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

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

FEB 2 2 2011

Mr. David Hankla, Field Supervisor
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517

Dear Mr. Hankla:

I am requesting a Statewide Programmatic Biological Opinion (SPBO) on sand placement and other shore protection activities. This would include sand placement for shore protection, sand placement from navigation dredging, sand by-passing, and certain other shore protection measures. The enclosed Statewide Programmatic Biological Assessment (SPBA) addresses both civil works and regulatory activities of the U.S. Army Corps of Engineers throughout the coast of Florida.

The Jacksonville District has responsibility for Regulatory Permit actions throughout Florida and for Civil Works activities only in the Peninsula of Florida (including the Aucilla River watershed and eastward). Since Jacksonville District does not have jurisdiction over Civil Works projects in the Florida Panhandle, a formal request to include those activities in the SPBO was provided by letter of May 21, 2010 from the Mobile District office (copy enclosed).

In addition, I have enclosed a letter dated April 29, 2010, from the Minerals Management Service [now called the Bureau of Ocean Energy Management (BOEM)] desiring to participate in this SPBA and SPBO. The Corps accepts "lead role" and invites BOEM to "participate" in this consultation to include their actions on authorization of sand extraction from the Outer Continental Shelf for beach or near-shore placement.

I would like to thank you, Ann Marie Lauritsen, and others of your agency's staff throughout Florida for their hard work on this broad and complex effort since 2005. At the same time, I encourage continued effort to make the SPBO as useful as possible to streamline and expedite consultation under Section 7 of the Endangered Species Act while offering reasonable and appropriate protection to listed species and their habitat. Even though the currently proposed SPBO would exclude many beach placement and shore protection activities, I am requesting a SPBO with the expectation that it will evolve into something more useful over time.

The technical point of contact for this request is Kenneth Dugger at 904 232-1686, kenneth.r.dugger@usace.army.mil. The SPBA and other enclosures to this letter are also temporarily posted on the internet at ftp://ftp.usace.army.mil/pub/saj/PBA .

Sincerely,

Eric P. Summa
Chief, Environmental Branch

Enclosures

Copies Furnished:

Kenneth P. Bradley (PD-E), U.S. Army Corps of Engineers, PO Box 2288, Mobile, Alabama 36628-0001
Jeff Howe, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960
Field Supervisor, U.S. Fish and Wildlife Service, 1601 Balboa Avenue, Panama City, Florida 32405
Ann Marie Lauritsen, U.S. Fish and Wildlife Service, 600 Fourth St. South, St Petersburg, Florida 33701
Geoffrey Wikel, Bureau of Ocean Energy Management, 381 Elden Street MS 4042 RM 3407, Herndon, Virgina 20170
Larry Parsons (PD-EC), U.S. Army Corps of Engineers, PO Box 2288, Mobile, Alabama 36628-0001
Vechere Lampley (PDS-P), U.S. Army Corps of Engineers, Room 10M15, 60 Forsyth St. S.W., Atlanta, Georgia 30303-8801
David Bernhart, Protected Resources, NOAA Fisheries, 263 13th Avenue South, St. Petersburg, Florida 33701

United States Department of the Interior

MINERALS MANAGEMENT SERVICE
Washington, DC 20240

APR 29 2010

Mr. Kenneth Dugger
Section Chief
Planning Division
Environmental Branch, Coastal Section
U.S. Army Corps of Engineers, Jacksonville District
701 San Marco Boulevard
Jacksonville, Florida 32232

Dear Mr. Dugger:

The Minerals Management Service (MMS) would welcome the opportunity to participate in the Corps' ongoing Programmatic Endangered Species Act (ESA) Section 7 consultation with the U.S. Fish and Wildlife Service (FWS) for all beach nourishment projects in Florida. A growing number of Corps' Water Resources Development Act (WRDA)-authorized projects require beach fill from borrow areas located on the Outer Continental Shelf (OCS) (Project List Attached). The Jacksonville District's Regulatory Division is also issuing Section 404 and Section 10 permits for non-Federal beach nourishment projects that propose to use OCS borrow areas. Under Section 7 of ESA, the Corps must consult with the FWS whether the project is federally-sponsored or regulatory in nature. Since the MMS has jurisdiction over the use of OCS minerals, the MMS is also responsible for consulting with FWS for the same projects.

