006). Wintering plovers are dependent on a mosaic of habitat patches and move among these patches depending on local weather and tidal conditions (Nicholls and Baldassarre 1990a).

Recent study results in North Carolina, South Carolina, and Florida complement information from earlier investigations in Texas and Alabama (summarized in the 1996 Atlantic Coast and 2003 Great Lakes Recovery Plans) regarding habitat use patterns of piping plovers in their coastal migration and wintering range. As documented in Gulf Coast studies, nonbreeding piping plovers in North Carolina primarily used sound (bay or bayshore) beaches and sound islands for foraging and ocean beaches for roosting, preening, and being alert (Cohen et al.

2008). The probability of piping plovers being present on the sound islands increased with increasing exposure of the intertidal area (Cohen et al. 2008). Maddock et al. (2009) observed shifts to roosting habitats and behaviors during high-tide periods in South Carolina.

Seven years of surveys, 2-3 per times per month, along 8 miles of Gulf of Mexico (ocean-facing) beach in Gulf County, Florida, cumulatively found nearly the entire area used at various times by roosting or foraging piping plover. Birds were reported using from the mid-beach to the inter-tidal zone. Numbers ranged from 0 to 39 on any given survey day (Eells unpubl. data).

As observed in Texas studies, Lott et al. (2009) identified bay beaches (bay shorelines as opposed to ocean-facing beaches) as the most common landform used by foraging piping plovers in southwest Florida. In northwest Florida, however, Smith (2007) reported landform use by foraging piping plovers about equally divided between Gulf of Mexico (ocean-facing) and bay beaches. Exposed intertidal areas were the dominant foraging substrate in South Carolina (accounting for 94% of observed foraging piping plovers; Maddock et al. 2009) and in northwest Florida (96% of foraging observations; Smith 2007). In southwest Florida, Lott et al. (2009) found approximately 75% of foraging piping plovers on intertidal substrates.

Atlantic Coast and Florida studies highlighted the importance of inlets for nonbreeding piping plovers. Almost 90% of observations of roosting piping plovers at ten coastal sites in southwest Florida were on inlet shorelines (Lott et al. 2009). Piping plovers were among seven shorebird species found more often than expected at inlet locations versus non-inlet locations in an evaluation of 361 International Shorebird Survey sites from North Carolina to Florida (Harrington 2008).

Piping plover surveys in the St. Lucie Inlet area, Martin County, southeast Florida, documented 48 of 87 plover sightings (high of 13 birds on any given survey) occurring on the inlet flood shoals with the birds either foraging or roosting (Ecological Associates, Inc. 2009). Twenty-four observations were of piping plovers foraging on the exposed intertidal flats on the north side of the flood shoal and 15 (of the overall 87 sightings) were observed resting on the sandy beach along the north side of the inlet (Ecological Associates, Inc. 2009). Other surveys within this area documented use of the south inlet beach as well as the Atlantic-facing beaches up to 5.3 miles from the inlet (Ecological Associates, Inc. 2009). It is unknown if the birds located 5.3 miles from the inlet were using nearby bayside habitats, solely dependent on the ocean beach, or if they foraged within the inlet area. Quite possibly, they relied on all of the above.

Recent geographic analysis of piping plover distribution on the upper Texas coast noted major concentration areas at the mouths of rivers and washover passes (low, sparsely vegetated barrier island habitats created and maintained by temporary, storm-driven water channels) into major bay systems (Arvin 2008). Earlier studies in Texas have drawn attention to washover passes, which are commonly used by piping plovers during periods of high bayshore tides and during the spring migration period (Zonick 1997; Zonick 2000). Cobb (*in* Elliott-Smith et al. 2009) reported piping plover concentrations on exposed seagrass beds and oyster reefs during seasonal low water periods in 2006.

The effects of dredge-material deposition merit further study. Drake et al. (2001) concluded that conversion of southern Texas mainland bayshore tidal flats to dredged material impoundments results in a net loss of habitat for wintering piping plovers, because impoundments eventually convert to upland habitat not used by piping plovers. Zonick et al. (1998) reported that dredged material placement areas along the Intracoastal Waterway in Texas were rarely used by piping plovers, and noted concern that dredge islands block wind-driven water flows, which are critical to maintaining important shorebird habitats. By contrast, most of the sound islands used by foraging piping plovers at Oregon Inlet were created by the Corps by deposition of dredged material in the subtidal bay bottom, with the most recent deposition ranging from 28 to less than 10 years prior to the study (Cohen et al. 2008).

Mean home range size (95% of locations) for 49 radio-marked piping plovers in southern Texas in 1997-98 was 12.6 km^2 (3,113 acres), mean core area (50% of locations) was 2.9 km^2 (717 acres), and mean linear distance moved between successive locations (1.97 $\pm$ 0.04 days apart), averaged across seasons, was 3.3 km (2.1 miles) (Drake 1999b; Drake et al. 2001). Seven radio-tagged piping plovers used a 20.1 km^2 (4,967 acres) area (100% minimum convex polygon) at Oregon Inlet in 2005-2006, and piping plover activity was concentrated in 12 areas totaling 2.2 km^2 (544 acres) (Cohen et al. 2008). Noel and Chandler (2008) observed high fidelity of banded piping plovers to 1-4.5 km (0.62-2.8 miles) sections of beach on Little St. Simons Island, Georgia.

Migration: Plovers depart their breeding grounds for their wintering grounds from July through late August, but southward migration extends through November. Piping plovers use habitats in the Florida mostly from July 15 through May 15. Both spring and fall migration routes of Atlantic Coast breeders are believed to occur primarily within a narrow zone along the Atlantic Coast (Service 1996). The pattern of both fall and spring counts at many Atlantic Coast sites demonstrates that many piping plovers make intermediate stopovers lasting from a few days up to one month during their migrations (Noel et al. 2005; Stucker and Cuthbert 2006). Some mid-continent breeders travel up or down the Atlantic Coast before or after their overland movements (Stucker and Cuthbert 2006). Use of inland stopovers during migration is also documented (Pompei and Cuthbert 2004). The source breeding population of a given wintering individual cannot be determined in the field unless it has been banded or otherwise marked. Information from observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a significant degree. See **Status and Distribution** section for additional information pertaining to population distribution on the wintering grounds. While piping plover migration patterns and needs remain poorly understood and occupancy of a particular habitat may involve shorter periods relative to wintering, information about the energetics of avian migration indicates that this might be a particularly critical time in the species' life cycle.

Critical Habitat: The Service has designated critical habitat for the piping plover on three occasions. Two of these designations protected different breeding populations of the piping plover. Critical habitat for the Great Lakes breeding population was designated May 7, 2001 (66 FR 22938, Service 2001a), and critical habitat for the northern Great Plains breeding population was designated September 11, 2002 (67 FR 57637, Service 2002). The Service designated critical habitat for wintering piping plovers on July 10, 2001 (66 FR 36038, Service 2001b). Wintering piping plovers may include individuals from the Great Lakes and northern Great

Plains breeding populations as well as birds that nest along the Atlantic coast. The three separate designations of piping plover critical habitat demonstrate diversity of constituent elements between the two breeding populations as well as diversity of constituent elements between breeding and wintering populations.

Designated wintering piping plover critical habitat originally included 142 areas [the rule states 137 units; this is in error] encompassing about 1,793 miles of mapped shoreline and 165,211 acres of mapped areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

Since the designation of wintering critical habitat, 19 units (TX- 3,4,7-10, 14-19, 22, 23, 27,28, and 31-33) in Texas have been vacated and remanded back to the Service for reconsideration by Court order (Texas General Land Office v. U.S. Department of Interior (Case No. V-06-CV-00032)). On May 19, 2009, the Service published a final rule designating 18 revised critical habitat units in Texas, totaling approximately 139,029 acres (74 FR 23476).

The Courts vacated and remanded back to the Service for reconsideration, four units in North Carolina (Cape Hatteras Access Preservation Alliance v. U.S. Department of Interior (344 F. Supp. 2d 108 (D.D.C. 2004)). The four critical habitat units vacated were NC-1, 2, 4, and 5, and all occurred within Cape Hatteras National Seashore (CAHA). A revised designation for these four units was published on October 21, 2008 (73 FR 62816). On February 6, 2009, Cape Hatteras Access Preservation Alliance and Dare and Hyde Counties, North Carolina filed a legal challenge to the revised designation. A final decision has not been made on the North Carolina challenge to date.

The primary constituent elements for piping plover wintering habitat are those biological and physical features that are essential to the conservation of the species. The primary constituent elements are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support these habitat components. These areas typically include those coastal areas that support intertidal beaches and flats and associated dune systems and flats above annual high tide (Service 2001a). PCEs of wintering piping plover critical habitat include sand or mud flats or both with no or sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers (Service 2001a). Important components of the beach/dune ecosystem include surf-cast algae, sparsely vegetated back beach and salterns, spits, and washover areas. Washover areas are broad, unvegetated zones, with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action. The units designated as critical habitat are those areas that have consistent use by piping plovers and that best meet the biological needs of the species. The amount of wintering habitat included in the designation appears sufficient to support future recovered populations, and the existence of this habitat is essential to the conservation of the species. Additional information on each specific unit included in the designation can be found at 66 FR 36038 (Service 2001a).

Life history

Piping plovers live an average of five years, although studies have documented birds as old as 11 (Wilcox 1959) and 15 years. Piping plover breeding activity begins in mid-March when birds begin returning to their nesting areas (Coutu et al. 1990; Cross 1990; Goldin et al. 1990; MacIvor 1990; Hake 1993). Plovers are known to begin breeding as early as one year of age (MacIvor 1990; Haig 1992); however, the percentage of birds that breed in their first adult year is unknown. Piping plovers generally fledge only a single brood per season, but may re-nest several times if previous nests are lost.

The most consistent finding in the various population viability analyses (PVAs) conducted for piping plovers (Ryan et al. 1993; Melvin and Gibbs 1996; Plissner and Haig 2000; Wemmer et al. 2001; Larson et al. 2002; Amirault et al. 2005; Calvert et al. 2006; Brault 2007) indicates that even small declines in adult and juvenile survival rates will cause very substantial increases in extinction risk. A banding study conducted between 1998 and 2004 in Atlantic Canada found lower return rates of juvenile (first year) birds to the breeding grounds than was documented for Massachusetts (Melvin and Gibbs 1994, cited in Appendix E, Service 1996), Maryland (Loegering 1992), and Virginia (Cross 1996) breeding populations in the mid-1980s and very early 1990s. This is consistent with failure of the Atlantic Canada population to increase in abundance despite very high productivity (relative to other breeding populations) and extremely low rates of dispersal to the U.S. over the last 15 plus years (Amirault et al. 2005). Simply stated, this suggests that maximizing productivity does not ensure population increases.

Efforts to partition survival within the annual cycle are beginning to receive more attention, but current information remains limited. Drake et al. (2001) observed no mortality among 49 radio-marked piping plovers (total of 2,704 transmitter days) in Texas in 2007-2008. Cohen et al. (2008) documented no mortality of 7 radio-tracked wintering piping plovers at Oregon Inlet from December 2005 to March 2006. They speculate their high survival rate was attributed to plovers food availability much of the day as well as the low occurrence of days below freezing and infrequent wet weather. Analysis of South Carolina resighting data for 87 banded piping plovers (78% Great Lakes breeders) in 2006-2007 and 2007-2008 found 100% survival from December to April[1] (J. Cohen, Virginia Polytechnic Institute and State University, pers. comm. 2009). Noel et al. (2007) inferred two winter (November to February) mortalities[2] among 21 banded (but not radio-tagged) overwintering piping plovers in 2003-2004 and 9 mortalities among 19

[1] However, of those birds, one unique and one non-uniquely banded piping plover were seen in the first winter and were resighted multiple times in the second fall at the same location but were not seen during the second winter; whether these two birds died in the fall or shifted their wintering location is unknown (Maddock et al. 2009).

[2] Noel et al. (2007) inferred mortality if a uniquely banded piping plover with multiple November to February sightings on the survey site disappeared during that time and was never observed again in either it's nonbreeding or breeding range. Note that most of these birds were from the Great Lakes breeding population, where detectability during the breeding season is very high.

overwintering birds during the winter of 2004-2005 at Little St. Simons Island, Georgia. LeDee (2008) found higher apparent survival[3] rates during breeding and southward migration than during winter and northward migration for 150 adult (i.e., after-hatch year) Great Lakes piping plovers.

Mark-recapture analysis of resightings of uniquely banded piping plovers from seven breeding areas by Roche et al. (2009) found that apparent adult survival declined in four populations and increased in none over the life of the studies[4]. Some evidence of correlation in year-to-year fluctuations in annual survival of Great Lakes and eastern Canada populations, both of which winter primarily along the southeastern U.S. Atlantic Coast, suggests that shared over-wintering and/or migration habitats may influence annual variation in survival. Further concurrent mark-resighting analysis of color-banded individuals across piping plover breeding populations has the potential to shed light on threats that affect survival in the migration and wintering range.

Population dynamics

The 2006 Piping Plover Breeding Census, the last comprehensive survey throughout the breeding grounds, documented 3,497 breeding pairs with a total of 8,065 birds throughout Canada and U.S (Elliott-Smith et al. 2009).

<u>Northern Great Plains Population</u>

The Northern Great Plains plover breeds from Alberta to Manitoba, Canada and south to Nebraska; although some nesting has recently occurred in Oklahoma. Currently the most westerly breeding piping plovers in the United States occur in Montana and Colorado.
The decline of piping plovers on rivers in the Northern Great Plains has been largely attributed to the loss of sandbar island habitat and forage base due to dam construction and operation. Nesting occurs on sand flats or bare shorelines of rivers and lakes, including sandbar islands in the upper Missouri River system, and patches of sand, gravel, or pebbly-mud on the alkali lakes of the northern Great Plains. Plovers do nest on shorelines of reservoirs created by the dams, but reproductive success is often low and reservoir habitat is not available in many years due to high water levels or vegetation. Dams operated with steady constant flows allow vegetation to grow on potential nesting islands, making these sites unsuitable for nesting. Population declines in alkali wetlands are attributed to wetland drainage, contaminants, and predation.

The International Piping Plover Census, conducted every five years, also estimates the number of piping plover pairs in the Northern Great Plains. As illustrated in **Table 3**, none of the International Piping Plover Census estimates of the number of pairs in the U.S. suggests that the Northern Great Plains population has yet satisfied the recovery criterion of 2,300 pairs (Plissner and Haig 1997; Ferland and Haig 2002; Elliot-Smith et al. 2009).

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[3] "Apparent survival" does not account for permanent emigration. If marked individuals leave a survey site, apparent survival rates will be lower than true survival. If a survey area is sufficiently large, such that emigration out of the site is unlikely, apparent survival will approach true survival.

[4] Data were analyzed for 3-11 years per breeding area, all between 1998 and 2008.

Table 2. The number of adult piping plovers and breeding pairs reported in the U.S. Northern Great Plains by the IPPC efforts.

Year	Adults	Pairs Reported by the Census
1991	2,023	891
1996	1,599	586
2001	1,981	899
2006	2,959	1,212

Source: Plissner and Haig 1997, Ferland and Haig 2002, Elliot-Smith et al. 2009.

The International Piping Plover Census counted in prairie Canada reported 1,703 adult birds in 2006, well short of the goal of 2,500 adult piping plover as stated in the Service's Recovery Plan (Service 1988).

Great Lakes Population

The Great Lakes plovers once nested on Great Lakes beaches in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario. Great Lakes piping plovers nest on wide, flat, open, sandy or cobble shoreline with very little grass or other vegetation. Reproduction is adversely affected by human disturbance of nesting areas and predation by foxes, gulls, crows and other avian species. Shoreline development, such as the construction of marinas, breakwaters, and other navigation structures, has adversely affected nesting and brood rearing.

The Recovery Plan (Service 2003) sets a population goal of at least 150 pairs (300 individuals), for at least 5 consecutive years, with at least 100 breeding pairs (200 individuals) in Michigan and 50 breeding pairs (100 individuals) distributed among sites in other Great Lakes states.

In 2008, the current Great Lakes piping plover population was estimated at 63 breeding pairs (126 individuals). Of these, 53 pairs were found nesting in Michigan, while 10 were found outside the state, including six pairs in Wisconsin and four in Ontario, Canada. The 53 nesting pairs in Michigan represent approximately 50% of the recovery criterion. The 10 breeding pairs outside Michigan in the Great Lakes basin, represents 20% of the goal, albeit the number of breeding pairs outside Michigan has continued to increase over the past five years. The single breeding pair discovered in 2007 in the Great Lakes region of Canada represented the first confirmed piping plover nest there in over 30 years, and in 2008 the number of nesting pairs further increased to four.

Atlantic Coast Population

The Atlantic Coast piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. Historical population trends for the Atlantic Coast piping plover have been reconstructed from scattered, largely qualitative records. Nineteenth-century naturalists, such as Audubon and Wilson, described the piping plover as a common summer resident on Atlantic Coast beaches (Haig and Oring 1987). However, by the beginning of the 20th Century, egg collecting and uncontrolled hunting, primarily for the millinery trade, had greatly reduced the population, and in some areas along the Atlantic Coast, the piping plover was close to extirpation. Following passage of the Migratory Bird Treaty Act (40 Stat. 775; 16 U.S.C. 703-712) in 1918, and changes in the fashion industry that no longer exploited wild birds for feathers, piping plover numbers recovered to some extent (Haig and Oring 1985).

Available data suggest that the most recent population decline began in the late 1940s or early 1950s (Haig and Oring 1985). Reports of local or statewide declines between 1950 and 1985 are numerous, and many are summarized by Cairns and McLaren (1980) and Haig and Oring (1985). While Wilcox (1939) estimated more than 500 pairs of piping plovers on Long Island, New York, the 1989 population estimate was 191 pairs (see Table 4, Service 1996). There was little focus on gathering quantitative data on piping plovers in Massachusetts through the late 1960s because the species was commonly observed and presumed to be secure. However, numbers of piping plover breeding pairs declined 50 to 100 percent at seven Massachusetts sites between the early 1970s and 1984 (Griffin and Melvin 1984). Piping plover surveys in the early years of the recovery effort found that counts of these cryptically colored birds sometimes went up with increased census effort, suggesting that some historic counts of piping plovers by one or a few observers may have underestimated the piping plover population. Thus, the magnitude of the species decline may have been more severe than available numbers imply.

The New England recovery unit population has exceeded (or been within three pairs of) its 625-pair abundance goal since 1998, attaining a post-listing high of 711 pairs in 2008. The New York-New Jersey recovery unit reached 586 pairs in 2007, surpassing its 575-pair goal for the first time; in 2008, however, abundance dipped to 554 pairs. The Southern recovery unit, which attained 333 pairs in 2007 and 331 pairs in 2008, has not yet reached its 400-pair goal.

The Eastern Canada recovery unit has experienced the lowest population growth (9% net increase between 1989 and 2008), despite higher overall productivity than in the U.S. The highest post-listing abundance estimate was 274 pairs in 2002, and the 2008 estimate was 253 pairs, placing this recovery unit furthest from its goal (400 pairs).

Status and distribution

Non-breeding (migrating and wintering)

Piping plovers spend up to 10 months of their life cycle on their migration and winter grounds, generally July 15 through as late as May 15. Piping plover migration routes and habitats overlap breeding and wintering habitats, and, unless banded, migrants passing through a site usually are indistinguishable from breeding or wintering piping plovers. Migration stopovers by banded piping plovers from the Great Lakes have been documented in New Jersey, Maryland, Virginia, and North Carolina (Stucker and Cuthbert 2006). Migrating breeders from eastern Canada have been observed in Massachusetts, New Jersey, New York, and North Carolina (Amirault et al. 2005). As many as 85 staging piping plovers have been tallied at various sites in the Atlantic breeding range (Perkins 2008 pers. communication), but the composition (e.g., adults that nested nearby and their fledged young of the year versus migrants moving to or from sites farther north), stopover duration, and local movements are unknown. In general, distance between stopover locations and duration of stopovers throughout the coastal migration range remains poorly understood.

Review of published records of piping plover sightings throughout North America by Pompei and Cuthbert (2004) found more than 3,400 fall and spring stopover records at 1,196 sites. Published reports indicated that piping plovers do not concentrate in large numbers at inland sites and that they seem to stop opportunistically. In most cases, reports of birds at inland sites were single individuals.

Piping plovers migrate through and winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Four rangewide mid-winter (late January to early February) population surveys, conducted at five-year intervals starting in 1991, are summarized in **Table 4**. Total numbers have fluctuated over time, with some areas experiencing increases and others decreases. Regional and local fluctuations may reflect the quantity and quality of suitable foraging and roosting habitat, which vary over time in response to natural coastal formation processes as well as anthropogenic habitat changes (e.g., inlet relocation, dredging of shoals and spits). See, for example, discussions of survey number changes in Mississippi, Louisiana, and Texas by Winstead, Baka, and Cobb, respectively, *in* Elliott-Smith et al. (2009). Fluctuations may also represent localized weather conditions (especially wind) during surveys, or unequal survey coverage. For example, airboats facilitated first-time surveys of several central Texas sites in 2006 (Cobb *in* Elliott-Smith et al. 2009). Similarly, the increase in the 2006 numbers in the Bahamas is attributed to greatly increased census efforts; the extent of additional habitat not surveyed remains undetermined (Maddock and Wardle *in* Elliott-Smith et al. 2009). Changes in wintering numbers may also be influenced by growth or decline in the particular breeding populations that concentrate their wintering distribution in a given area. Major opportunities to locate previously unidentified wintering sites are concentrated in the Caribbean and Mexico (see pertinent sections in Elliott-Smith et al. 2009). Further surveys and assessment of seasonally emergent habitats (e.g., seagrass beds, mudflats, oyster reefs) within bays lying between the mainland and barrier islands in Texas are also needed.

Table 3. Results of the 1991, 1996, 2001, and 2006 International Piping Plover Winter Censuses (Haig et al. 2005, Elliott-Smith et al. 2009)

Location	**1991**	**1996**	**2001**	**2006**
Virginia	not surveyed (ns)	ns	ns	1
North Carolina	20	50	87	84
South Carolina	51	78	78	100
Georgia	37	124	111	212
Florida	**551**	**375**	**416**	**454**
-Atlantic	***70***	***31***	***111***	***133***
-Gulf	***481***	***344***	***305***	***321***
Alabama	12	31	30	29
Mississippi	59	27	18	78
Louisiana	750	398	511	226
Texas	1,904	1,333	1,042	2,090
Puerto Rico	0	0	6	Ns

Location	1991	1996	2001	2006
U.S. Total	**3,384**	**2,416**	**2,299**	**3,355**
Mexico	27	16	Ns	76
Bahamas	29	17	35	417
Cuba	11	66	55	89
Other Caribbean Islands	0	0	0	28
GRAND TOTAL	**3,451**	**2,515**	**2,389**	**3,884**
Percent of Total International Piping Plover Breeding Census	62.9%	42.4%	40.2%	48.2%

Mid-winter surveys may substantially underestimate the abundance of nonbreeding piping plovers using a site or region during other months. In late September 2007, 104 piping plovers were counted at the south end of Ocracoke Island, North Carolina (NPS 2007), where none were seen during the 2006 International Piping Plover Winter Census (Elliott-Smith et al. 2009). Noel et al. (2007) observed up to 100 piping plovers during peak migration at Little St. Simons Island, Georgia, where approximately 40 piping plovers wintered in 2003–2005. Differences among fall, winter, and spring counts in South Carolina were less pronounced, but inter-year fluctuations (e.g., 108 piping plovers in spring 2007 versus 174 piping plovers in spring 2008) at 28 sites were striking (Maddock et al. 2009). Even as far south as the Florida Panhandle, monthly counts at Phipps Preserve in Franklin County ranged from a mid-winter low of four piping plovers in December 2006 to peak counts of 47 in October 2006 and March 2007 (Smith 2007). Pinkston (2004) observed much heavier use of Texas Gulf Coast (ocean-facing) beaches between early September and mid-October (approximately 16 birds per mile) than during December to March (approximately two birds per mile).

Local movements of nonbreeding piping plovers may also affect abundance estimates. At Deveaux Bank, one of South Carolina's most important piping plover sites, five counts at approximately 10-day intervals between August 27 and October 7, 2006, oscillated from 28 to 14 to 29 to 18 to 26 (Maddock et al. 2009). Noel and Chandler (2008) detected banded Great Lakes piping plovers known to be wintering on their Georgia study site in 73.8 ± 8.1 % of surveys over three years.

Abundance estimates for nonbreeding piping plovers may also be affected by the number of surveyor visits to the site. Preliminary analysis of detection rates by Maddock et al. (2009) found 87% detection during the mid-winter period on core sites surveyed three times a month during fall and spring and one time per month during winter, compared with 42% detection on sites surveyed three times per year (Cohen 2009 pers. communication).

Gratto-Trevor et al. (2009) found strong patterns (but no exclusive partitioning) in winter distribution of uniquely banded piping plovers from four breeding populations (**Figure 5**). All eastern Canada and 94% of Great Lakes birds wintered from North Carolina to southwest

Florida. However, eastern Canada birds were more heavily concentrated in North Carolina, and a larger proportion of Great Lakes piping plovers were found in South Carolina and Georgia. Northern Great Plains populations were primarily seen farther west and south, especially on the Texas Gulf Coast. Although the great majority of Prairie Canada individuals were observed in Texas, particularly southern Texas, individuals from the U.S. Great Plains were more widely distributed on the Gulf Coast from Florida to Texas.

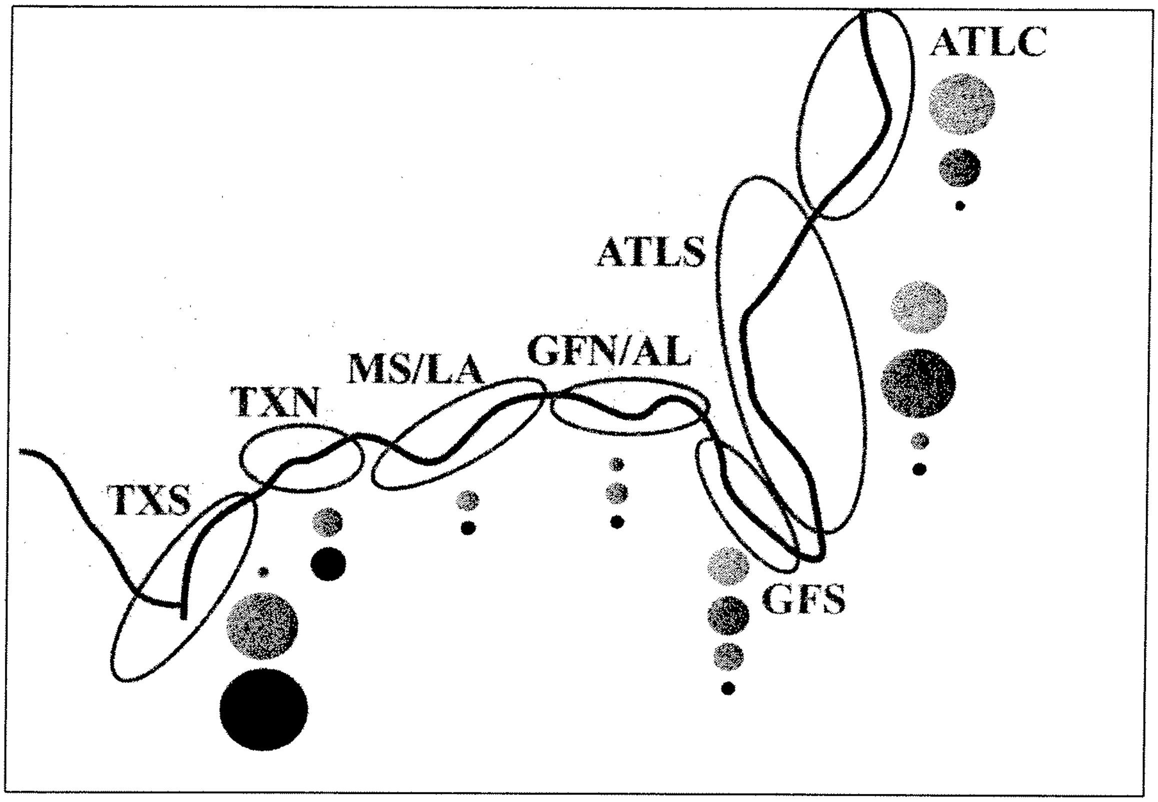

Figure 2. (from Gratto-Trevor et al. 2009, reproduced by permission). Breeding population distribution in the wintering/migration range. Grey circles represent Eastern Canada birds, Orange U.S. Great Lakes, Green U.S. Great Plains, and Black Prairie Canada

ATLC=Atlantic (eastern) Canada; GFS=Gulf Coast of southern Florida; GFN=Gulf Coast of north Florida; AL=Alabama; MS/LA=Mississippi and Louisiana; TXN=northern Texas; and TXS=southern Texas.

The findings of Gratto-Trevor et al. (2009) provide evidence of differences in the wintering distribution of piping plovers from these four breeding areas. However, the distribution of birds by breeding origin during migration remains largely unknown. Other major information gaps include the wintering locations of the U.S. Atlantic Coast breeding population (banding of U.S. Atlantic Coast piping plovers has been extremely limited) and the breeding origin of piping plovers wintering on Caribbean islands and in much of Mexico.

Banded piping plovers from the Great Lakes, Northern Great Plains, and eastern Canada breeding populations showed similar patterns of seasonal abundance at Little St. Simons Island, Georgia (Noel et al. 2007). However, the number of banded plovers originating from the latter two populations was relatively small at this study area.

This species exhibits a high degree of intra- and inter-annual wintering site fidelity (Nicholls and Baldassarre 1990a; Drake et al. 2001; Noel et al. 2005; Stucker and Cuthbert 2006). Gratto-Trevor et al. (2009) reported that six of 259 banded piping plovers observed more than once per winter moved across boundaries of the seven U.S. regions. Of 216 birds observed in different years, only eight changed regions between years, and several of these shifts were associated with late summer or early spring migration periods (Gratto-Trevor et al. 2009). For each breeding population, percentage of individuals reported wintering along the eastern coast of the U.S. from the central Atlantic to southern Texas/Mexico up to December 2008. Each individual was counted only once. The relative size of the circle represents the percentage from a specific breeding area seen in that winter region. Total number of individuals observed on the wintering grounds was 46 for Eastern Canada, 150 for the U.S. Great Lakes, 169 for the U.S. Great Plains, and 356 for Prairie Canada.

Local movements are more common. In South Carolina, Maddock et al. (2009) documented many cross-inlet movements by wintering banded piping plovers as well as occasional movements of up to 18 km by approximately 10% of the banded population; larger movements within South Carolina were seen during fall and spring migration. Similarly, eight banded piping plovers that were observed in two locations during 2006-2007 surveys in Louisiana and Texas were all in close proximity to their original location, such as on the bay and ocean side of the same island or on adjoining islands (Maddock 2008).

In 2001, 2,389 piping plovers were located during a winter census, accounting for only 40% of the known breeding birds recorded during a breeding census (Ferland and Haig 2002). About 89% of birds that are known to winter in the U.S. do so along the Gulf Coast (Texas to Florida), while eight percent winter along the Atlantic Coast (North Carolina to Florida).

The status of piping plovers on winter and migration grounds is difficult to assess, but threats to piping plover habitat used during winter and migration identified by the Service during its designation of critical habitat continue to affect the species. Unregulated motorized and pedestrian recreational use, inlet and shoreline stabilization projects, beach maintenance and nourishment, and pollution affect most winter and migration areas. Conservation efforts at some locations have likely resulted in the enhancement of wintering habitat.

The 2004 and 2005 hurricane seasons affected a substantial amount of habitat along the Gulf Coast. Habitats such as those along Gulf Islands National Seashore have benefited from increased washover events which created optimal habitat conditions for piping plovers. Conversely, hard shoreline structures are put into place following storms throughout the species range to prevent such shoreline migration (see *Factors Affecting Species Environment within the Action Area*). Four hurricanes between 2002 and 2005 are often cited in reference to rapid erosion of the Chandeleur Islands, a chain of low-lying islands in Louisiana where the 1991 International Piping Plover Census tallied more than 350 piping plovers. Comparison of imagery taken three years before and several days after Hurricane Katrina found that the Chandeleur Islands lost 82% of their surface area (Sallenger et al. 2009 in review), and a review of aerial photography prior to the 2006 Census suggested little piping plover habitat remained (Elliott-Smith et al. 2009). However, Sallenger et al. (2009 in review) noted that habitat changes in the Chandeleurs stem not only from the effects of these storms but rather from the combined effects of the storms, long-term (>1,000 years) diminishing sand supply, and sea-level rise relative to the land.

The Service is aware of the following site-specific conditions that affect the status of several habitats piping plover use while wintering and migrating, including critical habitat units. In Texas, one critical habitat unit was afforded greater protection due to the acquisition of adjacent upland properties by the local Audubon chapter. In another unit in Texas, vehicles were removed from a portion of the beach decreasing the likelihood of automobile disturbance to plovers. Exotic plant removal is occurring in another Florida critical habitat unit in South Florida that threatens to invade suitable piping plover habitat. The Service and other government agencies remain in a contractual agreement with the USDA for predator control within limited coastal areas in the Florida panhandle, including portions of some critical habitat units. Continued removal of potential terrestrial predators is likely to enhance survivorship of wintering and migrating piping plovers. In North Carolina, one critical habitat unit was afforded greater protection when the local Audubon chapter agreed to manage the area specifically for piping plovers and other shorebirds following the relocation of the nearby inlet channel.

Several projects have resulted in formal consultation for piping plovers or their designated critical habitat in Florida (**Table 5**).

Table 4. Biological opinions issued for all projects that had adverse impact to the piping plovers on non-breeding grounds in Florida

SPECIES Piping plover	YEAR	Habitat Impacted (miles (mi) or acres)	PROJECT ACTIVE YES/NO
East Pass re-opening	2001	2.0 mi	Completed
Amend BO for south jetty extension in Ponce De Leon Navigation Inlet	2003	Shoal habitat	Completed
Terminal groin and nearshore breakwater on south end of Amelia Island, Nassau, FL	2004	Shoal Habitat	Completed
Navarre beach nourishment emergency consultation and Amd. 1-6	2005	4.1 mi	Project completed, consultation not completed
Eglin AFB INRMP	2007-2011	17 mi (disturbance/ monitoring)	Completed
Tyndall AFB INRMP	2007-2011	18mi (disturbance/ Monitoring)	Completed

SPECIES Piping plover	YEAR	Habitat Impacted (miles (mi) or acres)	PROJECT ACTIVE YES/NO
St. Joseph Peninsula beach restoration	2007	7.5 mi	Consultation complete, project completed
Alligator Point beach nourishment	2007	2.9 nourished, add 1.5 disturbed	Consultation complete, project cancelled
NAS Pensacola pass dredging and spoil placement	2007	10.6 mi	Consultation ongoing
FEMA emergency berm repair for Florida coast	2008	50 mi (statewide)	Consultation complete
Eglin AFB nourishment	2008	7.3 mi	Consultation complete, project on hold until 2010.
Escambia Co., Perdido Key beach nourishment	2008	6.5 mi	Consultation complete, project not started.
Walton Co. beach nourishment	2008	14.1 mi	Consult complete, project not started
East Pass Destin Navigation Project	2009	Inlet dredge and 2.1 mi of shoreline	Consult complete, project not started.
Destin Beach SRI Project	2009	4.6 miles of shoreline and additional baysides	Consult complete, project partly completed.
Panama City Beach Erosion and Storm Damage Reduction	2010	2.5 CH miles, 9.0 miles of GOM and bayside shoreline	Consult complete, project completed.

Recovery criteria

Northern Great Plains Population (USFWS 1988, 1994)

1. Increase the number of birds in the U.S. northern Great Plains states to 2,300 pairs (Service 1994).
2. Increase the number of birds in the prairie region of Canada to 2,500 adult piping plovers (Service 1988).
3. Secure long-term protection of essential breeding and wintering habitat (Service 1994).

Great Lakes Population (USFWS 2003)

1. At least 150 pairs (300 individuals), for at least 5 consecutive years, with at least 100 breeding pairs (200 individuals) in Michigan and 50 breeding pairs (100 individuals) distributed among sites in other Great Lakes states.
2. Five-year average fecundity within the range of 1.5-2.0 fledglings per pair, per year, across the breeding distribution, and ten-year population projections indicate the population is stable or continuing to grow above the recovery goal.
3. Protection and long-term maintenance of essential breeding and wintering habitat is ensured, sufficient in quantity, quality, and distribution to support the recovery goal of 150 pairs (300 individuals).
4. Genetic diversity within the population is deemed adequate for population persistence and can be maintained over the long-term.
5. Agreements and funding mechanisms are in place for long-term protection and management activities in essential breeding and wintering habitat.

Atlantic Coast Population (USFWS 1996)

1. Increase and maintain for 5 years a total of 2,000 breeding pairs, distributed among 4 recovery units.

Recovery Unit	*Minimum Subpopulation*
Atlantic (eastern) Canada	*400 pairs*
New England	*625 pairs*
New York-New Jersey	*575 pairs*
Southern (DE-MD-VA-NC)	*400 pairs*

2. Verify the adequacy of a 2,000 pair population of piping plovers to maintain heterozygosity and allelic diversity over the long term.
3. Achieve a 5-year average productivity of 1.5 fledged chicks per pair in each of the 4 recovery units described in criterion 1, based on data from sites that collectively support at least 90% of the recover unit's population.
4. Institute long-term agreements to assure protection and management sufficient to maintain the population targets and average productivity in each recovery unit.
5. Ensure long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution to maintain survival rates for a 2,000-pair population.

Threats to Piping Plovers

In the following sections, we provide an analysis of threats to piping plovers in their migration and wintering range. We update information obtained since the 1985 listing rule, the 1991 status review, and the three breeding population recovery plans. Both previously identified and new threats are discussed. With minor exceptions, this analysis is focused on threats to piping plovers within the continental U.S. portion of their migration and wintering range. Threats in the Caribbean and Mexico remain largely unknown.

Present or threatened destruction, modification, or curtailment of its habitat or range:

The 1985 final rule stated that the number of piping plovers on the Gulf of Mexico coastal wintering grounds might be declining as indicated by preliminary analysis of Christmas Bird Count data. Independent counts of piping plovers on the Alabama coast indicated a decline in numbers between the 1950s and early 1980s. At the time of listing, the Texas Parks and Wildlife Department stated that 30% of wintering habitat in Texas had been lost over the previous 20 years. The final rule also stated that in addition to extensive breeding area problems, the loss and modification of wintering habitat was a significant threat to the piping plover.

The three recovery plans stated that shoreline development throughout the wintering range poses a threat to all populations of piping plovers. The plans further stated that beach maintenance and nourishment, inlet dredging, and artificial structures, such as jetties and groins, could eliminate wintering areas and alter sedimentation patterns leading to the loss of nearby habitat.

Priority 1 actions in the 1996 Atlantic Coast and 2003 Great Lakes Recovery Plans identify tasks to protect natural processes that maintain coastal ecosystems and quality wintering piping plover habitat and to protect wintering habitat from shoreline stabilization and navigation projects. The 1988 Northern Great Plains plan states that, as winter habitat is identified, current and potential threats to each site should be determined.

Important components of ecologically sound barrier beach management include perpetuation of natural dynamic coastal formation processes. Structural development along the shoreline or manipulation of natural inlets upsets the dynamic processes and results in habitat loss or degradation (Melvin et al. 1991). Throughout the range of migrating and wintering piping plovers, inlet and shoreline stabilization, inlet dredging, beach maintenance and nourishment activities, and seawall installations continue to constrain natural coastal processes. Dredging of inlets can affect spit formation adjacent to inlets and directly remove or affect ebb and flood tidal shoal formation. Jetties, which stabilize an island, cause island widening and subsequent growth of vegetation on inlet shores. Seawalls restrict natural island movement and exacerbate erosion. As discussed in more detail below, all these efforts result in loss of piping plover habitat. Construction of these projects during months when piping plovers are present also causes disturbance that disrupts the birds' foraging efficiency and hinders their ability to build fat reserves over the winter and in preparation for migration, as well as their recuperation from migratory flights. Additional investigation is needed to determine the extent to which these factors cumulatively affect piping plover survival and how they may impede conservation efforts for the species.

Any assessment of threats to piping plovers from loss and degradation of habitat must recognize that up to 24 shorebird species migrate or winter along the Atlantic Coast and almost 40 species of shorebirds are present during migration and wintering periods in the Gulf of Mexico region (Helmers 1992). Continual degradation and loss of habitats used by wintering and migrating shorebirds may cause an increase in intra-specific and inter-specific competition for remaining food supplies and roosting habitats. In Florida, for example, approximately 825 miles of coastline and parallel bayside flats (unspecified amount) were present prior to the advent of high human densities and beach stabilization projects. We estimate that only about 35% of the Florida coastline continues to support natural coastal formation processes, thereby concentrating foraging and roosting opportunities for all shorebird species and forcing some individuals into suboptimal habitats. Thus, intra- and inter-specific competition most likely exacerbates threats from habitat loss and degradation.

Sand placement projects

In the wake of episodic storm events, managers of lands under public, private, and county ownership often protect coastal structures using emergency storm berms; this is frequently followed by beach nourishment or renourishment activities (nourishment projects are considered "soft" stabilization versus "hard" stabilization such as seawalls). Berm placement and beach nourishment deposit substantial amounts of sand along Gulf of Mexico and Atlantic beaches to protect local property in anticipation of preventing erosion and what otherwise will be considered natural processes of overwash and island migration (Schmitt and Haines 2003).

Past and ongoing stabilization projects fundamentally alter the naturally dynamic coastal processes that create and maintain beach strand and bayside habitats, including those habitat components that piping plovers rely upon. Although impacts may vary depending on a range of factors, stabilization projects may directly degrade or destroy piping plover roosting and foraging habitat in several ways. Front beach habitat may be used to construct an artificial berm that is densely planted in grass, which can directly reduce the availability of roosting habitat. Over time, if the beach narrows due to erosion, additional roosting habitat between the berm and the water can be lost. Berms can also prevent or reduce the natural overwash that creates roosting habitats by converting vegetated areas to open sand areas. The vegetation growth caused by impeding natural overwash can also reduce the maintenance and creation of bayside intertidal feeding habitats. In addition, stabilization projects may indirectly encourage further development of coastal areas and increase the threat of disturbance.

Lott et al. (2007 in review) documented an increasing trend in sand placement events in Florida (**Figure 6**). Approximately 358 miles of 825 miles (43%) of Florida's sandy beach coastline were nourished from 1959-2006 (**Table 6**), with some areas being nourished multiple times. In northwest Florida, the USFWS consulted on first time sand placement projects along 46 miles of shoreline in 2007-2008, much of which occurred on public lands (Gulf Islands National Seashore (USFWS 2007a), portions of St. Joseph State Park (USFWS 2007b), and Eglin Air Force Base (USFWS 2008a)).

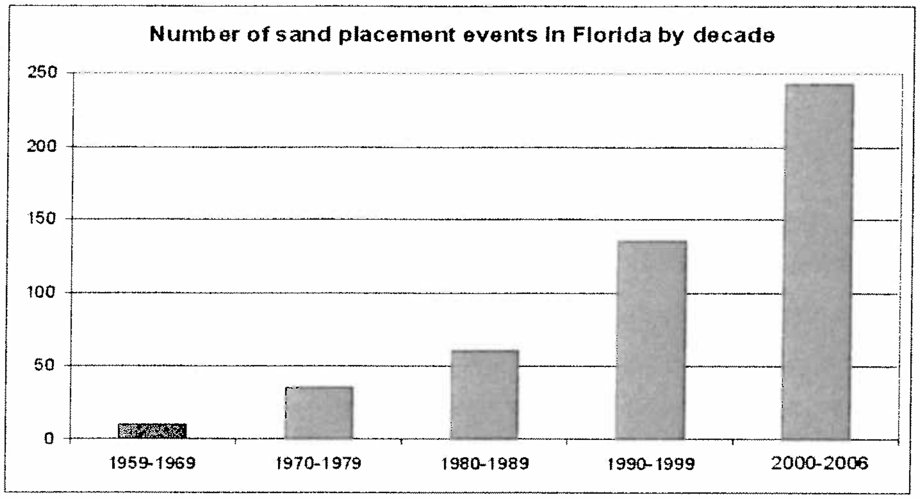

Figure 3. Number of sand placement events in Florida between 1959-2006

Table 5. Summary of the extent of nourished beaches in piping plover wintering and migrating habitat within the conterminous U.S. From USFWS unpublished data (project files, gray literature, and field observations)

State	Sandy beach shoreline miles available	Sandy beach shoreline miles nourished to date (within critical habitat units)	Percent of sandy beach shoreline affected (within critical habitat units)
North Carolina	301[1]	117[5] (unknown)	39 (unknown)
South Carolina	187[1]	56 (0.6)	30 (0.32))
Georgia	100[1]	8 (0.4)	8 (0.40)
Florida	825[2]	404 (6)[6]	49 (0.72)
Alabama	53[1]	12 (2)	23 (3.77)
Mississippi	110[3]	≥6 (0)	5 (0)
Louisiana	397[1]	Unquantified (usually restoration-oriented)	Unknown
Texas	367[4]	65 (45)	18 (12.26)
Overall Total	2,340 (does not include Louisiana)	≥668 does not include Louisiana (54 in CH)	29% (≥2.31% in CH)

Data from [1]www.50states.com; [2] Clark 1993; [3]N.Winstead, Mississippi Museum of Natural Science, in litt. 2008; [4] www.Surfrider.org; [5] H. Hall, USFWS, pers. comm. 2009; [6] partial data from Lott et al. (2007 in review).

At least 668 of 2,340 coastal shoreline miles (29% of beaches throughout the piping plover winter and migration range in the U.S.) are bermed, nourished, or renourished, generally for recreational purposes and to protect commercial and private infrastructure. However, only approximately 54 miles or 2.31% of these impacts have occurred within critical habitat. In

Louisiana, sediment placement projects are deemed environmental restoration projects by the Service, because without the sediment, many areas would erode below sea level.

Inlet stabilization/relocation

Many navigable mainland or barrier island tidal inlets along the Atlantic and Gulf of Mexico coasts are stabilized with jetties, groins, or by seawalls and/or adjacent industrial or residential development. Jetties are structures built perpendicular to the shoreline that extend through the entire nearshore zone and past the breaker zone (Hayes and Michel 2008) to prevent or decrease sand deposition in the channel. Inlet stabilization with rock jetties and associated channel dredging for navigation alter the dynamics of longshore sediment transport and affect the location and movement rate of barrier islands (Camfield and Holmes 1995), typically causing downdrift erosion. Sediment is then dredged and added back to islands, which subsequently widen. Once the island becomes stabilized, vegetation encroaches on the bayside habitat, thereby diminishing and eventually destroying its value to piping plovers. Accelerated erosion may compound future habitat loss, depending on the degree of sea-level rise. Unstabilized inlets naturally migrate, re-forming important habitat components, whereas jetties often trap sand and cause significant erosion of the downdrift shoreline. These combined actions affect the availability of piping plover habitat (Cohen et al. 2008).

Using Google Earth© (accessed April 2009), Service's biologists visually estimated the number of navigable mainland or barrier island tidal inlets throughout the wintering range of the piping plover in the conterminous U.S. that have some form of hardened structure. This includes seawalls or adjacent development, which lock the inlets in place (**Table 7**).

Table 6. Number of hardened inlets by state. Asterisk (*) represents an inlet at the state line, in which case half an inlet is counted in each state

State	Visually estimated number of navigable mainland and barrier island inlets per state	Number of hardened inlets	% of inlets affected
North Carolina	20	2.5*	12.5%
South Carolina	34	3.5*	10.3%
Georgia	26	2	7.7%
Florida	82	41	50%
Alabama	14	6	42.9%
Mississippi	16	7	43.8%
Louisiana	40	9	22.5%
Texas	17	10	58.8%
Overall Total	249	81	32.5%

Tidal inlet relocation can cause loss and/or degradation of piping plover habitat; although less permanent than construction of hard structures, effects can persist for years. For example, a project on Kiawah Island, South Carolina, degraded one of the most important piping plover habitats in the State by reducing the size and physical characteristics of an active foraging site, changing the composition of the benthic community, decreasing the tidal lag in an adjacent tidal lagoon, and decreasing the exposure time of the associated sandflats (USFWS and Town of Kiawah Island unpubl. data). In 2006, pre-project piping plover numbers in the project area recorded during four surveys conducted at low tide averaged 13.5 piping plovers. This contrasts with a post-project average of 7.1 plovers during eight surveys (four in 2007 and four in 2008) conducted during the same months (USFWS and Town of Kiawah Island unpubl. data). Service biologists are aware of at least seven inlet relocation projects (two in North Carolina, three in South Carolina, two in Florida), but this number likely under-represents the extent of this activity.

Sand mining/dredging

Sand mining, the practice of extracting (dredging) sand from sand bars, shoals, and inlets in the nearshore zone, is a less expensive source of sand than obtaining sand from offshore shoals for beach nourishment. Sand bars and shoals are sand sources that move onshore over time and act as natural breakwaters. Inlet dredging reduces the formation of exposed ebb and flood tidal shoals considered to be primary or optimal piping plover roosting and foraging habitat. Removing these sand sources can alter depth contours and change wave refraction as well as cause localized erosion (Hayes and Michel 2008). Exposed shoals and sandbars are also valuable to piping plovers, as they tend to receive less human recreational use (because they are only accessible by boat) and therefore provide relatively less disturbed habitats for birds. We do not have a good estimate of the amount of sand mining that occurs across the piping plover wintering range, nor do we have a good estimate of the number of inlet dredging projects that occur. This number is likely greater than the number of total jettied inlets shown in Table 10, since most jettied inlets need maintenance dredging, but non-hardened inlets are often dredged as well.

Groins

Groins (structures made of concrete, rip rap, wood, or metal built perpendicular to the beach in order to trap sand) are typically found on developed beaches with severe erosion. Although groins can be individual structures, they are often clustered along the shoreline. Groins act as barriers to longshore sand transport and cause downdrift erosion, which prevents piping plover habitat creation by limiting sediment deposition and accretion (Hayes and Michel 2008). These structures are found throughout the southeastern Atlantic Coast, and although most were in place prior to the piping plover's 1986 ESA listing, installation of new groins continues to occur. **Table 8** tallies recent groin installation projects in wintering and migration habitat, as estimated by Service's biologists.

Table 7. Number of recent groin installation projects in two states, as reported by USFWS staff

State	Timeframe	# Projects
South Carolina	2006–2009	1
Florida	2000–2009	11

Seawalls and revetments

Seawalls and revetments are vertical hard structures built parallel to the beach in front of buildings, roads, and other facilities to protect them from erosion. However, these structures often accelerate erosion by causing scouring in front of and downdrift from the structure (Hayes and Michel 2008), which can eliminate intertidal foraging habitat and adjacent roosting habitat. Physical characteristics that determine microhabitats and biological communities can be altered after installation of a seawall or revetment, thereby depleting or changing composition of benthic communities that serve as the prey base for piping plovers. At four California study sites, each comprised of an unarmored segment and a segment seaward of a seawall, Dugan and Hubbard (2006) found that armored segments had narrower intertidal zones, smaller standing crops of macrophyte wrack, and lower shorebird abundance and species richness. Geotubes (long cylindrical bags made of high-strength permeable fabric and filled with sand) are softer alternatives, but act as barriers by preventing overwash. We did not find any sources that summarize the linear extent of seawall, revetment, and geotube installation projects that have occurred across the piping plover's wintering and migration habitat. Table 15 summarizes the number of piping plover survey sites with at least some shoreline armoring.

Exotic/invasive vegetation

A recently identified threat to piping plover habitat, not described in the listing rule or recovery plans, is the spread of coastal invasive plants into suitable piping plover habitat. Like most invasive species, coastal exotic plants reproduce and spread quickly and exhibit dense growth habits, often outcompeting native plant species. If left uncontrolled, invasive plants cause a habitat shift from open or sparsely vegetated sand to dense vegetation, resulting in the loss or degradation of piping plover roosting habitat, which is especially important during high tides and migration periods.

Beach vitex (*Vitex rotundifolia*) is a woody vine introduced into the southeastern U.S. as a dune stabilization and ornamental plant (Westbrooks and Madsen 2006). It currently occupies a very small percentage of its potential range in the U.S.; however, it is expected to grow well in coastal communities throughout the southeastern U.S. from Virginia to Florida, and west to Texas (Westbrooks and Madsen 2006). In 2003, the plant was documented in New Hanover, Pender, and Onslow counties in North Carolina, and at 125 sites in Horry, Georgetown, and Charleston counties in South Carolina. One Chesapeake Bay site in Virginia was eradicated, and another site on Jekyll Island, Georgia, is about 95% controlled (Suiter 2009 pers. communication). Beach vitex has been documented from two locations in northwest Florida, but one site disappeared after erosional storm events. The landowner of the other site has indicated an intention to eradicate the plant, but follow through is unknown (Farley 2009 pers. communication). Task forces formed in North and South Carolina in 2004-05 have made great strides to remove this plant from their coasts. To date, about 200 sites in North Carolina have been treated, with 200 additional sites in need of treatment. Similar efforts are underway in South Carolina.

Unquantified amounts of crowfootgrass (*Dactyloctenium aegyptium*) grow invasively along portions of the Florida coastline. It forms thick bunches or mats that may change the vegetative structure of coastal plant communities and alter shorebird habitat.

The Australian pine (*Casuarina equisetifolia*) changes the vegetative structure of the coastal community in south Florida and islands within the Bahamas. Shorebirds prefer foraging in open areas where they are able to see potential predators, and tall trees provide good perches for avian predators. Australian pines potentially impact shorebirds, including the piping plover, by reducing attractiveness of foraging habitat and/or increasing avian predation.