The MMS recognizes the potential benefit and time savings in ensuring the outcome of the Corps' programmatic consultation also applies to future activities of the MMS. If the Corps and MMS decide not coordinate on this programmatic consultation, the MMS would have to consult on each individual project which would result in redundancy and additional processing time in the environmental review of future requests for access to OCS sand resources. The FWS has encouraged the MMS to pursue this coordinated approach. Upon recommendation from the National Marine Fisheries Service, the Corps and MMS have already worked together and successfully pursued a similar arrangement for the on-going South Atlantic Regional consultation.

If the Corps, as lead federal agency, decides to invite the MMS to participate in the consultation, the Corps must notify the FWS of its lead role and MMS' involvement. Preferably, the MMS would jointly submit the Biological Assessment to FWS. The MMS could provide any necessary language to include in the biological assessment to clarify its involvement in the proposed activities.

Please respond to this request by contacting me or Geoffrey Wikel (703)787-1283 to confirm MMS' participation in the Corps' consultation or and to ask any questions you may have.

Sincerely,

James F. Bennett
Chief, Branch of Environmental Assessment

Attachment

Ongoing and Potential Future Project List for Minerals Management Service and U.S. Army Corps of Engineers

Florida Civil Works Projects

Brevard County - North Reach
Brevard County - Mid-Reach
Brevard County - South Reach
Broward County
Duval County
Flagler County
Lee County
Manatee County
Miami-Dade County
Martin County
Pinellas County
Sarasota/Lido Key County
St. Lucie County
St. John's County
Volusia County

Florida Regulatory Projects

Collier County
Longboat Key
Patrick Air Force Base

DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO ATTENTION OF

May 21, 2010

Coastal Environment Team
Planning and Environmental Division

Dr. Donald W. Imm, Assistant Field Supervisor
U.S. Fish and Wildlife Service
1601 Balboa Avenue
Panama City Beach, Florida 32405-3721

Dear Dr. Imm:

It is my understanding that the U.S. Army Corps of Engineers, Jacksonville District, if they have not already done so, will be submitting a Programmatic Biological Assessment (PBA) requesting a Programmatic Biological Opinion (PBO) on sand placement and other shore protection activities for the State of Florida. Such activities will include sand placement for shore protection, sand placement from navigation dredging, sand by-passing, and certain other shore protection measures. The PBA addresses both civil works and regulatory activities of the U.S. Army Corps of Engineers throughout the coast of Florida. The Jacksonville District has responsibility for Regulatory Permit actions throughout Florida and for Civil Works activities only in the Peninsula of Florida and does not have jurisdiction over Civil Works projects in the Florida Panhandle. This area, from the Alabama/Florida border extending eastward to the St. Marks River, falls under the jurisdiction of the U.S. Army Corps of Engineers, Mobile District. The Mobile District is therefore formally requesting to be included in those activities that are covered under the PBO involving Civil Works projects throughout the Florida Panhandle.

I would like to take this opportunity to encourage continued efforts towards making the PBO as useful as possible to efficiently expedite Section 7 consultation under the Endangered Species Act while offering reasonable and appropriate protection to listed species and their habitat. The Mobile District is requesting inclusion in the PBO in anticipation that it will continue to evolve as a Civil Works projects primary consultation tool for those actions that fall under our Civil Works jurisdiction in the State of Florida. We appreciate the collaborative spirit of your office and look forward to continued progress toward development and implementation of a more comprehensive PBO.