The propensity of these exotic species to spread, and their tenacity once established, make them a persistent threat, partially countered by increasing landowner awareness and willingness to undertake eradication activities.

Wrack removal and beach cleaning

Wrack on beaches and baysides provides important foraging and roosting habitat for piping plovers (Drake 1999; Smith 2007; Maddock et al. 2009; Lott et al. 2009; and many other shorebirds on their winter, breeding, and migration grounds. Because shorebird numbers are positively correlated with wrack cover and biomass of their invertebrate prey that feed on wrack (Tarr and Tarr 1987; Hubbard and Dugan 2003; Dugan et al. 2003), grooming will lower bird numbers (Defreo et al. 2009).

There is increasing popularity in the Southeast, especially in Florida, for beach communities to carry out "beach cleaning" and "beach raking" actions. Beach cleaning occurs on private beaches, where piping plover use is not well documented, and on some municipal or county beaches that are used by piping plovers. Most wrack removal on state and federal lands is limited to post-storm cleanup and does not occur regularly.

Man-made beach cleaning and raking machines effectively remove seaweed, fish, glass, syringes, plastic, cans, cigarettes, shells, stone, wood, and virtually any unwanted debris (Barber Beach Cleaning Equipment 2009). These efforts remove accumulated wrack, topographic depressions, and sparse vegetation nodes used by roosting and foraging piping plovers. Removal of wrack also eliminates a beach's natural sand-trapping abilities, further destabilizing the beach. In addition, sand adhering to seaweed and trapped in the cracks and crevices of wrack is removed from the beach. Although the amount of sand lost due to single sweeping actions may be small, it adds up considerably over a period of years (Nordstrom et al. 2006; Neal et al. 2007). Beach cleaning or grooming can result in abnormally broad unvegetated zones that are inhospitable to dune formation or plant colonization, thereby enhancing the likelihood of erosion (Defreo et al. 2009).

Tilling beaches to reduce soil compaction, as sometimes required by the Service for sea turtle protection after beach nourishment activities, has similar impacts. Recently, the Service improved sea turtle protection provisions in Florida; these provisions now require tilling, when needed, to be above the primary wrack line, not within it.

Currently, the Florida Department of Environmental Protection's Beaches and Coastal Management Systems section has issued 117 permits for beach raking or cleaning to multiple entities. We estimate that 240 of 825 miles (29%) of sandy beach shoreline in Florida are cleaned or raked on various schedules, i.e., daily, weekly, monthly (Teich 2009 pers.

communication). Service's biologists estimate that South Carolina mechanically cleans approximately 34 of its 187 shoreline miles (18%), and Texas mechanically cleans approximately 20 of its 367 shoreline miles (5.4%). We are not aware of what percentage of mechanical cleaning occurs in piping plover critical habitat.

Efforts to avoid and reduce adverse effects

Through the section 7 consultation process, 11 Service's field offices consult formally and informally to avoid or minimize project impacts to wintering and migrating piping plovers and their habitat. In certain cases, the consultation process has resulted in minimization actions that benefit piping plovers. For example, one informal consultation aided in eliminating subsurface armoring proposed along a coastal road within a national seashore (Service 2007a). At least two consultations have required "notches" (breaks in dune placement to increase likelihood of overwash) in proposed sand placement projects on public lands (Service 2007a, 2008a). At least three other formal consultations greatly reduced the impacts of inlet relocation projects (Service 2001, 2004, 2006). Two completed consultations (Service 2009a, 2009b) requested that the Corps consider creating potential piping plover habitat with sediments removed from dredged inlets.

The Service often requests post-project surveys and eradication of coastal exotic plant species in Florida as permit conditions for beach berm or nourishment projects to reduce impacts to piping plover habitat. Four recent BOs for sand placement events in Florida included requirements that restricted the removal of wrack to minimize project effects (Service 2007b, 2008b, 2008c, 2008d). A statewide consultation with the Federal Emergency Management Agency to minimize emergency berm repair and construction projects in Florida was completed in 2008 (Service 2008b). In Texas, four BOs required avoidance and minimization measures for beach maintenance, oil and gas activities, and inlet dredging and stabilization projects (Service 2003b, 2003c, 2008e, 2009c). Terms and Conditions included restricted activities in the coastal foredunes, restoration of beach elevations post-project, reductions in oil and gas leaks from vehicles, avoidance of driving in the swash zone (wet sand where water washes onto the shore after an incoming wave has broken), requirements to keep dogs on leashes, and avoidance of work during inclement weather when piping plovers are roosting.

Section 10(a)(2)(A) of the ESA requires an applicant for an incidental take permit to submit a conservation plan that specifies, among other things, the impacts that are likely to result in the taking and the measures the permit applicant will undertake to minimize and mitigate such impacts. Incidental take of piping plovers associated with beach driving activities in Volusia County, Florida, were addressed in a Habitat Conservation Plan (Ecological Associates, Inc. 2005). Minimization efforts within the Habitat Conservation Plan include daytime driving only, 10 mile-per-hour speed limits, a no-drive area in critical habitat, and seasonal field surveys. Three other Florida county governments (Gulf, Escambia, and Walton) are in various stages of drafting Habitat Conservation Plans for beach driving, coastal developments, and associated activities. All three consultations include consideration of effects on piping plovers.

Coordinated efforts for several large projects are currently underway. Florida Service field offices are engaged in statewide programmatic consultation on Florida coastal Corps projects and permitting (dredging, jetty maintenance, and nourishment). Also, Florida's Department of Environmental Protection and Fish and Wildlife Commission are drafting a statewide Habitat Conservation Plan for coastal actions permitted through the FDEP. The primary purpose of this plan is to minimize or mitigate habitat impacts associated with wrack removal, seawall installation, and geotube placement.

As noted above, some project sponsors have incorporated recommended avoidance and minimization measures. Nonetheless, considerable challenges remain. Other project sponsors have not reacted positively to Service recommendations, citing financial costs and engineering restrictions.

Summary

Habitat loss and degradation on winter and migration grounds from shoreline and inlet stabilization efforts, both within and outside of designated critical habitat, remain a serious threat to all piping plover populations.

In some areas, beaches that abut private property are needed by wintering and migrating piping plovers. However, residential and commercial developments that typically occur along private beaches may pose significant challenges for efforts to maintain natural coastal processes. The threats of habitat loss and degradation, when combined with the threat of sea-level rise associated with climate change, raise serious concerns regarding the ability of private beaches to support piping plovers over the long term.

The future actions that are taken on private beaches will determine whether piping plovers continue to use these beaches or whether the recovery of piping plovers will principally depend on public property. As Lott (2009) concludes, "The combination of development and shoreline protection seems to limit distribution of non-breeding piping plovers in Florida. If mitigation or habitat restoration efforts on barrier islands fronting private property are not sufficient to allow plover use of some of these areas, the burden for plover conservation will fall almost entirely on public land managers."

While public lands may not be at risk of habitat loss from private development, significant threats to piping plover habitat remain on many municipal, state, and federally owned properties. These public lands may be managed with competing missions that include conservation of imperiled species, but this goal frequently ranks below providing recreational enjoyment to the public, readiness training for the military, or energy development projects.

Public lands remain the primary places where natural coastal dynamics are allowed. Of recent concern are requests to undertake beach nourishment actions to protect coastal roads or military infrastructure on public lands. If project design does not minimize impediments to shoreline overwash, which are needed to help replenish bayside tidal flat sediments and elevations, significant bayside habitat may become vegetated or inundated, thereby exacerbating the loss of preferred piping plover habitat. Conversely, if beach fill on public lands is applied in a way that allows for "normal" system overwash processes, and sediment is added back to the system, projects may be less injurious to barrier island species that depend on natural coastal dynamics.

Maintaining wrack for food and cover in areas used by piping plovers may help offset impacts that result from habitat degradation due to sand placement associated with berm and beach nourishment projects and ensuing human disturbance. Leaving wrack on private beaches may improve use by piping plovers, especially during migration when habitat fragmentation may have a greater impact on the species.

In addition, using recreation management techniques, Great Lakes recovery action 2.14 may minimize the effects of habitat loss. Addressing off-road vehicles and pet disturbance may increase the suitability of existing piping plover habitat.

Overutilization for commercial, recreational, scientific or educational purposes:

The 1985 final listing rule found no evidence to suggest that this factor is a threat to piping plovers while on migration or winter grounds. The various recovery plans state that hunting in the late 1800s may have severely reduced piping plover numbers. The plans did not identify hunting as an existing threat to piping plovers wintering in the U.S., as take is prohibited pursuant to the Migratory Bird Treaty Act. No credible information indicates that hunting is a threat in the U.S. or in other countries. Based on the current information, overutilization is not a threat to piping plovers on their wintering and migration grounds.

Disease or predation

Disease

Neither the final listing rule nor the recovery plans state that disease is an issue for the species, and no plan assigns recovery actions to this threat factor. Based on information available to date, West Nile virus and avian influenza are a minor threat to piping plovers (Service 2009).

Predation

The impact of predation on migrating or wintering piping plovers remains largely undocumented. Except for one incident involving a cat in Texas (NY Times 2007), no depredation of piping plovers during winter or migration has been noted, although it will be difficult to document. Avian and mammalian predators are common throughout the species' wintering range. Predatory birds are relatively common during fall and spring migration, and it is possible that raptors occasionally take piping plovers (Drake et al. 2001). It has been noted, however, that the behavioral response of crouching when in the presence of avian predators may minimize avian predation on piping plovers (Morrier and McNeil 1991; Drake 1999; Drake et al. 2001).

The 1996 Atlantic Coast Recovery Plan summarized evidence that human activities affect types, numbers, and activity patterns of some predators, thereby exacerbating natural predation on breeding piping plovers. Nonbreeding piping plovers may reap some collateral benefits from predator management conducted for the primary benefit of other species. In 1997, the U.S. Department of Agriculture (USDA) implemented a public lands predator control partnership in northwest Florida that included the Department of Defense, National Park Service (NPS), the State of Florida (state park lands) and USFWS (National Wildlife Refuges and Ecological Services). The program continues with all partners except Florida – in 2008, lack of funding precluded inclusion of Florida state lands (although Florida Department of Environmental Protection staff conduct occasional predator trapping on state lands, trapping is not implemented consistently).

National Park Service and individual state park staff in North Carolina participate in predator control programs (Rabon 2009 pers. communication). The Service issued permit conditions for raccoon eradication to Indian River County staff in Florida as part of a coastal Habitat Conservation Plan (Adams 2009 pers. communication). Destruction of turtle nests by dogs or coyotes in the Indian River area justified the need to amend the permit to include an education program targeting dog owners regarding the appropriate means to reduce impacts to coastal species caused by their pets. The Service partnered with Texas Audubon and the Coastal Bend Bays and Estuaries Program in Texas to implement predator control efforts on colonial waterbird nesting islands (Cobb 2009 pers. communication). Some of these predator control programs may provide very limited protection to piping plovers, should they use these areas for roosting or foraging. **Table 9** summarizes predator control actions on a state-by-state basis. The Service is not aware of any current predator control programs targeting protection of coastal species in Georgia, Alabama, Mississippi, or Louisiana.

Regarding predation, the magnitude of this threat to nonbreeding piping plovers remains unknown, but given the pervasive, persistent, and serious impacts of predation on other coastal reliant species, it remains a potential threat. Focused research to confirm impacts as well as to ascertain effectiveness of predator control programs may be warranted, especially in areas frequented by Great Lakes birds during migration and wintering months. We consider predator control on their wintering and migration grounds to be a low priority at this time.[5]

Table 8. Summary of predator control programs that may benefit piping plovers on winter and migration grounds

State	Entities with Predator Control Programs
North Carolina	State Parks, Cape Lookout and Cape Hatteras National Seashores.
South Carolina	As needed throughout the state-targets raccoons and coyotes.
Georgia	No programs known.
Florida	Merritt Island NWR, Cape Canaveral AFS, Indian River County, Eglin AFB, Gulf Islands NS, northwest Florida state parks (up until 2008), St. Vincent NWR, Tyndall AFB.
Alabama	Late 1990's Gulf State Park and Orange Beach for beach mice, none current.
Mississippi	None known.
Louisiana	None known.

[5] The threat of direct predation should be distinguished from the threat of disturbance to roosting and feeding piping plovers posed by dogs off leash.

Texas	Aransas NWR (hog control for habitat protection). Audubon (mammalian predator control on colonial waterbird islands that have occasional piping plover use).

Other natural or manmade factors affecting its continued existence:

Recreational disturbance

Intense human disturbance in shorebird winter habitat can be functionally equivalent to habitat loss if the disturbance prevents birds from using an area (Goss-Custard et al. 1996), which can lead to roost abandonment and local population declines (Burton et al. 1996). Pfister et al. (1992) implicate anthropogenic disturbance as a factor in the long-term decline of migrating shorebirds at staging areas. Disturbance, i.e., human and pet presence that alters bird behavior, disrupts piping plovers as well as other shorebird species. Disturbance can cause shorebirds to spend less time roosting or foraging and more time in alert postures or fleeing from the disturbances (Johnson and Baldassarre 1988; Burger 1991; Burger 1994; Elliott and Teas 1996; Lafferty 2001a, 2001b; Thomas et al. 2002), which limits the local abundance of piping plovers (Zonick and Ryan 1995; Zonick 2000). Shorebirds that are repeatedly flushed in response to disturbance expend energy on costly short flights (Nudds and Bryant 2000).

Shorebirds are more likely to flush from the presence of dogs than people, and birds react to dogs from farther distances than people (Lafferty 2001a, 2001b; Thomas et al. 2002). Dogs off leash are more likely to flush piping plovers from farther distances than are dogs on leash; nonetheless, dogs both on and off leashes disturb piping plovers (Hoopes 1993). Pedestrians walking with dogs often go through flocks of foraging and roosting shorebirds; some even encourage their dogs to chase birds.

Off-road vehicles can significantly degrade piping plover habitat (Wheeler 1979) or disrupt the birds' normal behavior patterns (Zonick 2000). The 1996 Atlantic Coast Recovery Plan cites tire ruts crushing wrack into the sand, making it unavailable as cover or as foraging substrate (Hoopes 1993; Goldin 1993). The plan also notes that the magnitude of the threat from off-road vehicles is particularly significant, because vehicles extend impacts to remote stretches of beach where human disturbance will otherwise be very slight. Godfrey et al. (1980 as cited *in* Lamont et al. 1997) postulated that vehicular traffic along the beach may compact the substrate and kill marine invertebrates that are food for the piping plover. Zonick (2000) found that the density of off-road vehicles negatively correlated with abundance of roosting piping plovers on the ocean beach. Cohen et al. (2008) found that radio-tagged piping plovers using ocean beach habitat at Oregon Inlet in North Carolina were far less likely to use the north side of the inlet where off-road vehicle use is allowed, and recommended controlled management experiments to determine if recreational disturbance drives roost site selection. Ninety-six percent of piping plover detections were on the south side of the inlet even though it was farther away from foraging sites (1.8 km from the sound side foraging site to the north side of the inlet versus 0.4 km from the sound side foraging site to the north side of the inlet; Cohen et al. 2008).

Based on surveys with land managers and biologists, knowledge of local site conditions, and other information, we have estimated the levels of eight types of disturbance at sites in the U.S. with wintering piping plovers. There are few areas used by wintering piping plovers that are devoid of human presence, and just under half have leashed and unleashed dog presence (Smith 2007; Lott et al. 2009, Service unpubl. data 2009; Maddock and Bimbi unpubl. data). **Table 10** summarizes the disturbance analysis results. Data are not available on human disturbance at wintering sites in the Bahamas, other Caribbean countries, or Mexico.

Table 9. Percent of known piping plover winter and migration habitat locations, by state, where various types of anthropogenic disturbance have been reported

	Percent by State							
Disturbance Type	**AL**	**FL**	**GA**	**LA**	**MS**	**NC**	**SC**	**TX**
Pedestrians	67	92	94	25	100	100	88	54
Dogs on leash	67	69	31	25	73	94	25	25
Dogs off leash	67	81	19	25	73	94	66	46
Bikes	0	19	63	25	0	0	28	19
ATVs	0	35	0	25	0	17	25	30
ORVs	0	21	0	25	0	50	31	38
Boats	33	65	100	100	0	78	63	44
Kite surfing	0	10	0	0	0	33	0	0

Although the timing, frequency, and duration of human and dog presence throughout the wintering range are unknown, studies in Alabama and South Carolina suggest that most disturbances to piping plovers occurs during periods of warmer weather, which coincides with piping plover migration (Johnson and Baldassarre 1988; Lott et al. 2009; Maddock et al. 2009). Smith (2007) documents varying disturbance levels throughout the non-breeding season at northwest Florida sites.

In South Carolina, 33% (13 out of 39) of sites surveyed during the 2007–2008 season had ≥5 birds. Of those 13 sites, 46.2% (6 out of 13) had ≥10 people present during surveys, and 61.5% (8 out of 13) allow dogs, indicating that South Carolina sites with the highest piping plover density are exposed to disturbance. Only 25.7% (9 out of 35) of sites in South Carolina prohibit dogs and restrict public access to the entire site or sections of sites used by piping plovers (Maddock and Bimbi unpubl.data). Compliance with the restrictions at these sites is unknown.

LeDee (2008) collected survey responses in 2007 from 35 managers (located in seven states) at sites that were designated as critical habitat for wintering piping plovers. Ownership included federal, state, and local governmental agencies and non-governmental organizations managing national wildlife refuges; national, state, county, and municipal parks; state and estuarine research reserves; state preserves; state wildlife management areas; and other types of managed lands. Of 44 reporting sites, 40 allowed public beach access year-round and four sites were closed to the public. Of the 40 sites that allow public access, 62% of site managers reported >10,000 visitors during September-March, and 31% reported >100,000 visitors. Restrictions on visitor activities on the beach included automobiles (at 81% of sites), all-terrain vehicles (89%), and dogs during the winter season (50%). Half of the survey respondents reported funding as a primary limitation in managing piping plovers and other threatened and endangered species at their sites. Other limitations included "human resource capacity" (24%), conflicting management priorities (12%), and lack of research (3%).

Disturbance can be addressed by implementing recreational management techniques such as vehicle and pet restrictions and symbolic fencing (usually sign posts and string) of roosting and feeding habitats. In implementing conservation measures, managers need to consider a range of site-specific factors, including the extent and quality of roosting and feeding habitats and the types and intensity of recreational use patterns. In addition, educational materials such as informational signs or brochures can provide valuable information so that the public understands the need for conservation measures.

In sum, although there is some variability among states, disturbance from human beach recreation and pets poses a moderate to high and escalating threat to migrating and wintering piping plovers. Systematic review of recreation policy and beach management across the nonbreeding range will assist in better understanding cumulative impacts. Site-specific analysis and implementation of conservation measures should be a high priority at piping plover sites that have moderate or high levels of disturbance and the Service and state wildlife agencies should increase technical assistance to land managers to implement management strategies and monitor their effectiveness.

Military Actions

Twelve coastal military bases are located in the Southeast (**Table 11**). To date, five bases have consulted with the Service under section 7 of the ESA, on military activities on beaches and baysides that may affect piping plovers or their habitat (**Table 11**). Camp Lejeune in North Carolina consulted formally with the Service in 2002 on troop activities, dune stabilization efforts, and recreational use of Onslow Beach. The permit conditions require twice-monthly piping plover surveys and use of buffer zones and work restrictions within buffer zones.

Naval Station Mayport in Duval County, Florida, consulted with the Service on Marine Corps training activities that included beach exercises and use of amphibious assault vehicles. The area of impact was not considered optimal for piping plovers, and the consultation was concluded informally. Similar informal consultations have occurred with Tyndall Air Force Base (Bay County) and Eglin Air Force Base (Okaloosa and Santa Rosa counties) in northwest Florida. Both consultations dealt with occasional use of motorized equipment on the beaches and associated baysides. Tyndall Air Force Base has minimal on-the-ground use, and activities, when conducted, occur on the Gulf of Mexico beach, which is not considered the optimal area for piping plovers within this region. Eglin Air Force Base conducts twice-monthly surveys for piping plovers, and habitats consistently documented with piping plover use are posted with avoidance requirements to minimize direct disturbance from troop activities. A 2001 consultation with the Navy for training exercises on the beach and retraction operations on Peveto Beach, Cameron Parish, Louisiana, concluded informally.

Table 10. Military bases that occur within the wintering/migration range of piping plovers and contain piping plover habitat. An asterisk (*) indicates bases which conduct activities that may affect piping plovers or their habitat

State	Coastal Military Bases
North Carolina	Camp Lejeune*
South Carolina	No coastal beach bases
Georgia	Kings Bay Naval Base
Florida	Key West Base, Naval Station Mayport*, Cape Canaveral Air Force Station, Patrick AFB, MacDill AFB, Eglin AFB*, Tyndall AFB*
Alabama	No coastal beach bases
Mississippi	Keesler AFB
Louisiana	US Navy* operations on Peveto Beach
Texas	Corpus Christi Naval Air Station

Overall, project avoidance and minimization actions currently reduce threats from military activities to wintering and migrating piping plovers to a minimal threat level. However, prior to removal of the piping plover from ESA protections, Integrated Resource Management Plans or other agreements should clarify if and how a change in legal status would affect plover protections.

Contaminants

Contaminants have the potential to cause direct toxicity to individual birds or negatively affect their invertebrate prey base (Rattner and Ackerson 2008). Depending on the type and degree of contact, contaminants can have lethal and sub-lethal effects on birds, including behavioral impairment, deformities, and impaired reproduction (Rand and Petrocelli 1985; Gilbertson et al. 1991; Hoffman et al. 1996). The Great Lakes plan states that concentration levels of polychlorinated biphenol (PCB) detected in Michigan piping plover eggs have the potential to cause reproductive harm. They further state that analysis of prey available to piping plovers at representative Michigan breeding sites indicated that breeding areas along the upper Great Lakes region are not likely the major source of contaminants to this population.

Following the Ixtoc spill, which began on June 3, 1979 off the coast of Mexico, approximately 350 metric tons of oil accumulated on South Texas barrier beaches, resulting in a 79% decrease in the total number of infaunal organisms on contaminated portions of the beach (Kindinger 1981, Tunnell et al. 1982). Chapman (1984) collected pre- and post-spill data on the abundance, distribution, and habitat use of shorebirds on the beaches in the affected area and saw declines in the numbers of birds as well as shifts in the habitats used. Shorebirds avoided the intertidal area of the beach, occupying the backshore or moving to estuarine habitats when most of the beach was coated. Chapman surmised that the decline in infauna probably contributed to the observed shifts in habitats used. His observations indicated that all the shorebirds, including piping plovers, avoided the contaminated sediments and concentrated in oil-free areas. Amos, however, reported that piping plovers ranked second to sanderlings in the numbers of oiled birds he observed on the beach, although there was no recorded mortality of plovers due to oil (Amos pers. comm. 2009, 2012). Oiled birds were seen for a year or more following the initial spill, likely due to continued washing in of sunken tar; but there were only occasional subsequent observations of oiled or tarred plovers (Amos pers. comm. 2009).

According to government estimates, the 2010 Deepwater Horizon Mississippi Canyon Well #252 oil spill discharged 100-200 million gallons of oil into the Gulf of Mexico. The U.S. Coast Guard estimates that clean-up operations removed more than 50 million gallons of oil from the Gulf. Additional impacts to natural resources may be attributed to the 1.84 million gallons of dispersant that were applied to the spill. By July 28, 2010, approximately 625 miles of Gulf of Mexico shoreline was oiled. This included approximately 360 miles in Louisiana, 105 miles in Mississippi, 66 miles in Alabama, and 94 miles in Florida (July 28, 2010 Joint Information Center news release). These numbers do not address cumulative impacts or include shoreline that was cleaned. The U.S. Coast Guard, the states, and responsible parties that form the Unified Command (with advice from federal and state natural resource agencies) initiated protective measures and clean-up efforts as provided in contingency plans for each state's coastline. The contingency plans identified sensitive habitats, including all ESA-listed species' habitats, which received a higher priority for response actions.

Efforts to prevent shoreline oiling and cleanup response activities can disturb piping plovers and their habitat. Although most piping plovers were on their breeding grounds during the time that the Deepwater well was discharging oil, they began arriving back on the Gulf in mid-July. Ninety percent of piping plovers detected during the prior four years of surveys in Louisiana were in the Deepwater Horizon oil spill impact zone, and Louisiana's Department of Wildlife and Fisheries reported significant disturbance to birds and their habitat from response activities. Wrack lines were removed, and sand washing equipment "cleansed" beaches (M. Seymour, Louisiana Natural Heritage Program, pers. comm. 2011). Potential long-term adverse effects stem from the construction of sand berms and closing of at least 32 inlets. Implementation of prescribed best management practices reduced, but did not negate, disturbance to plovers (and to other beach-dependent wildlife) from cleanup personnel, all-terrain vehicles, helicopters, and other equipment. USFWS and state biologists present during cleanup operations provided information about breeding, migrating, and wintering birds and their habitat protection needs. However, high staff turnover during the extended spill response period necessitated continuous education and training of clean up personnel (M. Bimbi, USFWS, pers. comm. 2011). Limited clean-up operations were still on-going throughout the spill area. Results of a natural resources damage assessment study to assess injury to piping plovers (Fraser et al. 2010) are not yet available.

More subtle but cumulatively damaging sources of oil and other contaminants are leaking vessels located offshore or within the bays on the Atlantic and Gulf coasts, offshore oil rigs and undersea pipelines in the Gulf of Mexico, pipelines buried under the bay bottoms, and onshore facilities such as petroleum refineries and petrochemical plants. In Louisiana, about 2,500-3,000 oil spills are reported in the Gulf region each year, ranging in size from very small to thousands of barrels (L. Carver, Louisiana Department of Wildlife and Fisheries, pers. comm. 2011). Chronic spills of oil from rigs and pipelines and natural seeps in the Gulf of Mexico generally involve small quantities of oil. The oil from these smaller leaks and seeps, if they occur far enough from land, will tend to wash ashore as tar balls. In cases such as this, the impact is limited to discrete areas of the beach, whereas oil slicks from larger spills coat longer stretches of the shoreline (K. Rice, USFWS, pers. comm. 2009). In late July and early August 2009, for example, oil suspected to have originated from an offshore oil rig in Mexican waters was observed on plumage or legs of 14 piping plovers in south Texas (Cobb pers. comm. 2012b).

Pesticides

In 2000, mortality of large numbers of wading birds and shorebirds, including one piping plover, at Audubon's Rookery Bay Sanctuary on Marco Island, Florida, occurred following the county's aerial application of the organophosphate pesticide Fenthion for mosquito control purposes (Williams 2001). Fenthion, a known toxin to birds, was registered for use as an avicide by Bayer chemical manufacturer. Subsequent to a lawsuit being filed against the Environmental Protection Agency (EPA) in 2002, the manufacturer withdrew Fenthion from the market, and EPA declared all uses were to end by November 30, 2004 (American Bird Conservancy 2007). All other counties in the U.S. now use less toxic chemicals for mosquito control. It is unknown whether pesticides are a threat for piping plovers wintering in the Bahamas, other Caribbean countries, or Mexico.

Accelerating sea-level rise

Over the past 100 years, the globally-averaged sea level has risen approximately 10-25 centimeters (Rahmstorf et al. 2007), a rate that is an order of magnitude greater than that seen in the past several thousand years (Douglas et al. 2001 as cited in Hopkinson et al. 2008). The IPCC suggests that by 2080 sea-level rise could convert as much as 33% of the world's coastal wetlands to open water (IPCC 2007). Although rapid changes in sea level are predicted, estimated time frames and resulting water levels vary due to the uncertainty about global temperature projections and the rate of ice sheets melting and slipping into the ocean (IPCC 2007; CCSP 2008).

Potential effects of sea-level rise on coastal beaches may vary regionally due to subsidence or uplift as well as the geological character of the coast and nearshore (CCSP 2009; Galbraith et al. 2002). In the last century, for example, sea-level rise along the U.S. Gulf Coast exceeded the global average by 13-15 cm, because coastal lands west of Florida are subsiding (EPA 2009). Sediment compaction and oil and gas extraction compound tectonic subsidence (Penland and Ramsey 1990; Morton et al. 2003; Hopkinson et al. 2008). Low elevations and proximity to the coast make all nonbreeding coastal piping plover foraging and roosting habitats vulnerable to the effects of rising sea level. Furthermore, areas with small astronomical tidal ranges (e.g., portions of the Gulf Coast where intertidal range is <1 meter) are the most vulnerable to loss of intertidal wetlands and flats induced by sea-level rise (EPA 2009). Sea-level rise was cited as a contributing factor in the 68% decline in tidal flats and algal mats in the Corpus Christi area (i.e., Lamar Peninsula to Encinal Peninsula) in Texas between the 1950s and 2004 (Tremblay et al. 2008). Mapping by Titus and Richman (2001) showed that more than 80% of the lowest land along the Atlantic and Gulf coasts was in Louisiana, Florida, Texas, and North Carolina, where 73.5% of all wintering piping plovers were tallied during the 2006 International Piping Plover Census (Elliott-Smith et al. 2009).

Inundation of piping plover habitat by rising seas could lead to permanent loss of habitat if natural coastal dynamics are impeded by numerous structures or roads, especially if those shorelines are also armored with hardened structures. Without development or armoring, low undeveloped islands can migrate toward the mainland, pushed by the overwashing of sand eroding from the seaward side and being re-deposited in the bay (Scavia et al. 2002). Overwash and sand migration are impeded on developed portions of islands. Instead, as sea-level increases, the ocean-facing beach erodes and the resulting sand is deposited offshore. The buildings and the sand dunes then prevent sand from washing back toward the lagoons, and the lagoon side becomes increasingly submerged during extreme high tides (Scavia et al. 2002), diminishing both barrier beach shorebird habitat and protection for mainland developments.

Modeling for three sea-level rise scenarios (reflecting variable projections of global temperature rise) at five important U.S. shorebird staging and wintering sites predicted loss of 20-70% of current intertidal foraging habitat (Galbraith et al. 2002). These authors estimated probabilistic sea-level changes for specific sites partially based on historical rates of sea-level change (from tide gauges at or near each site); they then superimposed this on projected 50% and 5% probability of global sea-level changes by 2100 of 34 cm and 77 cm, respectively. The 50% and 5% probability sea level change projections were based on assumed global temperature increases of 2° C (50% probability) and 4.7° C (5% probability). The most severe losses were projected at sites where the coastline is unable to move inland due to steep topography or seawalls. The Galbraith et al. (2002) Gulf Coast study site, Bolivar Flats, Texas, is a designated critical habitat unit known to host high numbers of piping plovers during migration and throughout the winter; e.g., 275 individuals were tallied during the 2006 International Piping Plover Census (Elliott-Smith et al. 2009). Under the 50% likelihood scenario for sea-level rise, Galbraith et al. (2002) projected approximately 38% loss of intertidal flats at Bolivar Flats by 2050; however, after initially losing habitat, the area of tidal flat habitat was predicted to slightly increase by the year 2100, because Bolivar Flats lacks armoring, and the coastline at this site can thus migrate inland. Although habitat losses in some areas are likely to be offset by gains in other locations, Galbraith et al. (2002) noted that time lags may exert serious adverse effects on shorebird populations. Furthermore, even if piping plovers are able to move their wintering locations in response to accelerated habitat changes, there could be adverse effects on the birds' survival rates or reproductive fitness.

Table 12 displays the potential for adjacent development and/or hardened shorelines to impede response of habitat to sea-level rise in the eight states supporting wintering piping plovers. Although complete linear shoreline estimates are not readily obtainable, almost all known piping plover wintering sites in the U.S. were surveyed during the 2006 International Piping Plover Census. To estimate effects at the census sites, as well as additional areas where piping plovers have been found outside of the census period, Service biologists reviewed satellite imagery and spoke with other biologists familiar with the sites. Of 406 sites, 204 (50%) have adjacent structures that may prevent the creation of new habitat if existing habitat were to become inundated. These threats will be perpetuated in places where damaged structures are repaired and replaced, and exacerbated where the height and strength of structures are increased. Data do not exist on the amount or types of hardened structures at wintering sites in the Bahamas, other Caribbean countries, or Mexico.

Table 11. Number of sites surveyed during the 2006 winter International Piping Plover Census with hardened or developed structures adjacent to the shoreline

State	Number of sites surveyed during the 2006 winter Census	Number of sites with some armoring or development	Percent of sites affected
North Carolina	37 (+2)*	20	51
South Carolina	39	18	46
Georgia	13	2	15
Florida	188	114	61
Alabama	4 (+2)*	3	50
Mississippi	16	7	44
Louisiana	25 (+2)*	9	33
Texas	78	31	40
Overall Total	406	204	50

An asterisk (*) indicates additional piping plovers sites not surveyed in the 2006 Census.

Sea-level rise poses a significant threat to all piping plover populations during the migration and wintering portion of their life cycle. Ongoing coastal stabilization activities may strongly influence the effects of sea-level rise on piping plover habitat. Improved understanding of how sea-level rise will affect the quality and quantity of habitat for migrating and wintering piping plovers is an urgent need.

Storm events

Although coastal piping plover habitats are storm-created and maintained, the 1996 Atlantic Coast Recovery Plan also noted that storms and severe cold weather may take a toll on piping plovers, and the 2003 Great Lakes Recovery Plan postulated that loss of habitats such as overwash passes or wrack, where birds shelter during harsh weather, poses a threat.

Storms are a component of the natural processes that form coastal habitats used by migrating and wintering piping plovers, and positive effects of storm-induced overwash and vegetation removal have been noted in portions of the wintering range. For example, Gulf Islands National Seashore habitats in Florida benefited from increased washover events that created optimal habitat conditions during the 2004 and 2005 hurricane seasons, with biologists reporting piping plover use of these habitats within six months of the storms (Nicholas 2005 pers. communication). Hurricane Katrina (2005) overwashed the mainland beaches of Mississippi, creating many tidal flats where piping plovers were subsequently observed (N.Winstead in litt. 2008). Hurricane Katrina also created a new inlet and improved habitat conditions on some areas of Dauphin Island, Alabama (LeBlanc 2009 pers. communication). Conversely, localized storms, since Katrina, have induced habitat losses on Dauphin Island (LeBlanc 2009 pers. communication).

Noel and Chandler (2005) suspect that changes in habitat caused by multiple hurricanes along the Georgia coastline altered the spatial distribution of piping plovers and may have contributed to winter mortality of three Great Lakes piping plovers. Following Hurricane Ike in 2008, Arvin (2009) reported decreased numbers of piping plovers at some heavily eroded Texas beaches in the center of the storm impact area and increases in plover numbers at sites about 100 miles to the southwest. However, piping plovers were observed later in the season using tidal lagoons and pools that Ike created behind the eroded beaches (Arvin 2009).

The adverse effects on piping plovers attributed to storms are sometimes due to a combination of storms and other environmental changes or human use patterns. For example, four hurricanes between 2002 and 2005 are often cited in reference to rapid erosion of the Chandeleur Islands, a chain of low-lying islands in Louisiana where the 1991 International Piping Plover Census tallied more than 350 piping plovers. Comparison of imagery taken three years before and several days after Hurricane Katrina found that the Chandeleur Islands lost 82% of their surface area (Sallenger et al. 2009 in review), and a review of aerial photography prior to the 2006 Census suggested little piping plover habitat remained (Elliott-Smith et al. 2009). However, Sallenger et al. (2009 in review) noted that habitat changes in the Chandeleurs stem not only from the effects of these storms but rather from the combined effects of the storms, long-term (>1,000 years) diminishing sand supply, and sea-level rise relative to the land.

Other storm-induced adverse effects include post-storm acceleration of human activities such as beach nourishment, sand scraping, and berm and seawall construction. Such stabilization activities can result in the loss and degradation of feeding and resting habitats. Storms also can cause widespread deposition of debris along beaches. Removal of debris often requires large machinery, which can cause extensive disturbance and adversely affect habitat elements such as wrack. Another example of indirect adverse effects linked to a storm event is the increased access to Pelican Island (LeBlanc 2009 pers. communication) due to merging with Dauphin Island following a 2007 storm (Gibson et al. 2009).

Recent climate change studies indicate a trend toward increasing hurricane numbers and intensity (Emanuel 2005; Webster et al. 2005). When combined with predicted effects of sea-level rise, there may be increased cumulative impacts from future storms.

In sum, storms can create or enhance piping plover habitat while causing localized losses elsewhere in the wintering and migration range. Available information suggests that some birds may have resiliency to storms and move to unaffected areas without harm, while other reports suggest birds may perish from storm events. Significant concerns include disturbance to piping plovers and habitats during cleanup of debris, and post-storm acceleration of shoreline stabilization activities, which can cause persistent habitat degradation and loss.

Analysis of the species/critical habitat likely to be affected

The proposed action has the potential to adversely affect wintering and migrating piping plovers and their habitat from all three populations within the proposed project area and Action Area. The Atlantic Coast nesting population of piping plover is a component of the entity listed as threatened which encompasses all breeding piping plovers (Great Plains and Atlantic) except the Great Lakes breeding population.

Florida has 34 piping plover designated critical habitat units, comprising approximately 26 percent of its coastline. The 34 units include approximately 68 miles of federal shoreline, 120 miles of State shoreline and 24 miles of shoreline in private ownership (including non-profit organizations). This equates to approximately 212 miles of shoreline in Florida designated as critical habitat for the piping plover. No critical habitat is located within the Action Area. Coastal projects, which include beach nourishment, jetty extensions, and inlet dredging activities that affect the conservation of piping plovers wintering or migrating in northwest Florida are included in the Service's evaluation of the species current status.

ENVIRONMENTAL BASELINE

Walton County coastal beaches and connected coastal lakes are part of a complex and dynamic coastal system that continually respond to inlets, tides, waves, erosion and deposition, longshore sediment transport, and depletion, fluctuations in sea level, and weather events. The location and shape of the coastline and coastal dune outlets 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 into the coastal lakes are common, depositing sediments on the interior of the lakes, clearing vegetation and increasing the amount of open, sandflat habitat ideal for shoreline dependent shorebirds. However, the protection or persistence of these important natural land forms, processes, and wildlife resources is often in conflict with long-term, large-scale beach stabilization projects and their indirect effects, i.e., increases in residential development, infrastructure, and public recreational uses, and preclusion of overwash which limits the creation of open sand flats preferred by piping plovers.

Status of the species within the action area

Piping plover habitat within the Action Area occurs within an area affected by dynamic coastal processes and ongoing human uses. Suitable piping plover habitat appears to be present at and near Draper Lake, Alligator Lake, and Eastern Lake outfall areas and lake side sand and mud flats and along ocean shoreline. The number of piping plovers within the Action Area during the winter or migration is difficult to assess. Regular surveys have not been conducted for non-breeding (including migrating and overwinterng) plovers within the Action Area. Surveyors report no piping plovers in the project area during either the 2001 or 2006 International Piping Plover Census (Ferland and Haig 2002; Service 2006 Recovery Plan).

The known distribution of the piping plover in Florida is a result of occasional statewide cursory surveys combined with sporadic localized surveys that provide better estimates on abundance and seasonal use in those specific areas depending on the strength of the surveys. Currently the International Plover Winter Census as summarized in **Table 12** remains the only consistent winter survey effort for piping plovers on a statewide basis (Ferland and Haig 2002). Relative to abundance and relying on the results of the International Plover Winter Census, Florida ranks in the top third of eight southeastern states on which wintering piping plovers depend. The section above "*Status and Distribution: non-breeding (migrating and wintering)*" explains the limitations in the data collected during the International Census survey window with regard to locating all sites and exact numbers of plovers in specific locations. By their nature, the habitat features that piping plovers depend on are in a constant state of change thereby making it difficult to document the exact status of piping plovers in the Action Area on any given year at any given site.

We use the results of the following survey effort to demonstrate the limitations of relying on just the results of the International Plover Winter Census or any short term, one day or season survey effort for a species dependent on dynamic habitats. In 2006, the Service and the American Bird Conservancy funded the Apalachicola Riverkeeper to collect shorebird abundance and distribution data throughout Franklin County, Florida. A biologist for the Apalachicola Riverkeeper, Bradley Smith, collected survey data from August 2006, through May 2007. He attempted to visit each primary site at least twice monthly. He visited Phipps Preserve, an area known for its historic plover use, twenty-four times with surveys occurring August 15, 2006, through May 1, 2007. Numbers of piping plover recorded ranged from zero to a high of 47 piping plovers on two different days (**Figure 17**). The 2006 International Plover Winter Census reports 17 piping plovers on Phipps Preserve. Given that piping plovers evolved in a dynamic system, and that they are dependent upon these ever-changing features for their survival and conservation it is important that sites that experience these natural processes where plover habitat may come and go, are protected.

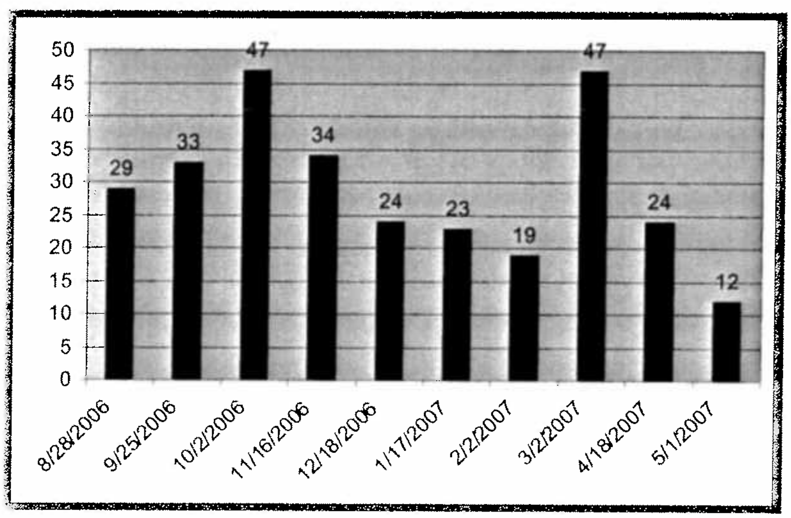

Figure 4. Piping plover sightings reported from Phipps Preserve, Franklin County, FL, from August 2006 through May 1, 2007.

Factors affecting species environment within the action area

A number of ongoing anthropogenic and natural factors may affect the species addressed in this biological opinion. Many of these effects have not been evaluated with respect to biological impacts on the species. In addition, some are interrelated and the effects of one cannot be separated from others. Known or suspected factors affecting the species addressed in these biological opinions are discussed below.

Most threats discussed above *(see threats: Status and Distribution section)* are threats seen throughout piping plover habitat in the entire Action Area. Depending on the local land codes, land ownership and enforcement capabilities, some threats are more pronounced in some areas than others.

Predation

Mammalian and avian predators are relatively common within the action area. In 1997, a multi-agency predator control partnership formed with US Department of Agriculture (USDA). The partnership has proven benefits for coastal species such as beach mice and shorebird and sea turtle nests. No depredation of piping plover during winter or migration has been noted, but would be difficult to document.

Pedestrian Use of the Beach

There are a number of potential sources of pedestrians, including those individuals driving and subsequently parking on the beach, those originating from off-beach parking areas (hotels, motels, commercial facilities, beachside parks, etc.), and those from beachfront and nearby residences. The effect of pedestrian traffic on roosting piping plovers on the Gulf beach side is unknown but evidence exists that pedestrian traffic affects wintering piping plovers. Lack of their visibility on the Gulf beaches may be a result of high pedestrian use. When approached, piping plovers typically flush to avoid close contact with humans *(see Life History section for more detail).* There are no closures areas within the Action Area for foraging and roosting piping plovers.

Dogs

Leashed dogs are a permitted activity on Walton County beaches between 3:00 p.m and 9:00 a.m. Dogs are restricted from State Park lands. On private and public lands, violations occur but enforcement is difficult because of the limited number of County and Park staff. Dogs running freely on beaches are potential predators of piping plovers and can harass migrating and wintering adults. The extent of the effects that free-running dogs have on piping plovers within the Action Area is unknown *(see Life History section for more detail).*

Vehicle Impacts

Walton County permits recreational beach driving in the Town of Grayton along approximately 600 feet of beachfront. The Tourist development Council collects trash along the beachfront. Vehicles can significantly degrade piping plover habitat and disrupt normal behavior patterns of the birds. Two studies show piping plovers avoidance of areas with vehicle use *(see Life History section for more detail).* Two sections of Walton County beaches are closed to vehicle use due to beach erosion.

Increasing Trend of Berm Placement and Nourishment Projects in Response to Storm Events

In the wake of an apparent increasing trend in episodic storm events, managers of lands under public, private and county ownership chose to protect coastal structures using emergency storm berms usually followed by nourishment activities. Berm placement and beach nourishment place substantial amounts of sand along the Gulf beaches in hopes of preventing what otherwise would be considered "natural processes" of overwash and island migration.

Past and ongoing stabilization projects along the northwest Florida coastline have fundamentally altered the naturally dynamic coastal processes that create and maintain beach strand habitats (**Figure 18**). Hard shoreline stabilization structures such as jetties and groins interrupt littoral drift, while artificially created berms and nourishment prevent overwash. These structures prevent natural shoreline migration. Such stabilization has encouraged residential and commercial development and associated infrastructure along otherwise ephemeral and/or flood prone habitats. The subsequent development has forestalled formation of highly productive piping plover overwash habitats and eliminated connectivity of piping plover oceanfront and bayside roosting and foraging habitats. The results of these projects have essentially forced public lands and some undeveloped private lands into becoming an oasis for endangered species such as the piping plover as well as other non-listed species. Of concern is the increasing trend of public lands applying these same actions. **Figure 18** shows the results of the 2006 International Plover Winter Census. It does not seem a coincidence that the areas populated with piping plovers in this snapshot survey are the areas that are not artificially stabilized and developed and preclude natural successional stages and processes from occurring. While shoreline hardening projects are installed to protect existing structures they further prevent natural shoreline processes. A similar pattern is seen throughout Florida (ABC and FWS unpublished data 2007). Recreational pressures are heavy on both the natural and unnatural lands, so it appears to be more a habitat component that makes the difference in areas selected for use by piping plovers.

Seven miles of Walton County shorelines within the Action Area were bermed in 2004. Approximately ten miles had artificial dunes constructed in 2005. The intentions of both efforts were to protect structures from eroding shorelines.

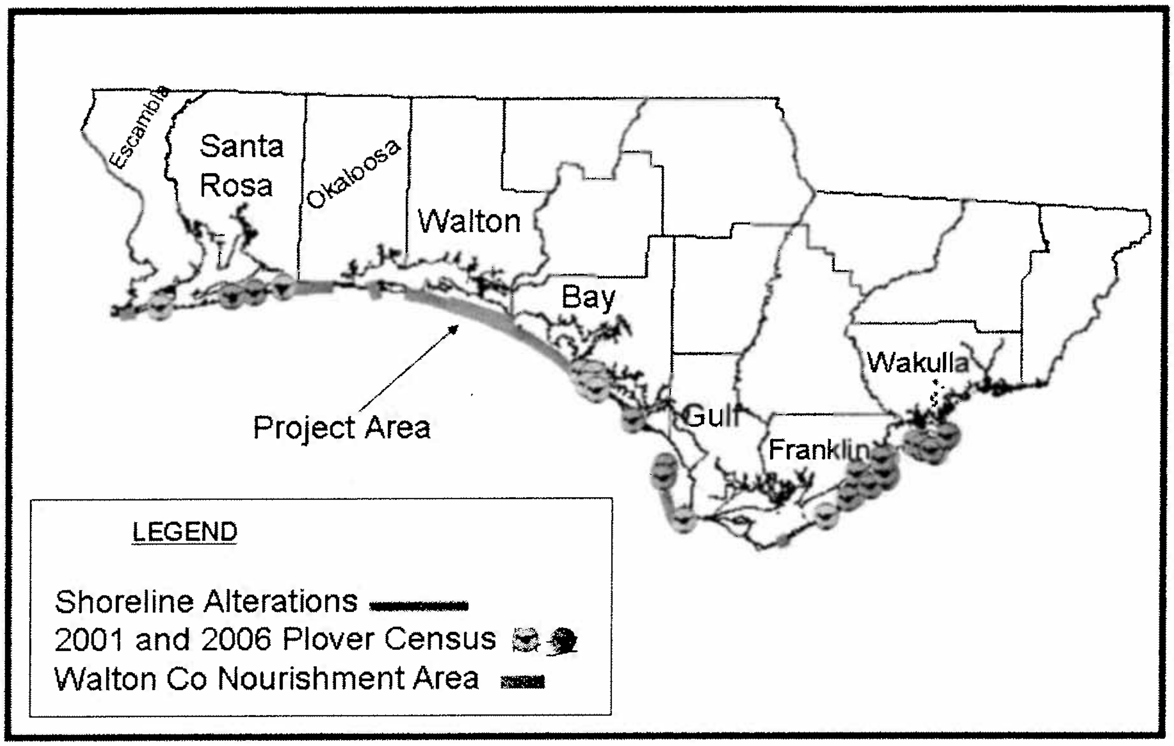

Figure 5. Comparison of shoreline stabilization projects (beach nourishment, hardening) and 2001 and 2006 piping plover census data.

Intraspecific and Interspecific Shorebird Competition

Historically, prior to high human densities and beach hardening projects, approximately 825 miles of coastline and parallel bayside flats (unspecified amount) of habitat occurred in Florida. This provided an unspecified amount of optimal foraging habitat for many shorebird species depending on the cumulative successional stages of the coastline. To date, approximately thirty-five percent of the coastline remains where coastal dynamics are allowed to function in Florida. As coastal functions are prohibited, formations of habitat appealing to different bird species dependent on these processes become more and more concentrated into the remaining optimal areas for foraging and roosting. It is likely they are, or will be, forced to forage and roost in less optimal areas.

Up to 24 shorebird species migrate or winter along the Atlantic Coast and almost 40 species of shorebirds occur during migrational and wintering periods in the GOM region (Helmers 1992). Continual degradation and loss of habitat needed by migrating and wintering shorebirds elevates the risk of increased pressure on remaining food supplies. Food limitations potentially increase intraspecies and interspecies competition and could result in eventual mortality. Shorebirds require maximum fat reserves to complete migrations. Birds with less than maximum fat reserves could be expected to show reduced survivorship. Piping plovers are part of this overall shorebird niche that may be forced to compete with the other 24 to 40 species of shorebirds dependent on Florida coastline habitats for some part of their life cycle. Shorebird species numbers are universally declining. The complexities of a shorebird life cycle make it difficult to determine what role the loss of 65 percent of habitat has played in this overall decline but it is likely significant.

Oil spill

The Deepwater Horizon oil spill, which started April 20, 2010, emanated into the Gulf of Mexico through July 15, 2010. Natural Resource Damage Assessment crews documented tar chunks along the Walton County beaches. As of the finalization of this document, the beaches are open for public use, including swimming. It is unknown if there are any current or lasting affects to the inter-tidal invertebrate food source used by piping plovers from either oil or oil dispersants within the Action Area. A greater impact to the piping plover and its habitat might be the increased human disturbance activities associated with clean-up, wildlife response, and damage assessment crews highly visible on the shorelines.

EFFECTS OF THE ACTION

Factors to be considered

The proposed activity includes dune restoration, berm construction, and beach fill over approximately 26.0 miles of eroding shoreline. The proposed project intends to raise the beach berm and widen the beach providing storm protection and increasing recreational space. The proposed project occurs within habitat that appears suitable for piping plover use. The Corps expects construction to take six to nine months. This coincides with the piping plovers migration and wintering period (July 15 through May 15). Short-term and temporary impacts to piping plovers will occur if the birds are roosting and feeding in the area during a migration stopover. The deposition of sand will temporarily deplete the intertidal food base and temporarily disturb roosting birds during project construction. The tilling to loosen compaction of the sand required to minimize sea turtle impacts may affect any wrack that has accumulated on the "new" beach. This impacts feeding and roosting habitat for piping plovers, since they often use wrack.

The geomorphic characteristics of barrier islands, peninsulas, beaches, dunes, overwash fans, and inlets are critical to a variety of natural resources and influence a beach's ability to respond to wave action, including storm overwash and sediment transport. However, the protection or persistence of these important natural land forms, processes, and wildlife resources is often in conflict with long-term, large-scale beach stabilization projects and their indirect effects, i.e., increases in residential development, infrastructure, and public recreational uses, and preclusion of overwash, especially into coastal dune lakes and creation of spit formations on which piping plovers thrive.

The manufactured dunes, berms and beach fill will partially impede overwash into the connected coastal dune's lake sides, thereby causing successional advances in the habitat that will minimize sand flat formation and therefore its use by piping plovers in the project area. The proposed nourishment project will completely impede any overwash potential coastal dune lakes if the specific project designs do not leave necessary gaps, lacking fill, to allow some overwash into the lakes to continue on occassion, thereby minimizing impacts to potential piping plover habitat.

Proximity of action: Lack of regular surveys along most of the project area makes it difficult to measure the amount of piping plovers actually using the Gulf beach within the project area. Regardless, we expect short-term impacts by direct disturbance during construction and temporary loss of food base along the Gulf shoreline. The footprint of the proposed action does not occur within any critical habitat units for wintering piping plover. We expect the indirect effects of the action, alterations of the natural processes of overwash, to occur throughout the project area where-ever coastal dune lakes occur within the Project Area. There are 8 lakes intermittently connected to the Gulf and two that are unnaturally restricted.

Distribution: The Corps proposes project construction activities on the GOM shoreline between FDEP reference monuments Reach (R) -1 to R-127 within Walton County. We expect direct and indirect impacts to migrating and wintering piping plover along lake side habitat and washover areas that, but for the project, would exist in the future. We expect indirect impacts to piping plover and optimal piping plover roosting and foraging habitat in the Action Area from increased human disturbance (vehicles, dog walking, and pedestrian traffic).

Timing: The timing of the dune, berm, and beach fill project may occur completely or partially during the migration and wintering period for piping plovers (July 15-May 15). We expect indirect effects to occur later in time.

Nature of the effect: The effects to piping plover are direct, indirect and long term. We anticipate changes to plover habitat in morphology due to the elimination or reduction of potential for washover into dune lakes due to the presence of the constructed beach. A decrease in survival of birds on migrating or wintering grounds due to lack of optimal habitat contribute to decreased survival rates, decreased productivity on the breeding grounds, and therefore increased vulnerability to any of the three piping plover populations.

In addition, we expect increased recreational use inside the project area to affect the shoreline by reducing the value of the beaches because of direct disturbance to foraging and roosting piping plovers. We expect short-term impacts from disturbance during project construction. Activities that impact or alter the use of optimal habitat or increase disturbance to the species may decrease the survival and recovery potential of the piping plover.

Duration: The activities associated with the dunes, berm, and beach fill project expected on a 12 year cycle and construction each time will be completed within 6 to 9 months. We expect long term, if not permanent, alteration of the natural coastal processes.

We expect permanent increased recreational pressures within the Action Area due to the expansion of the beach.

Disturbance frequency: We expect short-term disturbance from construction activities. We expect long-term effects of sand placement and the impact of increased disturbance within the Action Area on the piping plover. The Corps request a 12 year cycle for re-nourishment.

Disturbance intensity and severity: We anticipate construction activities to have short-term and temporary effects on the piping plover populations. We anticipate piping plovers located within the construction area to move outside of the construction zone due to disturbance. We anticipate project construction to indirectly effect shoreline morphology and lake side shoreline dynamics by reducing the creation of piping plover habitat. Permanent impacts to less than 3,186 feet of optimal (coastal lake shoreline estimate) and temporary impacts of 26.0 miles of less optimal piping plover habitat are expected.

Analyses for Effects of the Action

Direct effects

Direct effects are those direct or immediate effects of a project on the species or its habitat. The construction window (i.e., disposal of sand) will extend through approximately one piping plover migration and winter season. Heavy machinery and equipment (e.g., trucks and bulldozers operating on project area beaches, the placement of the dredge pipeline along the beach, and sand disposal) may adversely affect migrating and wintering piping plovers in the project area by disturbance and disruption of normal activities such as roosting and feeding, and possibly forcing birds to expend valuable energy reserves to seek available habitat elsewhere.

Burial and suffocation of invertebrate species will occur during each nourishment and renourishment cycle. Impacts will affect the entire 26.0 miles along the Project Area, as well as at some downdrift areas. Timeframes projected for benthic recruitment and re-establishment following beach nourishment are between 6 months to 2 years. Depending on actual recovery rates, impacts will occur even if nourishment activities occur outside the plover migration and wintering seasons.

Indirect effects

The proposed project includes construction of berm, dunes, and beach fill along 26.0 miles of GOM shoreline as protective elements against shoreline erosion to protect man-made infrastructure. Indirect effects of reducing potential for the formation of optimal habitats, especially along shorelines that are susceptible to overwash, pose a critical concern for piping plovers with respect to survival and recovery.

Eventually the inter-tidal zone along the beach front will re-establish and provide some feeding habitat for piping plovers but these feeding areas are considered substantially inferior to natural overwash habitat that is highly likely to form to a greater extent within sections of the project area absent the proposed project. The plover's rapid responses (bird occurred within 6 months) to habitats formed by washovers from the hurricanes in 2004-2005 in the Florida panhandle at Gulf Islands National Seashore, and similar observations of their preferences for overwash habitats at Phipps Preserve and Lanark Reef in Franklin County, Florida, and elsewhere in their range, demonstrate the importance of overwash created habitats for wintering and migrating piping plovers. The proposed project will perpetuate and contribute to the widespread activities that prevent the formation of these preferred early successional overwash habitats. These disturbance factors warrant additional investigation to determine the extent to which they cumulatively affect wintering plovers.

At the same time that the proposed project limits the creation of optimal foraging and roosting habitat, it increases the attractiveness of these beaches and increases recreational pressures within the project area. The draft biological assessment provided by the applicant states that the "proposed beach restoration project is a protective measure that reduces the risk of storm damage to upland property. At the same time, a healthy and wide beach provides increased recreational opportunities to the county's citizens, promotes tourism and increases revenue streams to local businesses....". Recreational activities that potentially adversely affect plovers include disturbance by unleashed pets, increased pedestrian use (walking, sunbathing, beach driving) and reduction of foraging habitat from deliberate removal of wrack (beach cleaning and raking), often seen as unattractive to beach goers.

We expect landowners and local governments to initiate construction of new infrastructure or upgrade existing facilities, such as buildings or parking areas adjacent to the project area. Long-term impacts include a decrease in use of habitat due to increased disturbance levels and preclusion of the creation of additional recovery habitat.

Species response to the proposed action

The Service bases this biological opinion on anticipated direct and indirect effects to piping plovers (wintering and migrating) as a result of dune, berm, and beach fill construction which restricts the formation of habitat that plovers consider optimal for foraging and roosting. In the context of migrating and wintering piping plovers, we anticipate that approximately 3,186 feet (estimated from Taylor Engineering permit drawings and the Services' Geographical Imaging System (GIS)) of lake side habitat, its associated mud and sand flat area, and an unspecified number of piping plovers will be impacted by habitat loss if the lake sides are restricted from future overwash processes. Foraging on suboptimal habitat on the non-breeding grounds by migrating and wintering piping plovers may reduce the fitness of individuals.

The Service anticipates adverse affects throughout the project area from increased recreational pressure resulting in increased disturbance to roosting and foraging piping plovers from levels of human presence significantly greater than those currently experienced.

Elliott and Teas (1996) found a significant difference in actions between piping plovers encountering pedestrians and those not encountering pedestrians. Piping plover encountering pedestrians spend proportionately more time in non-foraging behavior. This study suggests that interactions with pedestrians on beaches cause birds to shift their activities from calorie acquisition to calorie expenditure. In winter and migration sites, human disturbance continues to decrease the amount of undisturbed habitat and appears to limit local piping plover abundance (Zonick and Ryan 1996).

The presence of pets increases disturbance to wintering and migrating piping plovers. A study conducted on Cape Cod, Massachusetts, found that pets disturbed piping plovers by an average distance of 150 feet, compared with 75 feet from pedestrians. Furthermore, the birds reacted to the pets by moving an average of 187 feet, compared with 82 feet when the birds reacted to a pedestrian. The duration of the disturbance behavior stimulated by pets was significantly greater than that caused by pedestrians (Hoopes 1993). Disturbance also reduces the time migrating shorebirds spend foraging (Burger 1991). Pfister et al. (1992) implicate disturbance as a factor in the long-term decline of migrating shorebirds at staging areas. While piping plover migration patterns and needs remain poorly understood and occupancy of a particular habitat may involve shorter periods relative to wintering, information about the energetics of avian migration indicates that this might be a particularly critical time in the species' life cycle.

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 project are not considered in this opinion because they require separate consultation pursuant to section 7 of the Endangered Species Act.

The majority of the land within the Action Area is privately owned and is close to build out. It is reasonably certain to expect that coastal development, human occupancy and recreational use along the Gulf Coast of Florida, including Walton County, will increase in the future until build out occurs. Redevelopment along with new developments following the hurricane seasons of 2004 and 2005 occurs as allowed by local zoning standards and state and federal permitting. It is unknown how much influence a nourished beach contributes to the development and recreational use of the shoreline. Any projects that are within endangered or threatened species habitat will require section 7 or 10 permitting from the Service.

CONCLUSION

Piping Plover

After reviewing the current status of the wintering population of the northern Great Plains, the Great Lakes and the Atlantic Coast piping plover, the environmental baseline for the berm, dune and beach fill project and associated construction activities, and the cumulative effects, it is the Service's biological opinion that implementation of the project, as proposed, is not likely to jeopardize the continued existence of non-breeding piping plover. Specific rationale for the non-jeopardy determination for each population is provided below. As noted previously, the overall status of the listed entity is stable, if not increasing.

Of greatest concern is the reliance that piping plovers have on the remaining 35 percent of Florida's coastal shoreline where the natural coastal processes are allowed to function. In these natural areas, piping plover habitat conceivably comes and goes as a function of storm events and associated tides, winds, elevation, and vegetational succession. The best we can hope for is a balance between suitable and unsuitable piping plover habitat remaining in Florida as there is little opportunity to expand the amount of habitat available for future conservation of the species. The amount available today appears sufficient to sustain the species but it is unknown if it is sufficient to conserve the species into perpetuity. The remaining habitat in Florida available today for piping plover use where coastal processes are allowed to function are still subjected to threats, especially human disturbance, coastal highways, military missions, dredge disposal and nourishment projects. Increased management to minimize such impacts to piping plover in these areas is the best defense we may have to conserve the species.

The proposed project would directly affect 26.0 miles of Gulf beach shoreline temporarily and indirectly affect less than 3,186 feet (0.60 mile) of subsequent mud and sand flats by precluding natural development of additional habitat within the Project Area. An unspecified amount of piping plovers are probably using the Gulf shoreline and lake side sand and mud flats of the Action Area, at least temporarily during migration or winter months.

Ferland and Haig (2002) calculated from the 2001 International Plover Census results that 57 percent of piping plover sites contained 1-10 birds, 36 percent contain 11-50, and less than 8 percent contain more than 50 piping plovers. At the moment, this area appears to be of minimal importance with regard to piping plovers since they remain undocumented within the project area. It is difficult to determine how the preclusion of the creation of additional recovery habitat will affect the species.

On winter and migration sites, human disturbance continues to decrease the amount of undisturbed habitat and appears to limit local piping plover abundance (Zonick and Ryan 1996). It is unknown what the carrying capacity may be within the project area with removal of human disturbance, but it is believed to be greater than its current use. Foraging on optimal, but disturbed habitat, on the non-breeding grounds by migrating and wintering piping plovers may reduce the fitness of individuals, which will have an unknown affect on the listed entity.

Florida's shoreline equates to approximately 825 miles, of which, 211 are designated critical habitat for piping plovers. Permanent impacts to less than 3,186 feet (0.60 mile) of optimal and temporary impacts to 26.0 miles of less optimal piping plover habitat represents less than 0.07 percent and 3.2 percent, respectively, of shoreline in Florida. For the reasons stated above, this leads us to conclude that implementation of the project, with the temporary loss of 26.0 miles of coastal shoreline and the partial loss of 3,186 feet of lake side sand and mud flats and harassment of an unspecified amount of piping plovers would not appreciably affect the survival and recovery of the piping plover from the Atlantic Coast and Great Plains population.

The Great Lakes population of piping plovers is a separate listed entity, classified as endangered. Piping plovers from this population may occur within the Action Area during the non-breeding season. This population is currently increasing, but remains at very low levels. The current number, if any, of the Great Lakes piping plovers using the Action Area during migration and over winter is unknown. Assuming a worst case scenario of a fully diminished coastal dune lake sides and GOM shoreline habitat, less suitable for piping plover use, this may result in the incidental take of individuals. However, coupled with continued intensive management in the breeding range of the Great Lakes population, the lack of known use in this area, a reasonable portion of the population's repeated use of Georgia's mostly protected coastline, and the status of the listed entity rangewide, we conclude that implementation of the proposed project would not appreciably affect the survival and recovery of the piping plover from the Great Lakes population.

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 and/or their contractors completing the project 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 and/or their contractors completing the project (1) fail to assume and implement the terms and conditions or (2) fail to require their contractors 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 that directly and indirectly an unspecified amount of piping plovers and 26.0 miles of GOM shoreline and 0.60 mile of coastal dune lake side shoreline potentially used by piping plovers could be taken in the form of harm and harassment as a result of this proposed action; however, incidental take of piping plovers will be difficult to detect for the following reasons:

(1) Harassment to the level of harm may only be apparent on the breeding grounds the following year; and
(2) dead plovers may be carried away by waves or predators.

The level of take of this species can be anticipated by the proposed activities because (**Table 16**):

(1) Piping plovers probably migrate and winter in the Action Area;
(2) the placement of the constructed beach is expected to affect the coastal mainland morphology and prevent early successional stages, thereby precluding the maintenance and creation of additional recovery habitat;

(3) increased levels of pedestrian and dog disturbance is expected; and
(4) a temporary reduction of food base will occur.

Table 12. The amount of piping plover roosting and foraging habitat that will be affected by the project and the monitoring of incidental take for the proposed project.

SPECIES	CRITICAL HABITAT	HABITAT AFFECTED	MONITORING
Piping plover	N/A	26.0 miles of shoreline and 0.60 mile of coastal dune lakes shoreline habitat affected by physical alterations; in addition to 26.0 miles affected by increased human disturbance	Surveys/ educational and restrictive measures applied

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the piping plover species or destruction or adverse modification of its critical habitat. Incidental take of piping plovers is anticipated to occur along 26.0 miles of GOM shoreline and 0.60 mile of shoreline along coastal dune lakes during and following the life of the project.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize take on non-breeding piping plover in the proposed Walton County storm damage and reduction project within the Action Area.

Pursuant to its 2008 BO, Walton County shall minimize disturbance to piping plover feeding and roosting habitat.

1. The Corp shall notify Walton County that efforts to reduce the frequency of nourishment shall occur to reduce impacts to species.

2. Walton County as required by its 2008 BO, and the Corps, shall describe the actions taken to implement its portion of the conservation measures and terms and conditions associated with this incidental take statement and submit a report to the Service by June 1 of the year following completion of the proposed work for each year when the activity has occurred.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall agree to seek authorization and appropriations to comply with terms and conditions (2b, 2d, 2e, 3, and 4 below) which implement the reasonable and prudent measures (RPM) described above and outline required reporting/monitoring requirements. These terms and conditions (T&Cs) are non-discretionary if authorized and funded by Congress or if agreed and accepted in an existing Biological Opinion by Walton County.

Walton County has a standing BO (SAJ-2007-5152(IP-DEB)/FWS 2008-F-0060) issued in 2008 and have agreed to implement Terms and Conditions 1a-1b or 2a-2j. If the Corps is congressionally authorized to implement 2d, or 2e, Walton County and the Corps can determine which entity shall conduct the actions to avoid duplication of efforts.

Protection of Piping Plovers

1. **Per their 2008 BO, Walton County shall implement Term and Conditions "1a-b", <u>or</u> "Protection of Piping Plovers prior, during, and after the project 2a-j:"**

   1a. <u>Annually</u>, Walton County shall contribute at least **$3,100** for <u>each mile</u> or **$0.60** <u>per linear foot</u> of berm, dune, or beach fill constructed per life of the project*. The Service will specify where the funds shall be deposited once project is initiated. The funds will be used towards the management and monitoring of piping plovers and their habitat on public or private lands which have a demonstrated use or potential use by piping plovers within the Florida Panhandle. Management may include but not be limited to posting and roping important use areas, enforcement of pet ordinances, and protection of closed off areas. Monitoring may assist in summarizing the status of plovers and their habitat. Trends in areas used by piping plovers may also be assessed in portions of Florida depending on data collected as funding allows.* These funds are to be used to minimize potential impacts to areas that may be used by piping plover that may be displaced permanently or temporarily by the project.

   *Given the randomness of storm events and the unknowns associated with defining the "life" of the project, we will specify that <u>at least</u> **two** years of funding shall be required from the Walton County regardless of the state of the project and no more than 10 years of funding will be required. The "life" of the project is defined by Walton County's contractor as the point where only 50% of the original placement volume remains.

   1b. To preserve piping plover feeding and roosting habitat, the mechanical removal of natural organic material (wrack) shall be prohibited year-around along the shoreline. This has been identified as important foraging and roosting habitat by piping plovers as well as an abundance of other shorebirds on the winter and migration grounds as well. Trash and litter may be manually removed. Exceptions apply when health of humans may be affected such as with red tide events. Protection of wrack will help to offset the impacts of shorebird habitat directly or indirectly by the proposed project and ensuing human disturbance.

2. **Protection of piping plover prior, during, and after the project.**

2a. Prior to construction, survey and map onto aerial photography, throughout the Action Area, optimal non-breeding piping plover habitat (low lying areas, washover passes, inlets, ephemeral ponds, lagoons, and mud and sand flats). Walton County pursuant to the 2008 BO terms and conditions agree to work with the Service to integrate piping plover habitat features into the project design when possible.

2b. Avoid berm and dune construction within public lands such as county access areas and State Park lands unless considered a valuable addition by FDEP for species conservation.

2c. Poles or pier pilings occurring within 200 feet of piping plover habitat shall be retro-fit to reduce avian predation.

2d. Conduct surveys for non-breeding piping plover in the <u>Project</u> area (includes connected coastal dune lake shorelines <u>daily</u> starting two weeks prior to project initiation for the duration of the berm, dune, and beach fill construction period between July 15 and May 15 (10 months of the year). Submit daily piping plover survey results to the Service's Panama City Florida Field Office with maps documenting the locations of piping plovers (with GPS coordinates or latitude and longitude coordinates) <u>if</u> seen during this survey period. Negative data shall also be reported.

2e. Conduct bi-monthly surveys for piping plovers in the <u>Action</u> areas (includes Walton County beaches, State Park lands, and connected coastal dune lake shorelines) from July 15 through May 15 of each year (10 months of the year) beginning two weeks post construction and continuing for the duration of the project*. Maintain information in a database (e.g. Access or Excel). Report negative and positive survey data and the amount and type of recreational use documented. Record piping plover locations with a Global Positioning System (GPS), habitat type used (intertidal area, mid-beach, etc), and observed behavior (foraging, roosting, etc). Incorporate all information collected into the database. Guidelines for conducting surveys are included in Appendix 3. Submit yearly piping plover survey results (datasheets and database) to the Service's Panama City Florida Filed Office with maps documenting the locations of piping plovers (with GPS coordinates or latitude and longitude coordinates) when seen. Negative data (i.e., no plovers seen) shall also be reported.

Conduct at least one of the bi-monthly shorebird surveys April through October on a weekend to document the amount of recreational pressure potentially occurring along the shoreline.

*Given the randomness of storm events and the unknowns associated with defining the "life" of the project, we will specify that at least two years of surveys shall be required from the Corps or Walton County regardless of the state of the project and no more than 10 years of surveys will be required. The "life" of the project is defined by the Corps' contractor as the point where only 50% of the original placement volume remains.

2f. To preserve piping plover feeding and roosting habitat, the mechanical removal of natural organic material (wrack) shall be prohibited year-around along the shoreline. This has been identified as important foraging and roosting habitat by piping plovers as well as an abundance of other shorebirds on the winter and migration grounds as well. Trash and litter may be manually removed. Exceptions apply when health of humans may be affected such as with red tide events. Protection of wrack will help to offset the impacts of shorebird habitat directly or indirectly by the proposed project and ensuing human disturbance. This term and condition is the responsibility of Walton County pursuant to their 2008 BO.

2g. Annually, Walton County staff, pursuant to their 2008 BO terms and conditions, shall notify holders of beach driving permits to drive their vehicles just above or just below the primary "wrack" line.

2h. Walton County, pursuant to their 2008 BO terms and conditions, shall, at approximately every mile of beach, demarcate a "Disturbance-Free Zone" at least a one half acre area and shall post and rope off where potential bird roosting and feeding could occur (not into the tidal area and allowing enough space for walkers to cross) OR at least one half acre area adjacent to 3 coastal dune lake outlets shall be posted and roped off where potential bird roosting and feeding could occur. These areas shall remain rope off year around for the duration of the project*.

2i. Walton County, pursuant to their 2008 BO terms and conditions, shall post, where appropriate, at each beach access points, the provisions of the County Dogs on the Beach Permit Requirements. Annually a notice shall be placed in the local paper informing in this same regard. A copy of the published notice should be mailed to the USFWS. Warnings and citations should be issued when appropriate to minimize harassment of piping plovers and other shorebirds.

2j. Walton County, pursuant to their 2008 BO terms and conditions, shall restrict, and enforce this restriction, the use of all fireworks on the Walton front beaches adjacent to the roped and posted areas as discussed in Terms and Conditions 2h.

3. **The Corp shall notify Walton County that the following actions are necessary to minimize impacts to the piping plover:**

3a. Display signs with the provisions of the Walton County ordinance prohibiting dogs in the beach area at public access points that occur from R-1 to R-127

3b. Post-construction "post and rope" off the most landward one-third of the nourished beach to promote vegetation growth along with dune building to increase beach stabilization.

"Posts and rope" can be moved back as the beach erodes.

4. **Tilling associated with sea turtle BO requirements shall occur landward of the wrack line and avoid all vegetated areas three (3) square feet or greater with a three (3) square foot buffer around the vegetated areas.**

Reporting

1. A report describing the work conducted during the year and actions taken to implement the conservation measures of this incidental take statement shall be submitted to the Service's Panama City Florida Field Office by June 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 for piping plover (**Tables 14**):

Table 13. Information to include in the report following the project completion

All projects	Project location (include DEP R-Monuments)
	Project description
	Dates of actual construction activities
	Names of personnel involved in piping plover surveys, survey results with GPS coordinates or GIS shape files.[See Appendix I, for detailed reporting for piping plovers]

3. Upon locating a dead or injured piping plover 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's Panama City Florida Field Office (850-769-0552).

Care shall be taken in handling injured piping plover to ensure effective treatment or disposition and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

The Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory bird. Under the provisions of the MBTA it is unlawful "by any means or manner to pursue, hunt, take, capture or kill any migratory bird except as permitted by regulations issued by the Fish and Wildlife Service. The term "take" is not defined in the MBTA, but the Service has defined it by regulation to mean to pursue, hunt, shoot, wound, kill, trap, capture or collect any migratory bird, or any part, nest or egg or any migratory bird covered by the conventions or to attempt those activities.

In order to comply with the MBTA and potential for this project to impact nesting shorebirds, the Corps should follow FWC's standard guidelines to protect against impacts to nesting shorebirds during implementation of this project during the periods from February 15-August 31.

The Fish and Wildlife Service will not refer the incidental take of piping plover for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions specified here.

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. The Corps shall recommend that Walton County consider the following actions:

1. Walton County should consider measures to limit coastal development that would exacerbate coastal erosion and require storm protection in the future;

2. Walton County should consider purchasing land for shorebird conservation which could include locations where natural shoreline processes can occur unimpeded. These might include not only undeveloped areas, but the potential "buy-out" of developments in areas that are sparsely developed and have high potential habitat value (*e.g.*, proximity to feeding areas, prone to coastal dune outlets, etc.).

3. Walton County should consider placement of additional dune walkovers and parking areas where appropriate to protect dune habitats at beach access points.

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 NOTICE

This concludes formal consultation on the proposed action. 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 i.e. the shoreline amount described herein 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 shall cease pending reinitiation.

The above findings and recommendations constitute the report of the Department of the Interior. If you have any questions about this opinion, please contact Patty Kelly of this office at extension 228.

Sincerely,

Dr. Donald Imm
Project Leader

cc: (all electronic)
FDEP, Bureau of Beaches and Coastal Systems, Tallahassee, FL
FDEP, Danny Jones, Florida District 1 Parks, Panama City Beach, FL
John Himes, FWC, NW FL Regional Biologist, Panama City, FL
Anne Hecht, FWS, Piping Plover Lead Biologist, Sudbury, MA
Ken Graham, FWS, Atlanta, GA
Ann Marie Lauritsen, FWS, St. Petersburg, FL
Robbin Trindell, FWC, Office of Imperiled Species Management, Tallahassee, FL
South Walton County Tourist Development Council, Santa Rosa Beach, FL

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APPENDIX I: Piping and Snowy Plover Non-breeding Survey Guidelines [follow dates for surveys noted within the Terms and Conditions, not the guidelines below].

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Piping and Snowy Plover Non-breeding Season Survey Guidelines*

June 2007

*In coordination with the Florida Fish and Wildlife Conservation Commission, we recommend these guidelines for conducting piping and snowy plover non-breeding season surveys. These guidelines combine the survey protocol from the International Piping Plover Census and the International Shorebirds Survey (ISS). Please note that these guidelines only pertain to routine plover population monitoring and that a separate set of guidelines may be recommended for the purposes of evaluating potential project impacts.

1. Sites should be selected based on geographic features, suitability of habitat, and ability for you to adequately and consistently survey the site.

2. We have prepared a survey form for your use (enclosed). We also have the form in an Excel file if you need it. Let us know.

3. Monitoring should be conducted July 15 through May 15 which mostly follow ISS census dates listed below. The ISS schedule usually results in three surveys per month. If this is not feasible, try to do at least two surveys per month on the ISS census dates. Surveys should be conducted on ISS dates plus or minus 2 days (example: a survey scheduled for the 15th could be conducted on any day from the 13th through the 17th.)

Spring Migration	Fall Migration	Winter
February 25	July 15	October 15
March 5	July 25	October 25
March 25	August 5	November 5
April 5	August 15	November 15
April 15	August 25	November 25
April 25	September 5	December 5
May 5	September 15	December 15
May 15	September 25	December 25
	October 5	January 5
		January 15
		January 25
		February 5
		February 15

Piping Plover and Snowy Plover Survey Results in FL Panhandle

Surveyor(s) name:________________________________ Date:____________________

______________________ start GPS_____________________ end GPS_____________________

Ownership if known: public___________ private___________

Time surveyed: from _______ to ________ Temperature: _______ C° ___ or F° ___

Tide stage: low_____ Mid_____ High _____ (rising____/falling____)

Disturbance: Number of people on beach_____ Number of dogs leashed_____unleashed_____

# of Piping plovers seen: __________

Circle location: dunes foredune mid-beach tidal zone bay shoreline mudflat other________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

# of Snowy plovers seen: __________

Circle location: dunes foredune mid-beach tidal zone bay shoreline mudflat other________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

# of Red Knots seen: __________

Circle location: dunes foredune mid-beach tidal zone bay shoreline mudflat other________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

Bands seen: Right Leg____________Left Leg____________ GPS________________________

Other Species Seen:	Number:	Comments:
Black-bellied Plover		
American Golden Plover		
Wilson's Plover		
Semipalmated Plover		
Killdeer		
American Oystercatcher		
Greater Yellowlegs		
Lesser Yellowlegs		
Solitary Sandpiper		
Willet		
Spotted Sandpiper		
Whimbrel		
Marbled Godwit		
Ruddy Turnstone		
Sanderling		
Semipalmated Sandpiper		
Western Sandpiper		
Least Sandpiper		
White-rumped Sandpiper		
Baird's Sandpiper		
Pectoral Sandpiper		
Dunlin		
Stilt Sandpiper		
Peep sp.		
Short-billed Dowitcher		
Long-billed Dowitcher		
Other:		

Please send copies to: Patty Kelly, USFWS, 1601 Balboa Avenue, Panama City, FL 32405 or fax to 850/763-(Ph: 850/769-0552) and John Himes FWCC, 3911 Highway 2321, Panama City, FL 32409 or fax 850/747-56 (Ph: 850/265-3676). Thank You.

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:

Service Log Number: 41910-2011-F-0170

August 22, 2011

Colonel Alfred A. Pantano, Jr. District Engineer
U.S. Army Corps of Engineers
Regulatory Division, North Permits Branch
Atlantic Permits Section
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel Pantano:

This document is the U.S. Fish and Wildlife Service's revised Statewide Programmatic Biological Opinion (SPBO) for the U.S. Army Corps of Engineers (Corps) planning and regulatory sand placement activities in Florida and their effects on loggerhead (*Caretta caretta*), green (*Chelonia mydas),* leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles, and the southeastern (*Peromyscus polionotus niveiventris*), Anastasia Island (*Peromyscus polionotus phasma*), Choctawhatchee (*Peromyscus polionotus allophrys*), St. Andrews (*Peromyscus polionotus peninsularis*), and Perdido Key (*Peromyscus polionotus trissyllepsis*) beach mice and their designated critical habitat. It does not include take for the non breeding piping plover (*Charadrius melodus*) and its designated critical habitat.

Each proposed project will undergo an evaluation process by the Corps to determine if it properly fits within a programmatic approach. The project description will determine if the project is appropriate to apply to this programmatic consultation. If it is determined that the minimization measures, Reasonable and Prudent Measures, and Terms and Conditions in the SPBO are applicable to the project, it will be covered by this programmatic consultation. If not, the Corps will consult separately on individual projects that do not fit within this programmatic approach.

Proposed projects that "may affect" the piping plover or occur within piping plover critical habitat are not included in this SPBO and will be consulted on individually. The Corps should consult on all projects that are in areas where piping plover have been observed, all navigable inlets, washover areas), all projects in or within one mile of piping plover critical habitat, and all projects within public lands (county, state, federal, etc.) where coastal processes are allowed to function, mostly unimpeded.

We will meet annually during the fourth week of August to review the sand placement projects, assess new data, identify information needs, and scope methods to address those needs, including, but not limited to, evaluations and monitoring specified in this SPBO, reviewing results, formulating or amending actions that minimize take of listed species, and monitoring the effectiveness of those actions. We will also discuss progress for the future inclusion of piping plovers in the SPBO.

The entire programmatic consultation will be reviewed every five years or sooner if new information concerning the projects or protected species occurs. Reinitiation of formal consultation is also required 10 years after the issuance of this SPBO.

We are available to meet with agency representatives to discuss the remaining issues with this consultation. If you have any questions, please contact Ann Marie Lauritsen at the North Florida Ecological Services Office at (904) 731-3032, Jeffrey Howe at the South Florida Ecological Services Office at (772) 562-3909 ext. 283, or Richard Zane at the Panama City Ecological Services Office at (850) 769-0552 ext. 241.

Sincerely,

/s/

David L. Hankla
Field Supervisor,
Jacksonville Field Office

/s/

Donald W. Imm
Field Supervisor
Panama City Field Office

/s/

Field Supervisor
South Florida Field Office

Shore Protection Activities along the Coast of Florida

Statewide Programmatic Biological Opinion
August 22, 2011

Prepared by:
U.S. Fish and Wildlife Service

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Acronyms

ABM	Alabama Beach Mouse
Act	Endangered Species Act
AFB	Air Force Base
AIBM	Anastasia Island Beach Mouse
ASP	Anastasia State Park
BO	Biological Opinion
CBM	Choctawhatchee Beach Mouse
CBRA	Coastal Barrier Resources Act
CCAFS	Cape Canaveral Air Force Station
CFR	Code of Federal Regulations
CH	Critical Habitat
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Corps	U.S. Army Corps of Engineers
DOI	U.S. Department of the Interior
DTRU	Dry Tortugas Recovery Unit
F	Fahrenheit
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FMNM	Fort Matanzas National Monument

FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
FWC/FWRI	Florida Fish and Wildlife Conservation Commission’s Florida Fish and Wildlife Research Institute
GCRU	Greater Caribbean Recovery Unit
GINS	Gulf Islands National Seashore
GTMNERR	Guana Tolomato Matanzas National Estuarine Research Reserve
HCP	Habitat Conservation Plan
IMA	Important Manatee Areas
INBS	Index Nesting Beach Survey
IPCC	Intergovernmental Panel on Climate Change
ITP	Incidental Take Permit
K	Carrying Capacity
MANLAA	May Affect, but is Not Likely to Adversely Affect
MHW	Mean High Water
MHWL	Mean High Water Line
MMPA	Marine Mammal Protection Act
mtDNA	Mitochondrial Deoxyribonucleic Acid
NGMRU	Northern Gulf of Mexico Recovery Unit
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRU	Northern Recovery Unit

NWR	National Wildlife Refuge
PBA	Programmatic Biological Assessment
PCE	Primary Constituent Elements
PFRU	Peninsular Florida Recovery Unit
PHVA	Population and Habitat Viability Analysis
PKBM	Perdido Key Beach Mouse
PKSP	Perdido Key State Park
PSI	Per Square Inch
PVA	Population Viability Analysis
SABM	St. Andrews Beach Mouse
SAJ	South Atlantic Jacksonville
SAM	South Atlantic Mobile
SAV	submerged aquatic vegetation
SEBM	Southeastern Beach Mouse
Service	U.S. Fish and Wildlife Service
SNBS	Statewide Nesting Beach Survey
SPBO	Statewide Programmatic Biological Opinion
SR	State Road
TED	Turtle Excluder Device
TEWG	Turtle Expert Working Group
U.S.C.	United States Code

U.S.	United States

August 22, 2011

Colonel Alfred A. Pantano, Jr.
District Engineer
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Re: Service Federal Activity No: 41910-2010-F-0284
Applicant: U.S. Army Corps of Engineers
Date Started: May 30, 2007
Project Title: Shore Protection Activities
Ecosystem: Florida Coastline
Counties: Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, Escambia.

Dear Colonel Pantano:

This document is the U.S. Fish and Wildlife Service's (Service) Statewide Programmatic Biological Opinion (SPBO) for the U.S. Army Corps of Engineers (Corps) planning and regulatory shore protection activities in Florida and their effects on loggerhead (*Caretta caretta*), green (*Chelonia mydas),* leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles, and southeastern (*Peromyscus polionotus niveiventris*), Anastasia Island (*Peromyscus polionotus phasma*), Choctawhatchee (*Peromyscus polionotus allophrys*), St. Andrews (*Peromyscus polionotus peninsularis*), and Perdido Key (*Peromyscus polionotus trissyllepsis*) beach mice and designated critical habitat (CH) for the Perdido Key beach mouse (PKBM), Choctawhatchee beach mouse (CBM), and St. Andrews beach mouse (SABM) **(Table 1)**. This SPBO is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.). We have assigned Service Federal Activity number 41910-2010-F-0284 for this consultation.

Table 1. Status of federally listed species within the Action Area that may be adversely affected by the shore protection activities.

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	STATUS/CH
Mammals		
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Endangered(CH)
Southeastern beach mouse	*Peromyscus polionotus niveiventris*	Threatened
Anastasia Island beach mouse	*Peromyscus polionotus phasma*	Endangered
St. Andrews beach mouse	*Peromyscus polionotus peninsularis*	Endangered (CH)
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	Endangered (CH)
Birds		
Piping Plover	*Charadrius melodus*	Threatened
Reptiles		
Green sea turtle	*Chelonia mydas*	Endangered
Hawksbill turtle	*Eretmochelys imbricata*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Threatened

The Corps determined that the proposed project "may affect and is likely to adversely affect the above listed species (**Table 1**). The Corps also has determined that the proposed project "may affect, but is not likely to adversely affect" (MANLAA) the West Indian (Florida) manatee (*Trichechus manatus latirostris*), the roseate tern (*Sterna dougallii dougallii*), the beach jacquemontia (*Jacquemontia reclinata*), and the Garber's spurge (*Chamaesyce garberi*) **(Table 2)**. Based on our review of the project plans and the incorporation of the minimization measures listed in the final Programmatic Biological Assessment (PBA) as conditions of the projects where these species are known to exist, we concur with these determinations.

Table 2. Species and critical habitat evaluated for effects and those where the Service has concurred with a "may affect, not likely to adversely affect (MANLAA)" determination.

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	STATUS/CH	PRESENT IN ACTION AREA	MANLAA
Florida manatee	*Trichechus manatus latirostris*	Endangered (CH)	Yes	Yes
Roseate tern	*Sterna dougallii dougallii*	Threatened	Yes	Yes
Beach jacquemontia	*Jacquemontia reclinata*	Endangered	Yes	Yes
Garber's spurge	*Chamaesyce garberi*	Threatened	Yes	Yes

Piping Plover

The Corps should consult on all projects that are in areas where piping plover have been observed, all projects in or within one mile of an inlet (includes but not limited to streams, coastal dune lake outfalls, navigable inlets), all projects in or within one mile of piping plover critical habitat, and all projects within public lands (county, state, federal, etc.) where coastal processes are allowed to function, mostly unimpeded. Contact via electronic mail is recommended although contact may be made via telephone or regular mail. The Corps and the Service have agreed to the following interim section 7 consultation procedures.

1. The Corps shall contact the Service with the project description and location (include a map of any optimal habitat features that may be present within the project area). The Corps will also provide a "determination" based on available information.

2. The Service shall provide a response within 30 days. Based on additional information on the piping plover and other factors, the Service shall concur or not concur with the Corps' "determination".

In the final PBA, the Corps listed the following commitments to reduce impacts on piping plovers:

1. Adhere to appropriate windows to the maximum extent possible;
2. Implement survey guidelines for non-breeding shorebirds when appropriate. For Corps Civil Works projects, the "surveys" must be limited to the term of the construction unless they are otherwise authorized and funded (as used in Section 9.00 of the PBA, "funded" means subject to availability and allotment);
3. Pipeline alignment and associated construction activities may be modified to reduce impacts to foraging, sheltering, and roosting;

4. Avoid impacts to the primary constituent elements of piping plover critical habitat to the maximum extent possible;
5. Pre-project surveys will be performed to assess the presence of and/or potential for washover fan formation;
6. The Corps will work with the Service to develop shore protection design guidelines and/or mitigation measures that can be utilized during future project planning to protect and/or enhance high value piping plover habitat locations (*i.e.*, washover fans). For Corps Civil Works projects, "enhancement" must be limited to the extent authorized and funded as a project feature or project purpose; and
7. The Corps will work with the Florida Department of Environmental Protection (FDEP) to consider the value and context of inlet habitat features (*i.e.*, emergent spits, sand bars, etc.) within each inlet's management plan and adjust future dredging frequencies, to the maximum extent practicable and consistent with applicable law, so that adjacent habitats are made available and total habitat loss would not occur at one time within a given inlet complex.

Florida Manatee

<u>Dredging activities offshore associated with submerged borrow areas and navigational channels maintenance</u>

The Corps has determined that the proposed project "may affect, but is not likely to adversely affect" the Florida manatee. The Service has reviewed the draft PBA and concurs that, for dredging activities offshore, if the July 2009 Standard Manatee In-water Construction Conditions are implemented; these activities are not likely to adversely affect the Florida manatee. We also conclude that these activities will not adversely modify its critical habitat. These findings fulfill section 7 requirements of the Act in regard to manatees. In addition, because no incidental take of manatees is anticipated, no such authorization under the Marine Mammal Protection Act (MMPA) is needed.

<u>Dredging activities adjacent to the shore, inlet, and channels associated with submerged borrow areas and navigational channels maintenance</u>

For dredging activities adjacent to the shore, inlets, and/or inshore areas, based on the incorporation of the following additional conditions into the proposed projects and made a condition of the issued permit or Corps project plan and implemented, the Service would be able to concur with a determination by the Corps that these activities may affect, but are not likely to adversely affect the Florida manatee:

1. Barges shall install mooring bumpers that provide a minimum 4-foot standoff distance under maximum compression between other moored barges and large vessels, when in the vicinity of inlets, river mouths, and large estuaries where manatees are known to congregate.

2. Pipelines shall be positioned such that they do not restrict manatee movement to the maximum extent possible. Plastic pipelines shall be weighted or floated. Pipelines transporting dredged material within the vicinity of inlets, river mouths, and large estuaries where manatees are known to congregate shall be weighted or secured to the

bottom substrate as necessary to prevent movement of the pipeline and to prevent manatee entrapment or crushing.

3. In the event that such positioning has the potential to impact submerged aquatic vegetation (SAV) or nearshore hardbottom, the pipeline may be elevated or secured to the bottom substrate to minimize impacts to SAV.

Important Manatee Areas

Important Manatee Areas (IMAs) are areas where increased densities of manatees occur due to the proximity of warm water discharges, freshwater discharges, natural springs, and other habitat features that are attractive to manatees. These areas are heavily utilized for wintering, resting, feeding, drinking, transiting, nursing, etc., as indicated by aerial survey data, mortality data, and telemetry data. A current list of warm water IMAs that may occur within the project area includes:

Brevard County (Indian River) - Reliant and FP&L Power Plants
Hillsborough County (Tampa Bay)
Port Sutton Power Plant
Tampa Electric Big Bend Power Plant
Pinellas County (Old Tampa Bay)
Bartow Electric Generating Plant

A current map of all the IMAs or areas of inadequate protection can be found at the following Corps' website: http://www.saj.usace.army.mil/Divisions/Regulatory/sourcebook.htm.

Dredging activities within the IMA sites (both warm and other aggregation sites) are not included in this SPBO. For dredging activities within IMA sites (both warm water and other aggregation sites), the Corps shall contact the appropriate Service Field Office for project specific conditions (Table 3).

Table 3. Service Field Offices and County jurisdictions.

County	Service Field Office	Address	
Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Manatee, Pinellas, and Hillsborough	North Florida Ecological Services Office	7915 Baymeadows Way, Suite 200 Jacksonville, FL 32256-7517	(904) 731-3336
Indian River, St. Lucie, Martin, Palm Beach, Broward, Miami-Dade, Monroe, Collier, Lee, Charlotte, and Sarasota	South Florida Ecological Services Office	1339 20th Street Vero Beach, FL 32960	(772) 562-3909
Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia	Panama City Ecological Services Office	1601 Balboa Avenue Panama City, FL 32405	(850) 769-0552

Although this does not represent a biological opinion for the manatee as described in section 7 of the Act, it does fulfill the requirements of the Act and no further action is required regarding manatees. It also fulfills the requirements of the MMPA. If modifications are made in the programmatic action or additional information becomes available, reinitiation of consultation may be required.

Migratory Birds

In order to comply with the Migratory Bird Treaty Act (16 U.S.C. 701 *et seq.*) and potential for this project to impact nesting shorebirds, the Corps' or the Applicant should follow Florida Fish and Wildlife Conservation Commission (FWC) standard guidelines to protect against impacts to nesting shorebirds during implementation of this project during the periods from February 15 to August 31.

Consultation History

<u>1980s and 1990s</u> Beach nourishment projects in Florida began to occur frequently in the late 1980s and early 1990s. During that time, sea turtle protection measures were developed based on research findings available at that time. These measures addressed sand compaction, escarpment formation, and timing restrictions for projects in six south Florida counties with high nesting densities. In the mid-1990s, a sea turtle Biological Opinion (BO) template was developed that included protection measures and information on the status of sea turtles. In 1995, an expanded version of the sea turtle template BO was developed to incorporate new guidance on the required format for BOs and a biological rationale for the Terms and Conditions to be imposed. This document underwent review by four State conservation agencies and the Corps, and was subsequently revised. The primary purposes of the template BO were to: (1) incorporate a standardized format and language required for use in all BOs based on guidance from the Service's Washington Office, (2) assist Service biologists in the preparation of BOs, (3) increase consistency among Service field offices, and (4) increase consistency between the Service and the State agencies.

<u>March 7 and 8, 2006</u> The Corps met with the Services' three Florida field office representatives, a representative of the FWC, and a representative of the FDEP. The purpose of that meeting was to begin discussions about a regional consultation for sand placement activities along the coast of Florida and preparation of a PBA for sand placement activities in Florida. In addition to sea turtles, other Federal and state protected species were included in the discussions. At that meeting, the following topics were discussed:

1. Sand placement activities;
2. Sand source and placement methods;
3. Species and habitat;
4. Geographic scope;

5. Information availability; and
6. Minimization of impacts.

<u>July 13, 2006</u> A second meeting was held to further discuss the draft PBA. The Service provided the Corps with copies of the latest BO templates for each species to be considered. The Service held conference calls with the species recovery leads during August 2006.

<u>October 16, 2006</u> The Service received the draft PBA via email from the Corps for sand placement activities along the coast of Florida.

<u>October 27, 2006</u> The Service provided the Corps with draft comments on the PBA via email.

<u>October 31, 2006</u> The Corps provided a response to the Service's comments on the PBA via email.

<u>November 9, 2006</u> The Service and the Corps held a conference call to discuss the comments.

<u>December 20, 2006</u> The Service sent the Corps a letter with the final comments on the draft PBA.

<u>September 18 and 19, 2007</u>
The Corps met with the Services' three Florida field office representatives, a representative of the FWC, and a representative of the FDEP. The purpose of this meeting was to discuss the Terms and Conditions to be included in the BO.

<u>October 5, 2007</u> The Service sent the Corps, via email, the modifications to the draft Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice as discussed in the previous meeting.

<u>November 1, 2007</u> The Corps provided the Service with comments via email on the revised Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice.

<u>March 31, 2008</u> The Service revised the Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice. The Service also revised the minimization measures for the manatee. The revisions were sent to the Corps.

<u>September 16, 2008</u> The Service sent the Corps via mail the draft SPBO.

<u>October 2, 2008</u> The Corps provided the Service via email with a summary of the remaining issues concerning the Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice.

October 15, 2008	The Service sent the Corps, via email, the modifications to the draft Reasonable and Prudent Measures and Terms and Conditions for the sea turtles and beach mice as discussed in the previous email.
March 11, 2009	The Service received via email examples of previous agreements between the Corps and the local sponsor to carry out the Terms and Conditions in previous BOs.
April 7, 2009	The Service sent an email to the Corps with an update of the progress of our analysis of including piping plovers in the SPBO.
August 26, 2009	The Service sent to the Corps via email the latest Terms and Conditions for sea turtles and beach mice.
September 17, 2009	The Corps sent an email to the Service describing the actions to be taken for the completion and submittal of the PBA.
January 6, 2010	The Corps and the Service participated in a meeting to finalize the draft SPBO.
January 21, 2010	The Corps sent to the Service via email the revised draft PBA.
March 25, 2010	The Corps and the Service participated in an implementation meeting and submittal of the final PBA.
February 22, 2011	The Corps submitted the final PBA to the Service.
April 18, 2011	The Service sent the final Statewide PBO to the Corps.
June 21, 20100	The Corps provided written concerns with the final Statewide PBO
June 30, 2011	The Service revised the final Statewide PBO.
July 18, 2011	The Corps provided written agreement with the changes that were made and asked for additional changes.
July 22, 2011	The Service made additional revisions per the Corps request.
July 25, 2011	The Corps provided written agreement with the additional revisions.

This SPBO is based on the PBA, and information provided during meetings and discussions with the Corps' representatives and information from the Florida Fish and Wildlife Conservation Commission's Florida Fish and Wildlife Research Institute (FWC/FWRI) sea turtle databases. A complete administrative record of this consultation is on file in the Service's North Florida, Panama City, and South Florida Ecological Services Offices.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action includes all activities associated with the placement of compatible sediment on beaches of the Atlantic and Gulf coasts of Florida, encompassing both South Atlantic Jacksonville (SAJ) and South Atlantic Mobile (SAM) Corps Districts. Additionally, the proposed action includes the replacement and rehabilitation of groins, utilized as design components of beach projects for longer retention time and stabilization of associated sediment placed on the beach. This SPBO includes Corps Regulatory and Civil Works shore protection activities. Corps Regulatory activities may include the involvement of other Federal agencies, such as the Department of Defense, Bureau of Ocean Energy Management, and the Federal Emergency Management Agency (FEMA). The shore protection activities covered in the SPBO encompass the following shore protection activities:

1. Sand placement;
2. Sand placement as an associated authorization of sand extraction from the outer continental shelf by the Bureau of Ocean Energy Management;
3. Sand washed onto the beach from being placed in the swash zone;
4. Sand by-passing/back-passing;
5. Operations and Maintenance (O&M) dredging of navigation channels with beach disposal; and
6. Groins and jetty repair or replacement.

A detailed description of each activity is found in the final PBA. The history of shore protection activities throughout the Atlantic and Gulf Coasts of Florida is extensive and consists of a myriad of actions performed by local, State, and Federal entities. Future beach placement actions addressed in this SPBO may include maintenance of these existing projects or beaches that have not experienced a history of beach placement activities.

The Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) share Federal jurisdiction for sea turtles under the Act. The Service has responsibility for sea turtles on the nesting beach. NMFS has jurisdiction for sea turtles in the marine environment. This SPBO only addresses activities that may impact nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. NMFS will assess and consult with the Corps concerning potential impacts to sea turtles in the marine environment and the shoreline updrift and downdrift area.

Corps Commitments as listed in the final PBA

The following paragraph from the final PBA summarizes the Corps Commitments as listed below:

"For Corps projects, please note that "fish and wildlife enhancement" activities (which are beyond mitigation of project impacts) must be authorized as a project purpose or project feature or must be otherwise approved through Corps headquarters (Engineer Regulation ER 1105-2-100 Appendix G, Amendment #1, 30 Jun 2004). At the present time, no beach fill placement or shore protection activity in Florida has fish and wildlife enhancement as a project purpose or project feature. Since adding fish and wildlife enhancement as a project purpose or feature is not a budgetary priority (ER 1105-2-100 22 Apr 2000, Appendix C, part C-3b.(3)), authorization and funding for such is not expected."

Sea Turtles

1. Avoid sea turtle nesting season to the maximum extent practicable;

2. Except for O&M disposal actions, implement sea turtle nest monitoring and relocation plan during construction if nesting window cannot be adhered to;

3. Except for O&M disposal actions, escarpments that are identified prior to or during the nesting season that interfere with sea turtle nesting (exceed 18 inches in height for a distance of 100 feet) can be leveled to the natural beach for a given area. If it is determined that escarpment leveling is required during the nesting or hatching season, leveling actions should be directed by the Service. For Corps Civil Works projects, leveling of escarpments would be limited to the term of the construction or as otherwise may be authorized and funded;

4. Placement of pipe parallel to the shoreline and as far landward as possible so that a significant portion of available nesting habitat can be utilized and nest placement is not subject to inundation or washout;

5. Temporary storage of pipes and equipment will be located off the beach to the maximum extent possible;

6. The Corps will continue to work with the FDEP to identify aspects of beach nourishment construction templates that negatively impact sea turtles and develop and implement alternative design criteria that may minimize these impacts;

7. Except for O&M disposal actions, Service compaction assessment guidelines will be followed and tilling will be performed where appropriate. For Corps Civil Works projects, assessment of compaction and tilling will be limited to the term of the construction or as otherwise may be authorized and funded; and

8. All lighting associated with project construction will be minimized to the maximum extent possible, through reduction, shielding, angling, etc., while maintaining compliance with all Corps, U.S. Coast Guard, and OSHA safety requirements.

Beach Mice

1. Pipeline routes for beach construction projects will avoid identified primary constituent elements for beach mouse critical habitat to the maximum extent practicable;

2. Implementation of a trapping and relocation plan if avoidance alternatives are not practical; and

3. Implementation of a lighting plan to reduce, shield, lower, angle, etc. light sources in order to minimize illumination impacts on nocturnal beach mice during construction.

Action Area

The Service has described the action area to include sandy beaches of the Atlantic Coast of Florida (Key West to Fernandina/Kings Bay) and the Gulf Coast (Ten Thousand Islands to Alabama State Line) for reasons that will be explained and discussed in the "EFFECTS OF THE ACTION" section of this consultation.

Underlying Dynamics of a Barrier Island

Of all the states and provinces in North America, Florida is most intimately linked with the sea. Florida's 1,200-mile coastline (exclusive of the Keys) is easily the longest in the continental U.S. Of the 1,200 miles, 745 miles are sandy and mostly in the form of barrier islands. The coastline is dynamic and constantly changing as a result of waves, wind, tides, currents, sea level change, and storms. The entire state lies within the coastal plain, with a maximum elevation of about 400 feet, and no part is more than 60 miles from the Atlantic Ocean or Gulf of Mexico.

The east coast of Florida consists of a dynamic shoreline, with a relatively sloped berm, coarse-grained sand, and moderate to high surf (Witherington 1986). The southeast coast of Florida consists of continuous, narrow, sandy barrier islands bordering a narrow continental shelf (Wanless and Maier 2007). The dynamics of the east coast shoreline are due to the occurrence of storm surges and seas from tropical storms that occur mainly during August through early October. More erosion events can also occur during late September through March due to nor'easters. The impacts of these two types of storms may vary from event to event and year to year.

Northwest (panhandle) and Southwest Florida beaches are considered to be low energy beaches with a gradual offshore slope and low sloped fine grained quartz sand beaches. As along the east coast of Florida, the shoreline dynamics are shaped by tropical storms and hurricanes. Although Gulf beaches may experience winter erosion, they are largely protected from the severe nor'easters.

Coasts with greater tidal ranges are more buffered against storm surges than are those with low tidal ranges, except when the storm strikes during high tide. Mean tidal ranges decrease southward along the Atlantic coast from a mean of seven feet at the Florida-Georgia line to less than two feet in Palm Beach County. The mean tidal range along the Gulf Coast is less than three feet (microtidal) except in the extreme south where it ranges from three to four feet. Because of its lower elevation and lower wave energy regime, the West Coast of the peninsula is subject to greater changes during storm events than is the east coast.

Microtidal coasts have a high vulnerability to sea level rise and barrier islands respond by migrating landward. Migration occurs as a result of overwash from extreme storms that flatten topography and deposit sand on the backside of the island, extending the island landward (Young 2007). Significant widening can occur from a single storm event. For example, Dauphin Island, a barrier island in Alabama, has nearly doubled its width following Hurricanes Ivan and Katrina in 2004 and 2005, respectively.

Sea level has risen globally approximately 7.1 inches in the past century (Douglas 1997). Climate models predict a doubling of the rate of sea level rise over the next 100 years (Pendleton *et al.* 2004). Recent studies indicate a trend toward increasing hurricane number and intensity (Emanuel 2005, Webster *et al.* 2005). Barrier islands need to be able to move and respond to these conditions. By locking in a barrier island's location with infrastructure, the island loses its ability to migrate to higher elevations which can lead to its eventual collapse (Moore 2007).

Overwash from less intense storms can positively affect island topography. Low natural berms can develop along beach fronts, but generally can be exceeded by overwash from frontal storms. The berm is an accretionary feature at the landward extreme of wave influence. Sediment is transported over the berm crest and is deposited in a nearshore overwash fan and in breach corridors. Overwash deposition provides source sand for re-establishing dunes. Onshore winds transport the sediment from overwash fans to the dunes, gradually building back dune elevation during storm-free periods.

The interaction between the biology and geomorphology of barrier islands is complex. Just as the barrier island undergoes a process of continual change, so do the ecological communities present. Vegetation zones gradually re-establish following storms, and in turn affect physical processes such as sand accretion, erosion, and overwash. The beach front, dunes, and overwash areas all provide important habitat components. Many barrier island species are adapted to respond positively to periodic disturbance. As the island widens, new feeding habitat (sand/mud flats) is created for shorebirds such as the piping plover. The beaches provide nesting habitat for sea turtles. Early colonizer plants are favored as a food source by beach mice. These barrier island habitats are becoming increasingly rare as our Nation's coastlines rapidly develop.