If you require additional information regarding this request, please contact Mr. Larry Parson at (251) 690-3130 or larry.e.parson@usace.army.mil

Sincerely,

Curtis M. Flakes
Chief, Planning and Environmental
Division

Statewide Programmatic Biological Assessment

Beach Placement and Shore Protection, Coast of Florida

February 17, 2011

U.S. Army Corps of Engineers
Jacksonville District

Statewide Programmatic Biological Assessment

Beach Placement and Shore Protection in Florida

Statewide Programmatic Biological Assessment

For Sand Placement and Shore Protection
Along the Coast of Florida

Jacksonville District, US Army Corps of Engineers

Atlantic Coast – Fernandina/Kings Bay to Key West
Gulf Coast – Ten Thousand Islands to Apalachee Bay
Regulatory Permits for the Entire State of Florida

Mobile District, US Army Corps of Engineers

Gulf Coast – Apalachee Bay to Alabama State Line

Bureau of Ocean Energy Management

Associated Authorization of Sand Extraction from Outer Continental Shelf

Executive Summary

This Statewide Programmatic Biological Assessment (SPBA) addresses the impacts of beach nourishment and other shore protection activities along the coast of Florida. Activities include both U.S. Army Corps of Engineers (Corps) Civil Works projects and Regulatory permit activities. This includes most shore protection measures undertaken in Florida. It does not include activities above mean high-high tide that are not part of a Corps project and not subject to Corps Regulatory jurisdiction. Included in this consultation are coincident Federal actions including the associated authorization or consent for use of sand from the Outer Continental Shelf by the Minerals Management Service. In addition, certain actions within the scope of this SPBA may occur on Federal lands or be supported by a Federal civil or military entity. This SPBA is submitted to the U.S. Fish and Wildlife Service (FWS) and addresses those species subject to FWS authority under the Endangered Species Act. Sea turtles are subject to FWS when they occur naturally on the beach and out of the water. With the exception of the West Indian Manatee, species occurring in the Atlantic Ocean or the Gulf of Mexico are subject to the authority of the National Marine Fisheries Service (NMFS). The Corps already has Regional Biological Opinions (RBOs) with NMFS, one for the South Atlantic and another for the Gulf of Mexico. Among certain other marine species, these RBOs deal with sea turtles in the water, whereas sea turtles on the beach are the responsibility of the U.S. Fish and Wildlife Service.

The Florida Department of Environmental Protection (DEP) indicates that there are 825 miles of beach along the coast of Florida (Florida Department of Environmental Protection, 2009). DEP also indicates that 491.9 miles of beach are considered eroded, of which 396.4 miles are critically eroded. In addition, there are 12.1 miles of eroded with 8.9 miles of critically eroded inlet shoreline in Florida. Critically eroded includes those shorelines for which "upland development, recreational interests, wildlife habitat, or important cultural resources are threatened or lost". Approximately 155 miles of shoreline (beach and inlet) comprise a Corps Civil Works project. Any of the critically eroded shoreline and possibly portions of other eroded shoreline would be subject to shore protection measures either as a Corps project or as a Corps regulatory permit action to be constructed by a non-Corps entity.

Many shore protection activities involve the placement of sand on the beach. Many shore protection efforts require a renourishment interval of two to seven years to maintain project benefits. Other important shore protection activities include (1) near shore placement; (2) placement of suitable material from navigation dredging or sand by-passing (across navigation inlets); and (3) construction of breakwaters, groins, and other structures or features. Shore protection activities are likely to continue into the future due to the combination of the increasing value of shoreline property and unlikely decrease in erosive and storm damage forces.

Shore protection activities may have long-term environmental benefits by combating loss of shoreline, avoiding shoreline hardening (sea walls, revetments, rip-rap, etc.), and acting as a more gradual sand feeder to down-drift beaches. However, beach nourishment can be disruptive especially during the first year or two following placement. Temporary impacts include compaction, escarpment, burial of resources, and post-construction erosion (beach profile adjustment).

This SPBA addresses the various impacts to listed species and critical habitat, as well as measures to minimize such impacts. To the extent practicable and within the Corps authority, measures include the following (see Chapter 9 for list of commitments):

- avoidance of listed birds and their nests, sea turtles and their nests, and listed plants
- relocation of sea turtle nests and possibly beach mice and listed plants
- construction windows
- monitoring and correction of compaction, escarpment, and construction lighting.