SEA TURTLES

STATUS OF THE SPECIES/CRITICAL HABITAT

The Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) share Federal jurisdiction for sea turtles under the Act. The Service has responsibility for sea turtles on the nesting beach. NMFS has jurisdiction for sea turtles in the marine environment. This SPBO addresses nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. Five species of sea turtles are analyzed in this SPBO: the loggerhead, green, leatherback, hawksbill, and Kemp's ridley.

Loggerhead Sea Turtle

The loggerhead sea turtle was federally listed as a threatened species on July 28, 1978 (43 Federal Register [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 2009a). The loggerhead feeds on mollusks, crustaceans, fish, and other marine animals.

The loggerhead 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 Service 2008).

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

<u>Green Sea Turtle</u>

The green sea turtle was federally listed 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 four 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 2009b). 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 1991). 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 2009a).

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.

<u>Leatherback Sea Turtle</u>

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 nonbreeding 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 subpolar 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 four to eight 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 2009c). 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.

Leatherback turtle nesting grounds are distributed worldwide in the Atlantic, Pacific and Indian Oceans on beaches in the tropics and sub-tropics. The Pacific Coast of Mexico historically supported the world's largest known concentration of nesting leatherbacks.

The leatherback turtle regularly nests in the U.S. Caribbean in Puerto Rico and the U.S. Virgin Islands. Along the U.S. Atlantic coast, most nesting occurs in Florida (NMFS and Service 1992). Leatherback nesting has also been reported on the northwest coast of Florida (LeBuff 1990, FWC 2009a); and in southwest Florida a false crawl (nonnesting emergence) has been observed on Sanibel Island (LeBuff 1990). Nesting has also been reported in Georgia, South Carolina, and North Carolina (Rabon *et al.* 2003) and in Texas (Shaver 2008).

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 Code of Federal Regulations (CFR) 17.95).

<u>Hawksbill Sea Turtle</u>

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.

Data collected in the Wider Caribbean reported that hawksbills typically weigh around 176 pounds or less; 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 2009d).

Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Miami-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.

<u>Kemp's Ridley Sea Turtle</u>

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 sea turtle in the world, weigh an average of 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, Mexico (Marquez-Millan 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

<u>Loggerhead Sea Turtle</u>

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).

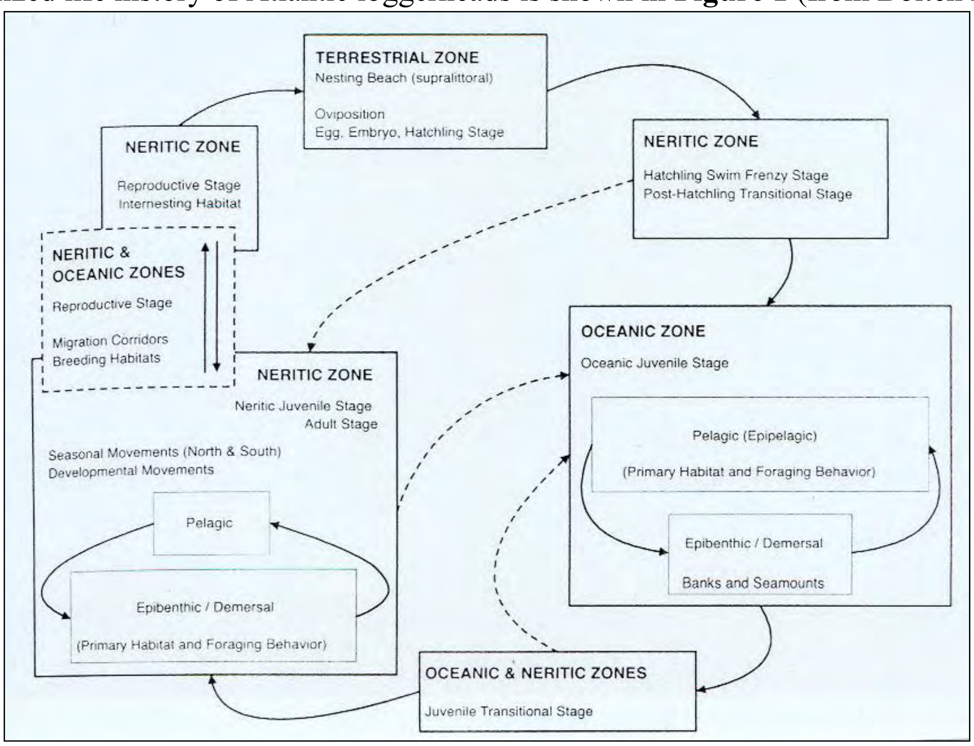

Figure 1. Life history stages of a loggerhead turtle. The boxes represent life stages and the corresponding ecosystems, solid lines represent movements between life stages and ecosystems, and dotted lines are speculative (Bolten 2003).

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 4** summarizes key life history characteristics for loggerheads nesting in the U.S.

Table 4. 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)	84˚F[5]
Nest productivity (emerged hatchlings/total eggs) x 100 (varies depending on site specific factors)	45-70 percent[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 (<34 inches Curved Carapace Length) sex ratio	65-70 percent 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 Witherington (2006) (information based on nests monitored throughout Florida beaches in 2005, n = 865).

[4] National Marine Fisheries Service (2001); Foley (2005).
[5] Mrosovsky (1988).
[6] Witherington (2006) (information based on nests monitored throughout Florida beaches in 2005, n = 1,680).
[7] Murphy and Hopkins (1984); Frazer and Richardson (1985); Hawkes *et al*. 2005; Scott 2006.
[8] Caldwell (1962), Dodd (1988).
[9] Richardson *et al.* (1978); Bjorndal *et al.* (1983).
[10] Snover (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 one to three day interval and move upward and out of the nest over a two to four day interval (Christens 1990). The time from pipping to emergence ranges from four to seven 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 and Martin 1996, Witherington 1997, Stewart and Wyneken 2004).

Loggerheads in the Northwest Atlantic display complex population structure based on life history stages. Based on mitochondrial deoxyribonucleic acid (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 sea 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 or more years intervene between breeding seasons (NMFS and Service 1991). 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 nine 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 two to three 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 six 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 two to three 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-Millan 1994, Rostal 2007).

Some females breed annually and nest an average of one to four times in a season at intervals of 10 to 28 days. Analysis by Rostal (2007) suggested that ridley females lay approximately 3.1 nests per nesting season. Interannual remigration rate for female ridleys is estimated to be approximately 1.8 (Rostal 2007) to 2.0 years (Marquez-Millan *et al.* 1989). 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 49,000 and 90,000 nests per year from 1999-2008 (FWC 2009a, NMFS and Service 2008). About 80 percent 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 (Possardt 2005). The loggerhead nesting aggregations in Oman and the U.S. account for the majority of nesting worldwide.

Green Sea Turtle

About 100 to 1,000 females are estimated to nest on beaches in Florida annually (FWC 2009c). 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 1998b). 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 decline 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, 1982 aerial surveys of adult female leatherbacks indicated this area had become 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 was 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 to 9,200 nests annually with 75 percent 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 to 94,000 adult leatherbacks (TEWG 2007). In Florida, an annual increase in number of leatherback nests at the core set of index beaches ranged from 27 to 615 between 1989 and 2010. Under the Core Index Nesting Beach Survey (INBS) program, 198.8 miles of nesting beach have been divided into zones, known as core index zones, averaging 0.5 mile in length. Annually, between 1989 and 2008, these core index zones were monitored daily during the 109-day sea turtle index nesting season (May 15 to August 31). On all index beaches, researchers recorded nests and nesting attempts by species, nest location, and date (FWC/FWRI 2010b).

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 a low of 5,029 nests in 1967 to a high of 63,294 nests in 2005, which represents a 92 percent increase since 1967 (TEWG 2007). Trinidad supports an estimated 6,000 leatherbacks nesting annually, which represents more than 80 percent of the nesting in the insular Caribbean Sea. Leatherback nesting along the Caribbean

Central American coast takes place between 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 to 1,623. Modeling of the Atlantic Costa Rica data indicated that the nesting population has decreased by 67.8 percent 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, annual population growth rate was estimated to be 1.10 (TEWG 2007). 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 (Garner *et al*. 2005). In the British Virgin Islands, annual nest numbers have increased in Tortola from zero to six nests per year in the late 1980s to 35 to 65 nests per year in the 2000s (TEWG 2007).

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 of Mayumba Beach in southern Gabon during the 1999-2000 nesting season (Billes *et al*. 2000). Some nesting has been reported in Mauritania, Senegal, 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. In addition, a large nesting population is found on the island of Bioko (Equatorial Guinea) (Fretey *et al*. 2007). .

<u>Hawksbill Sea Turtle</u>

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 per year (Meylan 1999). 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 1998c).

<u>Kemp's Ridley Sea Turtle</u>

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 (TEWG 1998). In addition, rare nesting events have been reported in Alabama, Florida, Georgia, South Carolina, and North Carolina. Historical 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 2009, 16,273 nests were documented along the 18.6 miles of coastline patrolled at Rancho Nuevo, and the total number of nests documented for all the monitored beaches in Mexico was 21,144 (Service 2009). In 2010, a total of 13,302 nests were documented in Mexico (Service 2010). In addition, 207 and 153 nests were recorded during 2009 and 2010, respectively, in the U.S., primarily in Texas.

Status and distribution

Loggerhead Sea turtle

Five recovery units have been identified in the Northwest Atlantic based on genetic differences and a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries (NMFS and Service 2008). Recovery units are subunits of a listed species that are geographically or otherwise identifiable and essential to the recovery of the species. Recovery units are individually necessary to conserve genetic robustness, demographic robustness, important life history stages, or some other feature necessary for long-term sustainability of the species. The five recovery units identified in the Northwest Atlantic (**Figure 2**) are:

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; and

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).

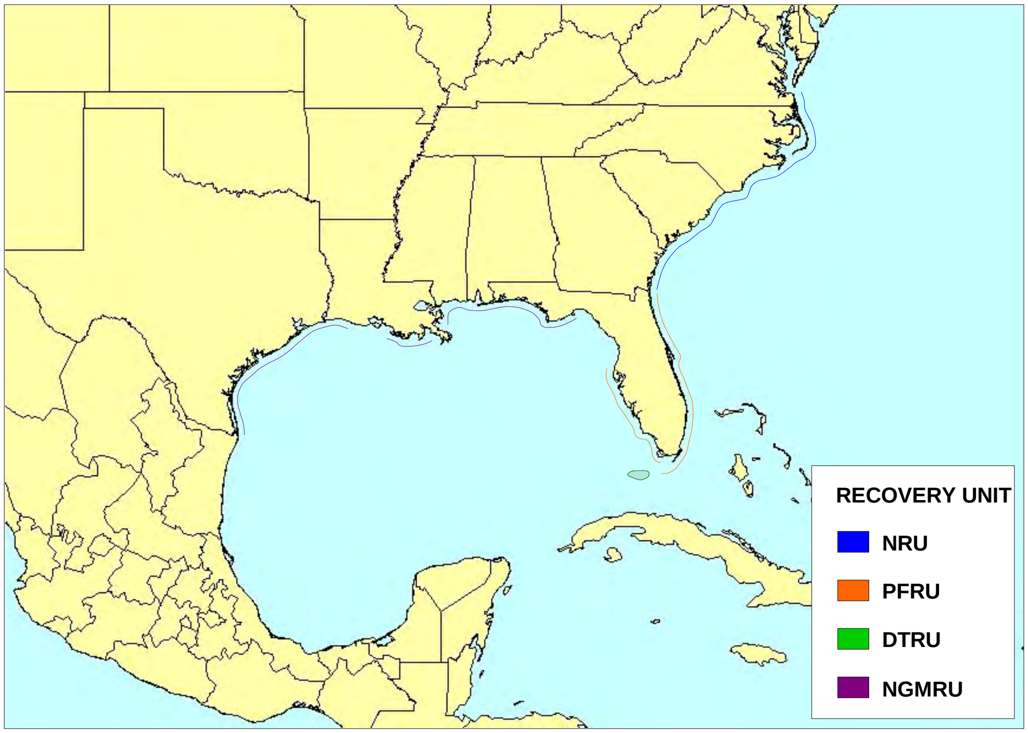

Figure 2. Map of the distribution of the loggerhead recovery units.

The mtDNA analyses show that there is limited exchange of females among these recovery units (Ehrhart 1989, Foote *et al.*, 2000, NMFS 2001, Hawkes *et al.* 2005. 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 GCRU 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 U.S. 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 (NMFS and Service 2008), 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 percent annually. Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 1.9 percent 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 (NMFS and Service 2008).

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) (FWC 2008d). 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 INBS sites surveyed with constant effort over time. In 1979, the Statewide Nesting Beach Survey (SNBS) program was initiated to document the total distribution, seasonality, and abundance of sea turtle nesting in Florida. In 1989, the INBS program was initiated in Florida to measure seasonal productivity, allowing comparisons between beaches and between years (FWC 2009b). Of the 190 SNBS surveyed areas, 33 participate in the INBS program (representing 30 percent of the SNBS beach length).

INBS nest counts from 1989–2010 show a shallow decline. However, recent trends (1998–2010) in nest counts have shown a 25 percent decline, with increases only observed in the most recent three-year period, 2008–2010 (FWC/FWRI 2010a). The analysis that reveals this decline uses nest-count data from 345 representative Atlantic-coast index zones (total length = 187 miles) and 23 representative zones on Florida's southern Gulf coast (total length = 14.3 miles). The spatial and temporal coverage (annually, 109 days and 368 zones) accounted for an average of 70 percent of statewide loggerhead nesting activity between 1989 and 2010.

The NGMRU is the third largest nesting assemblage among the four U.S. recovery units. Nesting surveys conducted on approximately 186 miles 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, (FWC 2008d). 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 (FWC 2008d). A log-linear regression showed a significant declining trend of 4.7 percent annually (NMFS and Service 2008).

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, (nine 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) (FWC 2008d). 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 SNBS program. There are nine 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 (NMFS and Service 2008).

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 andYucatán, Mexico, where an increasing trend was reported over a 15-year period from 1987-2001 (Zurita *et al.* 2003). However, since 2001, nesting has declined and the previously reported increasing trend appears not to have been sustained (NMFS and Service 2008). Other smaller nesting populations have experienced declines over the past few decades (e.g., Amorocho 2003).

Recovery Criteria (only the Demographic Recovery Criteria are presented below; for the Listing Factor Recovery Criteria, please see NMFS and Service 2008)

1. Number of Nests and Number of Nesting Females
   a. Northern Recovery Unit
      i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is 2 percent or greater resulting in a total annual number of nests of 14,000 or greater for this recovery unit (approximate distribution of nests is North Carolina =14 percent [2,000 nests], South Carolina =66 percent [9,200 nests], and Georgia =20 percent [2,800 nests]); and
      ii. 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
      i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is statistically detectable (one percent) resulting in a total annual number of nests of 106,100 or greater for this recovery unit; and

ii. 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
   i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is three percent or greater resulting in a total annual number of nests of 1,100 or greater for this recovery unit; and
   ii. 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
   i. There is statistical confidence (95 percent) that the annual rate of increase over a generation time of 50 years is three percent 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 Florida= 92 percent [3,700 nests] and Alabama =8 percent [300 nests]); and
   ii. 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
   i. 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, Bahamas) has increased over a generation time of 50 years; and
   ii. 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 across the foraging range is established and monitoring is implemented to measure abundance. There is statistical confidence (95 percent) 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.

The Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle was signed in 2008 (NMFS and Service 2008), and the Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle was signed in 1998 (NMFS and Service 1998e).

<u>Green Sea Turtle</u>

Annual nest totals documented as part of the Florida SNBS program from 1989-2008 have ranged from 435 nests laid in 1993 to 12,752 in 2007. Nesting occurs in 26 counties with a peak along the east coast, from Volusia through Broward Counties. 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, green turtle nesting trends are best assessed using standardized nest counts made at INBS sites surveyed with constant effort over time (1989-2009). Green sea turtle nesting in Florida is increasing based on 19 years (1989-2009) of INBS data from throughout the state (FWC 2009a). 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 Act afforded 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 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 Convention on International Trade in Endangered Species of Wild Fauna and Flora (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 if, 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 must be based on standardized surveys;

2. At least 25 percent (65 miles) of all available nesting beaches (260 miles) is in public ownership and encompasses 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; and

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

The Recovery Plan for U.S. Population of Atlantic Green Turtle was signed in 1991 (NMFS and Service 1991), the Recovery Plan for U.S. Pacific Populations of the Green Turtle was signed in 1998 (NMFS and Service 1998b), and the Recovery Plan for U.S. Pacific Populations of the East Pacific Green Turtle was signed in 1998 (NMFS and Service 1998a).

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 the 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 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 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 2009a, 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 (1989-2009). An analysis of the INBS data has shown a substantial increase in leatherback nesting in Florida since 1989 (FWC 2009b, TEWG Group 2007).

Recovery Criteria

The U.S. Atlantic population of leatherbacks can be considered for delisting if 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 Islands, 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; and.

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

The Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico was signed in 1992 (NMFS and Service 1992), and the Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle was signed in 1998 (NMFS and Service 1998d).

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 if, over a period of 25 years, the following conditions are met:

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

2. Habitat for at least 50 percent of the nesting activity that occurs in the U.S. Virgin Islands 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, U.S. Virgin Islands, and Florida; and

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

The Recovery Plan for the Hawksbill Turtle in the U.S. Caribbean, Atlantic, and Gulf of Mexico was signed in 1993 (NMFS and Service 1993), and the Recovery Plan for U.S. Pacific Populations of the Hawksbill Turtle was signed in 1998 (NMFS and Service 1998c).

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 binational 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 U.S. 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 MMPA, 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. Continuation of complete and active protection of the known nesting habitat and the waters adjacent to the nesting beach (concentrating on the Rancho Nuevo area) and continuation of the bi-national protection project;

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

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

4. Successful implementation of all priority one recovery tasks in the recovery plan.

The Recovery Plan for the Kemp's Ridley Sea Turtle was signed in 1992 (Service and NMFS 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.

Common threats to sea turtles in Florida

Anthropogenic 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 (*Solenopsis* spp.), feral hogs (*Sus scrofa*), dogs (*Canis familiaris),* and an increased presence of native species (e.g., raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), and opossums (*Didelphis virginiana*)), 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 or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching and fishery interactions. On April 20, 2010, an explosion and fire on the Mobile Offshore Drilling Unit *Deepwater Horizon* MC252 occurred approximately 50 miles southeast of the Mississippi Delta. A broken well head at the sea floor resulted in a sustained release of oil, estimated at 35,000 and 60,000 barrels per day. On July 15, the valves on the cap were closed, which effectively shut in the well and all sub-sea containment systems. Damage assessment from the sustained release of oil is currently ongoing and the Service does not have a basis at the present time to predict the complete scope of effects to the species range-wide.

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.

Analysis of the species/critical habitat likely to be affected

The threatened loggerhead sea turtle, the endangered green sea turtle, the endangered leatherback sea turtle, the endangered hawksbill sea turtle, and the endangered Kemp's ridley sea turtle are currently listed because of their reduced population sizes caused by overharvest and habitat loss with continuing anthropogenic threats from commercial fishing, disease, and degradation of remaining habitat. The proposed action has the potential to adversely affect nesting females of these species, their nests, and hatchlings on all nesting beaches where shore protection activities (including the placement of compatible sediment, repair or replacement of groins and jetties, and navigation channel maintenance on the beaches of the Atlantic and Gulf coasts of Florida) occur. Other activities, which include military missions and coastal development that have affected the conservation of sea turtles nesting in Florida, are included in the Service's evaluation of the species current status (**Appendix A)**.

ENVIRONMENTAL BASELINE

Status of the species/critical habitat within the action area

INBS nest counts represent approximately 69 percent of known loggerhead nesting in Florida, 74 percent of known green turtle nesting, and 34 percent of known leatherback nesting (FWC 2009a). The INBS program was established with a set of standardized data-collection criteria to measure seasonal nesting, and to allow accurate comparisons between both beaches and years. The reliability of these comparisons results from the uniformity of beach-survey effort in space and time, and from the specialized annual training of beach surveyors. Under the core INBS program, 178 miles of nesting beach have been divided into zones, known as core index zones, averaging 0.5 mile in length. These beaches are monitored daily beginning May 15 and ending August 31. On all index beaches, researchers record nests and nesting attempts by species, the location of each nest, and the date each nest was laid.

Nesting surveys begin at sunrise. Turtle crawls are identified as a true nesting crawl or false crawl (*i.e.*, nonnesting emergence). Nests are marked with stakes and some are surrounded with surveyor flagging tape and, if needed, screened to prevent predation. The marked nests are monitored throughout the incubation period for storm damage, predation, hatching activity and hatching and emerging success. Nest productivity surveys may continue into mid-November depending on nest incubation periods. All monitoring is conducted in accordance with guidelines provided by the FWC.

<u>Loggerhead Sea Turtle</u>

Five loggerhead sea turtle recovery units have been identified in the Northwest Atlantic (NMFS and Service 2008). Mitochondrial DNA analyses show that there is limited exchange of females among these recovery units (Foote *et al*. 2000, NMFS 2001, Hawkes *et al*. 2005). However, nuclear DNA analyses show that there are no substantial subdivisions across the loggerhead nesting colonies in the southeastern U.S. Male-mediated gene flow appears to be keeping the subpopulations genetically similar on a nuclear DNA level (Francisco-Pearce 2001). The NRU and NGMRU are believed to play an important role in providing males to mate with females from the more female-dominated recovery units.

Two (NGMRU and PFRU) of the five nesting subpopulations occur within the proposed Action Area. Northwest Florida accounts for 92 percent of the NGMRU in nest numbers consists of approximately 234 miles of nesting shoreline. The PFRU makes up 1,166 miles of shoreline and consists of approximately 64,513 recorded loggerhead nests per year (2000 to 2009).

Recovery Units	Nesting Range
NGMRU	Escambia through Franklin Counties
PFRU	Pinellas through Nassau Counties

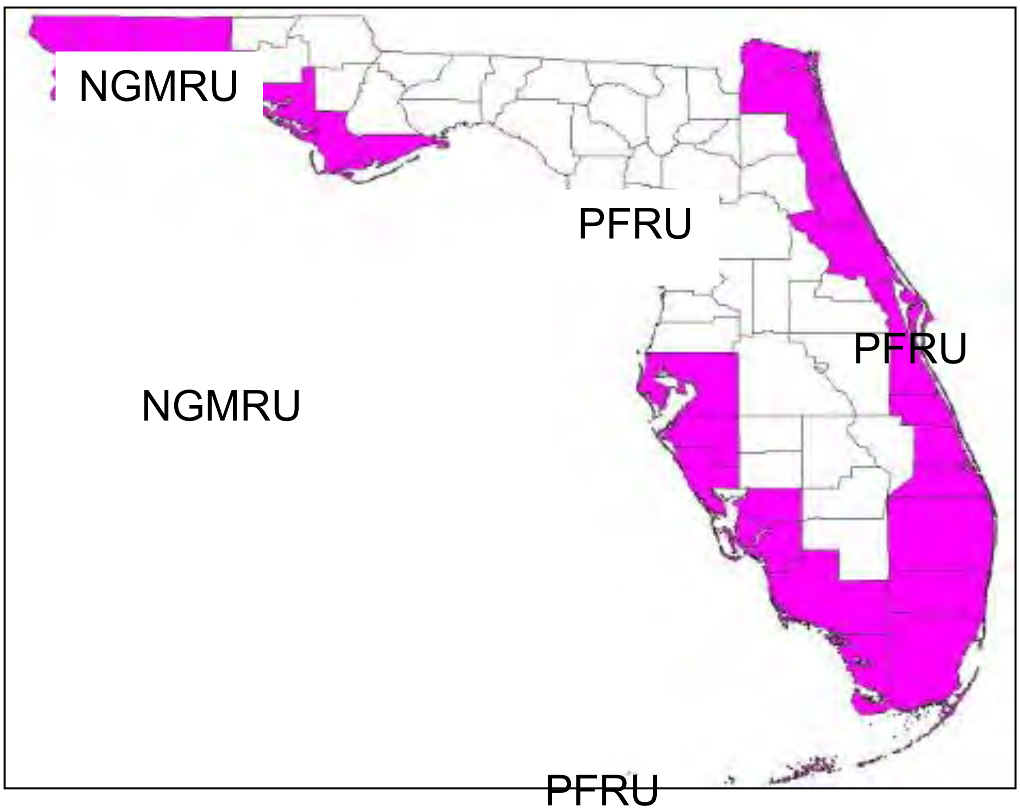

Figure 3. Distribution of loggerhead sea nesting in the PFRU and NGMRU in Florida.

The loggerhead sea turtle nesting and hatching season throughout Florida is shown in **Table 5**.

Table 5. Loggerhead sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Northern Gulf of Mexico	Escambia through Pasco	May 1 through October 31
Southern Gulf of Mexico	Pinellas through Monroe	April 1 through November 30
Southern Florida Atlantic	Brevard through Miami-Dade	March 15 through November 30
Northern Florida Atlantic	Nassau through Volusia	April 15 through November 30

An updated analysis by FWC/FWRI reveals a shallow decline in loggerhead nest numbers around the State of Florida based on INBS nest counts from 1989 through 2010 (FWC/FWRI 2010). However, recent trends in nest counts have shown a 25 percent decline from 1998 to 2010 (FWC/FWRI 2010a).

Sea turtles play a vital role in maintaining healthy and productive ecosystems. Nesting sea turtles introduce large quantities of nutrients from the marine ecosystem to the beach and dune system (Bouchard and Bjorndal 2000). In the U.S., loggerheads play a particularly important role in this regard due to their greater nesting numbers. The nutrients they leave behind on the nesting beaches in the form of eggs and eggshells play an important role for dune vegetation and terrestrial predator populations (Bouchard and Bjorndal 2000). In a study at Melbourne Beach, Florida, Bouchard and Bjorndal (2000) estimated that only 25 percent of the organic matter introduced into nests by loggerheads returned to the ocean as hatchlings. They found that 29-40 percent of all nutrients were made available to detritivores, decomposers, and plants, while 26-31 percent of all nutrients were consumed by nest predators. Thus, all loggerhead recovery units play a vital role in the maintenance of a healthy beach and dune ecosystem within their geographic distribution.

Green Sea Turtle

Green turtle nest numbers are increasing in Florida with a record number of nests being recorded during the 2007 season (FWC 2009a).

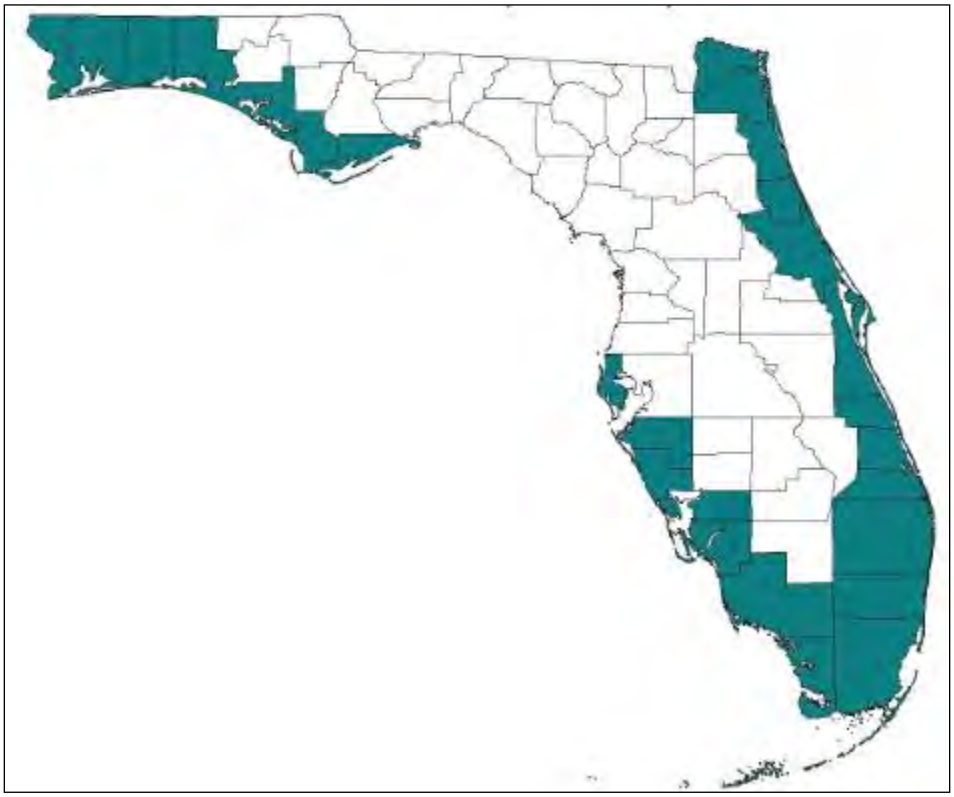

Figure 4. Distribution of green sea turtle nesting in Florida.

The green sea turtle nesting and hatching season throughout Florida is shown in **Table 6**.

Table 6. Green sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Northern Gulf of Mexico	Escambia through Pasco	May 15 through October 31
Southern Gulf of Mexico	Pinellas through Monroe	May 15 through October 31
Southern Florida Atlantic	Brevard through Miami-Dade	May 1 through November 30
Northern Florida Atlantic	Nassau through Volusia	May 15 through November 15

<u>Leatherback Sea Turtle</u>

Leatherback nest numbers are increasing in Florida with a record number of leatherback nests being recorded during the 2009 season (FWC 2009a).

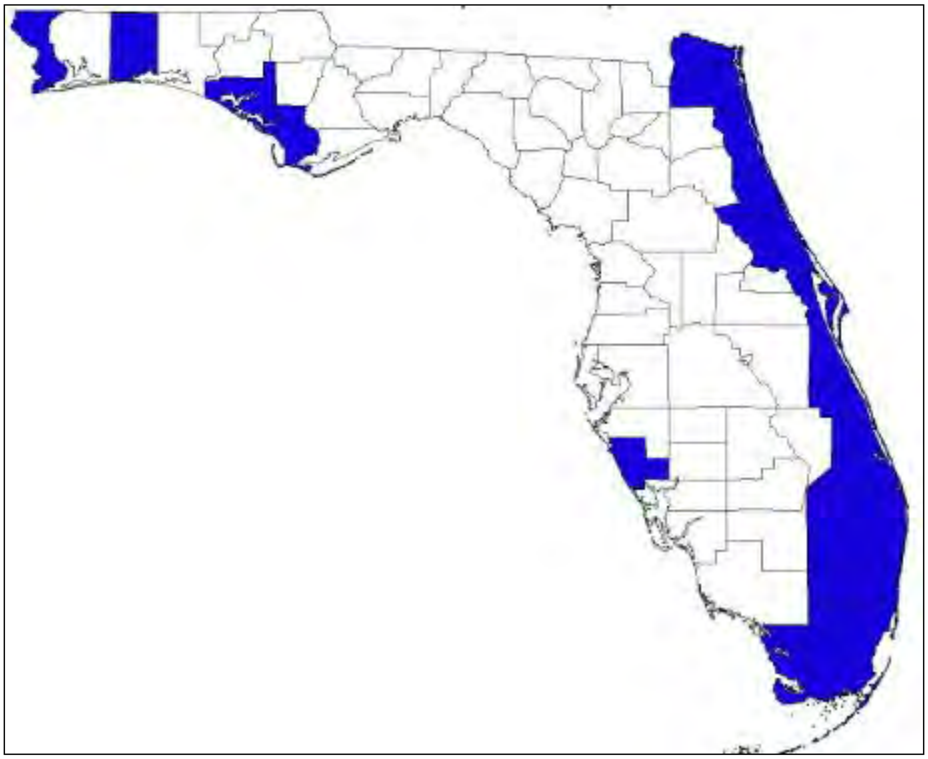

Figure 5. Distribution of leatherback sea turtle nesting in Florida.

The leatherback sea turtle nesting and hatching season throughout Florida is shown in **Table 7**.

Table 7. Leatherback sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Northern Gulf of Mexico	Escambia through Pasco	May 1 through September 30
Southern Florida Atlantic	Brevard through Miami-Dade	February 15 through November 30
Northern Florida Atlantic	Nassau through Volusia	April 15 through September 30

Hawksbill Sea Turtle

Thirty-nine hawksbill nests have been documented in Florida from 1979-2007 in Volusia, Martin, Palm Beach, Broward, Miami-Dade, Monroe, and Manatee Counties (FWC 2008c).
The hawksbill sea turtle nesting and hatching season throughout Florida is shown in **Table 8**.

Table 8. Hawksbill sea turtle nesting and hatching season for Florida.

AREA	COUNTIES	SEA TURTLE NESTING SEASON THROUGH HATCHING SEASON
Southern tip of Florida	Monroe	June 1 through December 31
Southern Florida Atlantic	Brevard through Miami-Dade	June 1 through December 31
Northeast Florida	Volusia	June 1 through December 31

Kemp's Ridley Sea Turtle

Twenty-six Kemp's ridley nests have been documented in Florida from 1979-2007 in Volusia, Brevard, Martin, Palm Beach, Lee, Sarasota, Pinellas, Gulf, Walton, Santa Rosa, and Escambia, Counties (FWC 2008c).

Factors affecting species habitat within the action area

In accordance with the Act, the Service completes consultations with all federal agencies for actions that may adversely affect sea turtles. In Florida, consultations have included military missions and operations, beach nourishment and other shoreline protection, and actions related to protection of coastal development on sandy beaches of Florida's Atlantic Coast (Key West to Fernandina/Kings Bay) and the Gulf Coast (Ten Thousand Islands to Alabama State Line) (**Appendix A**).

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 of, 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, which 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, 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 in a natural state with no immediate development landward of the sandy beach, 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 predevelopment 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 reestablished after periodic storms. While the beach itself moves landward during such storms, reconstruction or persistence of structures at their prestorm locations can result in a loss of nesting habitat.

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state.

The 2005 hurricane season was a record-breaking season with 27 named storms. Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy impacted Florida. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida.

A common question is whether the 2004 and 2005 hurricane seasons contributed to reduced loggerhead nest numbers observed from 2004-2007. Although Florida has been subject to numerous hurricanes in recent years, these storm events cannot account for the recent decline (1998-2010) observed in the number of loggerhead nests on Florida beaches. The hurricanes have a very limited effect on nesting activity of adult female turtles. Because loggerheads that hatch on Florida beaches require some 20 to 30 years to reach maturity, storm impacts would not manifest themselves for many years. Moreover, hurricane impacts to nests tend to be localized and often occur after the main hatching season for the loggerhead is over (FWC 2008a).

Erosion

The designation of a Critically Eroded Beach is a planning requirement of the State's Beach Erosion Control Funding Assistance Program (http://www.dep.state.fl.us/BEACHES/programs/bcherosn.htm). 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 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 which, although they may be stable or slightly erosional now, their inclusion is necessary for continuity of management of the coastal system or for the design integrity of adjacent beach management projects (FDEP 2009). 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.

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, Witherington and Martin 1996). 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). During the 2007 sea turtle nesting season in Florida, over 64,000 turtle hatchlings were documented as being disoriented (**Table 9**) (FWC 2007a). 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 (FWC 2007a).

Table 9. Documented disorientations along the Florida coast (FWC 2007a).

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[1]	1,192	49,623	62

[1]FWC 2008e

Predation

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 U.S. are ghost crabs (*Ocypode quadrata*), raccoons, feral hogs, foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), coyotes

(*Canis latrans*), armadillos, and fire ants (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). 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.

Driving on the Beach

The operation of motor vehicles on the beach affects sea turtle nesting by interrupting or striking a female turtle on 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 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 preemergent 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 an 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 reestablish 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.

Climate Change

The varying and dynamic elements of climate science are inherently long term, complex, and interrelated. Regardless of the underlying causes of climate change, glacial melting and expansion of warming oceans are causing sea level rise, although its extent or rate cannot as yet be predicted with certainty. At present, the science is not exact enough to precisely predict when and where climate impacts will occur. Although we may know the direction of change, it may not be possible to predict its precise timing or magnitude. These impacts may take place gradually or episodically in major leaps.

Climate change is evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level, according to the Intergovernmental Panel on Climate Change Report (IPCC 2007a). The IPCC Report (2007a) describes changes in natural ecosystems with potential widespread effects on many organisms, including marine mammals and migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the U.S. Department of the Interior (DOI) requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007c).

Climatic changes in Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management. Global warming will be a particular challenge for endangered, threatened, and other "at risk" species. It is difficult to estimate, with any degree of precision, which species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006). As the level of information increases relative to the effects of global climate change on sea turtles and its designated critical habitat, the Service will have a better basis to address the nature and magnitude of this potential threat and will more effectively evaluate these effects to the range-wide status of sea turtles.

Florida is one of the areas most vulnerable to the consequences of climate change. Sea level rise and the possibility of more intense hurricanes are the most serious threats to Florida potentially from climate change. Florida has over 1,350 miles of coastline, low-lying topography, and proximity to the hurricane-prone subtropical mid-Atlantic Ocean and Gulf of Mexico.

One of the most serious threats to Florida's coasts comes from the combination of elevated sea levels and intense hurricanes. Florida experiences more landings of tropical storms and hurricanes than any other state in the U.S. Storm surges due to hurricanes will be on top of elevated sea levels, tides, and wave action. As a result, barrier islands and low-lying areas of Florida will be more susceptible to the effects of storm surge. An important element of adaptation strategy is how to protect beaches, buildings and infrastructure against the effects of rising seas and wind, wave action, and storm surge due to hurricanes.

Temperatures are predicted to rise from 1.6^{o}F to 9^{o}F for North America by the end of this century (IPCC 2007a,b). Alterations of thermal sand characteristics could result in highly female-biased sex ratios because sea turtles exhibit temperature dependent sex determination (e.g., Glen and Mrosovsky 2004, Hawkes *et al*. 2008).

Along developed coastlines, and especially in areas where shoreline protection structures have been constructed to limit shoreline movement, rising sea levels will cause severe effects on nesting females and their eggs. Erosion control structures can result in the permanent loss of dry nesting beach or deter nesting females from reaching suitable nesting sites (National Research Council 1990a). Nesting females may deposit eggs seaward of the erosion control structures potentially subjecting them to repeated tidal inundation or washout by waves and tidal action.

Based on the present level of available information concerning the effects of global climate change on the status of sea turtles and their designated critical habitat, 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 their 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.

EFFECTS OF THE ACTION

This section is an analysis of the beneficial, direct, and indirect effects of the proposed actions on nesting sea turtles, nests, eggs, and hatchling sea turtles within the Action Area. The analysis includes effects interrelated and interdependent of the project activities. An interrelated activity is an activity that is part of a proposed action and depends on the proposed activity. An interdependent activity is an activity that has no independent utility apart from the action.

Factors to be considered

The proposed projects will occur within habitat that is used by sea turtles for nesting and may be constructed during a portion of the sea turtle nesting season. Long-term and permanent impacts could include a change in the nest incubation environment from the sand placement activities. Short-term and temporary impacts to sea turtle nesting activities could result from project work occurring on the nesting beach during the nesting or hatching period, changes in the physical characteristics of the beach from the placement of the sand, and changes in the nest incubation environment from the material.

Proximity of action: Sand placement activities would occur within and adjacent to nesting habitat for sea turtles and dune habitats that ensure the stability and integrity of the nesting beach. Specifically, the project would potentially impact loggerhead, green, leatherback, hawksbill, and Kemp's ridley nesting females, their nests, and hatchling sea turtles.

Distribution: Sand placement activities that may impact nesting and hatchling sea turtles and sea turtle nests would occur along Gulf of Mexico and Atlantic Ocean coasts.

Timing: The timing of the sand placement activities could directly and indirectly impact nesting females, their nests, and hatchling sea turtles when conducted between March 1 and November 30.

Nature of the effect: The effects of the sand placement activities may change the nesting behavior of adult female sea turtles, diminish nesting success, cause reduced hatching and emerging success. Sand placement can also change the incubation conditions within the nest. Any decrease in productivity and/or survival rates would contribute to the vulnerability of the sea turtles nesting in Florida.

Duration: The sand placement activity may be a one-time activity or a multiple-year activity and each sand placement project may take between three and seven months to complete. Thus, the direct effects would be expected to be short-term in duration. Indirect effects from the activity may continue to impact nesting and hatchling sea turtles and sea turtle nests in subsequent nesting seasons.

Disturbance frequency: Sea turtle populations in Florida may experience decreased nesting success, hatching success, and hatchling emerging success that could result from the sand placement activities being conducted at night during one nesting season, or during the earlier or later parts of two nesting seasons.

Disturbance intensity and severity: Depending on the need (including post-disaster work) and the timing of the sand placement activities during sea turtle nesting season, effects to the sea turtle populations of Florida, and potentially the U.S. populations, could be important.

Analyses for effects of the action

Beneficial Effects

The placement of sand on a beach with reduced dry foredune habitat may increase sea turtle nesting habitat if the placed sand is highly compatible (*i.e.*, grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project. In addition, a nourished beach that is designed and constructed to mimic a natural beach system may benefit sea turtles more than an eroding beach it replaces.

Adverse Effects

Through many years of research, it has been documented that beach nourishment can have adverse effects on nesting female sea turtles and hatchlings and sea turtle nests. Results of monitoring sea turtle nesting and beach nourishment activities provide additional information on how sea turtles respond to nourished beaches, minimization measures, and other factors that influence nesting, hatching, and emerging success. Science-based information on sea turtle nesting biology and review of empirical data on beach nourishment monitoring is used to manage beach nourishment activities to eliminate or reduce impacts to nesting and hatchling sea turtles and sea turtle nests so that beach nourishment can be accomplished. Measures can be incorporated pre-, during, and post-construction to reduce impacts to sea turtles. Because of the long history of sea turtle monitoring in Florida, it is not necessary to require studies on each project beach to document those effects each time.

Direct Effects

Direct effects are those direct or immediate effects of a project on the species or its habitat. Placement of sand on a beach in and of itself may not provide suitable nesting habitat for sea turtles. Although sand placement activities may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Sand placement activities during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about seven percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder 1994).

Nest relocation

Besides the potential for missing nests during surveys and a nest relocation program, there is a potential for eggs to be damaged by nest movement or relocation, particularly if eggs are not relocated within 12 hours of deposition (Limpus *et al.* 1979). Nest relocation can have adverse impacts on incubation temperature (and hence sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence (Limpus *et al.* 1979, Ackerman 1980, Parmenter 1980, Spotila *et al.* 1983, McGehee 1990). Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard *et al.* 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard *et al.* 1985), hatchling size (Packard *et al.* 1981, McGehee 1990), energy reserves in the yolk at hatching (Packard *et al.* 1988), and locomotory ability of hatchlings (Miller *et al.* 1987).

In a 1994 Florida study comparing loggerhead hatching and emerging success of relocated nests with nests left in their original location, Moody (1998) found that hatching success was lower in relocated nests at nine of 12 beaches evaluated. In addition, emerging success was lower in relocated nests at 10 of 12 beaches surveyed in 1993 and 1994. Many of the direct effects of beach nourishment may persist over time. These direct effects include increased susceptibility of relocated nests to catastrophic events, the consequences of potential increased beachfront development, changes in the physical characteristics of the beach, the formation of escarpments, repair/replacement of groins and jetties and future sand migration.

Equipment

The use of heavy machinery on beaches during a construction project may also have adverse effects on sea turtles. Equipment left on the nesting beach overnight can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure.

The operation of motor vehicles or equipment on the beach to complete the project work at night affects sea turtle nesting by: interrupting or colliding with a female turtle on the beach; headlights disorienting or misorienting emergent hatchlings; vehicles running over hatchlings attempting to reach the ocean, and vehicle tracks traversing the beach interfering with hatchlings crawling to the ocean. Apparently, hatchlings 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 preemergent hatchlings (Mann 1977, Nelson and Dickerson 1987, Nelson 1988).

Depending on when the dune project is completed dune vegetation may have become established in the vicinity of dune restoration sites. The physical changes and loss of plant cover caused by vehicles on vegetated areas or dunes can lead to various degrees of instability and cause dune migration. As vehicles move over the sand, sand is displaced downward, lowering the substrate. Since the vehicles also inhibit plant growth, and open the area to wind erosion, the beach and dunes may become unstable. Vehicular traffic on the beach or through dune breaches or low dunes may cause acceleration of overwash and erosion (Godfrey *et al.* 1978). Driving along the beachfront should be between the low and high tide water lines. To minimize the impacts to the beach and recovering dunes, transport and access to the dune restoration sites should be from the road. However, if the work needs to be conducted from the beach, the areas for the truck transport and bulldozer/bobcat equipment to work in should be designated and marked.

Artificial lighting

Visual cues are the primary sea-finding mechanism for hatchling sea turtles (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). When artificial lighting is present on or near the beach, it can misdirect hatchlings once they emerge from their nests and prevent them from reaching the ocean (Philibosian 1976, Mann 1977, FWC 2007a). In addition, a significant reduction in sea turtle nesting activity has been documented on beaches illuminated with artificial lights (Witherington 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest, misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings from adjacent non-project beaches.

The newly created wider and flatter beach berm exposes sea turtles and their nests to lights that were less visible, or not visible, from nesting areas before the sand placement activity leading to a higher mortality of hatchlings. Review of over 10 years of empirical information from beach nourishment projects indicates that the number of sea turtles impacted by lights increases on the post-construction berm. A review of selected nourished beaches in Florida (South Brevard, North Brevard, Captiva Island, Ocean Ridge, Boca Raton, Town of Palm Beach, Longboat Key, and Bonita Beach) indicated disorientation reporting increased by approximately 300 percent the first nesting season after project construction and up to 542 percent the second year compared to prenourishment reports (Trindell *et al.* 2005).

Specific examples of increased lighting disorientations after a sand placement project include Brevard and Palm Beach Counties, Florida. A sand placement project in Brevard County, completed in 2002, showed an increase of 130 percent in disorientations in the nourished area. Disorientations on beaches in the County that were not nourished remained constant (Trindell 2007). This same result was also documented in 2003 when another beach in Brevard County was nourished and the disorientations increased by 480 percent (Trindell 2007). Installing appropriate beachfront lighting is the most effective method to decrease the number of disorientations on any developed beach including nourished beaches. A shoreline protection project was constructed at Ocean Ridge in Palm Beach County, Florida, between August 1997 and April 1998. Lighting disorientation events increased after nourishment. In spite of continued aggressive efforts to identify and correct lighting violations in 1998 and 1999, 86 percent of the disorientation reports were in the nourished area in 1998 and 66 percent of the reports were in the nourished area in 1999 (Howard and Davis 1999).

While the effects of artificial lighting have not been specifically studied on each beach that is nourished in Florida, based on the experience of increased artificial lighting disorientations on other Florida beaches, impacts are expected to potentially occur on all nourished beaches statewide.

Changing to sea turtle compatible lighting can be easily accomplished at the local level through voluntary compliance or by adopting appropriate regulations. Of the 27 coastal counties in Florida where sea turtles are known to nest, 19 have passed beachfront lighting ordinances in addition to 58 municipalities (FWC 2007b). Local governments have realized that adopting a lighting ordinance is the most effective method to address artificial lighting along the beachfront.

Indirect Effects

Indirect effects are those effects that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Effects from the proposed project may continue to affect sea turtle nesting on the project beach and adjacent beaches in future years.

Increased susceptibility to catastrophic events

Nest relocation within a nesting season may concentrate eggs in an area making them more susceptible to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater predation rates from both land and marine predators, because the predators learn where to concentrate their efforts (Glenn 1998, Wyneken *et al.* 1998).

Increased beachfront development

Pilkey and Dixon (1996) stated that beach replenishment frequently leads to more development in greater density within shorefront communities that are then left with a future of further replenishment or more drastic stabilization measures. Dean (1999) also noted that the very existence of a beach nourishment project can encourage more development in coastal areas. Following completion of a beach nourishment project in Miami during 1982, investment in new and updated facilities substantially increased tourism there (National Research Council 1995). Increased building density immediately adjacent to the beach often resulted as much larger buildings that accommodated more beach users replaced older buildings. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures. Increased shoreline development may adversely affect sea turtle nesting success. Greater development may support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas

(National Research Council 1990a), and can also result in greater adverse effects due to artificial lighting, as discussed above.

Changes in the physical environment

Beach nourishment may result in changes in sand density (compaction), beach shear resistance (hardness), beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson 1988a). These changes could result in adverse impacts on nest site selection, digging behavior, clutch viability, and hatchling emergence (Nelson and Dickerson 1987, Nelson 1988).

Beach nourishment projects create an elevated, wider, and unnatural flat slope berm. Sea turtles nest closer to the water the first few years after nourishment because of the altered profile (and perhaps unnatural sediment grain size distribution) (Ernest and Martin 1999, Trindell 2005) (**Figure 6**).

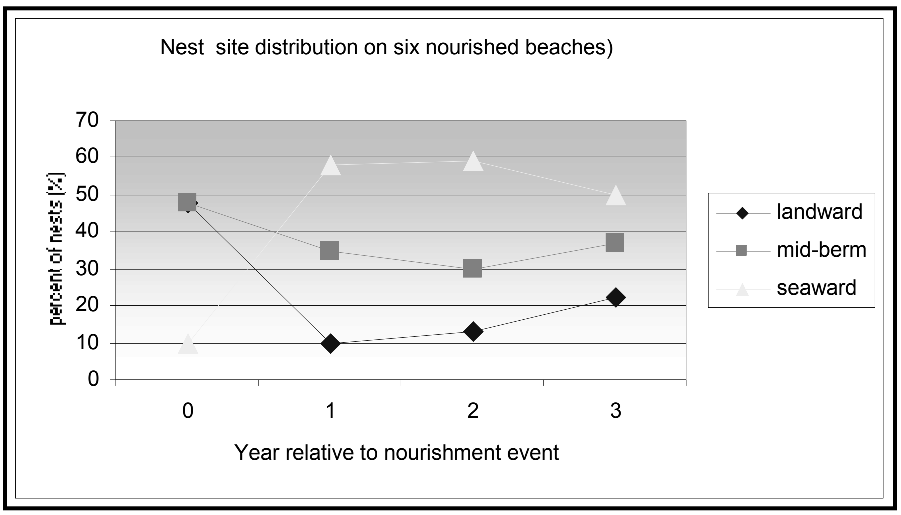

Figure 6. Review of sea turtle nesting site selection following nourishment (Trindell 2005).

Beach compaction and unnatural beach profiles resulting from beach nourishment activities could negatively impact sea turtles regardless of the timing of projects. Very fine sand or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson *et al.* 1987, Nelson and Dickerson 1988a). Significant reductions in nesting success (*i.e.*, false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Fletemeyer 1980, Raymond 1984, Nelson and Dickerson 1987, Nelson *et al.* 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and cause increased physiological stress to the animals (Nelson and Dickerson 1988b). Nelson and Dickerson (1988c) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

These impacts can be minimized by using suitable sand and by tilling (minimum depth of 36 inches) compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain uncompacted for up to one year. Multi-year beach compaction monitoring and, if necessary, tilling would ensure that project impacts on sea turtles are minimized.

A change in sediment color on a beach could change the natural incubation temperatures of nests in an area, which, in turn, could alter natural sex ratios. To provide the most suitable sediment for nesting sea turtles, the color of the nourished sediments should resemble the natural beach sand in the area. Natural reworking of sediments and bleaching from exposure to the sun would help to lighten dark nourishment sediments; however, the timeframe for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

Escarpment formation

On nourished beaches, steep escarpments may develop along their water line interface as they adjust from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center 1984, Nelson *et al.* 1987). These escarpments can hamper or prevent access to nesting sites (Nelson and Blihovde 1998). Researchers have shown that female sea turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (e.g., in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

Construction of groins and jetties

Groins and jetties are shore-perpendicular structures that are designed to trap sand that would otherwise be transported by longshore currents. Jetties are defined as structures placed to keep sand from flowing into channels (Kaufman and Pilkey 1979, Komar 1983). In preventing normal sand transport, these structures accrete updrift beaches while causing accelerated beach erosion downdrift of the structures (Komar 1983, Pilkey *et al.* 1984, National Research Council 1987), a process that results in degradation of sea turtle nesting habitat. As sand fills the area updrift from the groin or jetty, some littoral drift and sand deposition on adjacent downdrift beaches may occur due to spillover. However, these groins and jetties often force the stream of sand into deeper offshore water where it is lost from the system (Kaufman and Pilkey 1979). The greatest changes in beach profile near groins and jetties are observed close to the structures, but effects eventually may extend many miles along the coast (Komar 1983).

Jetties are placed at ocean inlets to keep transported sand from closing the inlet channel. Together, jetties and inlets are known to have profound effects on adjacent beaches (Kaufman and Pilkey 1979). Witherington *et al.* (2005) found a significant negative relationship between loggerhead nesting density and distance from the nearest of 17 ocean inlets on the Atlantic coast of Florida. The effect of inlets in lowering nesting density was observed both updrift and downdrift of the inlets, leading researchers to propose that beach instability from both erosion and accretion may discourage loggerhead nesting.

Construction or repair of groins and jetties during the nesting season may result in the destruction of nests, disturbance of females attempting to nest, and disorientation of emerging hatchlings from project lighting. Following construction, the presence of groins and jetties may interfere with nesting turtle access to the beach, result in a change in beach profile and width (downdrift erosion, loss of sandy berms, and escarpment formation), trap hatchlings, and concentrate predatory fishes, resulting in higher probabilities of hatchling predation.

Escarpments may develop on beaches between groins as the beaches equilibrate to their final profiles. These escarpments are known to prevent females from nesting on the upper beach and can cause them to choose unsuitable nesting areas, such as seaward of an escarpment. These nest sites commonly receive prolonged tidal inundation and erosion, which results in nest failure (Nelson and Blihovde 1998). As groin structures fail and break apart, they spread debris on the beach, which may further impede nesting females from accessing suitable nesting sites and trap both hatchlings and nesting turtles.

Species' response to a proposed action

The following summary illustrates sea turtle responses to and recovery from a nourishment project comprehensively studied by Ernest and Martin (1999). A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on natural or prenourished beaches. This reduction in nesting success is most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics associated with the nourishment project (e.g., beach profile, sediment grain size, beach compaction, frequency and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on untilled, hard-packed sands increases significantly relative to natural conditions. However, tilling (minimum depth of 36 inches) is effective in reducing sediment compaction to levels that did not significantly prolong digging times. As natural processes reduced compaction levels on nourished beaches during the second post-construction year, digging times returned to natural levels (Ernest and Martin 1999).

During the first post-construction year, nests on nourished beaches are deposited significantly seaward of the toe of the dune and significantly landward of the tide line than nests on natural beaches. More nests are washed out on the wide, flat beaches of the nourished treatments than on the narrower steeply sloped natural beaches. This phenomenon may persist through the second post-construction year monitoring and result from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping, occur as the beach equilibrates to a more natural contour.

The principal effect of beach nourishment on sea turtle reproduction is a reduction in nesting success during the first year following project construction. Although most studies have attributed this phenomenon to an increase in beach compaction and escarpment formation, Ernest and Martin (1999) indicated that changes in beach profile may be more important. Regardless, as a nourished beach is reworked by natural processes in subsequent years and adjusts from an unnatural construction profile to a natural beach profile, beach compaction and the frequency of escarpment formation decline, and nesting and nesting success return to levels found on natural beaches.

BEACH MICE

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 (Van Zant and Wooten 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 U.S. (Bowen 1968, Selander *et al.* 1971). Currently there are 16 recognized subspecies of old-field mice (Hall 1981). Eight subspecies 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 live along the Gulf coast of Alabama and northwestern Florida.

Rivers and various inlets bisect the Gulf and 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. As a consequence of coastal development and the dynamic nature of the coastal environment; beach mouse populations are generally comprised of various disjunct populations.

<u>Atlantic Coast beach mice</u>

The southeastern beach mouse (SEBM) was listed as a threatened species under the Act in 1989 (54 FR 20598). Critical habitat was not designated for this subspecies. SEBM is also listed as threatened by the State of Florida. The original distribution of the SEBM was from Ponce Inlet, Volusia County, southward to Hollywood, Broward County, and possibly as far south as Miami in Miami-Dade County. It is currently restricted to Volusia, Brevard, and Indian River Counties. Formerly, this subspecies occurred along about 175 miles of Florida's southeast coast; it now occupies about 50 miles, a significant reduction in range (**Figure 7**).

This subspecies uses both beach dunes and inland areas of scrub vegetation. The most seaward vegetation typically consists of sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), beach morning-glory (*Ipomoea stolonifera*), and camphorweed (*Heterotheca subaxillaris*). Further landward, vegetation is more diverse, including beach tea (*Croton punctatus*), pricklypear (*Opuntia humifusa*), saw palmetto (*Serenoa repens)*, wax myrtle (*Myrica cerifera)*, and sea grape (*Coccoloba uvifera*).

Anastasia Island beach mice

The Anastasia Island beach mouse (AIBM), was listed as endangered under the Act in 1989 (54 FR 20598). Critical habitat was not designated for the subspecies. 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 1996). Included in their range, AIBM populations are found along 14.5 miles of Anastasia Island, mainly on 3.5 miles at Anastasia State Park (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 Tolomato 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 8**).

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 nine 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 from development or alteration from storms.

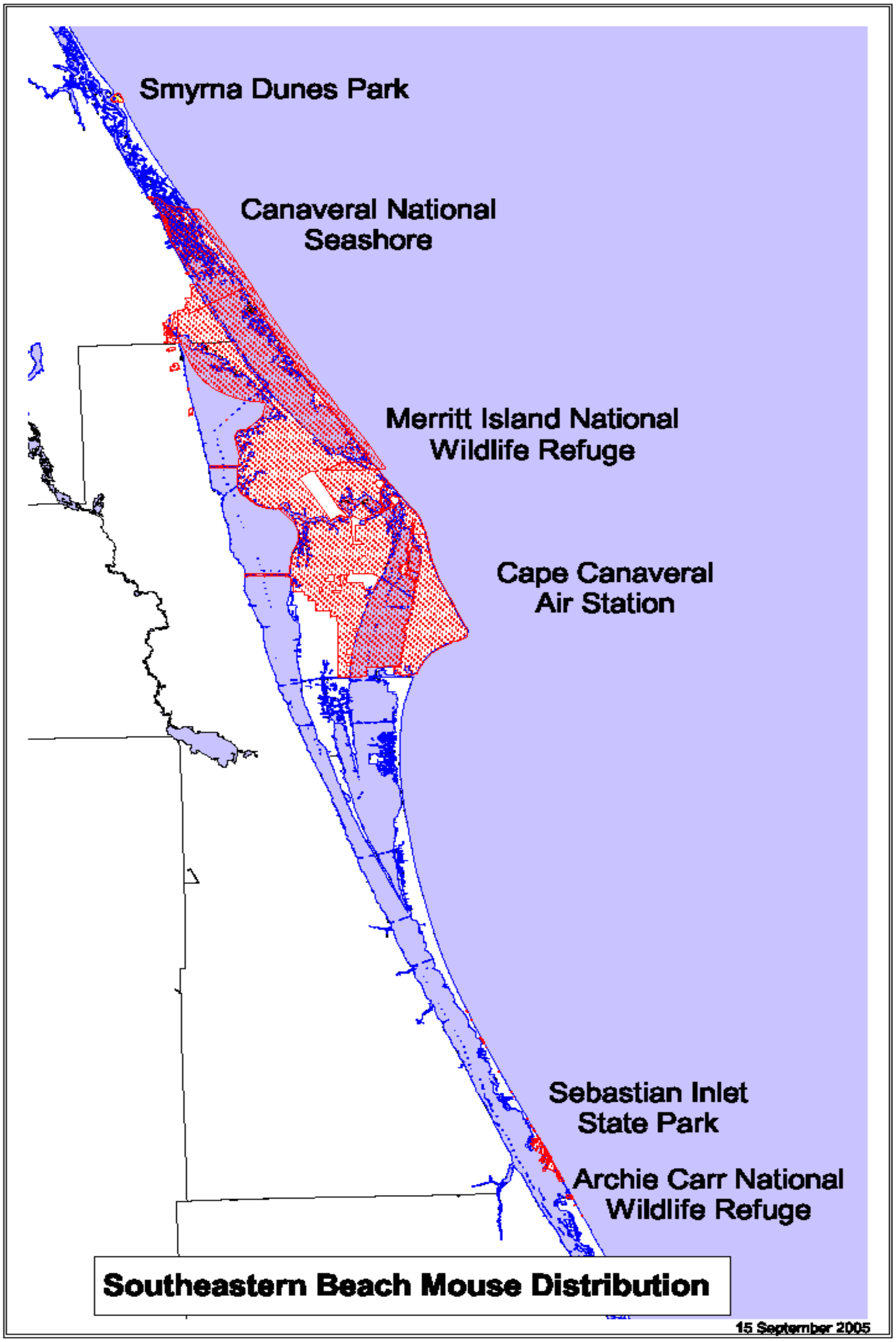

Figure 7. The distribution of the southeastern beach mouse.

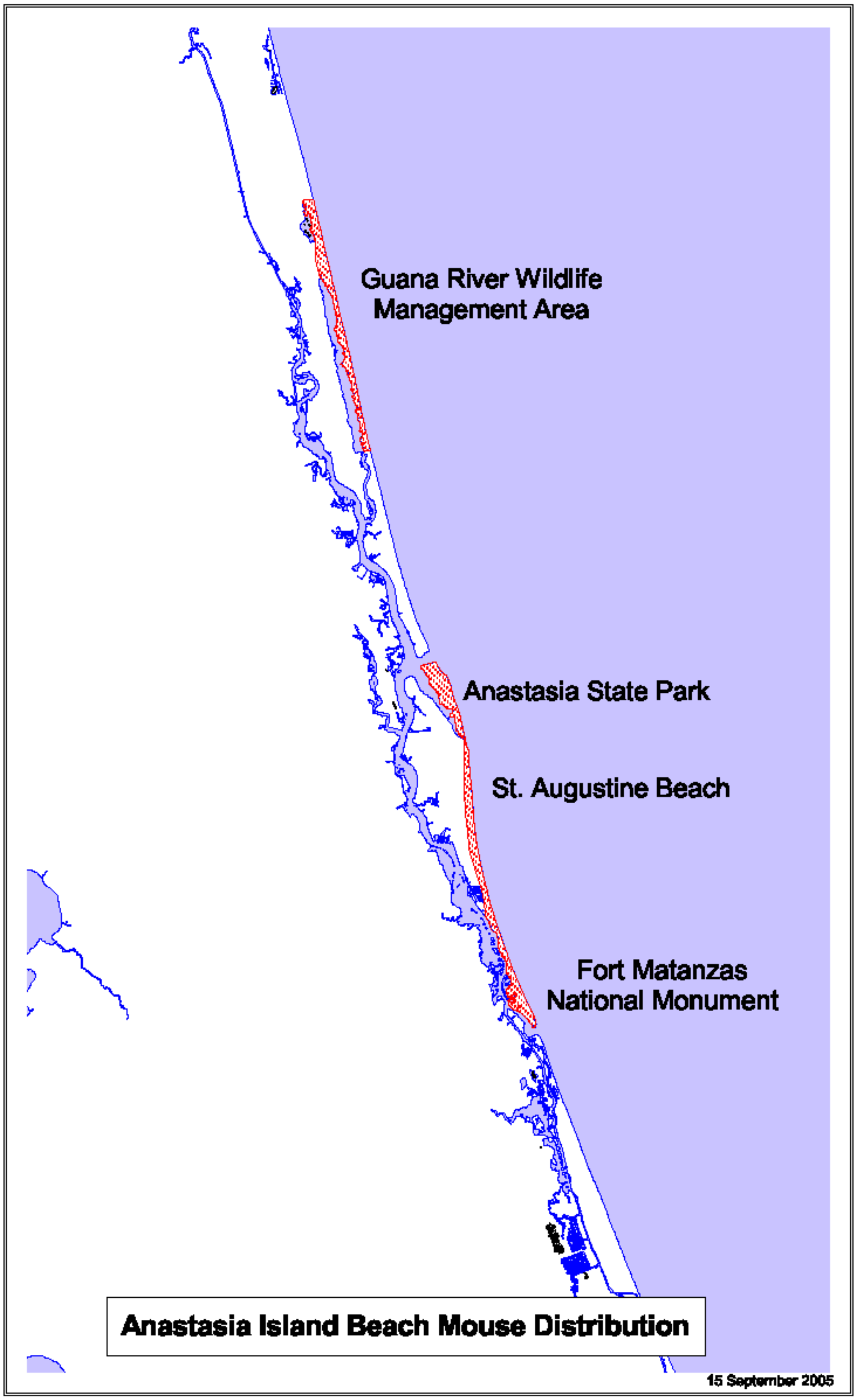

Figure 8. The distribution of the Anastasia Island beach mouse.

Gulf Coast Beach Mice

The CBM and the PKBM were listed with the Alabama beach mouse (ABM) (*Peromyscus polionotus ammobates*), as endangered species under the Act in 1985 (50 FR 23872). The SABM was listed under the Act in 1998 (63 FR 70053). CBM, SABM, and PKBM are also listed as endangered species by the State of Florida (FWC 2010). Critical habitat was designated for the CBM, and PKBM at the time of listing; however, critical habitat was revised in 2006 (71 FR 60238). Critical habitat was also designated for the SABM in 2006 (71 FR 60238).

The historical range of the CBM extended 53 miles between Destin Pass, Choctawhatchee Bay in Okaloosa County and East Pass in St. Andrew Bay, Bay County, Florida. PKBM historically ranged along the entire length of Perdido Key for 16.9 miles between Perdido Bay, Alabama (Perdido Pass) and Pensacola Bay, Florida (Bowen 1968). The historical range of the SABM extended 38 miles between Money Bayou in Gulf County, and Crooked Island at the East Pass of St. Andrews Bay, Bay County, Florida including the St. Joseph peninsula and the coastal mainland adjacent to St. Joseph Bay, Florida (**Figure 9**).

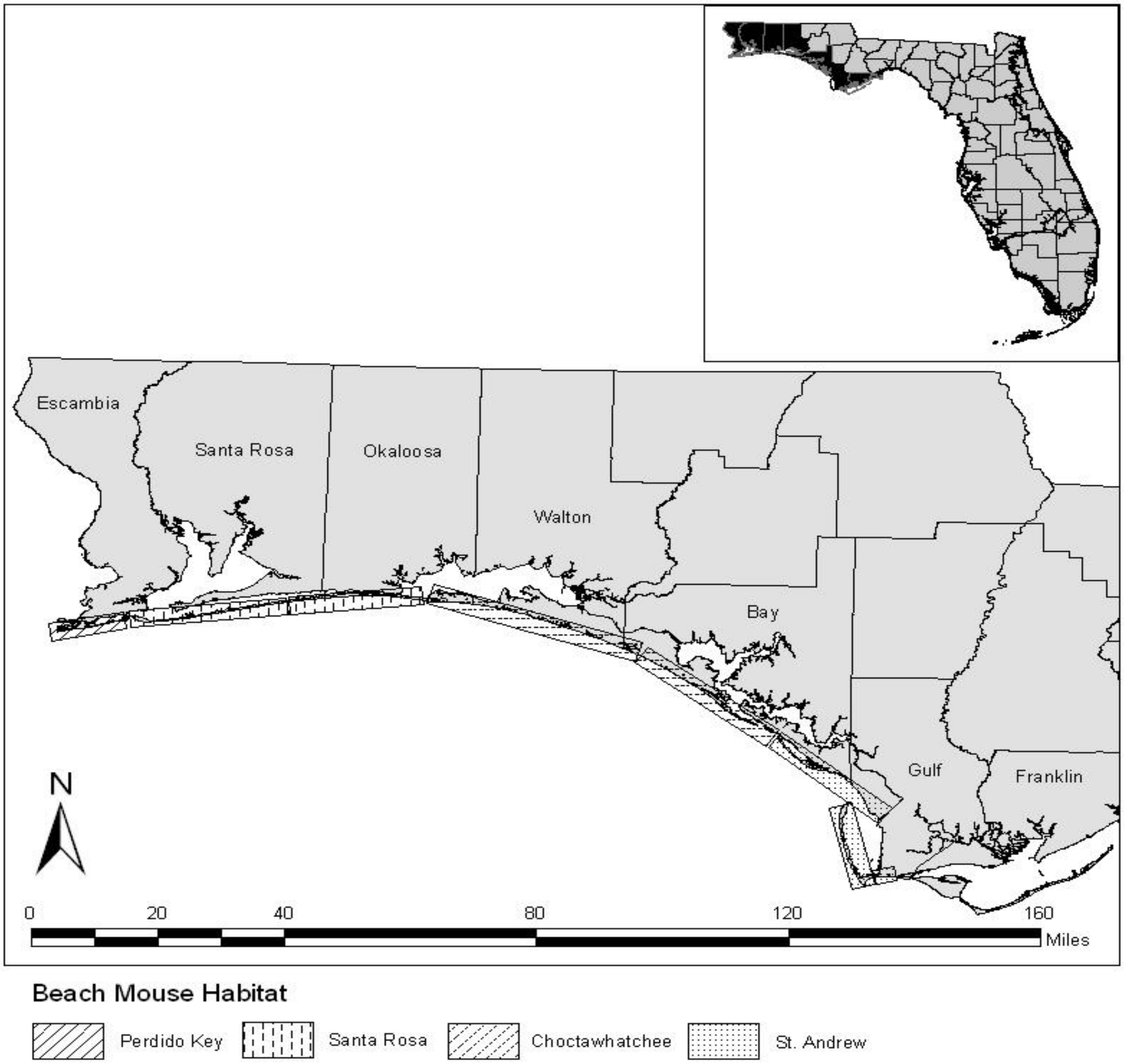

Figure 9. Historical range of Gulf Coast beach mouse subspecies.

Critical habitat

Since the listing of the PKBM and CBM in 1985, research has refined previous knowledge of Gulf Coast beach mouse habitat requirements and factors that influence their use of habitat. Based on the current knowledge of the life history, biology, and ecology of the subspecies and the requirements of the habitat to sustain the essential life history functions of the subspecies, the primary constituent elements (PCE) of critical habitat for Gulf Coast beach mice consist of:

1. A contiguous mosaic of primary, secondary scrub vegetation, and dune structure, with a balanced level of competition and predation and few or no competitive or predaceous nonnative species present, that collectively provide foraging opportunities, cover, and burrow sites;

2. Primary and secondary dunes, generally dominated by sea oats that despite occasional temporary impacts and reconfiguration from tropical storms and hurricanes provide abundant food resources, burrow sites, and protection from predators;

3. Scrub dunes, generally dominated by scrub oaks, that provide food resources and burrow sites, and provide elevated refugia during and after intense flooding due to rainfall and/or hurricane induced storm surge;.

4. Functional, unobstructed habitat connections that facilitate genetic exchange, dispersal, natural exploratory movements, and recolonization of locally extirpated areas; and

5. A natural light regime within the coastal dune ecosystem, compatible with the nocturnal activity of beach mice, necessary for normal behavior, growth and viability of all life stages.

Thirteen coastal dune areas (units) in southern Alabama and the panhandle of Florida have been determined to be essential to the conservation of PKBM, CBM, and SABM and are designated as critical habitat (**Figures 10 through 12**). These 13 units include five units for PKBM, five units for CBM, and three units for the SABM. These units total 6,194 acres of coastal dunes, and include 1,300 acres for the PKBM in Escambia County, Florida and Baldwin County, Alabama (**Table 10**); 2,404 acres for the CBM, in Okaloosa, Walton, and Bay Counties, Florida (**Table 11**); and 2,490 acres for the SABM in Bay and Gulf Counties, Florida (**Table 12**).

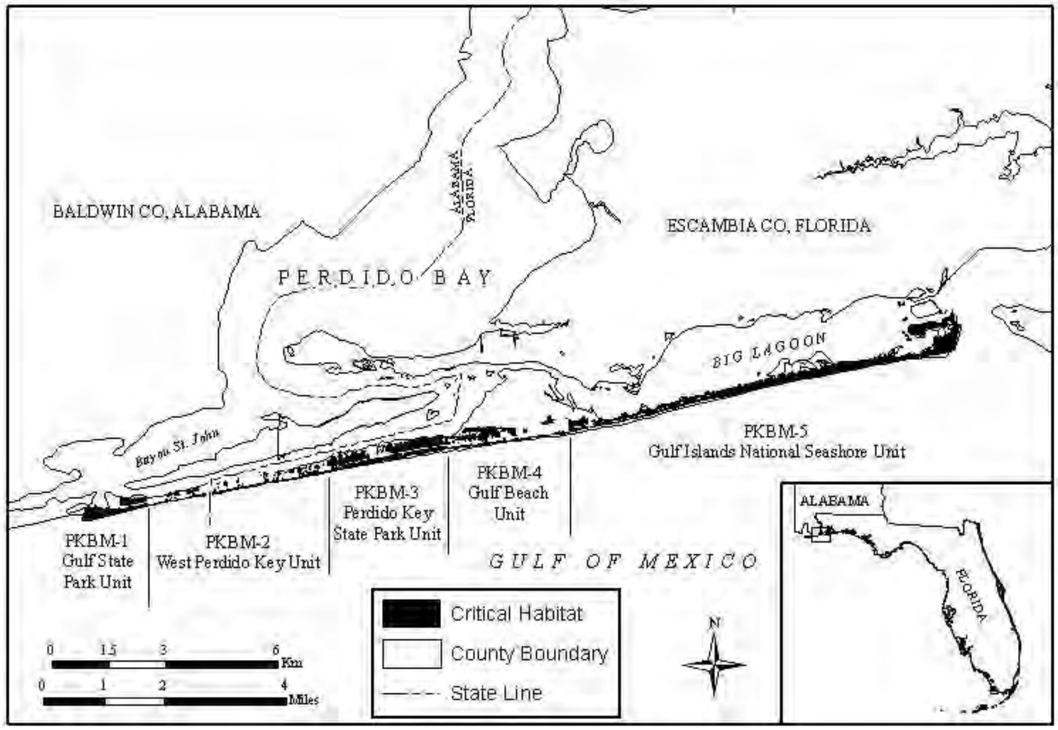

Figure 10. Critical habitat units designated for the Perdido Key beach mouse.

Table 10. Critical habitat units designated for the Perdido Key beach mouse.

Perdido Key Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. Gulf State Park Unit	0	115	0	115
2. West Perdido Key Unit	0	0	147	147
3. Perdido Key State Park Unit	0	238	0	238
4. Gulf Beach Unit	0	0	162	162
5. Gulf Islands National Seashore Unit	638	0	0	638
Total	638	353	309	1300

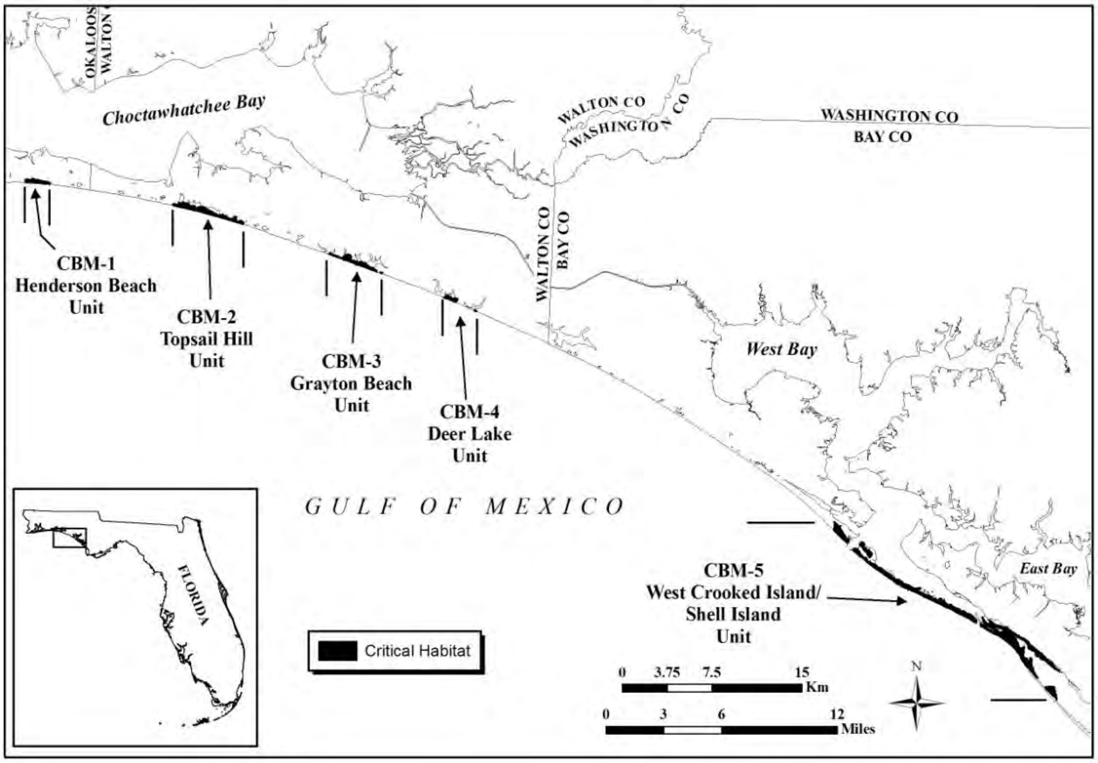

Figure 11. Critical habitat units designated for the Choctawhatchee beach mouse.

Table 11. Critical habitat units designated for the Choctawhatchee beach mouse.

Choctawhatchee Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. Henderson Beach Unit	0	96	0	96
2. Topsail Hill Unit	0	277	31	308
3. Grayton Beach Unit	0	162	17	179
4. Deer Lake Unit	0	40	9	49
5. W. Crooked Island/Shell Island Unit	1333	408	30	1771
Total	1333	982	87	2404

Map 1. Critical Habitat Units for St. Andrew Beach Mouse

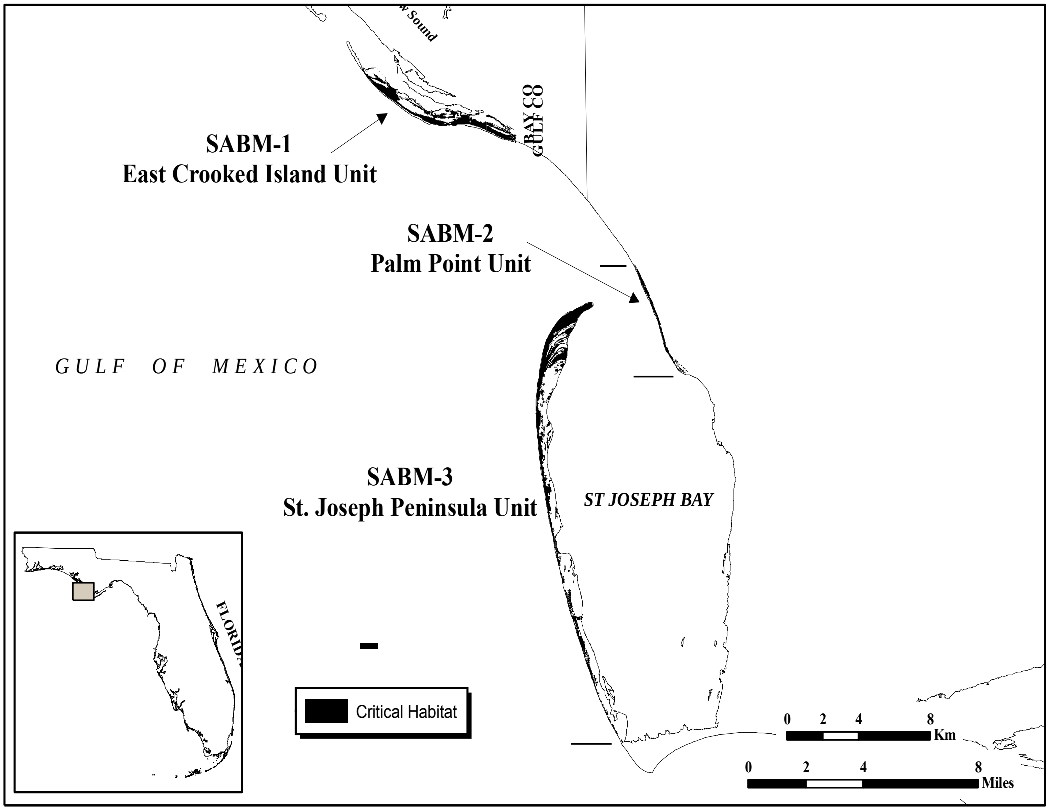

Figure 12. Critical habitat units designated for the St. Andrew beach mouse.

Table 12. Critical habitat units designated for the St. Andrew beach mouse.

St. Andrew Beach Mouse Critical Habitat Units	Federal Acres	State Acres	Local and Private Acres	Total Acres
1. East Crooked Island Unit	649	0	177	826
2. Palm Point Unit	0	0	162	162
3. St. Joseph Peninsula Unit	0	1280	222	1502
Total	649	1280	561	2490

The Gulf State Park Unit (PKBM-1) consists of 115 acres in southern Baldwin County, Alabama, on the westernmost region of Perdido Key. This unit encompasses essential features of beach mouse habitat within the boundary of Gulf State Park from the west tip of Perdido Key at Perdido Pass east to approximately 1.0 mile west of where the Alabama–Florida State line bisects Perdido Key and the area from the mean high water line (MHWL) north to the seaward extent of the maritime forest. This unit was occupied by the species at the time of listing. PKBM were known to inhabit this unit during surveys in 1979 and 1982, and by 1986 this was the only known existing population of the subspecies (Humphrey and Barbour 1981, Holler *et al.* 1989). This population was a core population and was the donor site for the reestablishment of PKBM into Gulf Islands National Seashore (GINS) in 1986. This project ultimately saved PKBM from extinction as the population at Gulf State Park was considered extirpated in 1998 due to tropical storms and predators (Moyers *et al*. 1999).

Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat. Because scrub habitat is separated from the frontal dunes by a highway in some areas, the population inhabiting this unit can be especially vulnerable to hurricane impacts, and therefore further linkage to scrub habitat and/or habitat management would improve connectivity. This unit is managed by the Alabama Department of Conservation and Natural Resources and provides PCEs 2, 3, 4, and 5. Threats specific to this unit that may require special management considerations include artificial lighting, presence of free-roaming cats (*Felis catus*) as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, and/or a decrease in habitat quality. This unit, which contains interior scrub habitat as well as primary and secondary dunes, serves as an expansion of the original critical habitat designation (50 FR 23872).

The West Perdido Key Unit (PKBM-2) consists of 114 acres in southern Escambia County, Florida, and 33 acres in southern Baldwin County, Alabama. This unit encompasses essential features of beach mouse habitat from approximately 1.0 mile west of where the Alabama-Florida State line bisects Perdido Key east to 2.0 miles east of the State line and areas from the MHWL north to the seaward extent of human development or maritime forest. This unit consists of private lands and ultimately includes essential features of beach mouse habitat between Perdido Key State Park (PKSP) (PKBM-3) and Gulf State Park (PKBM-1). Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat and provides PCEs 2, 3, and 4.

Habitat fragmentation and other threats specific to this unit are mainly due to development. Consequently, threats to this unit that may require special management considerations include habitat fragmentation and habitat loss, artificial lighting, presence of free-roaming cats as well as other predators at unnatural levels, excessive foot traffic and soil compaction, and damage to dune vegetation and structure. At the time of listing, it was not known that beach mice occupied this area. While no trapping has been conducted on these private lands to confirm absence for the Act sections 7 and 10 permitting, sign of beach mouse presence was confirmed in 2005 through observations of beach mouse burrows and tracks (Sneckenberger 2005), and this unit is adjacent to contiguous, occupied beach mouse habitat (PKBM-3). Therefore, this unit is considered currently occupied. This unit provides essential connectivity between two core population areas (PKSP and Gulf State Park), provides habitat for expansion, natural movements, and recolonization, and is therefore essential to the conservation of the species. Specifically, this unit may have historically provided for the recolonization of Gulf State Park (PKBM-1) and may facilitate similar recolonization in the future as the habitat recovers from recent hurricane events.

The PKSP Unit (PKBM-3) consists of 238 acres in southern Escambia County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of PKSP from approximately 2.0 miles east of the Alabama–Florida State line to 4.0 miles east of the State line and the area from the MHWL north to the seaward extent of the maritime forest. Beach mouse habitat in this unit consists of primary, secondary and scrub dune habitat. Trapping efforts in this area were limited in the past. In 2000, a relocation program began to reestablish mice at PKSP. This project is considered a success and the population occupying this unit now considered a core population. This unit provides PCEs 2, 3, 4, and 5, and is essential to the conservation of the species. Improving and/or restoring habitat connections would increase habitat quality and provide more functional connectivity for dispersal, exploratory movements, and population expansion.

The Florida Park Service manages this unit. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, and/or a decrease in habitat quality. This unit, which contains interior scrub habitat as well as primary and secondary dunes, serves as an expansion of the original critical habitat designation (50 FR 23872).

The Gulf Beach Unit (PKBM-4) consists of 162 acres in southern Escambia County, Florida. This unit includes essential features of beach mouse habitat between GINS and PKSP from approximately 4.0 miles east of the Alabama–Florida State line to 6.0 miles east of the State line and areas from the MHWL north to the seaward extent of human development or maritime forest. This unit consists of private lands. Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat. Habitat fragmentation and other threats specific to this unit are mainly due to development. Consequently, threats to this unit that may require special management considerations include habitat fragmentation and habitat loss, artificial lighting, presence of feral cats as well as other predators at unnatural levels, excessive foot traffic and soil compaction, and damage to dune vegetation and structure. While not known as occupied habitat at the time of listing, presence of beach mice has recently been confirmed within the unit as a result of trapping efforts in conjunction with permitting (Lynn 2004a). This unit provides PCEs 2, 3, and 4 and is essential to the conservation of the species. This unit includes high-elevation scrub habitat and serves as a refuge during storm events and as an important repopulation source if storms extirpate or greatly reduce local populations. This unit currently provides essential connectivity between two populations (PKBM-3 and PKBM-5) and provides essential habitat for expansion, natural movements, and recolonization (PCE 4).

The GINS Unit (PKBM-5) consists of 638 acres in southern Escambia County, Florida, on the easternmost region of Perdido Key. This unit encompasses essential features of beach mouse habitat within the boundary of GINS–Perdido Key Area (also referred to as Johnson Beach) from approximately 6.0 miles east of the Alabama–Florida State line to the eastern tip of Perdido Key at Pensacola Bay and the area from the MHWL north to the seaward extent of the maritime forest. Beach mouse habitat in this unit consists mainly of primary and secondary dune habitat, but provides the longest contiguous expanse of frontal dune habitat within the historical range of the PKBM. PKBM were known to inhabit this unit in 1979, though the population was impacted by Hurricane Frederic (1979) and no beach mice were captured during surveys in 1982 and 1986 (Humphrey and Barbour 1981, Holler *et al.* 1989) therefore, the unit was unoccupied at the time of listing. In 1986, PKBM were reestablished at this unit as a part of Service recovery efforts. This reestablishment project was identified as the most urgent recovery need for the mouse (Service 1987, Holler *et al.* 1989). The project is considered a success, as the population inhabiting this unit is considered a core population. In 2000 and 2001, PKBM captured from this site served as donors to reestablish beach mice at PKSP (PKBM-3).

PKBM-5, in its entirety, possesses all five PCEs and is essential to the conservation of the species. However, most of this unit consists of frontal dunes, making the population inhabiting this unit particularly threatened by storm events. Threats specific to this unit that may require special management considerations include artificial lighting, presence of free-roaming cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, and a decrease in habitat quality. The National Park Service GINS manages this unit. This unit was included in the initial critical habitat designation (50 FR 23872).

The Henderson Beach unit (CBM–1) consists of 96 acres in Okaloosa County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Henderson Beach State Park from 0.5 miles east of the intersection of Highway 98 and Scenic Highway 98 to 0.25 miles west of Matthew Boulevard and the area from the MHWL north to the seaward extent of the maritime forest. This westernmost unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3). This unit is within the historical range of the subspecies; however, it was not known to be occupied at the time of listing and current occupancy is unknown because no recent efforts have been made to document beach mouse presence or absence. Because this unit includes protected, high-elevation scrub habitat, it may serve as a refuge during storm events and as an important source population if storms extirpate or greatly reduce local populations or populations to the east.

This unit is managed by the Florida Park Service and is essential to the conservation of the species. Threats specific to this unit that may require special management considerations include habitat fragmentation, Park development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The Topsail Hill Unit (CBM–2) consists of 308 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Topsail Hill Preserve State Park, as well as adjacent private lands from 0.1 miles east of the Gulf Pines subdivision to 0.6 miles west of the Oyster Lake outlet and the area from the MHWL north to the seaward extent of human development or maritime forest. This unit provides primary, secondary, and scrub dune habitat and possesses all five PCEs. Its large, contiguous, high-quality habitat allows for natural movements and population expansion. Choctawhatchee beach mice were confirmed present in the unit in 1979 (Humphrey *et al*. 1987), were present at the time of listing, and are still present.

Beach mice have been captured on Stallworth County Park and Stallworth Preserve subdivision, a private development within the unit, and east of the Park (Service 2003a). The population of Choctawhatchee beach mice inhabiting this unit appears to harbor unique genetic variation and displays a relatively high degree of genetic divergence considering the close proximity of this population to other populations (Wooten and Holler 1999).

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include Park and residential development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the Habitat Conservation Plan (HCP) for the Stallworth County Preserve (4 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act.

The Grayton Beach Unit (CBM–3) consists of 179 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Grayton Beach State Park, as well as adjacent private lands and inholdings, from 0.3 mi west of the Alligator Lake outlet east to 0.8 miles west of Seagrove Beach and the area from the MHWL north to the seaward extent of human development or maritime forest. This unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3), habitat connectivity (PCE 4) and is essential to the conservation of the species. This unit also provides a relatively natural light regime (PCE 5). Beach mice were not detected in the unit in 1979 (Holler 1992a); however, they were found to be present in 1995 after Hurricane Opal (Moyers *et al.* 1999). While it seems likely that beach mice were present at the time of listing (and may have been present, but not detected, in 1979), the Service does not have data to confirm this assumption. Therefore, the Service considered this unit to be unoccupied at the time of listing. A program to strengthen and reestablish the population began in 1989 and yielded a persistent population at the State Park. Recent evidence of beach mice on State Park land was documented in 2004 (Service 2004). Beach mice are also known to currently occupy the private lands immediately east of the park.

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include hurricane impacts that may require dune restoration and revegetation, excessive open, unvegetated habitat due to recreational use or storm impacts that may require revegetation, Park development, artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the Choctawhatchee beach mouse within the area covered under the HCP for the Watercolor development (4 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act.

The Deer Lake Unit (CBM–4) consists of 49 acres in Walton County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of Deer Lake State Park as well as adjacent private lands from approximately one mile east of the Camp Creek Lake inlet west to approximately 0.5 miles west of the inlet of Deer Lake and the area from the MHWL north to the seaward extent of maritime forest or human development. This unit provides primary, secondary, and scrub dune habitat (PCEs 2 and 3), habitat connectivity to adjacent lands (PCE 4), and is essential to the conservation of the species. This unit also provides a relatively natural light regime (PCE 5). Because live-trapping efforts in this area have been limited to incidental trapping, and beach mice were not detected in 1998 (Moyers *et al*. 1999), the Service considered this unit to be unoccupied at the time of listing. CBM were translocated from Topsail Hill Preserve State Park to private lands adjacent to this unit in 2003 and 2005 (Service 2003b, 2005a, 2005b, 2005c, 2005d). Tracking within the adjacent State park lands have indicated expansion of the population into the park.

This unit has portions with different ownership, purposes, and mandates. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

Lands containing the features essential to the conservation of the CBM within the area covered under the HCP/Incidental Take Permit (ITP) for Watersound (71 acres) are excluded from critical habitat designation under section 4(b)(2) of the Act (see Application of Section 4(a)(3) and Exclusions Under Section 4(b)(2) of the Act section below). This excluded area is 0.5 miles west of the Camp Creek Lake inlet to 0.5 miles east of the Camp Creek Lake inlet.

The West Crooked Island/ Shell Island Unit (CBM–5) consists of 1,771 acres in Bay County, Florida. This unit encompasses essential features of beach mouse habitat within the boundaries of St. Andrew State Park mainland from 0.1 miles east of Venture Boulevard east to the entrance channel of St. Andrew Sound, Shell Island east of the entrance of St. Andrew Sound east to East Pass, and West Crooked Island southwest of East Bay and east of the entrance channel of St. Andrew Sound, and areas from the MHWL north to the seaward extent of the maritime forest. Shell Island consists of State lands, Tyndall Air Force Base (AFB) lands, and small private inholdings. Choctawhatchee beach mice were known to inhabit the majority of Shell Island in 1987 (Holler 1992b) and were again confirmed present in 1998 (Moyers *et al*. 1999), 2002, and 2003 (Lynn 2003a). Because beach mice inhabited nearly the entire suitable habitat on the island less than two years prior to listing and were reconfirmed after listing, the Service considered this area to be occupied at the time of listing. The West Crooked Island population is the result of a natural expansion of the Shell Island population after the two islands became connected in 1998 and 1999, a result of Hurricanes Opal and Georges (Service 2003b). Shell Island was connected to the mainland prior to the 1930s when a navigation inlet severed the connection on the western end. Beach mice were documented at St. Andrew State Park mainland as late as the 1960s (Bowen 1968), though no records of survey efforts exist again until Humphrey and Barbour (1981) and Meyers (1983) at which time beach mice were not detected. Therefore, it seems likely that this area was not occupied at the time of listing. Current beach mouse population levels at this site are unknown, and live-trapping to document the absence of mice has not been conducted. Similar to the original designation, this Park was designated as critical habitat because it has features essential to the CBM. It is also within the historical range of the mouse. This unit supports the easternmost population of CBM, with the next known population 22 miles to the west.

This unit provides primary, secondary, and scrub dune habitat and possesses all five PCEs. Portions of this unit are managed by the Florida Park Service, while the remaining areas are federally (Tyndall AFB) and privately owned.

Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high residential or recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The East Crooked Island Unit (SABM–1) consists of 826 acres in Bay County, Florida. This unit encompasses essential features of beach mouse habitat on East Crooked Island from the entrance of St. Andrew Sound to one mile west of Mexico Beach, and the area from the MHWL to the seaward extent of the maritime forest (not including Raffield Peninsula). Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat and possesses all five PCEs. SABM were known to inhabit the unit in 1986 and 1989 (James 1992), though the population was presumably extirpated after 1989 due to impacts from hurricanes. The East Crooked Island population was reestablished with donors from St. Joseph State Park in 1997. This unit was occupied at the time of listing. Recent live-trapping confirms present occupation of mice (Moyers and Shea 2002, Lynn 2002a, Slaby 2005). This unit maintains connectivity along the island and this unit is essential to provide a donor population following storm events.

The majority of this unit is federally owned (Tyndall AFB), while the remaining habitat is privately owned. Threats specific to this unit that may require special management considerations include artificial lighting, presence of feral cats as well as other predators at unnatural levels, and high recreational and military use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The Palm Point Unit (SABM–2) consists of 162 acres of private lands in Gulf County, Florida. This unit encompasses habitat from Palm Point 1.25 miles northwest of the inlet of the Gulf County Canal to the southeastern boundary of St. Joseph Beach and the area from the MHWL to the seaward extent of the maritime forest. SABM were documented in the area by Bowen (1968) and were considered to have been present in this unit at the time of listing. Since SABM beach mouse habitat is limited to only two other areas, protecting this mainland site located within the species' historical range is needed for the subspecies' long-term persistence. As other viable opportunities are limited or nonexistent, this unit is essential to reduce the threats of stochastic events to this subspecies. Furthermore, as this unit is on the mainland, it is somewhat buffered from the effects of storm events. This area provides frontal and scrub dune habitat (PCEs 2 and 3), but may provide limited connectivity between habitats. Threats specific to this unit that may require special management considerations include habitat fragmentation, habitat loss, artificial lighting, presence of free-roaming cats as well as other predators at unnatural levels, and high residential use that may result in soil compaction, damage to dunes, or other decrease in habitat quality.

The St. Joseph Peninsula Unit (SABM–3) consists of 1,502 acres in Gulf County, Florida. This unit encompasses essential features of beach mouse habitat within the boundary of St. Joseph Peninsula State Park (Park) as well as south of the Park to the peninsula's constriction north of Cape San Blas (also known as the "stumphole" region) and area from the MHWL to the seaward extent of the maritime forest. Beach mouse habitat in this unit consists of primary, secondary, and scrub dune habitat, and provides a relatively contiguous expanse of habitat within the historical range of the SABM. This unit possesses all five PCEs and was occupied at the time of listing. SABM were known to inhabit this unit in 1986 and 1987 (James 1987, 1992, 1995, Gore 1994, Moyers *et al.* 1999, Slaby 2005). In addition, recent tracking efforts suggest that mice continue to occupy private lands south of the Park (Slaby 2005). The Park alone does not provide sufficient habitat to allow for population expansion along the peninsula, which may be necessary for a population anchored by the tip of a historically dynamic peninsula. A continuous presence of beach mice along the peninsula is the species' best defense against local and complete extinctions due to storm events. The population of SABM inhabiting this unit appears to possess unique genetic variation, and displays greater than expected genetic divergence from other populations (Wooten and Holler 1999).

The Florida Park Service manages portions of this unit, while the remaining area is privately owned. Threats specific to this unit that may require special management considerations include artificial lighting, habitat fragmentation and habitat loss, presence of feral cats as well as other predators at unnatural levels, and high recreational use that may result in soil compaction, damage to dunes, or other decrease in habitat quality. The population inhabiting this unit may also be particularly susceptible to hurricanes due to its location within St. Joseph Bay (the peninsula is a thin barrier peninsula with a north–south orientation).

Life history (All subspecies of beach mice)

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 SEBM averages 5.47 inches in total length (average of 10 individuals = 5.07 inches, with a 2.04-inch tail length (Osgood 1909, Stout 1992). Females are slightly larger than males. These beach mice are slightly darker in appearance than some other subspecies of beach mice, but paler than inland populations of *P. polionotus* (Osgood 1909). SEBM have pale, buffy coloration from the back of their head to their tail, and their underparts are white. The white hairs extend up on their flanks, high on their jaw, and within 0.07 to 0.12 inches of their eyes (Stout 1992). There are no white spots above the eyes as with AIBM (Osgood 1909). Their tail is also buffy above and white below. Juvenile SEBM are more grayish in coloration than adults; otherwise they are similar in appearance (Osgood 1909).

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.

The SABM has head and body lengths averaging 2.95 inches, and tail mean lengths averaging 2.05 inches (James 1992). This subspecies has a very pale, buff-colored head and back with extensive white coloration underneath and along 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.

The PKBM is slightly smaller than the other Gulf coast beach mouse subspecies (Bowen 1968). Head and body length ranges from 2.7 to 3.3 inches (Holler 1992b). The pigmentation of PKBM is gray to gray-brown with the underparts white and coloration on the head is less pronounced. The line between pigmented and unpigmented pelage runs dorsally posterior above the eyes and behind the ears. Pigmentation patterns on the rump are either squared or squared superimposed on a tapered pattern (Bowen 1968). There is no tail stripe.

CBM have head and body lengths ranging from 2.7 to 3.5 inches (Holler 1992a). This beach mouse is distinctly more orange-brown to yellow-brown than the other Gulf coast beach mouse subspecies (Bowen 1968). Pigmentation on the head either extends along the dorsal surface of the nose to the tip, or ends posterior to the eyes leaving the cheeks white. A dorsal tail stripe is either present or absent.

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).

Apparent survival rate estimates (products of true survival and site fidelity) of beach mice along the Gulf Coasts of Florida and Alabama have demonstrated that their average life span is about nine months (Swilling 2000). Other research indicated that 63 percent of Alabama beach mice lived (or remained in the trapping area) for four months or less, 37 percent lived 5 months or greater and two percent lived 12 to 20 months (Rave and Holler 1992). Less than half (44 percent) of beach mice captured for the first time were recaptured the next season (Holler *et al.* 1997). Greater than 10 percent of mice were recaptured three seasons after first capture; and four to eight percent were recaptured more than one year after initial capture. Beach mice held in captivity have lived three years or more (Blair 1951, Holler 1995).

Habitat and Movement

Beach mice inhabit coastal dune ecosystems on the Atlantic and Gulf Coasts of Florida and the Gulf Coast of Alabama. 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 (*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), 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.

Primary dune vegetation described from SEBM habitat includes sea oats, bitter panicgrass, railroad vine, beach morning-glory, saltmeadow cordgrass (*Spartina patens*), lamb'squarters (*Chenopodium album*), saltgrass (*Distichlis spicata*), and camphorweed (Extine 1980). Coastal strand and inland vegetation is more diverse, and can include pricklypear, saw palmetto, wax myrtle, Florida rosemary (*Ceratiola ericoides*), sea grape, and sand pine (*Pinus clausa*) (Extine and Stout 1987). Extine (1980) observed this subspecies as far as 0.62 miles inland on Merritt Island; he concluded that the dune scrub communities he found them in represent only marginal habitat for the SEBM. SEBM have been documented in coastal scrub more than a mile from the beach habitat at Kennedy Space Center/Merritt Island National Wildlife Refuge (NWR) and Cape Canaveral Air Force Station (CCAFS) (Stout *et al*. 2006). Extine (1980) and Extine and Stout (1987) reported that the SEBM showed a preference for areas with clumps of palmetto, sea grape, and expanses of open sand.

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 1,800 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 FMNM, at either end of Anastasia Island.

Two main types of movement have been identified for small mammals: within home-range activity and long-range dispersal. Such movements are influenced by a suite of factors, such as availability of mates, predation risk, and habitat quality. Movement and home range studies have been conducted for most beach mouse subspecies, but are limited to natural habitat (*i.e.*, research has been conducted on public lands within contiguous beach mouse habitat, not within a development or in a fragmented landscape). Novak's (1997) study of the home range of CBM on Shell Island indicated males had a mean home range of 1.0 $\pm$ 4.1 acres and females had a mean home range of 0.81 $\pm$ 2.18 acres. Lynn (2000a) found male and female radio-tagged ABM had a mean home range of 1.68 $\pm$ 0.27 acres and 1.73 $\pm$ 0.40 acres, respectively. Swilling *et al.* (1998) observed one radio-collared ABM to travel over 328 feet during nightly forays after Hurricane Opal to obtain acorns from the scrub dunes. Using radio telemetry, Lynn (2000a) documented an ABM that traveled one mile within a 30-minute period. Moyers and Shea (2002) trapped a male and female CBM that moved about 637 feet and 2,720 feet in one night, respectively. Gore and Schaefer (1993) documented a marked Santa Rosa beach mouse crossing State Road (SR) 399, a two-lane highway. Lynn and Kovatch (2004) through mark and recapture trapping documented PKBM that crossed SR 292, a two-lane highway and right-of-way (100-feet wide).

Sneckenberger (2001) found significant seasonal differences in the movement of ABM, and suggested that this was a result of seasonal fluctuations in food availability, food quality, and nutritional needs. Smith (2003) found that Santa Rosa beach mice demonstrated an increase in movement as habitat isolation increased suggesting that longer travel distances were needed to obtain necessary resources. Smith also found that Santa Rosa beach mice had a preference for vegetation cover and connectivity, which is likely a behavioral response to increased predation risk in open areas. Thus, while beach mice are able and do travel great distances the travel pathways should have vegetated cover and no large gaps or open areas. Previous connectivity research suggests critical thresholds exist for species persistence in fragmented landscapes (With and Crist 1995). As fragmentation increases and connectivity is lost, species' ability to move through and between habitats is reduced in a nonlinear fashion.

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 autumn 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.

Gulf Coast Beach Mice

In 1979, Humphrey and Barbour (1981) estimated about 515 CBM existed on Topsail Hill and Shell Island. That estimate was used during the Federal listing of the CBM in 1985. Population estimates on Shell Island from February 1993 to March 1994, ranged from 105 to 338 CBM on a 23-acre study area (Novak 1997). Just prior to Hurricane Opal in 1995, it was estimated that Shell Island supported 800 to 1,200 CBM (Gore 1999). Three years following Hurricane Opal in June 1998, one trapping effort at six different sites on Shell Island resulted in a cumulative population estimate of 195 CBM (164 CBM captured) (Moyers *et al*. 1999). The east portion of the island has been trapped from 2000 to 2003. Population estimates have ranged between 24 and 67 CBM (Lynn 2004b). At Topsail Hill Preserve State Park, trapping conducted in March 2003 and March 2005 yielded a population estimate of 190 to 250 CBM (Service 2003a, Sneckenberger 2005). From late 2006 through 2007 results of tracking tubes surveys at Topsail Hill Preserve State Park suggested that the CBM population was not densely distributed (FWC 2008b). Trapping of four 100-trap transects yielded population estimates of 190, 250, less than 10 (too few to estimate), and 87 in 2003, 2005, 2006, and 2007, respectively (Service 2007a). The track and trapping data together indicate that Topsail Hill Reserve State Park currently does not support a high population of beach mice. In 2003 and again in 2005, a total of 26 mice were translocated from Topsail Hill Preserve State Park to the WaterSound private development adjacent to Deer Lake State Park. Trapping has been sporadic on WaterSound but has yielded population estimates of 5 to 46 individuals in 2003 to 2007 (Moyers 2007). Deer Lake State Park has not been trapped; however, tracks have been observed as recently as 2006 (FWC 2008b). Population estimates from trapping at Grayton Beach State Park (main unit) from 1995 to 2000, ranged from 25 to 116 CBM (Moyers *et al.* 1999, Van Zant 2000). The central unit was trapped for three nights in August 2002; however, no mice were captured (Lynn 2002b). Limited tracking surveys were accomplished in 2003, 2004 and 2005 and beach mouse tracks were observed (Kovatch 2003, Toothacker 2004, FWC 2008b). The western area, although it provides CBM habitat, has not been documented as occupied by CBM (Moyers *et al.* 1999, Van Zant 2000). The population estimates for the WaterColor development for the two years prior to and one year following development ranged from 3 to 7 CBM (St. Joe Company 1999). CBM were last captured in February of 2001 at WaterSound; quarterly trapping has continued on the site through mid-2008 without CBM being captured (St. Joe/Arvida 2003). Auburn University trapped West Crooked Island in October 2000, and the Service trapped the area in 2001 to 2003. The population estimate ranged from a low of 174 to a high of 244 CBM (Lynn 2000b, 2002d, 2002e, 2002f, 2002g, 2003b). The Service estimated the total population of CBM in 2003, to be about 600 to 1,000 beach mice.

Since its listing in 1985, PKBM population estimates never reached more than 400 to 500 individuals until 2003. Before Hurricane Ivan (2004) a population estimate of 500 to 800 was divided between two populations - the Johnson Beach Unit of GINS and PKSP (Service 2004). The status of PKBM at Gulf State Park (GSP) is uncertain, likely extirpated in 1999. In October 2005, following the active hurricane seasons of 2004 and 2005, a trapping effort of less than one-third of the habitat available on public lands yielded captures of less than 30 individuals. Tracking data from June 2006 indicated that about 25 and 32 percent of the available habitat was occupied at PKSP and GINS, respectively (Loggins 2007). Trapping at PKSP and GINS in March 2007, was cancelled after one night after the capture of only one mouse (a fatality) and very limited sightings of beach mouse sign (tracks, burrows) (Loggins 2007). With no tracks observed in the tube surveys the PKBM may now be absent from PKSP (FWC 2008b). At GINS, the number of PKBM has not increased since the initial high levels in winter of 2005-2006 (FWC 2008b). However, population estimates indicate there may be a few hundred PKBM at GINS (Gore 2008).