Table of Contents

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1.00 PROPOSED PROJECT

This Statewide Programmatic Biological Assessment (SPBA) is prepared in accordance with section 7 of the Endangered Species Act, as amended. 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 Jacksonville (SAJ) and Mobile (SAM) districts. Additionally, this assessment will cover the placement and rehabilitation of groins, shore-connected breakwaters, or other hard structure features utilized as design components of beach projects for longer retention time and stabilization of associated sediment placed on the beach. The intent of this assessment is to address impacts to threatened and endangered species and their critical habitat in the project area along the Florida coastline. This assessment assumes sediment being placed on the beach meets the Florida Department of Environmental Protection (FDEP) sediment compatibility requirements for beach and near shore placement [62B-41.007 (2) (j-k) or the most recent statutory requirements of the state of Florida] (http://www.dep.state.fl.us/legal/Rules/mainrulelist.htm). This assessment does not address actual sediment sources and/or characteristics of the sediment. Sand placement on the beach or the near shore that falls outside the scope of FDEP compatibility standards is not covered under this assessment. For all projects and associated actions that do not follow the scope of traditional beach fill placement operations, as discussed in this assessment, additional coordination and amendments to this document may be required. In addition, certain sensitive areas or high value habitat as identified herein would require additional coordination or a separate Biological Opinion. Except for excluded areas or activities, this assessment will include all Regulatory, Civil Works, Military, and FEMA actions that are subject to the regulatory or civil works jurisdiction of the Corps of Engineers. It encompasses, but is not limited to, the following coastal project construction, repair, replacement, rehabilitation, and maintenance activities: (1) shore protection projects, (2) coastal emergencies (PL 84-99 appropriations), (3) off-loading dredged material management areas (DMMA's), (4) sand by-passing/back-passing, (5) sand sharing / sand re-distribution, (6) beach disposal of dredged material from navigation channels, (7) near shore disposal (seaward of mean high water and below mean low water), (8) beach grooming, (9) beach scraping, (10) beach raking, (11) beach tilling, and (12) emergency actions relating to any of the above. In those instances where the applicant or client is another Federal agency, it may be more appropriate for that Federal agency to conduct consultation with the FWS pursuant to section 7 of the Endangered Species Act.

2.00 ACTIVITIES COVERED

2.01 Shore Protection Projects

2.01.1 Federally Authorized Hurricane and Storm Damage Reduction Projects

Authorities giving the Corps responsibilities for actions subject to section 7 of the Endangered Species Act primarily include the following:

- 1946 Shore Protection Cost Sharing Act (P.L. 79-727), as amended; Section 55, WRDA 1974 (P.L. 93-251); 1956 Beach Nourishment Act, (P.L. 84-826); Sections 103 (c) (5) and (d), WRDA 1986, (P.L. 99-662); Section 402, WRDA 1986, (P.L. 99-662) as amended by Section 14, WRDA 1988 (P.L. 100-676), Section 202 (c), WRDA 1996, (P.L. 104-303) and

Section 209, WRDA 2000 (P.L. 104-303); Section 215 (a), WRDA 1999 (P.L. 106-53): Establishes Federal policy to assist in the construction, but not the maintenance, of works for the improvement and protection of the shores of the U.S. against erosion by waves or currents.

- Section 55, WRDA 1974 (P.L. 93-251): The Corps can provide technical and engineering assistance to non-Federal public interests in developing structural and non-structural methods of preventing damages attributable to shore and stream bank erosion.

- Emergency Preparedness, Response, and Recovery - Coastal Emergencies (P.L. 84-99 appropriations): P.L. 84-99 and prior legislation allow Corps participation in planning and preparedness for all natural disasters (P.L. 84-99 and P.L. 101-640), flood fighting and rescue operations (FCA of 1941), emergency repair and restoration of flood damaged or destroyed flood control works (FCA of 1941), emergency protection, repair, and restoration of Federal hurricane or shore protection project structures damaged or destroyed by extraordinary storm (P.L. 87-874), non-structural alternatives to the repair or restoration of flood damaged flood control works (P.L. 104-303), and advance measures to prevent loss of life and catastrophic property damage when there is an imminent threat of unusual flooding (P.L. 84-99).