The SABM even at its lowest population probably numbered several hundred individuals (Gore as cited in 63 FR 70055). James (1992) estimated that the East Crooked Island subpopulation to be about 150. However, by 1996, SABM were no longer found on East Crooked Island. Following Hurricane Opal in 1995, Mitchell *et al.* (1997) estimated the St. Joe Peninsula State Park population to be between 300 and 500 mice. In November 1997 and January 1998, 19 pairs of St. Andrew beach mice were relocated from St. Joseph Peninsula State Park to East Crooked Island, Tyndall Air Force Base (Moyers *et al.* 1999). Trapping surveys conducted on East Crooked Island in 2000 and 2002 through 2007 indicated that beach mice occupied the entire island (Lynn 2002c, FWC 2008b). Population estimates ranged from 71 to 133 mice (Lynn 2002c). The FWC (2008b) estimates 22 miles of habitat as occupied by SABM throughout the mouse's historical range with population estimates of about 3,000 mice at East Crooked Island and about 1,775 mice in the front dunes at St. Joseph State Park.

Atlantic Coast Beach Mice

Populations of the SEBM have been estimated to be around 5,000 to 6,000 mice. Recent surveys have confirmed that SEBM are found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (Sauzo 2004). Prior to 2006, populations of the SEBM were thought extirpated from both sides of the Sebastian Inlet (Bard 2004). However, during surveys in June 2006, a single mouse was located at the very southern end of the Sebastian Inlet State Park. Mice were also found at Jungle Trail on the Pelican Island National Wildlife Refuge, another area where they where thought extirpated. Additional surveys of other areas south of Brevard County have not located any mice and indicate the distribution of this subspecies in the counties south of Brevard, severely fragmented. SEBM are no longer believed to occur at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (Service 1999).

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 1996). Quarterly surveys of these two sites have shown that the populations have remained stable. Due to the limited dune habitat at the ASP, this population has not been able to maintain a stable population and it is unknown how many mice remain.

<u>Population variability</u>

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).

<u>Population stability</u>

Population viability analysis (PVA) is essentially a demographic modeling exercise to predict the likelihood a population will continue to exist over time (Groom and Pascual 1997). The true value in using this analytical approach is not to determine the probability of a species' extinction, but to clarify factors that have the most influence on a species' persistence. From 1996 to 1999, the Service funded Auburn University to develop a PVA for beach mice (Holler *et al*. 1999, Oli *et al.* 2001). Four subpopulations of Gulf Coast beach mice subspecies were modeled. They consisted of two subpopulations of PKBM, one at GINS-Perdido Key Area and one at Florida Point, and two subpopulations of ABM, one at Bon Secour NWR and one at Fort Morgan State Park. They used a stochastic (random) differential equation (Wiener-drift) model, applied to long term demographic data. The model is stochastic because it incorporates the variable effects of the environment upon population change. However, it did not model the effects of hurricanes on the habitat or population of beach mice.

The Oli *et al.* (2001) analyses indicated that all four subpopulations were at risk of extinction, with habitat fragmentation as the most influential factor. The GINS-Perdido Key Area had the highest risk for extinction; the PKBM had a 100 percent chance of reaching one individual (becoming functionally extinct) within 21 (mode) or 45 (median) years. At Florida Point, the PKBM had a low risk of becoming functionally extinct (1.3 percent) within 13 to 20 years. However, following Hurricane Opal in 1995, and subsequent predation pressure, the PKBM population at Florida Point was believed extirpated in 1999. This localized extirpation clearly demonstrates that while PVA's are useful in determining significant factors in species survival, they have limited use in predicting the time to extinction for a given species.

More recently, the Conservation Breeding Specialist Group (Traylor-Holzer 2004, 2005, 2006) was contracted by the Service to conduct a population and habitat viability analysis (PHVA) on ABM using the Vortex population simulation model (Lacy 1993). The goal was to develop an ABM population model and use the model to assess the status of the ABM habitat, and populations and projections for continued existence. The PHVA results projects the ABM to have a 26.8 percent ± 1.0 percent likelihood of extinction over the next 100 years. Much of this risk is due to hurricane impacts on ABM populations and habitat, which can result in population declines. The model suggests that hurricanes are a driving force for ABM populations, both directly and also indirectly as their impacts interact with other factors, including development of higher elevation (scrub) habitat and predation by cats. Due to the similarities in the subspecies and proximal location, it can be inferred that these factors also have a strong influence on the persistence of PKBM populations. When reviewing PHVA results, it is crucial that the actual values for the risk of extinction are not the focus of the interpretation. The true value of a PHVA is the ability to compare management strategies and development scenarios, run sensitivity analyses, and determine the main influence(s) on population persistence.

Similar to the land use arrangement on Perdido Key, the Fort Morgan peninsula (occupied by ABM) consists of three areas of public lands separated by two areas of private lands, which allow for limited (varied) dispersal between the public lands. The current level of dispersal between public lands through private lands is unknown, but is affected by development and habitat degradation. Without dispersal between public lands through private lands, the PHVA results project the ABM to have a 41.2 percent ± 1.1 percent likelihood of extinction. If all privately-owned habitat between the public lands is lost, the likelihood of extinction increases to 46.8 percent ± 1.1 percent. Again, it can be inferred that a similar increase in risk of extinction would occur with the PKBM if dispersal could not occur through private lands.

Despite the similarities in the subspecies, it is important to note that carrying capacity (K), which was found to be a strong influence on the model, would be different in PKBM. For ABM, K was estimated using maximum ABM density estimates (4.5 to 11.6 ABM per acre) and acres of habitat (2,989 acres). As density estimates for PKBM would likely be lower, and remaining PKBM habitat is less than 1,300 acres, the Vortex model for PKBM would likely project a greater likelihood of extinction.

The Service contracted with the Georgia Cooperative Fish and Wildlife Research Unit to critique the PVAs for the ABM accomplished by Oli *et al.* (2001) and Conservation Breeding Specialist Group (Traylor-Holzer 2006). Conroy and Runge (2006) indicated that neither PVA provided reliable estimates of extinction probability for ABM. They recommended that future PVA work should incorporate sampling, temporal, and possibly spatial variance for input variables and should clearly and explicitly express uncertainty in extinction output. Until this can be done, reliable estimates of extinction probability for the ABM (and other beach mouse subspecies) cannot be estimated.

Species that are protected across their ranges have lower probabilities of extinction (Soulé and Wilcox 1980). Beach mouse populations persist naturally through local extirpations due to storm events or the harsh, stochastic nature of coastal ecosystems. Historically, these areas would be recolonized as population densities increase and dispersal occurred from adjacent populated areas. In addition, from a genetic perspective, beach mice recover well from population size reductions (Wooten 1994), given sufficient habitat is available for population expansion after the bottleneck occurs. As human development has fragmented the coastal dune landscape, beach mice can no longer recolonize along these areas as they did in the past (Holliman 1983). As a continuous presence of beach mice or suitable habitat along the coastline is no longer possible and any hurricane can impact the entire range of each subspecies, the probability of beach mice persisting would be enhanced by the presence of contiguous tracts of suitable habitat occupied by multiple independent populations (Shaffer and Stein 2000). The history of the PKBM alone illustrates the need for multiple populations (a now potentially extirpated population was the source of the two remaining populations of the subspecies) (Holler *et al.* 1989, 71 FR 60238). While maintaining multiple populations of beach mouse subspecies provides protection from total loss (extinction), especially when migration and relocations are possible (Oli *et al.* 2001), conservation of each subspecies necessitates protection of genetic variability throughout their ranges (Ehrlich 1988). Preservation of natural populations is therefore crucial, as the loss of a population of beach mice can result in a permanent loss of alleles (Wooten and Holler 1999). This loss of genetic variability cannot be regained through translocations or other efforts.

Status and Distribution

The distribution of all the beach mouse subspecies is significantly reduced from their historical ranges due to modification and destruction of the coastal dune ecosystem inhabit. Habitat loss and alteration was likely a primary cause of the extinction of one subspecies, the Pallid beach mouse, which was endemic to barrier beach between Matanzas and Ponce de Leon inlets in Volusia and Flagler Counties (Humphrey and Barbour 1981).

<u>Atlantic Coast Beach Mice</u>

The distribution of the SEBM has declined significantly, particularly in the southern part of its range. Historically, it was reported to occur along about 174 miles of Florida's central and southeast Atlantic coast from Ponce (Mosquito) Inlet, Volusia County, to Hollywood Beach, Broward County (Hall 1981). Bangs (1898) reported it as extremely abundant on all the beaches of the east peninsula from Palm Beach at least to Mosquito (Ponce) Inlet. During the 1990s, the SEBM was reported only from Volusia County (Canaveral National Seashore); in Brevard County (Canaveral National Seashore, Kennedy Space Center/Merritt Island NWR, and CCAFS); a few localities in Indian River County (Sebastian Inlet State Park, Treasure Shores Park, and several private properties), and St. Lucie County (Pepper Beach County Park and Fort Pierce Inlet State Park) (Humphrey *et al*. 1987, Robson 1989, Land Planning Group, Inc. 1991, Humphrey and Frank 1992b, Service 1993). The SEBM is geographically isolated from all other subspecies of beach mice.

Populations of the SEBM are still found on the beaches of Canaveral National Seashore, Merritt Island NWR, and CCAFS in Brevard County, all on federally protected lands. In April 2002, a population of SEBM was documented at the Smyrna Dunes Park, at the north end of New Smyrna Beach (Sauzo 2004). Populations from the north side of Sebastian Inlet appear to be extirpated

(Bard 2004). SEBM were documented on the south side of Sebastian Inlet in 2006, although none have been found since then.

The status of the species south of Brevard County is currently unknown. The surveys conducted during the mid-1990s indicated the distribution of this subspecies in the counties south of Brevard County was severely limited and fragmented. There are not enough data available to determine population trends for these populations. These surveys revealed that it occurred only in very small numbers where it was found. In Indian River County, the Treasure Shores Park population experienced a significant decline in the 1990s, and it is uncertain whether populations still exist at Turtle Trail or adjacent to the various private properties (Jennings 2004). Trapping efforts documented a decline from an estimated 300 individuals down to numbers in the single digits. In 2006, a population off Jungle Trail at Pelican Island NWR was discovered (Van Zant 2006). No beach mice were found during surveys in St. Lucie County and it is possible that this species is extirpated there. The SEBM no longer occurs at Jupiter Island, Palm Beach, Lake Worth, Hillsboro Inlet or Hollywood Beach (Service 1999).

The primary reason for the significant reduction in the range of the SEBM is the loss and alteration of coastal dunes. Large-scale commercial and residential development on the coast of Florida has eliminated SEBM habitat in the southern part 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 pronounced 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 and harassment by free-roaming cats and dogs. A healthy population of SEBM on the north side of Sebastian Inlet State Park in Brevard County was completely extirpated by 1972, presumably by free-roaming cats (Bard 2004). Urbanization of coastal habitat could also lead to potential competition of beach mice with house mice (*Mus musculus*) and introduced rats.

The distribution of the beach mouse is limited due to modification and destruction of its coastal habitats due mostly to developmental pressures. One additional Atlantic coast subspecies, the pallid beach mouse (*P. p. decoloratus*), was formerly reported from two sites in Volusia County, but extensive surveys provide substantial evidence that this subspecies is extinct (Humphrey and Barbour 1981).

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 miles of beach; current populations occupy about 14 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 and commercial and residential development.

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 effect 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 free-roaming 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.

<u>Gulf Coast Beach Mice</u>

PKBM populations have existed since the late 1970s as isolated populations along its historical range (16.9 miles). The effects of Hurricane Frederic (1979) coupled with increased habitat fragmentation due to human development led to the extirpation of all but one population of PKBM. The less than 30 individuals at Gulf State Park (at the westernmost end of Perdido Key) were once the only known existing population of PKBM (Holler *et al*. 1989). Beach mice from this site were used to reestablish PKBM at Gulf Islands National Seashore (GINS) between 1986 and 1988 (Holler *et al.* 1989). Then in 1999 the population at Gulf State Park was considered extirpated (Moyers *et al.* 1999). In 2000, 10 PKBM (five pairs) was relocated from GINS to PKSP. In February of 2001, this relocation was supplemented with an additional 32 PKBM (16 pairs). The PKBM were released on both north and south sides of SR 292 in suitable habitat. Two years of quarterly survey trapping indicated that the relocations of PKBM to PKSP were successful and this was considered an established population (Lynn and Kovatch 2004). PKBM were also trapped on private land between GINS and PKSP in 2004, increasing documentation of current occurrences of the mouse (Lynn 2004a). Based on the similarity of habitat between these areas and the rest of Perdido Key, as well as the continuity of the habitat, the mouse is believed to inhabit other private properties where suitable habitat exists north and south of SR 292. The PKBM is considered to occur on 42 percent of Perdido Key (1,227 acres of 2,949 acres) (**Table 13**).

Table 13. Perdido Key beach mouse habitat on Perdido Key in Florida and Alabama – 2007 estimate[1].

Area	Total in AL & FL		Total in Florida		Total in Alabama	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Perdido Key	2,949	100	2,615	89	334	11
PKBM habitat	**1,292**	100	**1,146**	**88**	148	12
Private lands	1,440	49	1,278	43	162	5
PKBM habitat	**302**	**23**	**270**	**24**	33	3
Public lands	1,509	51	1,337 GINS 1,052 PKSP 285	45	172 GSP 172	6
PKBM habitat	990	76	876 GINS 638 PKSP 238	67	114 GSP 114	9

[1]Data calculated by Service's Panama City, Florida using 2004 Digital Orthophoto Quarter-Quadrangle (DOQQ) aerial photography, 2005 parcel data from Baldwin County, Florida and 2005 parcel data from Escambia County, Florida and revised June 2006.

The listing of PKBM was based on data collected in 1983-84, and at that time the mouse was recovering from the effects of Hurricane Frederick in 1979. Following Hurricane Frederic estimated population numbers based on trapping were 13 PKBM found at one location (Gulf State Park). Just prior to listing, only one PKBM was captured in trapping surveys, this again being at Gulf State Park. Since that time, numbers have fluctuated dramatically based on hurricanes and/or translocation efforts, but were at their highest estimate ever documented just prior to Hurricane Ivan in 2004 at between 500-800 individuals. This was a result of significant partnership efforts and included translocation and habitat restoration on public lands. Even with the destructive hurricanes in 2004 and 2005, current numbers of PKBM, while low (no population estimates are available), are greater than one mouse and mice have been confirmed from two areas (PKSP and GINS). Survey efforts (tracking and trapping) have also been sporadic and inconsistent; therefore, it is difficult to establish long term trend information at this time.

CBM subpopulations currently persist along approximately 15 miles of Gulf of Mexico shoreline consisting of four isolated areas along 11 miles of beachfront within its former range. Another five miles outside of the CBM's known historical range has been recently colonized (Lynn, 2000a, 2003a). In the 1950s, the CBM was widespread and abundant at that time according to Bowen (1968). By 1979, Humphrey and Barbour (1981) reported only 40 percent of the original habitat remained undeveloped in noncontiguous areas. They also documented that the CBM had been extirpated from seven of its nine historical localities being restricted to the Topsail Hill area in Walton County and Shell Island in Bay County. In 1985 when the CBM became federally protected, CBM were still only known from the Topsail Hill area and Shell Island, an area consisting of about 10 miles of coastline (50 FR 23872). In 1989, a cooperative interagency effort reintroduced CBM onto the central and west units of Grayton Beach State Park increasing the occupied coastline by another mile (Holler *et al*. 1989). In 1999, with the closing of East Pass and Shell Island connecting to West Crooked Island, CBM increased their range by approximately four miles (Lynn 2000b). CBM are now known to occupy approximately 15 miles of Gulf of Mexico beachfront; 12 of the 15 miles are publicly owned lands.

There are four subpopulations of CBM that exist: 1) Topsail Hill Preserve State Park (and adjacent eastern and western private lands), 2) Shell Island (includes St. Andrew State Park mainland and Shell Island with private inholdings and Tyndall AFB), 3) Grayton Beach (and adjacent eastern private lands), and 4) West Crooked Island. Approximately 96 percent of the lands known to be occupied by CBM are public lands. Translocations to establish a fifth subpopulation of CBM occurred in March of 2003 and 2005. CBM from Topsail Hill Preserve State Park were moved to private lands at Camp Creek/Water Sound in Walton County, Florida (Lynn 2003a, Service 2005a, 2005b, 2005c, 2005d).

Topsail Hill Preserve State Park consists of 1,637 acres of which 262 acres provide CBM habitat; the majority being occupied by CBM. The Florida Park Service prepared a Unit Management Plan for the Preserve that explicitly plans for conservation and protection of CBM habitats (FDEP 2007). Private lands on the east side consist of approximately 9.63 acres. Of that, 7 acres consist of the development known as the Stallworth Preserve. The Service issued an ITP for CBM associated with the Stallworth Preserve HCP in 1995; an amendment to the permit was issued in 1999. The remaining 2.63 acres has been purchased by Walton County with a grant from the Service. Private lands on the west side of the Preserve consist of 24 acres and include Four-Mile Village, a low density single family development, and the Coffeen Nature Preserve managed by the Sierra Club.

Shell Island consists of lands within the St. Andrew State Park, Tyndall AFB, and private lands. The Unit Management Plan for the State Park was completed in 1999. The plan identifies the need for protection and management of the CBM. Tyndall AFB manages their portion of Shell Island under the installation's Integrated Natural Resources Management Plan. The Service has joined with the State Park and Tyndall AFB since 1995 by providing funding to protect and restore CBM habitats on Shell Island.

The St. Andrew State Park mainland consists of 1,260 acres of which 123 acres are beach mouse habitat. Several tracking efforts looking for signs of CBM on the mainland were made between 1995 and 1998; no evidence was found that indicated the presence of the beach mouse (Moyers 1996, Moyers *et al.* 1999). However, live-trapping to document the absence of the mouse has not been conducted. Reintroduction of this area is considered an action to support recovery of CBM.

The Grayton Beach subpopulation consists of two units in Grayton Beach State Park. The Park is divided into a central and western unit and is currently connected by a narrow band of primary dunes. Total acreage of the Park is 2,236 acres with 153 acres providing suitable CBM habitat. The Unit Management Plan for the Park identified the protection of the CBM as an important component. The Park has requested and received funds from the Service to implement CBM habitat restoration and protection. Portions of private lands (WaterColor and Seaside developments) on the east side of the central unit are occupied by CBM or provide suitable habitat.

West Crooked Island consists of 1,558 acres of which 730 acres provide CBM habitat and remains occupied by CBM (Lynn 2004b). The West Crooked Island subpopulation resulted from its connection to Shell Island in 1998 -1999. The construction of the St. Andrew Pass navigation inlet in the early 1930s severed Shell Island from the mainland on its western end. Since then, the original pass, East Pass (or Old Pass) began to close. After passage of Hurricane Opal in 1995, East Pass temporarily closed and reopened; however, after passage of hurricanes Earl and Georges in 1998, the pass closed (Coastal Tech 1999, Middlemas 1999). CBM dispersed onto West Crooked Island from Shell Island colonizing most of the island within two years (Lynn 2004b). East Pass was reopened as a joint venture between Tyndall AFB and Bay County in December of 2001 but has since closed again.

SABM is now known to consist of two subpopulations, East Crooked Island and St. Joseph Peninsula State Park. The majority of the East Crooked Island subpopulation is located on Tyndall AFB and the other on the St. Joseph Peninsula State Park. Other important public lands for the conservation of the mouse would include Eglin Air Force Base lands at Cape San Blas and Billy Joe Rish Park. Private lands adjacent to Tyndall AFB and the State Park are either known to be occupied by SABM or contain habitat. Trapping by St Joe/Arvida on about 111 acres of SABM habitat at East Crooked Island was conducted in 2000, 2001, and 2003. The trapping confirmed existence of SABM on the property (Moyers and Shea 2002). However, trapping their property in St. Joseph Beach did not result in capture of any beach mice (Moyers and Shea 2002). Although SABM is thought to continue to occupy habitat south of St. Joseph Peninsula State Park, only tracking has been conducted to confirm its presence on private lands since the late 1990s. Private lands adjacent to public lands are available for population dispersal and food source during periods of high population and after severe weather events. However, subpopulations on large tracts of private land within the historical range of the subspecies are needed for conservation of the SABM.

Land development has been primarily responsible for the permanent loss of SABM habitat along its approximately 40-mile long historical range. In addition, construction of U.S. highway 98 accelerated the habitat loss from associated development. By the mid 1990's about 12 linear miles were known to be occupied (Gore 1994, 1995), indicating a 68 percent reduction in it historical distribution (63 FR 70053). An effort to re-establish the SABM back into its historical range was initiated around the time of listing (Moyers *et al.* 1999); however, the range reduction described above did not take this into account since the success of the reintroduction was not known at the time (63 FR 70053). Similar analyses have not been conducted since.

Our best documentation of the species' decline can be seen from trapping or tracking surveys conducted at various times throughout its range. By the mid to late 1980's concerns were raised when trapping efforts failed to result in captures at West Crooked Island (Gore 1987). By 1990 the SABM appeared to only inhabit a small portion (approximately 11 linear miles) of its original range: west end of East Crooked Island and within St. Joseph Peninsula State Park (Gore 1990). SABM's apparent decline continued into the mid-1990's when in 1994, the population on East Crooked Island was "presumed to be extinct" (Wooten and Holler 1999), leaving only one known population on St. Joseph Peninsula (Moyers *et al.* 1999). Subsequent reintroduction efforts in 1997-1998 appeared to have re-established the population on East Crooked Island (Moyers *et al.* 1999).

Recovery Criteria

The Recovery Plan for the SEBM identifies the primary recovery objectives for the subspecies (Service 1993). The SEBM can be considered for delisting if 10 viable, self-sustaining populations can be established throughout a significant portion of its historical range. More specifically, delisting can be considered if the following conditions are met:

1. Viable populations are maintained on the five public land areas where the subspecies currently occurs. Each population should not fluctuate below an effective breeding size of 500 individuals;

2. Five additional viable populations are established throughout the historical range of the subspecies; and

3. These populations should be monitored for at least five years.

The Recovery Plan for the AIBM identifies the primary recovery objectives for the subspecies (Service 1993). The AIBM 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 historical range. All of these populations should be monitored for five years.

The Recovery Plan for the PKBM, CBM, and ABM identifies the primary recovery objectives to be the stabilization of present populations by preventing further habitat deterioration, and the reestablishment of populations in areas where they were extirpated (Service 1987). For each of the subspecies to be considered for downlisting to threatened, it is required that there be a minimum of at least three distinct self-sustaining populations in designated critical habitat with at least 50 percent of the critical habitat being protected and occupied by beach mice (Service 1987).

While this is the currently approved Recovery Plan for the three beach mouse subspecies, studies and research since the Recovery Plan publication provided additional information concerning recovery needs for the subspecies. Protection and enhancement of existing populations and their habitat, plus reestablishment of populations in suitable areas within their historical ranges, are necessary for the subspecies survival and recovery. Core beach mouse populations remain isolated and are vulnerable to natural and anthropogenic factors that may further reduce or degrade habitat and/or directly reduce beach mouse population sizes. Maximizing the number of independent populations is critical to species survival. Protection of a single, isolated, minimally viable population risks the extirpation or extinction of a species as a result of harsh environmental conditions, catastrophic events, or genetic deterioration over several generations (Kautz and Cox 2001). To reduce the risk of extinction through these processes, it is important to establish multiple protected populations across the landscape (Soulé and Simberloff 1986, Wiens 1996). Through the critical habitat designation process we are addressing this by designating five independent units for the subspecies spaced throughout its historical range, depending on the relative fragmentation, size, and health of habitat, as well as availability of areas with beach mouse PCEs.

The Service completed a five-year status review of the CBM and PKBM in August 2007 (Service 2007a, 2007b). For both subspecies the following was recommended: designate a beach mouse recovery coordinator; revise the recovery plan; accomplish viable populations, monitor habitat improvement, corridor persistence and hurricane response; conduct genetic studies and translocations as necessary; participate in education and outreach and complete an emergency response plan. A draft Recovery Plan for the SABM has been completed and distributed for public review..

In accordance with the Act, Federal agencies (including the Service) consult with the Service for actions that may adversely affect beach mice and their designated habitat. In Florida, consultations have included military missions and operations, beach nourishment and other shoreline protection, and actions related to protection of coastal development (**Table 14**).

Table 14. Previous biological opinions within Florida that have been issued for projects that had adverse impact to the nesting beach mice.

PROJECT	YEAR	IMPACT (Habitat/critical habitat/individuals)
GINS Dune Protection (PKBM)	2000	0.01 acre (CH)
Translocation to PKSP (PKBM)	2000	≤ 3 beach mice (source mice from CH; relocation to CH and non-CH in PKSP)
Supplemental translocation to PKSP (PKBM)	2003	≤ 3 beach mice (source mice from CH; relocation to CH and non-CH in PKSP)
FEMA Berm Orange Beach, AL (PKBM)	2003	0.14 acre non-CH
Service scientific collecting permit program (PKBM)	2004-2005	1 beach mouse per 400 trap-nights per area (partial CH)
Florencia Development (within Action Area) (PKBM)	2005	3.5 acres (non-CH)
PKSP Re-build (PKBM)	2005	1.99 acres (CH)
FEMA Berm Emergency consultation (within Action Area) (PKBM)	2005	Consultation not complete (non-CH)
GINS road rebuild (PKBM)	2005	1.7 acres (CH)
Magnolia West Development (within Action Area) (PKBM)	2006	5.2 acres (not CH at time of construction, presently CH)
Palazzo Development (PKBM)	2006	0.58 acre (not CH at time of construction, presently CH)
Searinity Development (PKBM)	2006	0.32 acre (not CH at time of construction, presently CH)

Retreat Development (PKBM)	2006	0.21 acre (not CH at time of construction, presently CH)
Bond Residence (PKBM)	2006	0.17 acre (CH)
Three-batch condo (Island Club, Marquesas, Lorelei) (PKBM)	2007	0.95 acres (CH)
Naval Air Station Pensacola Pensacola Pass navigation channel dredging (PKBM)	2007	6.3 miles (CH)
Paradise Island development (PKBM)	2007	0.91 acres (CH)
Calabria condo development (PKBM)	2008	0.33 acres (non-CH)
Escambia County beach nourishment (PKBM)	2008	0.16 acres (partial CH)
Seabreeze Condominiums (PKBM)	2009	0.39 acres
Spanish Key Parking Lot (PKBM)	2009	0.28 acres
Perdido Key Fire Station (PKBM)	2010	0.43 acres (CH)
Stallworth Preserve Development (CBM)	1995	7 acres (CH)
Navy Panama City Beach site 4 construction (CBM)	2000	0.01 acre (CH)
East Pass Re-opening (CBM)	2001	Temporary, indirect take (CH)
WaterColor and WaterSound Developments (CBM)	2000	7.6 acres (non-CH)
Service scientific collecting permit (CBM)	2004-2005	1 beach mouse per 400 trap-nights per area (partial CH)
FEMA beach berms post hurricane Ivan emergency consultation (CBM)	2005	Consultation not complete (partial CH)
Western Lake Reopening consultation (CBM)	2006	2.7 acres annually for 5 years (CH)
FEMA Statewide post-disaster berm programmatic BO (PKBM, CBM, SABM, AIBM, and SEBM)	2007	75 miles for eroded shoreline(partial CH)
Angelos Development (CBM)	2009	0.42 acres
Bonfire Beach (SABM)	2008	38 acres
Ovation (SABM)	2010	5.41 acres (CH)

Sea Colony Development (AIBM)	1998	0.7 acres (non-CH)
Anastasia State Park beach nourishment (AIBM)	2005	50 linear feet (non-CH)
Service scientific collecting permit program (AIBM)	2004-2005	1 beach mouse per 400 trap-nights per area (non-CH)
Rodent Control Program on CCAFS (SEBM)	2002	50 beach mice
Cape Canaveral Air Force borrow source (SEBM)	2007	300 linear feet (non-CH)
Service scientific collecting permit program (SEBM)	2004-2005	1 beach mouse per 400 trap-nights per area (non-CH)
CCAFS Routine Maintenance Programmatic (SEBM)	2008	Temporary loss of habitat during trenching/digging for pipeline installation and repair, roadside mowing, soil remediation, pole placement, wells, soil boring, lines of sight, scrub restoration

Common Threats to Beach Mice in Florida

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 order of magnitude 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 and Frank 1992a). Coastal commercial and residential 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 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 of land 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 foredune 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 2000a, 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 owl (*Asio flammeus*), great-horned owl (*Bubo virginianus*), great blue heron (*Ardea herodias*), northern harrier (*Circus cyaneus*), red fox, gray fox, skunk (*Mephitis mephitis*), weasel (*Shallela frenata*), and raccoon (Blair 1951, Bowen 1968, Holler 1992a, Novak 1997, Moyers *et al.* 1999, Van Zant and Wooten 2003). Predation of 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 cats 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 would occur in over 99 percent of all iterations (Traylor-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 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.* 1998). However, population densities in scrub habitat typically increased following hurricanes (Swilling *et al.* 1998). 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).

In 1995, the Service contracted with Auburn to conduct genetic analysis of: 1) post-reestablishment gene structure in PKBM and CBM; 2) microgeographic patterning and its relevance to alternate management approaches for ABM on the Bon Secour NWR; and 3) if feasible, the historical relationship of SABM from Crooked Island relative to CBM from Shell Island and SABM from St. Joseph Peninsula.

Results of the work for CBM found: 1) founder effects were observed in the Grayton Beach State Park population (fixation of alleles common to the donor population and allele frequency shifts); 2) incongruity in number and size of several alleles was observed between Grayton Beach State Park and Shell Island; 3) overall genetic divergence between the donor and reestablished population was moderate; 4) genetic differences between Topsail Hill Preserve State Park and other CBM sites were higher than expected given the spatial proximity; 5) Topsail Hill Preserve State Park appears to be a reservoir for unique variation within the remaining populations of CBM; and 6) the overall relatedness estimated for Grayton Beach State Park suggested that any mating would involve close relatives (Wooten and Holler 1999).

Wooten and Holler (1999) recommended strategies for management of CBM based on genetics. Management of the Grayton Beach State Park population for genetic characteristics appears to be needed; however, additional genetic analyses will be needed. Relocation of CBM to Grayton Beach State Park from Shell Island should be continued.

Results of the work for PKBM found that: 1) founder effect (from Florida Point to GINS) did impact the GINS-Perdido Key Area subpopulation. Loss of rare alleles and allele frequency shifts were noted; 2) a low to moderate level of overall genetic divergence was observed; 3) data suggests that some effects of genetic drift were mediated by continued transfer of individuals; 4) levels of heterozygosity were unexpected given recent history; 5) average levels of relatedness among individuals is high which may portend future inbreeding related problems (however, no evidence of existing inbreeding was observed in the data); and 6) the overall level of microsatellite variation retained in the GINS-Perdido Key Area subpopulation was higher than anticipated. Wooten and Holler (1999) recommended management of PKBM based on genetics by: 1) preserving the natural population to the maximum extent possible since the loss of the Florida Point subpopulation resulted in the permanent loss of alleles; 2) using the GINS-Perdido Key Area subpopulation as a donor for reestablishment of other populations because of the retention of a substantial amount of genetic variation; and 3) reestablishment plans should include transfers between donor and reestablished subpopulations. In addition, translocations should be accomplished in pairs.

Analysis of genetic work focused on SABM indicated that there are two possible genetic histories for Crooked Island beach mice: 1) the last known beach mice from Crooked Island were derived from CBM or 2) the last known beach mouse from Crooked Island were unique from both CBM found on Shell Island or SABM found on St. Joseph peninsula (Van Zant 2003).

Climate Change (refer to page 43)

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 (including critical habitat for CBM, PKBM, and SABM) 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.

Critical habitat for three (PKBM, CBM, and SABM) of the five subspecies of beach mice has been designated and will be discussed. No critical habitat has been designated for the other two subspecies (SEBM and AIBM). Therefore, the proposed action would have no effect on designated critical habitat for these two subspecies because none is designated.

Generally, sand placement activities 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 sand placement activities 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. Sand placement 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 SPBO.

ENVIRONMENTAL BASELINE

Status of the species/Critical Habitat within the Action Area (all subspecies of beach mice)

The action area encompasses the entire range of five subspecies of beach mice, and designated critical habitats of three beach mouse subspecies. Therefore, the previous discussion in "Status of the Species" applies here. The known distribution of the five subspecies of beach mice 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

Coastal development

Beach mice were listed as 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 predevelopment 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 prestorm locations can result in a major loss of habitat for beach mice.

The 2004 hurricane season was the most active storm season in Florida since weather records began in 1851. Hurricanes Charley, Frances, Ivan, and Jeanne, along with Tropical Storm Bonnie, damaged the beach and dune system, upland structures and properties, and infrastructure in the majority of Florida's coastal counties. The cumulative impact of these storms exacerbated erosion conditions throughout the state.

The 2005 hurricane season was a record-breaking season with 27 named storms. Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma, and Tropical Storms Arlene and Tammy impacted Florida. The cumulative impact of these storms exacerbated erosion conditions in south and northwest Florida.

Beachfront Lighting

Artificial lighting along developed areas of both coastlines continues to cause increase susceptibility to predators, altered foraging and breeding habits which impact 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 be unregulated resulting in urban glow. Even the darker areas of conservation managed lands are subject to surrounding sky glow.

Predation

A major continuing threat to beach mice is predation by free-roaming cats and other nonnative species. The domestic cat 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-roaming pets 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 nonnative predators may result in the extirpation of small, local populations of beach mice in a very short time (Bowen 1968, Linzey 1978).

Climate Change

Based on the present level of available information concerning the effects of global climate change on the status of beach mice and its designated critical habitat, 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 beach mice 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.

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 sand placement activities or dredged material 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 including critical habitat for the PKBM, CBM, and SABM.

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 Corps'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 (pipe sections are typically 40 to 50 feet long). In NW Florida and Alabama, these yards have been approximately eight miles apart.

“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. In addition, 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 intervals.

Protective, avoidance, and minimization measures have been incorporated into the project plan to avoid or minimize the potential impacts from the sand placement and dredged 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 and/or their habitat including designated critical habitat for the PKBM, CBM, and SABM. The work may occur on public and/or private lands.

Proximity of Action: Some aspects of the sand placement 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 SEBM, AIBM, PKBM, CBM, and SABM. Beach mice spend their entire life cycle within the coastal dune system.

Distribution: The storage or staging of pipe and other equipment and vehicles and use of beach access points that could occur in habitat occupied or used by SEBM, AIBM, PKBM, CBM, and SABM may vary depending on the individual project length and existing beach accesses and non-beach mouse habitat that can be used for storage and staging.

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 one or two years. Beach mouse habitats would remain disturbed until the project is completed and the habitats are restored. Dune restoration could be complete from 6 to 12 months after the project has been completed. The short generation time of beach mice combined with the time frames provided in this document (projects from 1 month to 2 years, dune restoration 6 to 12 months following project completion) will impact multiple generations of beach mice. The time to complete a project and restore the habitat can be a complete loss of habitat availability and use for multiple generations of beach mice.

Disturbance frequency: Depending on the sand placement activity 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 2 years. Following initial sand placement, activities could occur every year depending on the project location and erosion events. The actual number of times the sand placement would occur is unknown. Following initial sand placement or dredge material placement, maintenance activities could occur every two to 10 years depending on the project location and situation (erosion, long shore sand transportation, upstream activities, and weather events). Thus, impacts related to the subject activities would be expected to occur no more often than every two to three years. However, while not anticipated, work could occur annually in response to emergency events. The actual number of times the nourishment and dredging material disposal activities is unknown but can be based on previous work.

Disturbance intensity and severity: Depending on the frequency needed to conduct the nourishment and dredged material work and the existence of staging areas and beach access points, effects to the recovery of beach mouse may vary. However, the action area encompasses entire range of each subspecies 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).

The staging and storage of equipment and materials and beach access points could occur within habitat occupied or used by SEBM, AIBM, PKBM, CBM, and SABM and could be adjacent to designated critical habitat for the PKBM, CBM, and SABM. Beach mice are permanent inhabitants of the coastal ecosystem conducting all their life cycles in this environment. While the current status of individual beach mouse subspecies is unknown, their general distribution is known.

Analysis for effects of the action

The action area consists of the Atlantic or Gulf beachfront including the wet and dry unvegetated beach, developing foredunes and interdunal swales, and areas that were formerly primary or secondary dunes. Sand placement or dredged material placement work would not occur on existing vegetated primary or secondary dunes. However, construction of or expansion of an existing beach access could be located through scrub, secondary, or primary dunes. Beach mice would generally be found inhabiting stable primary, secondary, and scrub dunes on a permanent basis with other habitats being used periodically on a daily or seasonal basis for feeding and movement. Some of these areas also include critical habitat.

Direct and Indirect Impacts

Direct impacts are effects of the action on the species occurring during project implementation and construction (sand placement or dredged material placement). Direct loss of individual beach mice may occur during the creation or expansion of beach access points when heavy equipment clears the habitat and packs the sand. In general the length of time between project maintenance work is expected to be sufficient for beach mouse habitat to be restored. Thus, it is not anticipated that the nourishment and dredged material placement activities would result in permanent beach mouse habitat destruction (including critical habitat). However, habitat for all the beach mouse subspecies and critical habitat for the PKBM, CBM, and SABM that provides food or cover may be temporarily destroyed or altered from the activities.

Indirect effects are a result of a proposed action that occur later in time and are reasonably certain to occur. The indirect effect of the sand placement and dredged material placement activities would be newly created or expanded existing beach access points that act as barriers to beach mouse movement for foraging, or population expansion or dispersal. Maintaining the connectivity among habitats is vital to persistence of beach mice recovery. Recovery actions needed to assure the connectivity include restoration and maintenance of the dune system following project completion.

For the Service to determine if the project impacts on designated critical habitat would be an adverse modification, the Service shall determine if the impact on the habitat appreciably diminishes the capability of the critical habitat to satisfy essential requirements of beach mice. The long-term maintenance of the beach mouse populations in the project areas could be compromised if the sand placement and dredged material placement activities occur too frequently resulting in a long-term barrier to mice movement. However, our evaluation indicates the impacts to critical habitat should be temporary in nature based on past history of nourishment projects. In addition, the area to be directly affected within the individual subspecies would be a small percentage of the overall critical habitat and would not be expected to reduce the carrying capacity of the recovery unit or appreciably diminish the ability of the PCE's to provide for the essential functions of the critical habitat units.

Species' response to a proposed action

This SPBO is based on effects that are anticipated to beach mice (all life stages) as a result of the temporary physical disturbance of beach mice habitat from beach nourishment or dredged material placement and associated activities. Some individual beach mice (all life stages) may be lost during the initial construction or expansion of beach accesses where heavy equipment destroys dune habitat and compacts the sand within the access corridor. Any mice that survive the initial construction may move outside of the disturbed area and construct burrows elsewhere in the vicinity. This will result in increased exposure to predation due to the removal of their burrows. Following access construction, a bare gap of sand could form a barrier to limit beach mouse movement within the area altering regular movement patterns. The bare areas could not be used for foraging, breeding or sheltering. These impacts are expected to be limited to the construction phase of the project (one month to two years). As the life span of a beach mouse is estimated to be approximately nine months, the loss of individual mice or the temporary loss of habitat could affect several generations of beach mice, but because beach mice can reproduce rapidly with adequate resources, colonization or recolonization of the restored habitat would be expected.

Beach mice have evolved to adapt to catastrophic weather events. Additional factors such as surrounding development pressure and nonnative predators may affect the species' ability to recover from the loss of individuals. However, the temporary loss of the habitat itself is not expected to permanently impact the populations as all beach mouse habitat within the project areas not permanently destroyed would be restored or maintained as part of the conservation measures committed to by the Corps or the Applicant. The temporary nature of the impacts to dune habitats is not expected to alter the function and conservation role of the remaining beach mouse habitat including designated critical habitat.

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 SPBO. Future Federal actions that are unrelated to the proposed project are not considered in this opinion and require separate consultation pursuant to section 7 of the Act.

It is reasonably certain to expect that coastal development, human occupancy and recreational use along the Atlantic and Gulf coasts of Florida will increase in the future. Redevelopment along with new developments following the hurricane seasons of 2004 and 2005 are occurring as allowed by local zoning standards. It is unknown how much influence a nourished beach would contribute to the development and recreational use of the shoreline. Any projects that are within endangered or threatened species habitat will require section 7 consultation or section 10(a) (1)(B) permitting from the Service.

In recognizing the importance of coastal barrier islands along the Atlantic and Gulf coasts, Congress passed the Coastal Barrier Resources Act (CBRA) of 1982 and Coastal Barrier Improvement Act in 1991. The purpose of CBRA is "…to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf coasts by restricting future Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers." Congress established the Coastal Barrier Resources System units that apply to the CBRA.

Escambia County is currently in the final permitting stages of a beach nourishment project for Perdido Key. The project would cover approximately 4 miles of beachfront along county and private lands, not including state and Federal lands. The Service completed an endangered species consultation for the project in 2008. The project construction is expected to begin in late 2009-2010. The beach nourishment project is likely to enhance beach mouse habitat by providing an additional buffer to the dune habitats from storm events.

The Pensacola Naval Air Station has proposed to dredge their navigation channel resulting in the need to place eight million cubic yards of dredged material that is beach compatible. Because of cost, Perdido Key is the closest area to receive the material. Receiving areas include the Perdido Key Gulf beachfront (in lieu of the County implementing their project described above), PKSP, and GINS, Escambia County. The project could result in the placement of dredged material on 16 miles of beachfront including private, county, state, and Federal lands. The Navy has received their permits to complete the project. The Service completed an endangered species consultation for the project in 2007. The full project is on hold due to funding. However, the Federal navigation channel in the lower portion of the project area is expected to be maintenance dredged in 2009-2010.

Gulf County is currently completing a beach restoration project on St. Joseph peninsula and St. Joseph Peninsula State Park. The project will cover approximately 7.5 miles of Gulf of Mexico beachfront. The Service completed an endangered species consultation for the project. The project was completed in 2008.

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 activities, the "Conservation Measures," and the cumulative effects, it is the Service's biological opinion that work conducted under the Statewide Programmatic action , as proposed, 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 U.S.; 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. Three of the five loggerhead recovery units in the Northwest Atlantic occur within the action area, the PFRU, the DTRU, and the NGMRU. Sand placement is not expected to occur within the DTRU. The NGMRU averages about 1,000 nests per year. Northwest Florida accounts for 92 percent of this recovery unit in nest numbers (920 nests) and consists of approximately 234 miles of nesting shoreline. Of the available nesting habitat within the NGMRU, with most sand placement projects have a project life of five to seven years and channel maintenance activities occurring every two to three years, on average, sand placement impacts will occur on 8.8 miles of sea turtle nesting shoreline per year. This is based on the average linear feet of beach on which sand placement occurred during nonemergency years from 2001 to 2008.

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, sand placement activities will occur on 18.9 miles of nesting shoreline per year during nonemergency years. This is based on the average linear feet of beach on which sand placement occurred during non-emergency years from 2001 to 2008.

Generally, green, leatherback, hawksbill, and Kemp's ridley nesting overlaps with or occurs within the beaches where loggerhead sea turtles nest 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 an average of 27.7 miles of shoreline per year. This is based on the average linear feet of beach on which sand placement occurred during nonemergency years from 2001 to 2008.

For all species of sea turtles, post-hurricane sand placement activities occurred on approximately 205 miles of shoreline for the 2004-2005 period following the emergency events (declared disasters and Congressional Orders). These activities are within 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 nourishment 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 nourishment project will perform from an engineering perspective, measures can be implemented to minimize impacts to sea turtles.

Beach Mice

The PKBM, CBM, and SABM occur on both public and private lands throughout their historical ranges. Both the SEBM and 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 SEBM, AIBM, PKBM, CBM, and SABM, the environmental baseline for the action area, the effects of beach nourishment and dredged material placement and associated activities, the "Conservation Measures," and the cumulative effects, it is the Service's biological opinion that the Statewide Programmatic action for these projects, as proposed, is not likely to jeopardize the continued existence of any of the above subspecies of beach mice and is not likely to destroy or adversely modify designated critical habitat for the PKBM, CBM, or SABM.

As discussed in the Effects of the Action section of this SPBO, 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 loss 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; and

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.

Also, 50 feet of beach mouse critical habitat for each subspecies (PKBM, CBM, and SABM) could be temporarily affected each time a project is completed as a result of the sand placement activities. We would not anticipate that the loss of the critical habitat would alter or affect the remaining critical habitat in the action area for each subspecies (PKBM, CBM, and SABM) to the extent that it would appreciably diminish the habitat's capability to provide the intended conservation role for the subspecies in the wild.

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 shall 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 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 shall 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 ANTICIPATED TAKE

Sea Turtles

The Service anticipates that no more than 27.7 miles of highly eroded shoreline along the Florida coastline (no more than 8.8 miles within the NGMRU and no more than 18.9 miles within the PFRU) would receive sand placement per year during nonemergency years with a maximum of 102 miles of shoreline (38 miles within the NGMRU and 64 miles of shoreline within the PFRU) receiving sand during or following an emergency event (declared disaster or Congressional Order) as a result of the Statewide Programmatic action. This represents two percent of the entire shoreline per year during a nonemergency year and seven percent of the entire shoreline during an emergency year. Over the last 10 years, one Congressional Order occurred due to emergency events in the 2004-2005 period. The increased sand placement on 102 miles of shoreline is expected to occur once in a 10-year period due to emergency events. Incidental take of sea turtles will be difficult to detect for the following reasons:

1. Turtles nest primarily at night and all nests are not located 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 prevent 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 sand placement on suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) sand placement activities will likely occur during a portion of the nesting season; (3) sand placement activities will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter or misdirect nesting females and hatchlings during and following sand placement.

Take is expected to be in the form of: (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 project areas; (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 projects; (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 sand placement areas or on adjacent beaches during and after sand placement or construction activities; (5) misdirection of nesting and hatchling turtles on beaches adjacent to the sand placement or construction area as a result of project lighting including the ambient lighting from dredges; (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.

According to Schroeder (1994), there is an average survey error of seven percent; therefore, there is the possibility that some nests within the Action Area may be misidentified as false crawls and missed. However, due to implementation of the sea turtle protection measures, we anticipate that the take will not exceed seven percent of the nesting average in the action area. This number is not the level of take anticipated because the exact number cannot be predicted nor can the level of incidental take be monitored.

Beach Mouse

The Service has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated from the sand placement activities may occur any time of the year within a ten-year period. The Service anticipates incidental take of beach mice 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 50 linear feet of beach mouse habitat could be affected per sand placement activity 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 the SPBO, the Service determined that the 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 loggerhead 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 material will be placed or where jetty or groin maintenance is located but is not expected to exceed 8.8 miles of shoreline per year within the northwest portion of Florida for the NGMRU and 18.9 miles of shoreline per year within the PFRU during a nonemergency year. Take will occur on nesting habitat consisting of the length of the beach where the material will be placed or where groin maintenance is located but is not expected to exceed 102 miles of shoreline (38 miles of shoreline per year within the northwest portion of Florida for the NGMRU and 64 miles of shoreline per year within the PFRU) during an emergency (declared disasters or Congressional Orders) year. The increased sand placement of 102 miles of shoreline is expected to occur once in a 10-year period due to emergency events.

Incidental take of green, leatherback, hawksbill and Kemp's ridley 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 material will be placed or where jetty or groin maintenance is located but is not expected to exceed 27.7 miles (8.8 miles within the northwest portion of Florida and 18.9 miles within the northeast, south and west portion of Florida) of shoreline per year during a nonemergency year. Take will occur on nesting habitat consisting of the length of the beach where the material will be placed or where jetty or groin maintenance is located but is not expected to exceed 102 miles of shoreline (38 miles of shoreline per year within the northwest portion of Florida for the NGMRU and 64 miles of shoreline per year within the PFRU) during an emergency (declared disasters or Congressional Orders) year.

Beach Mouse

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

Incidental take of SEBM, AIBM, PKBM, CBM, and SABM 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 50 feet of vegetated dunes for beach access.

REASONABLE AND PRUDENT MEASURES

The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize take of the loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles; SEBM, AIBM, CBM, PKBM, and SABM in the action area for the following activities:

A. Sand placement from beach nourishment, sand bypass, and sand back pass activities;

B. Sand placement from navigation channel maintenance; and

C. Groin and jetty repair or replacement.

If the Corps is unable to comply with the Reasonable and Prudent Measures and Terms and Conditions, the Corps as the construction agent or regulatory authority may:

1. Inform the Service why the term and condition is not reasonable and prudent for the specific project or activity and request exception under the SPBO or
2. Initiate consultation with the Service for the specific project or activity. The Service may respond by either of the following:
    a. Allowing an exception to the terms and conditions under the SPBO or
    b. Recommending or accepting initiation of consultation (if initiated by the Corps) for the specific project or activity.

Post construction requirements are listed in Reasonable and Prudent measures A10, A11, A12, and A13. These post construction requirements are subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Reasonable and Prudent Measures, the Corps must reinitiate consultation.

REASONABLE AND PRUDENT MEASURES for:

A. Projects that include sand placement from beach nourishment, sand bypass, and sand back pass activities primarily for shore protection shall include the following measures:

A1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice shall be implemented in the Corps federally authorized project or regulated activity.

A2. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence and beach mouse burrow construction shall be used for sand placement.

A3. Sand placement shall not occur during the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation. In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties, sand placement shall not occur from May 1 through October 31. In St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte counties, sand placement shall not occur from June 1 through September 30. In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte (except Manasota Key), Sarasota (except Manasota Key), Manatee, Hillsborough, Pinellas, Franklin (except St. George Island), Gulf (except St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas), Bay, Walton, Okaloosa, Santa Rosa, and Escambia counties, Florida, sand placement may occur during the sea turtle nesting season.

A4. All derelict material or other debris shall be removed from the beach prior to any sand placement.

A5. The Corps shall continue to work with FDEP, FWC and the Service to create a sea turtle friendly beach profile for placement of material during construction.

A6. If a dune system is already part of the project design, the placement and design of the dune shall emulate the natural dune system to the maximum extent possible, including the dune configuration and shape.

A7. 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.

A8. A meeting between representatives of the Applicant's or Corps, Service, FWC, the permitted sea turtle surveyor, and other species surveyors, as appropriate, shall be held prior to the commencement of work on this project.

A9. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted. Surveys for early and late nesting sea turtles shall be conducted where appropriate. If nests are constructed in the area of sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation.

A10. A post construction survey(s) of all artificial lighting visible from the project beach shall be completed by the Applicant or Corps.

A11. Daily nesting surveys shall be conducted by the Applicant or Corps for two nesting seasons following construction if the new sand still remains on the beach.

A12. Sand compaction shall be monitored and tilling shall be conducted if needed to reduce the likelihood of impacting sea turtle nesting and hatching activities.

A13. Escarpment formation shall be monitored and leveling shall be conducted if needed to reduce the likelihood of impacting nesting and hatchling sea turtles.

A14. Construction equipment and materials shall be stored in a manner that will minimize impacts to nesting and hatchling sea turtles and beach mice.

A15. Lighting associated with the project construction shall be minimized to reduce the possibility of disrupting and disorienting nesting and hatchling sea turtles and nocturnal activities of beach mice.

A16. During the sea turtle nesting season, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length) between dusk and the time of completion the following day's nesting survey to reduce the impact to emerging sea turtles and burial of new nests.

A17. All vegetation planting shall be designed and conducted to minimize impacts to sea turtles and beach mice.

A18. Beach mouse habitat shall be avoided when selecting sites for storage and staging of equipment to the maximum extent possible.

A19. Equipment and construction materials shall not be stored near the seaward dune toe in areas of occupied beach mouse habitat. This area is highly utilized by beach mice.

A20. Existing vegetated habitat at beach access points and travel corridors shall be protected to the maximum extent possible to ensure vehicles and equipment transport stay within the access corridor.

A21. Expanded or newly created beach access points shall be restored following construction.

A22. A report describing the actions taken shall be submitted to the Service following completion of the proposed work for each year when the activity has occurred.

A23. The Service and the FWC shall 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

All conservation measures described in the Corps' PBA are hereby incorporated by reference as Terms and Conditions within this document pursuant to 50 CFR §402.14(I) with the addition of the following Terms and Conditions. In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall 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 nondiscretionary.

Post construction requirements are listed in Terms and Conditions A10, A11, A12, and A13. These post construction requirements are subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Terms and Conditions, the Corps must reinitiate consultation.

TERMS AND CONDITIONS for:

A. Projects that include sand placement from beach nourishment, sand bypass, and sand back pass activities primarily for shore protection shall include the following conditions:

All beaches

A1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice listed on pages 9 and 10 of the SPBO shall be implemented in the Corps federally authorized project or regulated activity.

A2. Beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill must be sand that is similar to a native beach in the vicinity of the site that has not been affected by prior sand placement activity. The fill material must be similar in both coloration and grain size distribution to that native beach. 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. Fill material shall comply with FDEP requirements pursuant to the Florida Administrative Code (FAC) subsection 62B-41.005(15). A Quality Control Plan shall be implemented pursuant to FAC Rule 62B-41.008(1)(k)4.b.

A3. Sand placement shall not occur during the period of peak sea turtle egg laying and egg hatching to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.

a. Sand placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties shall be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes may be placed and/or stored on the beach.

b. Sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties may occur during the sea turtle nesting season except on publicly owned conservation lands such as state parks and areas where such work is prohibited by the managing agency or under applicable local land use codes (see exceptions in A3.c below).

c. For higher density nesting beaches in Gulf and Franklin Counties and on Manasota Key located in Sarasota and Charlotte counties, sand placement shall not occur during the main part of the nesting season (June 1 through September 30). These beaches include St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte counties.

The Service shall be contacted for coordination, on a project-by-project basis, if sand placement is needed on publicly owned conservation lands and in these higher density nesting beaches in Gulf and Franklin Counties and on Manasota Key in Sarasota and Charlotte counties during the above exclusionary period. The Service will determine whether work (1) may proceed in accordance with the Terms and Conditions; (2) proceed in accordance with the Terms and Conditions and other requirements as developed by the Service; or (3) would require that an individual emergency consultation be conducted.

A4. 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 possible. If debris removal activities take place during the peak sea turtle nesting season (**Tables 17 and 18**), the work shall be conducted during daylight hours only and shall not commence until completion of the sea turtle nesting survey each day.

Table 15. Beach Sand Placement and Sea Turtle Nest Monitoring/Relocation Windows, Brevard through Broward Counties, Coast of Florida.

Region	Nest Laying Season	Hatching Season Ends	Beach Placement Window	Early Season Relocation *	Late Season Relocation**	Nesting Season Monitoring
Brevard, Indian River, St. Lucie, and Broward Counties	25 Feb - 11 Nov	15 Jan	1 Nov - 30 Apr	1 Mar - 30 Apr In St. Lucie County, nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded	65 days prior to 1 Nov (28 Aug) (or prior to start of construction **)	1 Mar - 15 Oct
Martin and Palm Beach Counties	12 Feb - 16 Oct	20 Dec	1 Nov - 30 Apr	1 Mar - 30 Apr In Martin and Palm Beach Counties, nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded	65 days prior to 1 Nov (28 Aug) (or prior to start of construction **)	1 Mar - 15 Oct

Table 16. Beach Sand Placement and Sea Turtle Nest Monitoring/Relocation Windows, Outside of Brevard through Broward Counties, Coast of Florida.

Region	Nest Laying Season	Hatching Season Ends	Beach Placement Window	Nesting Season Monitoring and Relocation
Nassau, Duval, St. Johns, Flagler, and Volusia Counties	27 Apr - 3 Oct	30 Nov	All Year	15 Apr – 30 Sep
Miami-Dade County	30 Mar - 25 Sep	30 Nov	All Year	1 Apr – 30 Sep
Gulf County (St. Joseph Peninsula State Park, St. Joseph peninsula, Cape San Blas) and Franklin County (St. George Island)	1 May - 4 Sep	15 Nov	1 Oct - 31 May	1 May – 15 Sep
All other beaches in Gulf and Franklin Counties, and Escambia, Santa Rosa, Okaloosa, Walton, and Bay Counties	11 May - 5 Sep	15 Nov	All Year	1 May - 31 Aug
Sarasota and Charlotte Counties (Manasota Key)	27 Apr - 7 Sep	15 Nov	1 Nov - 30 Apr	15 Apr – 15 Sep
All other beaches in Sarasota and Charlotte Counties	27 Apr - 7 Sep	15 Nov	All Year	15 Apr – 15 Sep
Pinellas, Hillsborough, Manatee, Lee, Collier, and Monroe Counties	24 Apr - 11 Sep	15 Nov	All Year	15 Apr – 15 Sep

A5. The Corps shall continue to work with FDEP, FWC and the Service in conducting the second phase of testing on the sea turtle friendly profile during project construction. This includes exploring options to include a dune system in the project design for existing authorized projects and new non-Federal projects and how the existing sand placement template may be modified.

A6. Dune restoration or creation included in the profile design (or project) shall have a slope of 1.5:1 followed by a gradual slope of 4:1 for approximately 20 feet seaward on a high erosion beach (**Figure 13)** or a 4:1 slope (**Figure 14**) on a low erosion beach. If another slope is proposed for use, the Corps shall consult the Service.

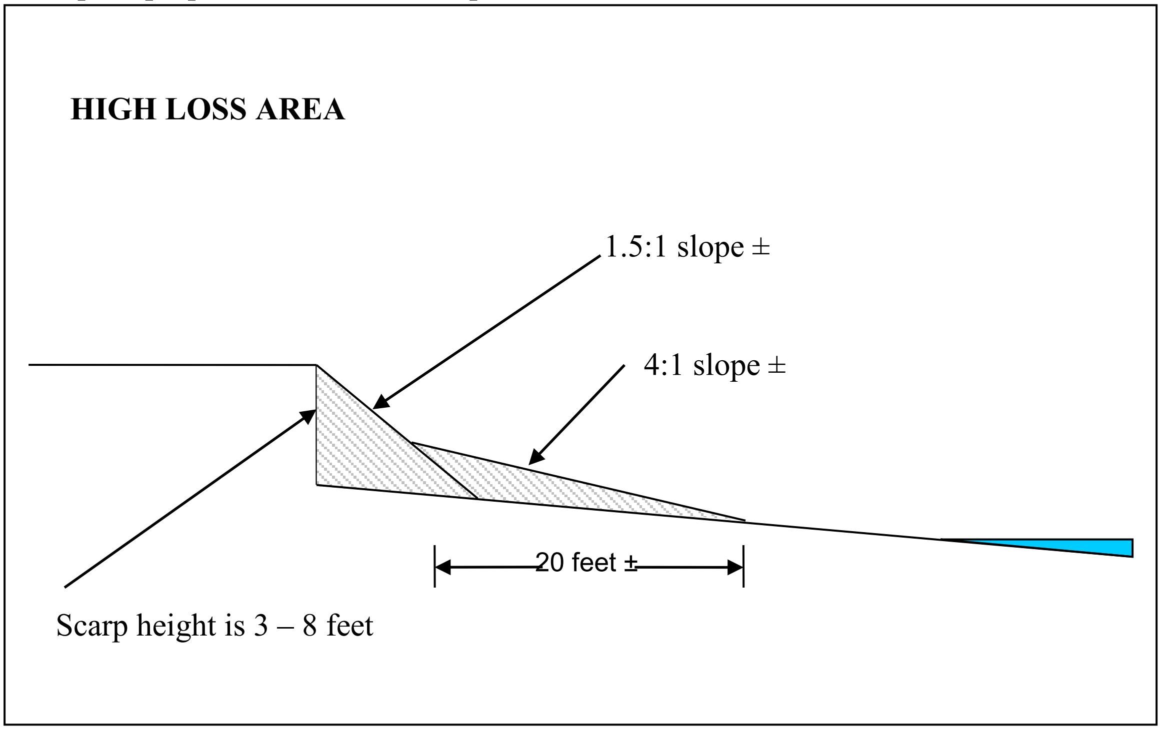

Figure 13. Recommended slope on a high erosion beach for sand placement projects that include the creation of a dune.

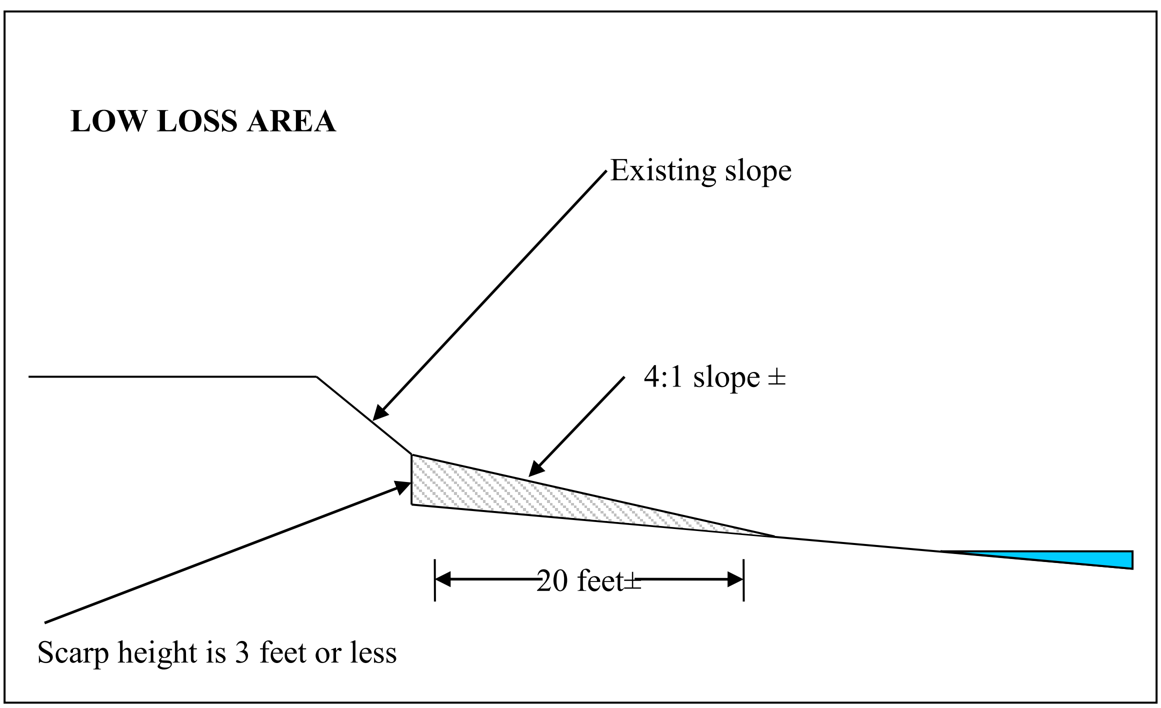

Figure 14. Recommended slope on a low erosion beach for sand placement projects that include the creation of a dune.

A7. Predator-proof trash receptacles shall be installed and maintained during construction at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice (**Appendix C**). The Corps shall provide predator-proof trash receptacles for the construction workers. The Corps shall brief workers on the importance of not littering and keeping the project area trash and debris free.

A8. A meeting between representatives of the Corps, 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, free-roaming cat observation, and reporting within the work area, as well as follow up meetings during construction (**Table 3**).

Sea Turtle Protection

A9. Daily early morning surveys for sea turtle nests shall be required as outlined in **Tables 15 and 16 (Nesting Season Monitoring)**. If nests are constructed in the area of sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation as outlined in a through f.

a. For sand placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties that occur during March 1 through April 30, daily early morning surveys and egg relocation shall be conducted for sea turtle nests until completion of the project (whichever is earliest). Eggs shall be relocated per the following requirements. For sand placement projects that occur during the period from November 1 through November 30, daily early morning sea turtle nesting surveys shall be conducted 65 days prior to project initiation and continue through November 30, and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

i. 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 FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at (561) 575-5407 for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones).

ii. 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, predation, or subject to artificial lighting. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests.

iii. 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 situ unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and 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 that 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.

During the period from March 1 through April 30, daytime surveys shall be conducted for leatherback sea turtle nests beginning March 1. Nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded within the project or adjacent beach area through April 30 or until completion of the project (whichever is earliest). Nightly nesting surveys shall be conducted from 9 p.m. until 6 a.m. The project area shall be surveyed at 1-hour intervals (since leatherbacks require at least 1.5 hours to complete nesting, this will ensure all nesting leatherbacks are encountered) and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

b. For sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties that occur during the period from May 1 through October 31, daily early morning (before 9 a.m.) surveys and egg relocation shall be conducted. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin, Gulf, Sarasota, and Charlotte Counties in A9.d. below).

c. For Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties, nesting surveys shall be initiated 70 days prior to sand placement activities (incubation periods are longer in these counties) or by May 1 whichever is later. Nesting surveys and relocation shall continue through the end of the project or through August 31 whichever is earlier. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin and Gulf Counties in A9.d. below).

d. For St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte Counties, sand placement activities shall not occur from June 1 through September 30, the period of peak sea turtle egg laying and egg hatching for this area. If nests are laid between May 1 and May 31 in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii.

e. For Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe Counties, nesting surveys shall be initiated 65 days prior to nourishment or dredged channel material placement activities or by April 15 whichever is later. Nesting surveys and egg relocation shall continue through the end of the project or through September 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 (a)i through (a)iii (see nest relocation exceptions for Sarasota and Charlotte Counties in A9.d. above).

f. For Miami-Dade County, nesting surveys shall be initiated 65 days prior to nourishment or dredged channel material placement activities or by April 1 whichever is later. Nesting surveys and egg relocation shall continue through the end of the project or through September 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 (a)i through (a)iii

g. For Volusia, Flagler, St. Johns, Duval, and Nassau Counties, nesting surveys shall be initiated 65 days prior to sand placement activities or by April 15 whichever is later. Nesting surveys and egg relocation shall continue through the end of the project or through September 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 (a)i through (a)iii.

A10. Daily nesting surveys shall be conducted for two nesting seasons in accordance with the FWC's Statewide Nesting Beach Survey Protocol (**Appendix B**) by the Corps or the Applicant following construction if placed material still remains on the beach (**Table 17**). Post construction year-one surveys shall record the number of nests, nesting success, reproductive success, and lost nests due to erosion and/or inundation. Post construction year-two surveys shall only need to record nest numbers and nesting success. This information will be used to periodically assess the cumulative effects of these projects on sea turtle nesting and hatchling production and monitor suitability of post construction beaches for nesting.

Table 17. Post-Construction Sea Turtle Monitoring.

Region	Nest Laying Season	Years 1 and 2 Post-Construction Monitoring
Brevard, Indian River, St. Lucie, and Broward Counties	25 Feb - 11 Nov	Bi-weekly surveys: 1 Mar - 30 Apr and from 15 Oct – 15 Nov Daily surveys: 1 May - 15 Oct
Martin and Palm Beach Counties	12 Feb - 16 Oct	Daily surveys: 1 Mar - 15 Oct
Nassau, Duval, St. Johns, Flagler, and Volusia Counties	27 Apr - 3 Oct	Daily surveys: 1 May – 30 Sep
Miami-Dade County	30 Mar - 25 Sep	Daily surveys: 1 Apr – 30 Sep
Gulf County (St. Joseph Peninsula State Park, St. Joseph peninsula, Cape San Blas) and Franklin County (St. George Island)	1 May - 4 Sep	Daily surveys: 1 May – 31 Aug
All other beaches in Gulf and Franklin Counties, and Escambia, Santa Rosa, Okaloosa, Walton, and Bay Counties	11 May - 5 Sep	Daily surveys: 1 May - 31 Aug
Sarasota and Charlotte Counties (Manasota Key)	27 Apr - 7 Sep	Daily surveys: 1 May –15 Sep
All other beaches in Sarasota and Charlotte Counties	27 Apr - 7 Sep	Daily surveys: 1 May – 15 Sep
Pinellas, Hillsborough, Manatee, Lee, Collier, and Monroe Counties	24 Apr - 11 Sep	Daily surveys: 1 May – 15 Sep

A11. Two surveys shall be conducted of all lighting visible from the beach placement area by the Applicant or Corps, using standard techniques for such a survey (**Appendix C**), in the year following construction. The first survey shall be conducted between May 1 and May 15 and a brief summary provided to the Service. The second survey shall be conducted between July 15 and August 1. A summary report of the surveys, including any actions taken, shall be submitted to the Service by December 1 of the year in which surveys are conducted. After the annual report is completed, a meeting shall be set up with the Applicant, county or municipality, FWC, Corps, and the Service to discuss the survey report, as well as any documented sea turtle disorientations in or adjacent to the project area. If the project is completed during the nesting season and prior to May 1, the Corps may conduct the lighting surveys during the year of construction.

A12. Sand compaction shall be monitored in the area of sand placement immediately after completion of the project and prior to the dates in **Table 18** for 3 subsequent years.

Table 18. Dates for Compaction Monitoring and Escarpment Surveys by County.

County where project occurs	Date
Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward	March 1
Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin, Volusia, Flagler, St. Johns, Duval, Nassau, Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier	April 15
Miami-Dade, Monroe	April 1

If tilling is needed, the area shall be tilled to a depth of 36 inches. Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling. All tilling activity shall be completed at least once prior to the nesting season. An electronic copy of the results of the compaction monitoring shall be submitted to the appropriate Service Field Office (**Table 3**) prior to any tilling actions being taken or if a request not to till is made based on compaction results. 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.
(NOTE: If tilling occurs during shorebird nesting season (February 15-August 31), shorebirds surveys prior to tilling are required per the Migratory Bird Treaty Act http://myfwc.com/docs/Conservation/FBCI_BNB_SeaTurtleMonitors.pdf)

a. Compaction sampling stations shall be located at 500-foot intervals along the sand placement template. 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).

b. 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 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 six averaged compaction values.

c. 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 appropriate date listed in **Table 18**.

d. 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.

e. 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.

A13. Visual surveys for escarpments along the project area shall be made immediately after completion of the sand placement and within 30 days prior to the start dates for Nesting Season Monitoring in **Tables 15 and 16** for 3 subsequent years if sand in the project area still remains on the dry beach.

Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation by the dates listed above. Any escarpment removal shall be reported by location. If the project is completed during the early part of the sea turtle nesting and hatching season (March 1 through April 30), 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 within 30 days 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 appropriate Service Field Office (**Table 3**).

A14. If available, staging areas for construction equipment shall be located off the beach during early (March 1 through April 30) and late (November 1 through November 30) nesting season for Brevard through Broward counties and peak nesting season (May 1 through October 31) for the remaining counties. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes placed on the beach shall be located as far landward as possible without compromising the integrity of the dune system. Pipes placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune if the width of the beach allows. Temporary storage of pipes shall be off the beach to the maximum extent possible. If the pipes are stored 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.

A15. Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area during early (March 1 through April 30) and late (November 1 through November 30) nesting season for Brevard through Broward counties and peak nesting season (May 1 through October 31) for the remaining counties, and shall comply with safety requirements. Lighting on all 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, Corps EM 385-1-1, and 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 or to the adjacent sea turtle nesting beach in line-of-sight of the dredge (**Figure 15**).

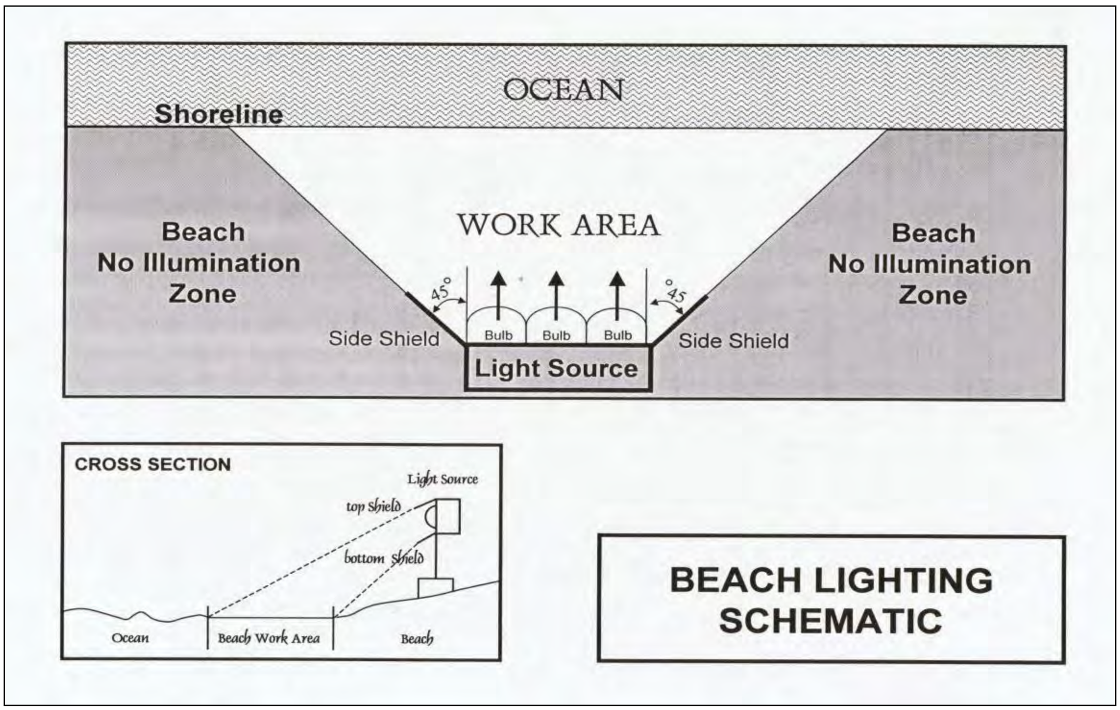

Figure 15. Beach lighting schematic.

A16. During the period during early (March 1 through April 30) and late (November 1 through November 30) nesting season for Brevard through Broward counties and peak nesting season (May 1 through October 31) for the remaining counties, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length) along the shoreline between dusk and dawn of 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 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 Corps will be allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length (or other agreed upon length) limitation shall apply. If any nesting turtles are sighted on the beach within the immediate construction area, activities shall cease immediately until the turtle has returned to the water and the sea turtle permit holder responsible for nest monitoring has relocated the nest.

Dune Planting

A17. 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 and 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 that 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 Corps, or the Applicant 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.

Beach Mouse Protection

A18. Beach mouse habitat shall be avoided when selecting sites for equipment, pipes, vehicle storage and staging to the maximum extent possible. Suitable beach mouse habitat constitutes the primary dunes (characterized by sea oats 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.

A19. 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 16**). The toe of the dune is where the slope breaks at the seaward foot of the dune.

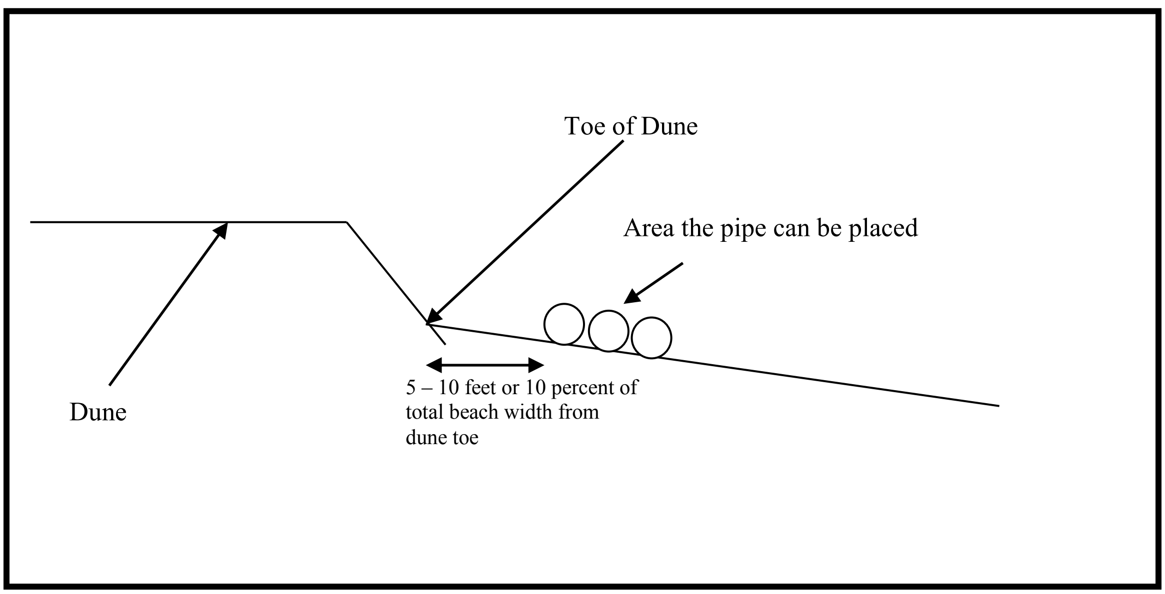

Figure 16. Equipment placement for projects occurring in beach mouse occupied habitat.

A20. Existing beach access points shall be used for vehicle and equipment beach access to the maximum extent possible. These access points shall be delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The access corridors shall be fully restored to the preconstruction conditions following project completion. Parking areas for construction crews shall be located as close as possible to the work sites, but outside of vegetated dune areas to minimize impacts to existing habitat and transporting workers along the beachfront.

A21. The location of new or expanded existing beach access corridors for vehicles and equipment within beach mouse habitat consisting of vegetated dunes shall be spaced no closer than every four miles. The distribution of access areas will result in the least number of access areas within beach mouse habitat as possible and delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The access corridors shall be (1) no more than 25 feet wide for vehicles and (2) no more than 50 feet wide for equipment. Expanded or new beach access points that impact vegetated dunes shall be restored within 3 months following project completion. Habitat restoration shall consist of restoring the dune to preconstruction conditions with planting of 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). Seedlings shall be at least one inch square with a 2.5-inch pot. Planting shall be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the area to be planted. Vegetation shall be planted with an appropriate amount of fertilizer and antidesiccant material, as appropriate, for the plant size. No sand stabilizer material (coconut matting or other material) shall be used in the dune restoration. The plants may be watered without installing an irrigation system. In order for the restoration to be considered successful, 80 percent of the total planted vegetation shall be documented to survive six months following planting of vegetation. If the habitat restoration is unsuccessful, the area shall be replanted following coordination with the Service.

<u>Reporting</u>

A22. An excel sheet with the information listed in **Table 19** shall be submitted to the Service (**Table 3**) by July 31 of the following year of construction. The excel sheet shall be available on the Service's website.

A report with the information listed in **Table 20** shall be submitted to the Service by the Corps by December 31 of the year following construction.

Table 19. Information to include in the report following the project completion.

All projects	Project location (include Florida DEP R-monuments and latitude and longitude coordinates)
	Project description (include linear feet of beach, actual fill template, access points, and borrow areas)
	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
	Sand compaction, escarpment formation, and lighting survey results by project shall be reported as listed in the Terms and Conditions by December 31 to the FWC and appropriate Service Field Office

	(Table 3)
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

Table 20. Sea turtle monitoring following sand placement activity.

CHARACTERISTIC	PARAMETER	MEASUREMENT	VARIABLE
Nesting Success	False crawls - number	Visual assessment of all false crawls	Number and location of false crawls in nourished areas and non-nourished areas: any interaction of the turtle with obstructions, such as groins, seawalls, or scarps, should be noted.
	False crawl - type	Categorization of the stage at which nesting was abandoned	Number in each of the following categories: emergence-no digging, preliminary body pit, abandoned egg chamber.
	Nests	Number	The number of sea turtle nests in nourished and non-nourished areas should be noted. If possible, the location of all sea turtle nests shall be marked on a project map, and approximate distance to seawalls or scarps measured in meters. Any abnormal cavity morphologies should be reported as well as whether turtle touched groins, seawalls, or scarps during nest excavation.
		Lost Nests	The number of nests lost to inundation or erosion or the number with lost markers.
	Nests	Relocated Nests	The number of nests relocated and relocation area on a map of the areas. The number of successfully hatched eggs per relocated nest.
	Lighting Impacts	Disoriented sea turtles	The number of disoriented hatchlings and adults shall be documented and reported in accordance with existing FWC protocol for disorientation events.

A23. In the event a sea turtle nest is excavated during construction activities, the project turtle permit holder 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, Applicant shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the appropriate Service Field Office immediately (**Table 3**).

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.

REASONABLE AND PRUDENT MEASURES for:

B. Projects that are navigation maintenance dredging with beach placement, swash zone placement, and submerged littoral zone placement shall include the following measures:

Historically, these sand placement events as a result of a navigation maintenance dredging project with no local sponsor are smaller scaled, conducted at closer time intervals, and the sand often does not remain on the beach for an extended period of time.

Post construction requirements are listed in Reasonable and Prudent Measures B11 and B12. These post construction requirements are subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Reasonable and Prudent Measures, the Corps must reinitiate consultation.

B1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice shall be implemented in the Corps federally authorized project or regulated activity.

B2. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence and beach mouse burrow construction shall be used for sand placement.

B3. For dredged material placement on the beach, sand placement shall not occur during the period of peak sea turtle egg laying and egg hatching to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation. In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties, dredged material placement shall not occur from May 1 through October 31. In St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte Counties, dredged material placement shall not occur from June 1 through September 30. In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte (except Manasota Key), Sarasota (except Manasota Key), Manatee, Hillsborough, Pinellas, Franklin (except St. George Island), Gulf (except St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape Sand Blas), Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties, sand placement may occur during the sea turtle nesting season (**Table 15 and Table 16**).

B4. For dredged material placement in the swash zone (at or below the MHWL) or submerged littoral zone, sand placement will be conducted at or below the +3-foot contour. The swash zone is that region between the upper limit of wave run-up (approximately one-foot above MHW) and the lower limit of wave run-out (approximately one-foot below MLW. Material will not be stacked too high that the material is above the water during low tide.

B5. For dredged material placement in the swash zone (at or below the MHWL) or submerged littoral zone, sand placement will be conducted at or below the +3-foot contour.

B6. All derelict material or other debris shall be removed from the beach prior to any sand placement.

B7. The Corps shall continue to work with FDEP, FWC, and the Service to create a sea turtle friendly beach profile for placement of material during construction.

B8. 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.

B9. A meeting between representatives of the Corps, Service, FWC, the permitted sea turtle surveyor, and other species surveyors, as appropriate, shall be held prior to the commencement of work on this project.

B10. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted. Surveys for early and late nesting sea turtles shall be conducted where appropriate. If nests are constructed in the area of sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation.

B11. Sand compaction shall be monitored and tilling shall be conducted if needed to reduce the likelihood of impacting sea turtle nesting and hatching activities. Not required for dredged material placement in the swash and littoral zone.

B12. Escarpment formation shall be monitored and leveling shall be conducted if needed to reduce the likelihood of impacting nesting and hatchling sea turtles. Not required for dredged material placement in the swash and littoral zone.

B13. Construction equipment and materials shall be stored in a manner that will minimize impacts to nesting and hatchling sea turtles and beach mice.

B14. Lighting associated with the project construction shall be minimized to reduce the possibility of disrupting and disorienting nesting and hatchling sea turtles and nocturnal activities of beach mice.

B15. During the sea turtle nesting season, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length) between dusk and the time of completion of the following day’s nesting survey to reduce the impact to emerging sea turtles and burial of new nests.

B16. Beach mouse habitat shall be avoided when selecting sites for storage and staging of equipment to the maximum extent possible.

B17. Equipment and construction materials shall not be stored near the seaward dune toe in areas of occupied beach mouse habitat. This area is highly utilized by beach mice.

B18. Existing vegetated habitat at beach access points and along shoreline travel corridors shall be protected to the maximum extent possible to ensure vehicles and equipment transport stay within the access and travel corridors.

B19. Expanded or newly created beach access points shall be restored.

B20. A report describing the actions taken shall be submitted to the Service following completion of the proposed work for each year when the activity has occurred.

B21. The Service and the FWC shall 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 for:

B. Projects that are navigation maintenance dredging with beach placement, swash zone placement, and submerged littoral zone placement of Corps civil works project shall include the following measures:

Historically, these sand placement events as a result of a navigation maintenance dredging project with no local sponsor are smaller scaled, conducted at closer time intervals, and the sand often does not remain on the beach for an extended period of time.

Post construction requirements are listed in Terms and Conditions B10 and B11. These post construction requirements are subject to congressional authorization and the allocation of funds. If the Corps or Applicant cannot fulfill these Terms and Conditions, the Corps must reinitiate consultation.

All beaches

B1. Conservation Measures included in the Corps' PBA that address protection of nesting sea turtles and beach mice listed on pages 9 and 10 of the SPBO shall be implemented in the Corps federally authorized project or regulated activity.

B2. Beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill must be sand that is similar to a native beach in the vicinity of the site that has not been affected by prior sand placement activity. The fill material must be similar in both coloration and grain size distribution to that native beach. 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. Fill material shall comply with FDEP requirements pursuant to the Florida Administrative Code (FAC) subsection 62B-41.005(15). A Quality Control Plan shall be implemented pursuant to FAC Rule 62B-41.008(1)(k)4.b.

B3. Dredged material placement shall not occur during the period of peak sea turtle egg laying and egg hatching to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.

a. Dredged material placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties shall be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes may be placed and/or stored on the beach.

b. Dredged material placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties may occur during the sea turtle nesting season except on publicly owned conservation lands such as state parks and areas where such work is prohibited by the managing agency or under applicable local land use codes (see exceptions in B3.c. below).

c. For higher density nesting beaches in Gulf and Franklin Counties and on Manasota Key in Sarasota and Charlotte Counties, dredged material placement shall not occur during the main part of the nesting season (June 1 through September 30). These beaches include St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte Counties.

d. For dredged material placement in the swash zone (at or below the MHWL) or submerged littoral zone during the sea turtle nesting season (**Tables 15 and 16**), the Corps shall contact the Service for coordination.

The Service shall be contacted for coordination, on a project-by-project basis, if sand placement is needed on publicly owned conservation lands and in these higher density nesting beaches in Gulf and Franklin Counties and on Manasota Key in Sarasota and Charlotte Counties during the above exclusionary period. The Service will determine whether work (1) may proceed in accordance with the Terms and Conditions; (2) proceed in accordance with the Terms and Conditions and other requirements as developed by the Service; or (3) would require that an individual emergency consultation be conducted.

B4. For dredged material placement in the swash zone (at or below the MHWL) or submerged littoral zone, sand placement will be conducted at or below the +3-foot contour. The swash zone is that region between the upper limit of wave run-up (approximately one-foot above MHW) and the lower limit of wave run-out (approximately one-foot below MLW. Material will not be stacked too high that the material is above the water during low tide and can obstruct the approach of nesting females to the beach.

B5. All derelict concrete, metal, and coastal armoring geotextile material and other debris shall be removed from the beach prior to any dredged material placement to the maximum extent possible. If debris removal activities take place during the peak sea turtle nesting season

(**Tables 15 and 16**), the work shall be conducted during daylight hours only and shall not commence until completion of the sea turtle nesting survey each day.

B6. The Corps shall continue to work with FDEP, FWC and the Service in conducting the second phase of testing on the sea turtle friendly profile during project construction. This includes exploring options to include a dune system in the project design for existing authorized projects and new non-Federal projects and how the existing sand placement template may be modified.

B7. Predator-proof trash receptacles shall be installed and maintained during construction at all beach access points used for the project construction to minimize the potential for attracting predators of sea turtles and beach mice (**Appendix C**). The Corps shall provide predator-proof trash receptacles for the construction workers. All workers shall be briefed on the importance of not littering and keeping the project area trash and debris free.

B8. A meeting between representatives of the Corps, 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, free-roaming cat observation, and reporting within the work area, as well as follow up meetings during construction (**Table 3**).

<u>Sea Turtle Protection</u>

B9. Daily early morning surveys for sea turtle nests shall be required as outlined in a through f. If nests are constructed in the area of sand placement, the eggs shall be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation (**Tables 15 and 16**).

a. For sand placement projects in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties that occur during March 1 through April 30, daily early morning surveys shall be conducted for sea turtle nests until completion of the project (whichever is earliest), and eggs shall be relocated per the following requirements. For sand placement projects that occur during the period from November 1 through November 30, daily early morning sea turtle nesting surveys shall be conducted 65 days prior to project initiation and continue through November 30, and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

i. 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 FAC 68E-1. Please contact FWC’s Imperiled Species Management Section in Tequesta at (561) 575-5407 for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones).

ii. 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.

iii. Nests deposited within areas where construction activities have ceased or will not occur for 65 days or nests laid in the nourished area prior to tilling shall be marked and left in situ unless other factors threaten the success of the nest. The turtle permit holder shall install an on-beach marker at the nest site and 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 that 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.

During the period from March 1 through April 30, daytime surveys shall be conducted for leatherback sea turtle nests beginning March 1. Nighttime surveys for leatherback sea turtles shall begin when the first leatherback crawl is recorded within the project or adjacent beach area through April 30 or until completion of the project (whichever is earliest). Nightly nesting surveys shall be conducted from 9 p.m. until 6 a.m. The project area shall be surveyed at 1-hour intervals (since leatherbacks require at least 1.5 hours to complete nesting, this will ensure all nesting leatherbacks are encountered) and eggs shall be relocated per the requirements listed in (a)i through (a)iii.

b. For sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties that occur during the period from May 1 through October 31, daily early morning (before 9 a.m.) surveys shall be conducted. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin, Gulf, Sarasota, and Charlotte Counties in B9.d. below).

c. For Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties, nesting surveys shall be initiated 70 days prior to sand placement activities (incubation periods are longer in these counties) or by May 1 whichever is later. Nesting surveys shall continue through the end of the project or through September 1 whichever is earlier. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys. If nests are laid in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii (see nest relocation exceptions for Franklin and Gulf Counties in B9.d. below).

d. For St. Joseph Peninsula State Park, St. Joseph peninsula, and Cape San Blas in Gulf County, St. George Island in Franklin County, and Manasota Key in Sarasota and Charlotte Counties, sand placement activities shall not occur from June 1 through September 30, the period of peak sea turtle egg laying and egg hatching for this area. If nests laid between May 1 and May 31 in areas where they may be affected by construction activities, eggs shall be relocated per the requirements listed in (a)i through (a)iii below.

e. For Pinellas, Hillsborough, Manatee, Sarasota, Charlotte, Lee, Collier, and Monroe Counties, nesting surveys shall be initiated 65 days prior to nourishment or dredged channel material placement activities or by April 15 whichever is later. Nesting surveys shall continue through the end of the project or through September 15 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 (a)i through (a)iii (see nest relocation exceptions for Sarasota and Charlotte Counties in B9.d. above).

f. For Miami-Dade County, nesting surveys shall be initiated 65 days prior to dredged material placement activities or by April 1 whichever is later. Nesting surveys shall continue through the end of the project or through September 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 (a)i through (a)iii.

g. For Volusia, Flagler, St. Johns, Duval, and Nassau Counties, nesting surveys shall be initiated 65 days prior to dredged material placement activities or by April 15 whichever is later. Nesting surveys shall continue through the end of the project or through September 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 (a)i through (a)iii.

B10. Sand compaction shall be monitored in the area of dredged material placement immediately after completion of the project and prior to the dates in **Table 18** for 3 subsequent years. Not required for dredged material placement in the swash and littoral zone.

If tilling is needed, the area shall be tilled to a depth of 36 inches. Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling. All tilling activity shall be completed at least once prior to the nesting season. An electronic copy of the results of the compaction monitoring shall be submitted to the appropriate Service Field Office (**Table 3**) prior to any tilling actions being taken. 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.(NOTE: If tilling occurs during shorebird nesting season (February 15-August 31), shorebirds surveys prior to tilling are required per the Migratory Bird Treaty Act (http://myfwc.com/docs/Conservation/FBCI_BNB_SeaTurtleMonitors.pdf)

a. Compaction sampling stations shall be located at 500-foot intervals along the sand placement template. 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).

b. 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 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 six averaged compaction values.

c. 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 appropriate date listed in **Table 18**.

d. 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.

e. 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.

B11. Visual surveys for escarpments along the project area shall be made immediately after completion of the dredged material placement and within 30 days prior to the start dates for Nesting Season Monitoring in **Tables 15 and 16** for 3 subsequent years if sand in the project area still remains on the dry beach. Not required for dredged material placement in the swash and littoral zone.

Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled and the beach profile shall be reconfigured to minimize scarp formation by the dates listed above. Any escarpment removal shall be reported by location. If the project is completed during the early part of the sea turtle nesting and hatching season (March 1 through April 30), 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 within 30 days 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 appropriate Service Field Office (**Table 3**).

B12. If available, staging areas for construction equipment shall be located off the beach during early (March 1 through April 30) and late (November 1 through November 30) nesting season for Brevard through Broward counties and peak nesting season (May 1 through October 31) for the remaining counties. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes placed on the beach shall be located as far landward as possible without compromising the integrity of the dune system. Pipes placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune if the width of the beach allows. Temporary storage of pipes shall be off the beach to the maximum extent possible. If the pipes are stored 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.

B13. Direct lighting of the beach and nearshore waters shall be limited to the immediate construction area during early (March 1 through April 30) and late (November 1 through November 30) nesting season for Brevard through Broward counties and peak nesting season (May 1 through October 31) for the remaining counties, and shall comply with safety requirements. Lighting on all 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, Corps EM 385-1-1, and 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 15**).

B14. During the period during early (March 1 through April 30) and late (November 1 through November 30) nesting season for Brevard through Broward counties and peak nesting season (May 1 through October 31) for the remaining counties, the Corps shall not extend the beach fill more than 500 feet (or other agreed upon length) along the shoreline between dusk and dawn of 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 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 Corps will be allowed to proceed with the placement of fill during daylight hours until dusk at which time the 500-foot length (or other agreed upon length) limitation shall apply. If any nesting turtles are sighted on the beach within the immediate construction area, activities shall cease immediately until the turtle has returned to the water and the sea turtle permit holder responsible for nest monitoring has relocated the nest.

<u>Beach Mouse Protection</u>

B15. Beach mouse habitat shall be avoided when selecting sites for equipment, pipes, vehicle storage and staging, and beach travel corridors to the maximum extent possible. Suitable beach mouse habitat constitutes the primary dunes (characterized by sea oats 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.

B16. 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 16**). The toe of the dune is where the slope breaks at the seaward foot of the dune.

B17. Existing beach access points shall be used for vehicle and equipment beach access to the maximum extent possible. These access points shall 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 access points shall be fully restored to preconstruction conditions following project completion. Parking areas for construction crews shall be located as close as possible to the work sites, but outside of vegetated dune areas to minimize impacts to existing habitat and transporting workers along the beachfront.

B18. The location of new or expanded existing beach access corridors for vehicles and equipment within beach mouse habitat consisting of vegetated dunes shall be no closer than every four miles. The distribution of access areas will result in the least number of access areas within beach mouse habitat as possible and delineated by post and rope or other suitable material to ensure vehicles and equipment transport stay within the access corridor. The access corridors shall be (1) no more than 25 feet wide for vehicles and (2) no more than 50 feet wide for equipment. Expanded or new beach access points that impact vegetated dunes shall be restored within 3 months following project completion. Habitat restoration shall consist of restoring the dune to preconstruction conditions with planting of 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). Seedlings shall be at least 1 inch square with a 2.5-inch pot. Planting shall be on 18-inch centers throughout the created dune; however, 24-inch centers may be acceptable depending on the area to be planted. Vegetation shall be planted with an appropriate amount of fertilizer and antidesiccant material, as appropriate, for the plant size. No sand stabilizer material (coconut matting or other material) shall be used in the dune restoration. The plants may be watered without installing an irrigation system. In order for the restoration to be considered successful, 80 percent of the total planted vegetation shall be documented to survive six months following planting of vegetation. If the habitat restoration is unsuccessful, the area shall be replanted following coordination with the Service.

<u>Reporting</u>

B19. An excel sheet with the information listed in **Table 21** shall be submitted to the Service (**Table 3**) by July 31 of the year following construction. The excel sheet shall be available on the Service's website. A report with the information from Terms Conditions B9 and B10 shall be submitted to the Service by December 31 of the year following construction.

B20. In the event a sea turtle nest is excavated during construction activities, the project turtle permit holder 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, Applicant shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the appropriate Service Field Office immediately (**Table 3**).

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.

REASONABLE AND PRUDENT MEASURES for:

C. Projects that include groin or jetty repair or replacement shall include the following measures:

In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties:

C1. Groin or jetty repair or replacement projects shall not occur during the period of peak sea turtle egg laying and egg hatching (May 1 through October 31), to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.

C2. Maintenance of groin or jetty projects conducted during the early (February 1 through April 30) and late sea turtle nesting season (November 1 through November 30) shall adhere to the following conditions:

a. Install a barrier around the perimeter of the groin or jetty repair or replacement work area sufficient to prevent adult sea turtles from accessing the project site.

b. For projects conducted during the early and late sea turtle nesting season, construction equipment and materials shall be stored in a manner that will minimize impacts to sea turtles to the maximum extent possible.

c. For projects conducted during the early and late sea turtle nesting season, no work may occur at night.

In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties:

C3. For maintenance of groin or jetty projects, conducted during the sea turtle nesting season.

a. Daily surveys shall be conducted by sea turtle permit holders. Nests laid adjacent to the work area shall be marked by flag and rope for avoidance.

b. A barrier shall be installed around the perimeter of the groin or jetty maintenance work area sufficient to prevent adult sea turtles from accessing the project site.

c. Construction equipment and materials shall be stored in a manner that will minimize impacts to sea turtles and beach mice to the maximum extent possible.

d. No work shall occur at night.

In All Counties:

C4. Safety lighting associated with the project shall be minimized to reduce the possibility of disrupting and disorienting nesting or hatchling sea turtles and nocturnal activities of beach mice.

C5. If entrapment of sea turtle hatchlings occurs in the groin or jetty system, the Corps shall meet with the Service to discuss a possible solution prior to the next nesting season.

C6. 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.

TERMS AND CONDITIONS for:

C. Projects that include groin or jetty repair or replacement shall include the following conditions:

In Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties:

C1. Groin or jetty repair or replacement projects shall be started after October 31 and be completed before May 1.

C2. For groin or jetty repair or replacement projects conducted during the early (March 1 through April 30) and/or late (November 1 through November 30) sea turtle nesting season:

a. A barrier (e.g., hay bales, silt screens) sufficient to prevent adult and hatchling sea turtles from accessing the project site shall be installed in a 100-foot buffer around the perimeter of the project site. The barrier shall be placed parallel to shore, at mean high water (MHW), as close to the groin or jetty as feasible, particularly during the period from sunset to sunrise.

b. On-beach access to the construction site shall be restricted to the wet sand below MHW to the maximum extent possible. Travel corridors on the beach to the MHWL shall be delineated. If the project is conducted during the early (March 1 through April 30) and/or late (November 1 through November 30) sea turtle nesting season, daily morning surveys shall be conducted within the travel corridor. If nests are laid within the travel corridor, the travel corridor must be re-routed to avoid the nest. If re-routing is not possible, these nests shall be relocated per the requirements listed in A9 (a)i through (a)iii.

c. Staging areas for construction equipment shall be located off the beach to the maximum extent possible.

d. No construction shall be conducted at night.

e. Daily early morning surveys for sea turtle nests shall be required as outlined in e(i) and e (ii). All nests laid in the vicinity of the project area shall be marked for avoidance per the requirements specified below:

i. Nesting surveys and nest marking will only be conducted by persons with prior experience and training in these activities and who are authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at (561) 575-5407 for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones). The Corps shall not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

ii. Nests deposited within the project area and access areas shall be left in place and marked for avoidance unless other factors threaten the success of the nest (nest laid below debris line marking the typical high tide, erosion). The turtle permit holder shall install an on-beach marker at the nest site and 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. The actual location of the clutch will be determined and nests will be marked. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest. No activity shall occur within this area nor will any activity occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and that the nest has not been disturbed by the project activity. Nest relocation is only allowed if nests laid within the travel corridor (beach access to MHWL) cannot be rerouted to avoid the nest.

In Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, and Escambia Counties:

C3. For groin or jetty repair or replacement projects conducted during the sea turtle nesting season:

a. Daily early morning surveys shall be conducted within the travel corridor.

b. A barrier (e.g., hay bales, silt screens) sufficient to prevent adult and hatchling sea turtles from accessing the project site shall be installed in a 100-foot buffer around the perimeter of the project site. The barrier shall be placed parallel to shore, at MHW, as close to the groin or jetty as feasible during the period from sunset to sunrise.

c. On-beach access to the construction site shall be restricted to the wet sand below MHW to the maximum extent possible. Travel corridors on the beach to the MHWL will be delineated. Nests laid within the travel corridor that would impede traffic will be relocated per the requirements listed in A9(a)i through (a)iii.. Nests laid in adjacent areas will be marked and avoided per the requirements listed in C(2)(e) i through iii. Staging areas for construction equipment shall be located off the beach to the maximum extent possible.

d. No nighttime construction may occur during the nesting season.

e. Material stockpiled on the beach shall only occur within the 200-foot barrier (100-foot area on either side). Construction activities shall not occur in any location prior to completion of the necessary sea turtle protection measures outlined below. If any nesting turtles are sighted on the beach, construction activities shall cease immediately until the turtle has returned to the water and the sea turtle permit holder responsible for nest monitoring has marked the nest. All activities shall avoid the marked nest areas.

C4. All nests laid adjacent to the project area shall be marked for avoidance per the following requirements:

a. Nesting surveys and nest marking will only be conducted by persons with prior experience and training in these activities and who are authorized to conduct such activities through a valid permit issued by FWC, pursuant to FAC 68E-1. Please contact FWC's Imperiled Species Management Section in Tequesta at (561) 575-5407 for information on the permit holder in the project area. Nesting surveys shall be conducted daily between sunrise and 9 a.m. (this is for all time zones). The Corps shall not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

i.b. Nests deposited within the project area and access areas shall be left in place and marked for avoidance unless other factors threaten the success of the nest (nest laid below debris line marking the typical high tide, erosion). The turtle permit holder shall install an on-beach marker at the nest site and 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. The actual location of the clutch will be determined and nests will be marked. A series of stakes and highly visible survey ribbon or string shall be installed to establish a 10-foot radius around the nest. No activity shall occur within this area nor will any activity occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and that the nest has not been disturbed by the project activity. Nest relocation is only allowed if nests laid within the travel corridor (beach access to MHWL) cannot be rerouted to avoid the nest.

In All Counties:

C5. To the maximum extent possible within the travel corridor, all ruts shall be filled or leveled to the natural beach profile prior to completion of daily construction.

C6. Exterior lighting shall not be permanently installed in association with the project. Temporary lighting of the construction area during the sea turtle nesting season shall be reduced to the minimum standard required by OSHA for general construction areas. Lighting on all equipment including offshore 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, Corps EM 385-1-1, and 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 15**).

C7. If entrapment of sea turtle hatchlings occurs in the groin or jetty system during construction, the Corps shall contact the Service immediately.

C8. 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 (**Table 3**) by July 31 of the year following completion of the proposed work for each year when the activity has occurred. This report will include the following information:

Table 21. Information to include in the report following the project completion.

All projects	Project location (include Florida DEP R-monuments and latitude and longitude coordinates)
	Project description
	Dates of actual construction activities
	Names and qualifications of personnel involved in sea turtle nesting surveys and mark and avoid activities
	Nesting survey, mark and avoid activities, and nest relocation results

The Service believes that incidental take will be limited to the 8.8 miles of shoreline per year within the northwest portion of Florida for the NGMRU (38 miles during an emergency year) and 18.9 miles of shoreline within the PFRU (64 miles during an emergency year) of beach that have been identified for sand placement. 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 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 project areas; (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 projects; (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 sand placement areas or on adjacent beaches during and after sand placement or construction activities; (5) misdirection of nesting and hatchling turtles on beaches adjacent to the sand placement or construction area as a result of project lighting including the ambient lighting from dredges; (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 will be considered exceeded if the project results in more than a 8.8 miles of shoreline per year within the northwest portion of Florida for the NGMRU (38 miles during an emergency year) and 18.9 miles of shoreline within the PFRU (64 miles during an emergency year) of sand on the of beach that have been identified for sand placement. 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. If public driving is allowed on the project beach, and if the Corps has the authority, we recommend it exercise its discretionary authority to require the local sponsor or Applicant to have authorization from the Service for incidental take of sea turtles, their nests, and hatchlings and beach mice, as appropriate, due to such driving or provide written documentation from the Service that no incidental take authorization is required. If required, the incidental take authorization for driving on the beach should be obtained prior to any subsequent sand placement events.

2. For sand placement projects in Nassau, Duval, St. Johns, Flagler, Volusia, Miami-Dade, Monroe, Collier, Lee, Charlotte, Sarasota, Manatee, Hillsborough, Pinellas, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa and Escambia Counties, 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 (May 1 through October 31).

3. Beach nourishment should not occur on publicly owned conservation lands during the sea turtle nesting season.

4. All created dunes should be planted with at least three species of appropriate native salt-resistant dune vegetation. Examples along the Atlantic coast include: bitter panicgrass, sea oats (grown from local genetic stock), beach morning-glory, or railroad vine. Examples along the Northwest Florida coast includes: bitter panicgrass, little bluestem (*Schizachyrium scoparium),* sea oats (grown from local genetic stock), beach morning-glory, or railroad vine. Examples along the Southwest Florida coast include: sea oats (grown from local genetic stock), bitter panicgrass, beach morning-glory, and railroad vine.

5. If the project area is within a local municipality that has not adopted a lighting ordinance, and lighting is shown to be an issue on a nourished beach, and if the Corps has the authority, we recommend it exercise its discretionary authority to require an ordinance be adopted prior to any subsequent sand placement event.

6. To increase public awareness about sea turtles and beach mice, informational signs should be placed at beach access points where appropriate. The signs should explain the importance of the beach to sea turtles and beach mice.

7. If the Corps has the authority, we recommend it exercise its discretionary authority to require predator control programs (including education of pet owners and cat colony supporters) should be implemented that target free-roaming cats.

8. Dune walkovers should be installed at beach access points to protect the restored beach and dunes.

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 NOTICE

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. Reinitiation of formal consultation is also required ten years after the issuance of this SPBO. In instances where the amount or extent of incidental take is exceeded, any operations causing such take shall cease pending reinitiation.

The above findings and recommendations constitute the report of the Service. If you have any questions about this SPBO, please contact Ann Marie Lauritsen of this office at (904) 525-0661, Richard Zane of the Panama City Field Office at (850) 769-0552, or Jeffrey Howe of the South Florida Field Office at (772) 562-3909.

Service Log Number: 41910-2011-F-0170

Sincerely,

/s/

David L. Hankla
Field Supervisor

cc:
FWC, Tallahassee, Florida, (Robbin Trindell)
FWC, Panama City, Florida (John Himes)
FWC, Lake City, Florida (Terry Doonan)
FWC, Lake City, Florida (Melissa Tucker)
FWC, Lake City, Florida (Nancy Douglass)
Service, Panama City, Florida, (Patricia Kelly, Richard Zane, Ben Frater)Service, Vero Beach, Florida (Jeffrey Howe)
Service, Jacksonville, Florida (Sandy MacPherson)
Service, Atlanta RO digital version in Word (Ken Graham)
NMFS, Protected Species Division, St. Petersburg (Eric Hawk)

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Appendix A

PREVIOUS FORMAL CONSULTATIONS/BIOLOGICAL OPINIONS WITHIN FLORIDA THAT HAVE BEEN ISSUED FOR ALL PROJECTS THAT HAD ADVERSE IMPACTS TO THE SEA TURTLES ON THE NESTING BEACH

YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	PROJECT LOCATION	PROJECT TYPE	ANTICIPATED INCIDENTAL TAKE (linear footage, no. of eggs, etc.)
STATEWIDE	Nassau, Duval, St. Johns, Flagler, Volusia, Brevard, Indian River, St. Lucie, Martin, Palm Beach, Broward, Monroe, Miami-Dade, Collier, Lee, Charlotte, Sarasota, Manatee, Pinellas, Pasco, Franklin, Gulf, Bay, Walton, Okaloosa, Santa Rosa, Escambia	FEMA Emergency Beach Berm Repair	2007-F-0430		Repair of 5-year beach berms post-disaster	75 miles
JAX FIELD OFFICE						
1991	Brevard	Lighting at Cape Canaveral Air Force and Patrick Air Force Station	4-1-91-028	Lighting at both installations	Sea turtle lighting	75 disoriented loggerhead nests; 2 green turtles nests at CCAFS and 2 loggerhead nests at PAFB
1993	Brevard	Beach nourishment on Cape Canaveral	4-1-93-073C		Beach nourishment	2 miles
1995	Brevard	Inlet Bypass on Brevard County Beach at Cape Canaveral		R-1 to R-14	Inlet bypass	
1996	Brevard	Canaveral Port Authority Dredge and Beach Disposal		R-34 to R-38	Dredge and beach restoration	
1998	Brevard	Inlet bypass on Brevard County Beach at Cape Canaveral		R-1 to R-14		
2000	Brevard	Amended Lighting at Cape Canaveral Air Force and Patrick Air Force Station	00-0545	Lighting at both installations	Sea turtle lighting	2 percent hatchling and nesting female disorientations at each installation.
2001	Brevard	Brevard County Shore Protection Project (North Reach)		R-5 to R-12 and R-13 to R-54.5	Beach nourishment	9.4 miles
2001	Brevard	Patrick Air Force Base Beach Restoration		R-53 to R-70	Beach nourishment	
2002	Brevard	Brevard County Shore Protection Project		R-123.5 to R-139	Beach nourishment	3.02 miles

		(South Reach)				
2002	Brevard	Brevard County Shore Protection Project (North Reach)		R-4 to R-20	Beach nourishment	
2002	Brevard	Permanent Sand Tightening of North Jetty at Canaveral Harbor	02-1090	North jetty at Canaveral Inlet	Sand tightening and extension of existing jetty	500 feet
2003	Brevard	Brevard County Shore Protection Project (South Reach)		R-118.3 to R-123.5		0.94 mile
2004	Brevard	Canaveral Harbor Federal Sand Bypass and Beach Placement	04-0077	R-14 to R-20	Inlet bypass and beach nourishment	18,600 linear feet
2005	Brevard	Brevard County Shore Protection Project (North and South Reach)	05-0443	R-5 to R-20 and R-21 to R-54.5 and R-118 to R-139	Beach nourishment	13.2 miles
2005	Brevard	Brevard County FEMA Berm and Dune Restoration	05-1054	R-75 to R-118	Dune repair	12 miles
2005	Brevard	Patrick Air Force Base Beach Restoration	05-0258	R-54.5 to R-75.3	Beach nourishment	
2005	Brevard	Sloped Geotexile Revetment Armoring Structures	05-0454	5 tubes along north and south Melbourne beach	Protec tube installation	4,600 linear feet
2006	Brevard	Brevard County FEMA Berm and Dune Restoration	41910-2006-F-0189	R-75 to R-118	Dune repair	12 miles
2006	Brevard	Amended Lighting at Cape Canaveral Air Force and Patrick Air Force Station	41910-2006-F-0841		Sea turtle lighting	3 percent hatchling and nesting female disorientations at each installation
15 Feb 2008	Brevard	Patrick Air Force Base Dune Restoration	41910-2008-F-0150	R-65 to R-70	Dune restoration	6,000 linear feet
25 Jan 2008	Brevard	Brevard County's Dune Restoration	41910-2008-F-0189	R-75 to R-118 and R-138 to R-202	Dune restoration	140,000 cy along 3,000 linear feet
2009	Brevard	Brevard County's Dune Restoration	41910-2009-F-0125	R 75.4 to R 118.3 and R-139 to R-213	Dune restoration	22 miles
2009	Brevard	Mid Reach		R-75 to R119	Beach berm repair (permanent)	40,748 linear feet
2009	Brevard	South Beach		R-139 to R-215	Beach berm repair (permanent)	70,385 linear feet
2009	Brevard	Patrick Air Force Base Dune Restoration and Beach Nourishment	41910-2009-F-0336	R-36 to R-75, R-53 to R-65	Sand placement	8,500 linear feet for dune restoration and 11,235 linear feet for beach nourishment.
2009	Brevard	Brevard Dune	41910-2009-F-0125	R-75.4 to R-118.3, R-139 to R-213	Dune restoration	Periodically on no more than 22 miles.

		Restoration				
2009	Brevard	Mid Reach Shore Protection	41910-2008-F-0547	R-119 to R-75.4	Sand placement	7.7 linear miles
2009	Brevard	Canaveral Harbor Sand Bypass	41910-2008-F-0547	Canaveral Harbor	Sand bypass	18,600 linear no more than every 2 years
2009	Brevard	Kennedy Space Center Lighting	41910-2009-F-0306			3% of all hatchling disorientation events
2009	Brevard	South Beach Renourishment	41910-2009-F-0327			7.8 miles
1991	Duval	Duval County Beach Erosion Control		R-44 to R-52.5	Beach nourishment	9,000 linear feet
1996	Duval	Duval County Beach Erosion Control		R-47 to R-80	Beach nourishment	5 miles
2003	Duval	Duval County Beach Erosion Control		R-72 to R-80	Beach nourishment	
2005	Duval	Duval County Beach Erosion Control	05-1544	R-43 to R-53 and R-57 to R-80	Beach nourishment	5.7 miles
2010	Duval	Duval County Hurricane and Storm Damage Reduction	2010-CPA-0045	V-501 to R-80	Beach nourishment	52,800 linear feet
2005	Flagler	Road Stabilization from SR A1A	41910-2006-IE-0173		Seawall	140 linear feet
2009	Flager	State Road (SR) A1A Shoreline Stabilization	41910-2007-F-0495	200 feet south of South 28th Street to 980 feet south of Osprey Point Drive	Sand placement, revetments, and seawalls	5.2 miles = length of take; 3,000 linear feet of anticipated incidental take
2005	Hillsborough	Egmont Key Nourishment	05-1845	R-2 to R-10	Beach nourishment	8,000 linear feet
1993	Manatee	Anna Maria Island Beach Restoration		R-2 to R-36	Beach nourishment	4.7 miles
1997	Manatee	Dredge Material Disposal and Longboat Key Beach Restoration		R-48 to R-51	Dredge and beach nourishment	
2002	Manatee	Anna Maria Island Beach Restoration		R-7 to R-10 and R-12 to R-36	Beach nourishment	5.2 miles
2005	Manatee	Anna Maria Island Shore Protection Project	41910-2006-F-0079	R-7 to R-10	Beach nourishment	3,000 linear feet
2005	Manatee	Anna Maria Island Emergency Beach Restoration	05-1227	R-2 to R-41	Beach nourishment	4.2 miles
2005	Manatee	Town of Longboat Key Beach Renourishment	4-1-04-TR-4529	R-44.5 to R-46	Beach nourishment	0.34 mile
2007	Manatee	Longboat Key Groin Installation	41910-2007-F-0521		Groin installation	2,210 linear feet
2009	Manatee	Anna Maria Island Beach Nourishment	41910-2008-F-456	R-7 to R-10, R-35 +790 feet and R-41 +365 feet	Sand placement	8,000 linear feet
2010	Manatee	Longboat Key North	41910-2010-F-0301			4,015 linear feet of beach

		End Nourishment				
1994	Nassau	South Amelia Island Beach Restoration		R-60 to R-78	Beach nourishment	
1997	Nassau	Dredging of Sawpit Creek Cut and Beach Disposal		R-73.5 to R-78	Dredge and beach nourishment	2,900 linear feet
2002	Nassau	South Amelia Island Beach Restoration		R-50 to R-80	Beach nourishment	3.4 miles
2002	Nassau	Fernandina Harbor Dredge and Beach Disposal		R-1 to R-9	Dredge and beach nourishment	8,000 linear feet
2004	Nassau	Nassau County Shore Protection Project at Amelia Island	05-1355	R-9 to R-33	Beach nourishment	3.6 miles
2005	Nassau	Nassau County Shore Protection Project at Amelia Island	05-1355	R-11 to R-34	Beach nourishment	4.3 miles
2005	Nassau	Dredging of Sawpit Creek Cut and Beach Disposal	41910-2006-F-0254	R-73.5 to R-78	Dredge and beach nourishment	2,900 linear feet
1988	Pinellas	Sand Key/Redington Beach Restoration		R-99 to R-107	Beach nourishment	
1990	Pinellas	Sand Key/Indian Rocks Beach Restoration		R-72 to R-85	Beach nourishment	
1991	Pinellas	Long Key Beach Restoration		R-144 to R-147	Beach nourishment	0.45 mile
1991	Pinellas	Johns Pass Dredge Material Disposal		R-127 to R-130	Dredge disposal and sand placement	
1992	Pinellas	Sand Key/Redington Beach Restoration		R-99 to R-107	Beach nourishment	
1992	Pinellas	Sand Key/Indian Shore Beach Restoration		R-85 to R-99	Beach nourishment	
1996	Pinellas	Treasure Island Beach Restoration		R-138 to R-142	Beach nourishment	2,500 linear feet
1996	Pinellas	Long Key Beach Restoration		R-144 to R-146	Beach nourishment	0.45 mile
1998	Pinellas	Sand Key/Belleair Beach Restoration		R-56 to R-66	Beach nourishment	
1999	Pinellas	Sand Key Beach Restoration		R-71 to R-107	Beach nourishment	
2000	Pinellas	Treasure Island Beach Restoration		R-136 to R-141	Beach nourishment	2.0 miles
2000	Pinellas	Terminal Groin at North End of Treasure Island			Groin construction	
2000	Pinellas	Long Key Beach Restoration		R-144 to R-145.6	Beach nourishment	2,800 linear feet
2000	Pinellas	Dredge Material Disposal and Honeymoon Island		R-10 to R-12	Dredge disposal and sand placement	

		Beach Restoration				
2004	Pinellas	Treasure Island Beach Restoration	04-1247	R-136 to R-141	Beach nourishment	5,000 feet
2004	Pinellas	Long Key Beach Restoration	04-1247	R-144 to R-148	Beach nourishment	4,000 linear feet
2005	Pinellas	Sand Key Emergency Renourishment	05-0627	R-56 to R-66 and R-72 to R-106	Beach nourishment	8.6 miles
2006	Pinellas	Treasure Island, Sunset, Long Key, Pass a Grill Emergency Renourishment	41910-2006-F-0480	R-126 to R-146	Beach nourishment	9.5 miles
2006	Pinellas	Dredge Material Disposal and Mullet Key and Fort DeSoto Beach Restoration	41910-2006-F-0692	R-177 to R-179.5 and R-181 to R-183	Dredge disposal and sand placement	4,500 linear feet
2009	Pinellas	Treasure Island Beach Nourishment	41910-2009-F-0250	R-136 to R-141, R-144 to R-148	Sand placement	11,375 linear feet
1997	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D	R-197 to R-209		
2001	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D			
2002	St. Johns	St. Johns County Shore Protection Project at St. Augustine		R-137 to R-152	Beach nourishment	2.5 miles
2003	St. Johns	St. Johns County Shore Protection Project at St. Augustine		R-132 to R-152	Beach nourishment	3.8 miles
2003	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D	R-197 to R-209	Beach nourishment	
2005	St. Johns	St. Johns County Shore Protection Project at St. Augustine	05-0446	R-137 to R-150	Beach nourishment	2.5 miles
2006	St. Johns		TE091980-0		Beach driving	41.1 linear miles
2007	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	41910-2007-F-0305	R-200 to R-208	Beach nourishment	4,000 linear feet
2009	St. Johns	Beach berm repair		R-201 to R-203, R-207 to R-208	Beach berm repair	7,000 linear feet
2009	St. Johns	Matanzas Inlet Maintenance Dredge and Summer Haven Sand Placement	41910-2009-F-0462	R-200 to R-208	Sand placement	8,000 linear feet

2009	St. Johns	St. Augustine Shore Protection Project	41910-2009-F-0444	600 feet north of R-137 and 600 feet south of R-151	Sand placement	15,280 linear feet
2010	St. Johns	St. Augustine Inlet Dredge and Sand Placement	41910-2010-F-0105			20,000 linear feet
2004	Volusia	Volusia County FEMA Berm	05-1074	R-40 to R-145 and R-161 to R-208	Beach nourishment	
2005	Volusia	Ponce de Leon Dredge and Beach Placement	05-0884	R-143 to R-145	Dredge and sand placement	3,000 linear feet
2005	Volusia		TE811813-11		Beach driving	50 miles
2006	Volusia	New Smyrna/Silver Sands Dune Restoration	05-1007	R-161 to R-175	Beach restoration	5.4 miles
2006	Volusia	Volusia County FEMA Berm	41910-2006-F-0831		Repair of right of way and beach placement	230 linear feet
2007	Volusia	Ponce de Leon Dredge and Beach Placement	41910-2007-F-0109	R-158 to R-175	Dredge and sand placement	3.2 miles
2009	Volusia	Ponce de Leon Inlet Maintenance Dredging and Sand Placement	41910-2009-F-0362	R-143 to R-145	Sand placement	8,000 linear feet
PANAMA CITY FIELD OFFICE						
8 April 1998	Bay	Panama City Beach Beach Nourishment	4-P-97-108	R-4.4 and R-93.2	Beach nourishment new project	16 miles
24 June 1998	Bay	Tyndall AFB Driving on the Beach	4-P-98-020	V-9 (virtual) to R-122	Driving on the beach for military missions	18 miles
31 July 1998	Bay	Lake Powell Emergency Opening	4-P-97-089	R- 0.5	Emergency outlet opening	1,500 feet
16 April 1999	Bay	Panama City Beach Beach Nourishment Amendment 1	4-P-97-108	R-0.5 to R-9	Beach nourishment completion	16 miles (no additional take provided from original)
9 March 2000	Bay	Panama City Beach Beach Nourishment Amendment 2	4-P-97-108	R-35 to R-71	Relief from tilling requirement beach nourishment	16 miles (no additional take provided from original)
10 April 2000	Bay	Panama City Beach Beach Nourishment Amendment 3	4-P-97-108	R-35 to R-71	Relief from tilling requirement beach nourishment	16 miles (no additional take provided from original)
18 December 2000	Bay	Panama City Beach Beach Nourishment Amendment 4	4-P-97-108	R-35 to R-71	Relief from tilling depth requirement and compaction testing sample numbers beach nourishment	16 miles (no additional take provided from original)
4 January 2001	Bay	East Pass Re-Opening	4-P-00-211	No R-monuments	Dredging of a closed inlet and dredged material placement on beach	2 miles

29 March 2001	Bay	Panama City Beach Beach Nourishment Amendment 5	4-P-97-108	R-35 to R-71	Relief from tilling depth requirement beach nourishment	16 miles (no additional take provided from original)
7 Sept 2001	Bay	City of Mexico Beach Sand Bypass System	4-P-01-178	Mexico Beach canal	Dredging and spoil disposal	3,700 feet 2.0 acres
14 January 2005	Bay	Panama City Beach Beach Nourishment Amendment 5	4-P-97-108	R-4.4 and R-93.2	Post hurricane restoration	16 miles (no additional take provided from original)
2006	Bay	Tyndall Air Force Base INRMP	4-P-05-240	V-9 (virtual) to R-122	Integrated Natural Resources Management Plan	18 miles
26 March 2006	Bay	Mexico Beach Canal Sand By Pass Amendment 1	4-P-05-281 2007-F-0205	R-127 to R-129	By pass system improvements	5,000 feet
24 May 2007	Bay	Panama City Beach Beach Nourishment Amendment 6	4-P-97-108 2007-TA-0127	R-4.5 to R-30 and R-76 to R-88	New work and post hurricane restoration	31,500 feet of 16 miles total no additional take provided
25 October 2007	Bay	Panama City Beach Nourishment Amendment 8	2008-F-0004	2008 project: R-74 to R-91; Entire project: R-0.5 to R-91	Beach nourishment	17.9 miles
29 Feb 2008	Bay	Panama City Harbor (revised BO)	2008-F-0168	R-97	Navigation channel maintenance dredging and beach placement of dredged material.	500 ft of beachfront at St. Andrew State Park
8 June 2009	Bay	Panama City Harbor Navigation Channel Amendment 1	2009-F-0175	R-92 to R-97	Maintenance navigation channel dredging and dredged material placement	0.85 mile
2009	Bay	City of Mexico Beach		R-128.5 to R-138.2	Beach berm repair (emergency)	9,393 linear feet
06 Jan 2010	Bay	Lake Powell Outlet Emergency Opening	2009-F-0226	R-0-A and R-1	Emergency opening of the outlet to the Gulf of Mexico	2,400 feet
7 August 2000	Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin	Destin Dome OCS Offshore Oil and Gas Drilling	4-P-00-003	Gulf of Mexico federal waters	Oil and gas offshore exploration	Formal consultation with no take
3 June 2002	Escambia	Pensacola Beach Beach Nourishment	4-P-02-056	R-108 to R-143	Beach nourishment	8.3 miles Loggerhead 14 nests Green 1 nest Leatherback < 1 nest Kemp's ridley <1 nest
9 June 2009	Escambia	Perdido Key Beach Nourishment	2008-F-0059	R-1 to R-34	New beach nourishment	6.5 miles
9 Sept 2010	Escambia	Pensacola Navigation Channel	2009-F-0205; using statewide programmatic 41910-2010-F-0547	R-32 to R-64	Navigation channel maintenance and dredge material disposal	6.3 miles

11 Jan 2010	Escambia	FEMA Perdido Key Upland Berm	Using statewide programmatic 41910-2010-F-0547	R-21.5 to R-31.5	Post Tropical Storm Gustav berm	2.0 miles
8 April 2005	Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf	FEMA Beach Berms Post Hurricane Ivan Emergency Coordination (consultation incomplete)		UK	Emergency beach berms	Walton 20 miles Okaloosa 4.2 miles Mexico Bch 1 mile Panama City Bch UK St Joseph peninsula UK Perdido Key UK Navarre UK
10 May 2004	Franklin	Alligator Point Beach Nourishment	4-P-02-163	R-207 to R-210	Beach nourishment	2,500 feet Loggerhead,: 2 nests, green 1 nest; leatherback 1 nest
17 May 2007	Gulf	St. Joseph Peninsula Beach Nourishment	4-P-07-056 2007-F-0220	R-67 to R-105.5	Beach nourishment	7.5 miles
31 Jan 2008	Gulf	St. Joseph Peninsula Beach Nourishment; Amendment 2	2008-F-0161	R-67 to R-105.5	Beach nourishment – change from work in 2 to 1 season.	7.5 miles; no increase in IT.
2009	Gulf	St. Joseph Peninsula Beach		R-95.3 to R-105.5	Beach berm repair (emergency)	10,300 linear feet
25 April 2001	Okaloosa	Eglin AFB Porous Groin within Season	4-P-00-207	Eglin AFB Test Sites 1 and 3	Experimental porous groin system	
18 June 2002	Okaloosa	Eglin 737 Sensor Test Site 13-A SRI	4-P-02-088	V-507	Military testing	0.01 acre 0.12 mile
2009	Okaloosa	City of Destin		R-17.37 to R-19	Beach berm repair (emergency)	1,260 linear feet
23 Dec 2009	Okaloosa	East Pass at Destin Navigation Channel	2009-F-0096	R-17 to R-25.5	Navigational channel maintenance	1.7 miles
21 March 2003	Okaloosa Santa Rosa	Eglin Marine Expeditionary Unit Training	4-P-03-052	V-621 to V-501	Military marine training	
9 October 2003	Okaloosa Santa Rosa	Eglin AFB U.S. Army Ranger Los Banos	4-P-03-289	V-502 to V-533	Military army training	7 miles
25 February 2004	Okaloosa, Santa Rosa	Eglin AFB Advance Skills Training	4-P-03-264	R-502 to R-534	Military training	7 miles 70 acres
4 June 2004	Okaloosa Santa Rosa	Eglin AFB Airborne Littoral Reconnaissance Test	4-P-04-225	V-501 to V-514	Military naval testing	0.5 mile 15.2 acres
1 December 2005	Okaloosa Santa Rosa	Eglin Air Force Base Military Mission & Training Santa Rosa Island Programmatic	4-P-05-242	V-621 to V-501	Military missions	17 miles
6 December 2007	Okaloosa Santa Rosa	Eglin AFB Airborne Littoral Reconnaissance Test	2008-F-0056	V-501 to V-514 Test Site A-15	Military naval testing	0.7 acre
3 June 2008	Okaloosa Santa Rosa	Eglin AFB Beach and Dune Restoration	2008-F-0139	V-551 to V-609 excluding non-AF lands and V-512 to	Beach nourishment including dune	5.0 miles

				V-518	restoration (new)	
28 August 2008	Okaloosa, Santa Rosa	Eglin Air Force Base Armoring Santa Rosa Island Test Sites A-3, A-6, A-13B	2008-F-061	Test Sites A-3, A-6, A-13B	Storm protection at air force facilities, Santa Rosa island	0.57 miles
21 April 2009	Okaloosa, Santa Rosa	East Pass Destin Navigation Channel	2009-F-0295	V-619.5 to V-621 and R-17	Maintenance navigation channel dredging and dredged material placement	1.6 miles
28 Dec 2009	Okaloosa, Santa Rosa	Eglin Air Force Base protection of Test Sites A-3, A-13, and A-13b	2008-F-061 amendment 1	V-608 and V-512	Sand placement 100% proposed at sites A-3 and 50% of proposed between sites A-13b and A-13.	A-3, = 7,000 feet; between A-13b and A-13.5=5,500-7,000 feet
28 Dec 2009	Okaloosa, Santa Rosa	Eglin Air Force Base	2008-F-039 amendment 1	V-608 and V-512	Sand placement 100% proposed at sites A-3 and 50% of proposed between sites A-13b and A-13.	A-3, = 7,000 feet; between A-13b and A-13.5=5,500-7,000 feet
26 March 2002	Santa Rosa, Okaloosa, Gulf	Eglin AFB INRMP		V-621 to V-501	Integrated natural resources management program	17 miles
19 July 2005	Santa Rosa	Navarre Beach Nourishment Emergency Coordination (consultation incomplete)	4-P-04-244	R-192.5 to R-213.5	Emergency beach nourishment	4.1 miles
24 Aug 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
30 Aug 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
29 Nov 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with beach nourishment	4.1 miles (no additional take provided from original)
28 August 2008	Santa Rosa	Eglin AFB SRI Armoring at Test Sites	2008-F-0061	V-608, V-551, and V-512	Bulkheads around test sites A-3, A-6, and A-13B	0.57 mile
7 Dec 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139		Walkover construction associated with	4.1 miles (no additional take provided from original)

					beach nourishment	
9 October 2009	Santa Rosa	Navarre Beach Restoration Amendment 7	2010-F-0036	R-192 to R-194	Emergency beach restoration	1,800 feet
30 April 2004	Walton, Okaloosa	Walton County-Destin Beach Nourishment	4-P-01-149	R-39 (Okaloosa Co.) to R-21.93 (Walton Co.)	New beach nourishment	6.7 miles Loggerhead: 11 nests; green 1 nests; leatherback & Kemp's ridley: < 1 nests
8 May 2006	Walton	Western Lake Emergency Opening	4-P-01-105	R-72 to R-73	Emergency outlet opening	0.5 miles 3.0 acres
26 October 2007	Walton	Eastern Lake Emergency Opening	2007-F-0627	R-94 to R-95	Emergency opening of coastal dune lake to GOM	0.5 mile
9 November 2007	Walton	Alligator Lake Emergency Opening	2007-F-0031	R-68 to R-70	Emergency opening of coastal dune lake to GOM	0.5 mile
2 October 2008	Walton	Walton County Beach Nourishment Phase 2	2008-F-060	R-41 to R-67, R-78 to R-98, R-105.5 to R-127	Beach nourishment (new)	13.5 miles
SOUTH FLORIDA FIELD OFFICE						3,390 feet
11 March 2003	Broward	Broward County Shore Protection Project	4-1-99-F-506		Port Everglades dredging and beach nourishment	
4 Dec 2003	Broward	Diplomat Beach Nourishment	4-1-00-F-743		Nourishment and 200 feet of riprap	
25 Aug 2004	Broward	Fishermen's Pier	4-1-04-F-8366		Pier repair	14,910 square feet
18 June 2007	Broward	Hillsboro Inlet Maintenance Dredging and Sand Placement	41420-2006-FA-0896	315 feet of the Inlet and 500 feet of shoreline at R-25.	Inlet dredging and sand nourishment	500 feet
10 Dec 2007	Broward	Town of Hillsboro Beach Pressure Equalizing Modules (PEMs) Pilot Project	41420-2007-F-0859	300 feet north of R-7 to 100 feet south of R-12 1 mile of shoreline	Pilot project to investigate the effectiveness of the PEMs	1 mile
7 Mar 2008	Broward	Broward County Glass Cullet Pilot Project	41420-2007-FA-0599	Centered at R-103	Pilot project to examine the effectiveness of glass cullet as potential beach fill supplement material for shoreline stabilization.	333 feet
28 April 2008	Broward	Town of Hillsboro Truck Haul Beach Nourishment Project	41420-2008-FA-0187	330 feet north and 100 feet south of R-7	Temporary beach nourishment	0.08 mile (430 feet)

3 Sept 2008	Broward	Hillsboro Inlet Maintenance Dredging and Sand Placement	41420-2006-FA-0896	500 feet south of R-25	Inlet dredging and sand placement. This is an amended BO in regard to the original BO completed on 18 June 2007.	500 feet
28 May 2010	Broward	Port Everglades Jetty Repair	41420-2010-CPA-0144	South Jetty	Repair of the south jetty.	0.15 mile
18 June 2010	Broward	Hillsboro Beach Sand Placement	41420-2008-FA-0187	R-5 +300 to R-12 +450 feet	Beach nourishment	1.35 miles
23 March 2005	Charlotte	Manasota Key Groin Construction	4-1-04-F-8338	R-19 to R-20	Stump Pass dredging (material placed on beach); and groin construction	1,000 feet
29 March 2006	Charlotte	Stump Pass Dredging and Beach Nourishment	4-1-04-F-8338	R-16.5 to R-18	Stump Pass dredging and beach nourishment	1,500 feet
26 April 2010	Charlotte	Stump Pass Dredging and Sand Placement	41420-2008-FA-0425	R-14.4 to R-20 R-22 to R-23 R-29 to R-39	Stump Pass dredging and sand placement	3.5 miles
3 April 2003	Collier	Keewaydin Island Limited Partnership T-Groin Project	4-02-F-1099	R-90 to R-91	Gordon Pass – maintenance dredge; nourish the section of beach where groins are to be constructed; construct three t-groins	1,000 feet
14 March 2005	Collier	Hideaway Beach	4-1-04-F-6342	H-1 to H-5 and H-9 to H-12	Beach nourishment and t-groin construction	1.4 miles
20 Sept 2005	Collier	Collier County Beach Re-Nourishment Project	4-1-04-TR-8709	Segments within R-22 and R-79	Beach nourishment	13.4 miles
14 Nov 2005	Collier	South Marco Island Beach Re-Nourishment	4-1-04-TR-11752	R-144 to G-2	Beach nourishment	0.83 mile
28 August 2008	Collier	Doctor's Pass North Jetty Repair	41420-2008-FA-0432	R-57 plus 500 feet south	Removing the existing 240 feet of existing jetty and constructing a new jetty within generally the same footprint.	0.25 mile
27 October 2009	Collier	Hideaway Beach Erosion Control	41420-2008-FA-0935	H-4 to H-9	Sand placement and construction of six T-head groins.	0.47 mile
18 August 2010	Collier	Gordon Pass Erosion Control Project – Phase 2 (T-head groins)	41420-2008-FA-0765	R-91 to R-92	Construction of two T-head groins.	0.19 mile

28 Oct 2010	Collier	Collier County Truck Haul Sand Placement (Park Shore & Naples Beach)	41420-2010-F-0225	R-45 +600 feet to R-46 +400 feet; R-58A -500 feet to R-58	A truck haul sand placement project	0.37 mile
12 Oct 2004	Indian River	Issuance of Permits to Homeowners for Emergency Coastal Armoring	10(a)(1)(B) permit			3,196 feet
28 Feb 2005	Indian River	Indian River County Beach Nourishment - Sectors 3 and 5	4-1-05-F-10922	Gaps between R-21 and R-107	Dune restoration and beach nourishment	5.90 miles dunes 0.8 mile beach
22 Nov 2005	Indian River	Indian River County Beach Nourishment – Sector 7	4-1-05-TR-9179	R-97 to R-108	Beach nourishment	2.2 miles
31 Oct 2006	Indian River	Indian River County Beach Nourishment – Sectors 1 and 2	41420-2006-FA-1491	R-3.5 to R-12	Dune enhancement and beach nourishment	1.62 miles
10 Sept 2007	Indian River	Sebastian Inlet Channel and Sand Trap Dredging, Sectors 1 and 2 Beach Nourishment	41420-2007-F-0864	R-3 to R-12	Sand trap dredging and beach nourishment	1.61 miles
10 October 2008	Indian River	Baytree and Marbrisa Condominium Dune Restoration	41420-2008-FA-0007	200 feet south of R-46 to 200 feet south of R-48	Dune restoration/enhancement	0.38 mile
16 October 2009	Indian River	City of Vero Beach, Outfall Pipe Installation	41420-2009-FA-0255	220 feet north and 930 feet south of R-83	Outfall pipe installation	0.22 mile
2 December 2009	Indian River	Indian River County Beach Nourishment Sector 3	41420-2007-F-0839	Phase 1 = R-32 to R-55 Phase 2 = R-20 to R-32	Beach and dune nourishment	Phase 1 = ~4.4 miles Phase 2 = ~2.3 miles
24 July 2002	Lee	Gasparilla Island Beach Nourishment	4-01-F-765	R-10 to R-26.5 R-25, R-25.5, R-26	Beach nourishment; breakwater construction; and two t-head groins	3.2 miles
19 June 2003	Lee	Bonita Beach Re-nourishment	4-1-02-F-1736		Beach nourishment	3,922 feet
4 March 2005	Lee	Sanibel and Captiva Island Beach Nourishment	4-1-04-F-9180	R-83 to R-109 and R-110 to R-118	Beach nourishment	6.0 miles
14 March 2007	Lee	Gasparilla Island Beach Nourishment (BO amendment)	41420-2007-FA-0509	South of R-26A	Beach nourishment	
27 August 2007	Lee	North Captiva Island Beach Nourishment	41420-2007-FA-1023	R-81 and 208 feet south of R-81A	Beach nourishment	0.23 mile
5 August 2009	Lee	Matanzas Pass Reopening	41420-2009-FA-0132	North end of Estero Island	Channel dredging	0.14 mile
21 March 2008	Lee	Blind Pass Reopening	41420-2006-FA-1549	R-109 to R-114	Reopening Blind Pass and then	0.95 mile

					nourishing the shoreline between R-112 and R-114.	
7 Dec 2009	Lee	Sanibel Island Sand Placement	41420-2009-FA-0066	R-174A to Bay 1A	Beach nourishment	0.25 mile
15 Sept 2010	Lee	Big Hickory Island Sand Placement and Groin Construction	41420-2010-CPA-0100	R-222.3 to R-223.8	Beach nourishment and groin construction	0.47 mile
31 Jan 2002	Martin	Jupiter Island	4-1-05-TR-13281	R-75 to R-117	Beach nourishment	6.5 miles
5 Jan 2005	Martin	Martin County Shore Protection Project	4-1-05-F-10476	R-1 to R-25.6	Beach nourishment	4.1 miles
2 Dec 2005	Martin	Jupiter Island Modification	4-1-05-TR-13281	R-76 to R-84 and R-87 to R-11	Beach nourishment	5 miles
2 Feb 2007	Martin	Sailfish Point Marina Channel Dredging and Beach Nourishment	41420-2007-FA-0196	R-36 to R-39	Channel dredging and beach nourishment	0.66 mile
6 October 2009	Martin	Bathtub Beach Park Sand Placement	41420-2009-FA-0110	R-34.5 to R-36	Beach nourishment	0.24 mile
8 June 2010	Martin	Martin County Beach Erosion Control Project	41420-2009-FA-0190	R-1 to R-25	Beach nourishment	~ 4 miles
23 Sept 2005	Miami-Dade	Bal-Harbour T-Groin Reconstruction	4-1-05-12842	R-27 to R-31.5	Groin removal and reconstruction	0.85 mile
11 Oct 2005	Miami-Dade	Bakers Haulover AIW Maintenance Dredging	4-1-04-TR-8700	R-28 to R-32	Dredging and beach nourishment	0.85 mile
7 June 2006	Miami-Dade	Miami-Dade Beach Nourishment	41420-2006-FA-0028	3 segments within R-48.7 and R-61	Beach nourishment	3,716 feet
25 July 2007	Miami-Dade	Miami Beach Nourishment	41420-2006-F-0028	R-67 to R-70	BO modification to June 7, 2006 BO	3,000 feet
5 Nov 2008	Miami-Dade	Baker's Haulover Dredging and Sand Placement	41420-2008-FA-0729	R-28 to R-32	BO modification to the October 11, 2005 BO. Dredging and sand placement events will be biannual.	4,000 feet
12 Nov 2008	Miami-Dade	DERM Truck Haul Sand Placement	41420-2008-FA-0776	R-27 to R-29 R-7 to R-12 R-43 to R-44+500 feet	Beach nourishment	1.78 miles
25 Nov 2009	Miami-Dade	DERM 27th Street Sand Placement	41420-2009-FA-0045	R-60 to R-61	Beach nourishment	0.19 mile
17 Dec 2009	Miami-Dade	32nd and 63rd Streets Sand Placement	41420-2009-FA-0415	R-37.75 to R-46.25 R-53.7 to R-55.5 R-60 to R-61	Sand placement	2.14 miles
31 March 2010	Miami-Dade	55th Street Sand Placement	41420-2009-FA-0046	R-48.7 to R-50.7	Sand placement	0.38 mile
30 April 2010	Miami-Dade	44th Street Sand Placement	41420-2009-FA-0047	R-53.7 to R-55.5	Sand placement	0.34 mile
25 June 2010	Miami-Dade	Bal Harbour Sand	41420-2009-FA-	R-29 to R-32	Sand Placement –	0.60 mile

		Placement	0593		truck haul	
28 June 2010	Miami-Dade	Sunny Isles BeachSand Placement	41420-2009-FA-0594	R-12 to R-15)	Sand Placement – truck haul	0.58 mile
30 July 2010	Miami-Dade	Miami Beach sand placement	41420-2009-FA-0595	R-45 to R-48 +700 feet	Sand Placement – truck haul	0.78 mile
13 Sept 2010	Miami-Dade	Miami Beach sand placement	41420-2009-FA-0527	R-43 to R-44 + 500 feet	Sand Placement – truck haul	0.26 mile
8 October 2010	Miami-Dade	Sunny Isles Beach Sand Placement	41420-2009-FA-0526	R-7 to R-12	Sand Placement – truck haul	0.95 mile
8 October 2010	Miami-Dade	Bal Harbour Sand Placement	41420-2009-FA-0525	R-27 to R-29	Sand Placement – truck haul	0.38 mile
2009	Monroe	Reclaimed sand placement and sand cleaning (seaweed removal)	41420-2010-F-0006	No R-monuments	Sand placement and cleaning	1,462 linear feet
2009	Monroe	City of Key West (South Beach)	41420-2010-F-0013	No R-monuments	Beach repair (emergency)	235 linear feet
2009	Monroe	City of Key West (Rest Beach)	41420-2010-F-0014	No R-monuments	Beach repair (emergency)	640 linear feet
2009	Monroe	City of Marathon, Sombrero Beach	41420-2010-F-0001	No R-monuments	Beach repair (emergency)	1,380 linear feet
5 March 2010	Monroe	City of Key West – Simonton Beach	41420-2010-FC-0412	Approximately 350 feet ENE of V-416 (latitude 24.562, longitude -81.8054	Emergency beach repair	95 linear feet
5 March 2010	Monroe	City of Key West – Dog Beach	41420-2010-FC-0413	Between V-414 and V-413 (latitude 24.5473, longitude -81.7929	Emergency beach repair	35 linear feet
13 May 2010	Monroe	City of Key West, Smathers Beach	41420-2008-FA-0185	No R-monuments	Sand placement	0.57 mile
27 March 2003	Palm Beach	Palm Beach Harbor M & O	4-1-03-F-139	200 feet south of the south jetty	Jetty sand tightening	200 feet
16 March 2004	Palm Beach	Boca Raton Inlet Sand Bypassing	4-1-04-F-4688	200 feet south of R-223	Inlet sand bypassing and beach nourishment	500 feet
11 Feb 2005	Palm Beach	Palm Beach Shoreline Protection Project - Delray Segment	4-1-05-F-10767	R-175 to R-188	Beach restoration	2.7 miles
24 Feb 2005	Palm Beach	Palm Beach Shoreline Protection Project - Ocean Ridge Section	4-1-05-F-10787	R-153 to R-159	Beach nourishment	1.12 miles
11 April 2005	Palm Beach	South Lake Worth Inlet Sand Transfer Plant Reconstruction and Bypassing	4-1-04-F-8640	135 feet south of R-151, to 275 feet south of R-152	STP reconstruction and bypassing	900 feet
5 Dec 2005	Palm Beach	Mid-Town Beach Nourishment Project (Reach 3 & 4)	4-1-00-F-742	R-90.4 to R-101.4	Beach nourishment	2.4 miles

23 Dec 2005	Palm Beach	Palm Beach Harbor M & O	4-1-05-TR-13258	R-76 to R-79	Dredging and beach nourishment	3,450 feet
23 Feb 2006	Palm Beach	Boca Raton Central Beach Nourishment Project	4-1-01-F-1795	R-216 to R-222	Dredge shoal fronting Boca Raton Inlet and beach nourishment	1.3 miles
23 Feb 2006	Palm Beach	Boca Raton South Beach Nourishment Project	41420-2008-FA-0777 Old database number 41-01-F-652	R-223.3 to R-227.9	Dredge shoal fronting Boca Raton Inlet and beach nourishment	Approx. 1 mile
28 April 2006	Palm Beach	Palm Beach Nourishment Project – Reach 8	41420-2006-F-0018	R-125 to R-134	Beach nourishment	2.17 miles
31 July 2006	Palm Beach	Sea Dunes Condominium Seawall	41420-2006-FA-1108		Seawall construction	0.03 acre
15 Dec 2006	Palm Beach	North Ocean Boulevard Rock Revetment	41420-2006-FA-1490	290 feet north of R-84; 1,150 feet south of R-85	Rock revetment construction	0.34 mile
5 Feb 2007	Palm Beach	Palm Beach Sand Transfer Plant Reconstruction	41420-2006-FA-1447	R-76 to R-79	Sand transfer plant reconstruction and discharge pipe extension	0.57 mile
28 March 2007	Palm Beach	Lake Worth Inlet Jetty Repair	41420-2007-FA-0221	200 feet north of R-75 and 200 feet south of R-76	Jetty repair	400 feet
25 May 2007	Palm Beach	Singer Island and South Palm Beach Emergency Dune Restoration	41420-2007-FA-1001	385’ south of R-137 to 500’ north of R-136; 500’south of R-60 to 850’ south of R-65	Dune Restoration	6,135 feet
25 May 2007	Palm Beach	Jupiter Island ICWW Maintenance Dredging and Beach Nourishment	41420-2006-FA-1582	16,000 feet (130,000 cy) of the ICWW dredged; material placed between R-13 and R-19.	Channel dredging and beach nourishment	1.04 miles
20 July 2007	Palm Beach	North Boca Raton Beach Nourishment	41420-2007-FA-0477	T-205 to 181 feet south of R-212	Beach nourishment	1.45 miles
9 Nov 2007	Palm Beach	Jupiter Inlet and channel dredging	41420-2006-FA-1582	R-13 to R-17	Dune restoration	~ 4,000 linear feet
14 Nov 2007	Palm Beach	Jupiter Inlet Sand Trap Dredging and Sand Placement	41420-2007-FA-0600	Maintenance dredging of the inlet; beach compatible placed R-13 to R-19	Inlet dredging and beach nourishment	1.02 miles
28 Nov 2007	Palm Beach	Modification to a Sheet Pile and Rubble-Mound T-Head Groin System	41420-2007-FA-0574	500 feet north of R-94 south to R-95	T-groin repair, extension, construction	0.4 mile
5 Feb 2008	Palm Beach	Reach 8 Dune Restoration	41420-2006-F-0018	R-125 to 350 feet south of R-134	Dune restoration	2.17 miles
9 Sept 2008	Palm Beach	Juno Beach Sand Placement	41420-2008-FA-0081	R-26 to R-38	Sand placement	2.45 miles
4 Nov 2008	Palm Beach	Palm Beach Harbor M&O and Sand	41420-2008-FA-0524	R-76 to R-79	Biannual Inlet dredging and sand	3,450 feet

		Placement			placement events.	
2009	Palm Beach	Beach berm repair	41420-2010-F-0008	R-60 to R-68	Beach berm repair (permanent work)	6,880 linear feet
2009	Palm Beach	Beach berm repair	41420-2010-F-0009	R-135 to R-138	Beach berm repair (permanent work)	3,590 linear feet
2009	Palm Beach	Beach berm repair	41420-2010-F0010	R-137 to R-138	Beach berm repair (emergency)	125 linear feet
21 June 2010	Palm Beach	Mid-Town Reaches 3 & 4 Sand Placement	41420-2006-F-0011-R001	R-95 to R-100	Beach nourishment	0.95 mile
2 July 2010	Palm Beach	Phipps Ocean Park Reaches 7&8	41420-2010-CPA-0110	R-116 to R-125	Sand Placement	3.4 miles
3 Sept 2010	Palm Beach	Singer Island Breakwater	41420-2008-FA-0019	R-60.5 to R-66	Segmented, submerged breakwater	1.1 miles
19 June 2003	St. Lucie	Fort Pierce Shoreline Protection	4-1-03-F-1867 41420-2006-FA-1575	R-33.8 to R-41	Beach nourishment; berm expansion; and six t-head groins	1.3 miles
9 March 2006	St. Lucie	Blind Creek Restoration and South St. Lucie Emergency Berm Remediation Project	41420-2006-FA-0075	R-98 to R-115 R-88 to R-90	Wetland restoration and beach nourishment	3.6 miles
27 June 2008	St. Lucie	Fort Pierce Shoreline Protection Project	41420-2006-FA-1575	R-34 to R-41	Beach nourishment, berm expansion, and six t-head groins	1.3 miles
25 Aug 2004	Sarasota and Manatee	Longboat Key Beach Nourishment	4-1-04-F-4529	R-46A to R-29.5	Beach nourishment	9.45 miles
4 Oct 2005	Sarasota and Manatee	Longboat Key Beach Nourishment Project – BO Amendment	4-1-04-TR-4529	R-44 to R-44.5 and R-46A to R-44.5	Beach nourishment	0.47 mile
20 Oct 2005	Sarasota	South Siesta Key	4-1-05-TR-12691	R-67 to R-77 plus 200 feet	Beach nourishment	2.1 miles
7 Dec 2007 (original BO) 28 July 08 (BO mod)	Sarasota	Lido Key Beach Fill Placement Project	41420-2007-F-0841	R-35.5 to R-44.2 2.27 miles	Beach nourishment with 425,000 cy of fill material.	2.27 miles
13 August 2008	Sarasota	Longboat Key Permeable Adjustable Groins	41420-2007-FA-0205	R-13 to R-13.5	Construction of two permeable adjustable groins.	0.09 mile project area 0.43 mile action area
2009	Sarasota		41420-2010-F-0003	R-77 to midpoint between R-77 and R-76	Beach restoration	700 linear feet
2009	Sarasota	Longboat Key Beach	41420-2010-F-0007	R-13 to R-14 Sarasota County; R-44 to R-5, and R-48.5 to R-49.5 Manatee County	Beach berm repair	951, 1,197, and 1,142 linear feet, respectively

Appendix B

FWC Fish and Wildlife Research Institute Statewide Nesting Beach Survey Protocol

1. **Survey Period:** There is no set period for Statewide nesting beach surveys, but ideally, all nesting activity is encompassed. Beaches with leatherback nesting usually begin by 1 March.

2. **Survey Time:** Surveys must be conducted in the early morning hours, preferably beginning at dawn in order to optimize crawl interpretation.

3. **Survey Frequency:** Most Statewide nesting beach surveys are conducted seven days a week, but some beaches, particularly remote ones, are surveyed on a less frequent basis.
Ideally, survey frequency should remain constant. All crawls should be marked or "erased" daily to avoid duplicate counts on subsequent survey days. If surveys are not conducted seven days/wk, only emergences made during the preceding 24 hours should be counted on a survey day.

4. **Survey Boundaries:** Survey boundaries should remain the same from year to year. If changes are necessary, please contact FWC well before the nesting season begins.
Boundaries should be permanent physical features.

5. **Crawl Identification:** All fresh crawls are identified to species and as either nests or false crawls based on observable crawl characteristics.

6. **Crawl Verification:** When a crawl does not have characteristics clearly indicating whether it is a nest or a false crawl, surveyors may dig with their hands at the probable location of the eggs to find the soft sand directly above the eggs. Digging should be a rare event. Probing for eggs is not permitted nor is the use of shovels.

7. **Data Reporting:** Data are reported on annual report forms supplied by FWC. The deadline for filing this report is 30 November.

8. **Significant Events:** If significant events occur that may affect turtles or their nests, please let FWC know about them. Significant events include habitat alterations such as beach nourishment, the placement of armoring or beach-access ramps, or erosion due to storms. Indicate date(s) and type of event in the comments section of the data form.

9. **Assistance:** Should questions arise or problems occur, contact Beth Brost at 1-727-896-8626, extension 1914, Fax 727-896-9176.

Appendix C

ASSESSMENTS: DISCERNING PROBLEMS CAUSED BY ARTIFICIAL LIGHTING

LIGHTING INSPECTIONS

WHAT ARE LIGHTING INSPECTIONS?

During a lighting inspection, a complete census is made of the number, types, locations, and custodians of artificial light sources that emit light visible from the beach. The goal of lighting inspections is to locate lighting problems and to identify the property owner, manager, caretaker, or tenant who can modify the lighting or turn it off.

WHICH LIGHTS CAUSE PROBLEMS?

Although the attributes that can make a light source harmful to sea turtles are complex, a simple rule has proven to be useful in identifying problem lighting under a variety of conditions:

An artificial light source is likely to cause problems for sea turtles if light from the source can be seen by an observer standing anywhere on the nesting beach.

If light can be seen by an observer on the beach, then the light is reaching the beach and can affect sea turtles. If any glowing portion of a luminaire (including the lamp, globe, or reflector) is directly visible from the beach, then this source is likely to be a problem for sea turtles. But light may also reach the beach indirectly by reflecting off buildings or trees that are visible from the beach. Bright or numerous sources, especially those directed upward, will illuminate sea mist and low clouds, creating a distinct glow visible from the beach. This “urban skyglow” is common over brightly lighted areas. Although some indirect lighting may be perceived as nonpoint-source light pollution, contributing light sources can be readily identified and include sources that are poorly directed or are directed upward. Indirect lighting can originate far from the beach. Although most of the light that sea turtles can detect can also be seen by humans, observers should realize that some sources, particularly those emitting near-ultraviolet and violet light (e.g., bug-zapper lights, white electric-discharge lighting) will appear brighter to sea turtles than to humans. A human is also considerably taller than a hatchling; however, an observer on the dry beach who crouches to the level of a hatchling may miss some lighting that will affect turtles. Because of the way that some lights are partially hidden by the dune, a standing observer is more likely to see light that is visible to hatchlings and nesting turtles in the swash zone.

HOW SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Lighting inspections to identify problem light sources may be conducted either under the purview of a lighting ordinance or independently. In either case, goals and methods should be similar.

GATHER BACKGROUND INFORMATION

Before walking the beach in search of lighting, it is important to identify the boundaries of the area to be inspected. For inspections that are part of lighting ordinance enforcement efforts, the jurisdictional boundaries of the sponsoring local government should be determined. It will help to have a list that includes the name, owner, and address of each property within inspection area so that custodians of problem lighting can be identified. Plat maps or aerial photographs will help surveyors orient themselves on heavily developed beaches.

PRELIMINARY DAYTIME INSPECTIONS

An advantage to conducting lighting inspections during the day is that surveyors will be better able to judge their exact location than they would be able to at night. Preliminary daytime inspections are especially important on beaches that have restricted access at night. Property owners are also more likely to be available during the day than at night to discuss strategies for dealing with problem lighting at their sites.

A disadvantage to daytime inspections is that fixtures that are not directly visible from the beach will be difficult to identify as problems. Moreover, some light sources that can be seen from the beach in daylight may be kept off at night and thus present no problems. For these reasons, daytime inspections are not a substitute for nighttime inspections. Descriptions of light sources identified during daytime inspections should be detailed enough so that anyone can locate the lighting. In addition to a general description of each luminaire (e.g., HPS floodlight directed seaward at top northeast corner of the building at 123 Ocean Street), photographs or sketches of the lighting may be necessary. Descriptions should also include an assessment of how the specific lighting problem can be resolved (e.g., needs turning off; should be redirected 90° to the east). These detailed descriptions will show property owners exactly which luminaries need what remedy.

NIGHTTIME INSPECTIONS

Surveyors orienting themselves on the beach at night will benefit from notes made during daytime surveys. During nighttime lighting inspections, a surveyor walks the length of the nesting beach looking for light from artificial sources. There are two general categories of artificial lighting that observers are likely to detect:

1. **Direct lighting**. A luminaire is considered to be direct lighting if some glowing element of the luminaire (e.g., the globe, lamp [bulb], reflector) is visible to an observer on the beach. A source not visible from one location may be visible from another farther down the beach. When direct lighting is observed, notes should be made of the number, lamp type (discernable by color; Appendix A), style of fixture (Appendix E), mounting (pole, porch, *etc.*), and location (street address, apartment number, or pole identification number) of the luminaire(s). If exact locations of problem sources were not determined during preliminary daytime surveys, this should be done during daylight soon after the nighttime survey. Photographing light sources (using long exposure times) is often helpful.

2. **Indirect lighting**. A luminaire is considered to be indirect lighting if it is not visible from the beach but illuminates an object (e.g., building, wall, tree) that is visible from the beach. Any object on the dune that appears to glow is probably being lighted by an indirect source. When possible, notes should be made of the number, lamp type, fixture style, and mounting of an indirect-lighting source. Minimally, notes should be taken that would allow a surveyor to find the lighting during a follow-up daytime inspection (for instance, which building wall is illuminated

and from what angle?).

WHEN SHOULD LIGHTING INSPECTIONS BE CONDUCTED?

Because problem lighting will be most visible on the darkest nights, lighting inspections are ideally conducted when there is no moon visible. Except for a few nights near the time of the full moon, each night of the month has periods when there is no moon visible. Early-evening lighting inspections (probably the time of night most convenient for inspectors) are best conducted during the period of two to 14 days following the full moon. Although most lighting problems will be visible on moonlit nights, some problems, especially those involving indirect lighting, will be difficult to detect on bright nights.

A set of daytime and nighttime lighting inspections before the nesting season and a minimum of three additional nighttime inspections during the nesting-hatching season are recommended. The first set of day and night inspections should take place just before nesting begins. The hope is that managers, tenants, and owners made aware of lighting problems will alter or replace lights before they can affect sea turtles. A follow-up nighttime lighting inspection should be made approximately two weeks after the first inspection so that remaining problems can be identified. During the nesting-hatching season, lighting problems that seemed to have been remedied may reappear because owners have been forgetful or because ownership has changed. For this reason, two midseason lighting inspections are recommended. The first of these should take place approximately two months after the beginning of the nesting season, which is about when hatchlings begin to emerge from nests. To verify that lighting problems have been resolved, another follow-up inspection should be conducted approximately one week after the first midseason inspection.

WHO SHOULD CONDUCT LIGHTING INSPECTIONS?

Although no specific authority is required to conduct lighting inspections, property managers, tenants, and owners are more likely to be receptive if the individual making recommendations represent a recognized conservation group, research consultant, or government agency. When local ordinances regulate beach lighting, local government code-enforcement agents should conduct lighting inspections and contact the public about resolving problems.

WHAT SHOULD BE DONE WITH INFORMATION FROM LIGHTING INSPECTIONS?

Although lighting surveys serve as a way for conservationists to assess the extent of lighting problems on a particular nesting beach, the principal goal of those conducting lighting inspections should be to ensure that lighting problems are resolved. To resolve lighting problems, property managers, tenants, and owners should be give the information they need to make proper alterations to light sources. This information should include details on the location and description of problem lights, as well as on how the lighting problem can be solved. One should also be prepared to discuss the details of how lighting affects sea turtles. Understanding the nature of the problem will motivate people more than simply being told what to do.

Appendix D

EXAMPLES OF PREDATOR PROOF TRASH RECEPTACLES

Example of predator proof trash receptacle at Gulf Islands National Seashore. Lid must be tight fitting and made of material heavy enough to stop animals such as raccoons.

Example of trash receptacle anchored into the ground so it is not easily turned over.

Example of predator proof trash receptacle at Perdido Key State Park. Metal trash can is stored inside. Cover must be tight fitting and made of material heavy enough to stop animals such as raccoons.

Example of trash receptacle must be secured or heavy enough so it is not easily turned over.