- 1956 Beach Nourishment Act, (P.L. 84-826): Federal assistance in periodic beach nourishment is provided on the same basis as new construction when it would be the most suitable and economical remedial measure.

- Section 402, WRDA 198, (P.L. 99-662) as amended: Non-Federal sponsors must comply with Federal flood insurance program and prepare floodplain management plan within one year after signing PCA and implement plan one year after project completion.

- This assessment also includes any subsequent authorities and amendments similar in nature and emergency actions under any of the authorities listed in this section, section 2.01.2 (regulatory permits), and section 2.03.

- ASA (CW) policy stipulates that Corps shore protection projects be formulated primarily for hurricane and storm reduction (Engineer Regulation ER 1105-2-100, Appendix E, part E-24 c. and ER 1165-2-130, part 6.a.(1)).

- The Administration's shore protection policy is that projects that support mainly recreation activities or projects in tourist or recreation areas that provide substantial income to regional and local economies can be undertaken solely by non-Federal interests (Engineer Regulation ER 1105-2-100, part 3-4 b(4)(a)).

2.01.2 Regulatory - Permitted Shoreline Protection Projects

Legal authority for permitting shoreline protection projects is derived from Section 404 of the Clean Water Act; Section 10 of the River and Harbor Act; and Section 103 of the Marine Protection, Research, and Sanctuaries Act.

(1) Section 404 of the Clean Water Act (33 USC 1344)

Section 404 of the Clean Water Act (33 USC 1344) requires authorization from the Secretary of the Army, acting through the Corps of Engineers, for the discharge of dredged or fill material into all waters of the United States, including wetlands (as defined in 33 CFR 328). Discharges of fill material generally include, without limitation: placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; dams and dikes; artificial islands; property protection or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments; beach nourishment; levees; fill for intake and outfall pipes and sub-aqueous utility lines; fill associated with the creation of ponds; and any other work involving the discharge of fill or dredged material. A Corps permit is required whether the work is permanent or temporary. Examples of temporary discharges include dewatering of dredged material prior to final disposal, and temporary fills for access roadways, cofferdams, storage, and work areas.

(2) Section 10 of the River and Harbor Act of 1899 (33 USC 403)

Section 10 of the River and Harbor Act of 1899 (33 USC 403) requires authorization from the Secretary of the Army, acting through the Corps of Engineers, for the construction of any structure in or over any navigable water of the United States (as defined in 33 CFR 329). Structures or work outside the limits defined for navigable waters of the United States require a Section 10 permit if the structure or work affects the course, location, condition, or capacity of the water body. The law applies to any dredging or disposal of dredged materials, excavation, filling, re-channelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking. It further includes, without limitation, any wharf, dolphin, weir, boom breakwater, jetty, groin, bank protection (e.g. riprap, revetment, bulkhead), mooring structures such as pilings, aerial or sub-aqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal, boat ramp, aids to navigation, and any other permanent, or semi-permanent obstacle or obstruction.

(3) Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC 1413)

Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC 1413), as amended, requires authorization from the Secretary of the Army, acting through the Corps of Engineers, for the transportation of dredged material for the purpose of dumping it in ocean waters. Discharges of dredged or fill materials into territorial seas also requires authorization under Section 404 of the Clean Water Act.

2.02 Shore Protection and Beach Fill Placement Activities

Below is an overview of shore protection and/or beach fill placement projects and associated activities. For additional information on shore protection measures and features and the management of inlets and navigation channels along the coast, see the Coastal Engineering

Manual, Part V (USACE 2008, http://140.194.76.129/publications/eng-manuals/em1110-2-1100/PartV/PartV.htm). See Figure 1 showing typical beach fill and nearshore placement.

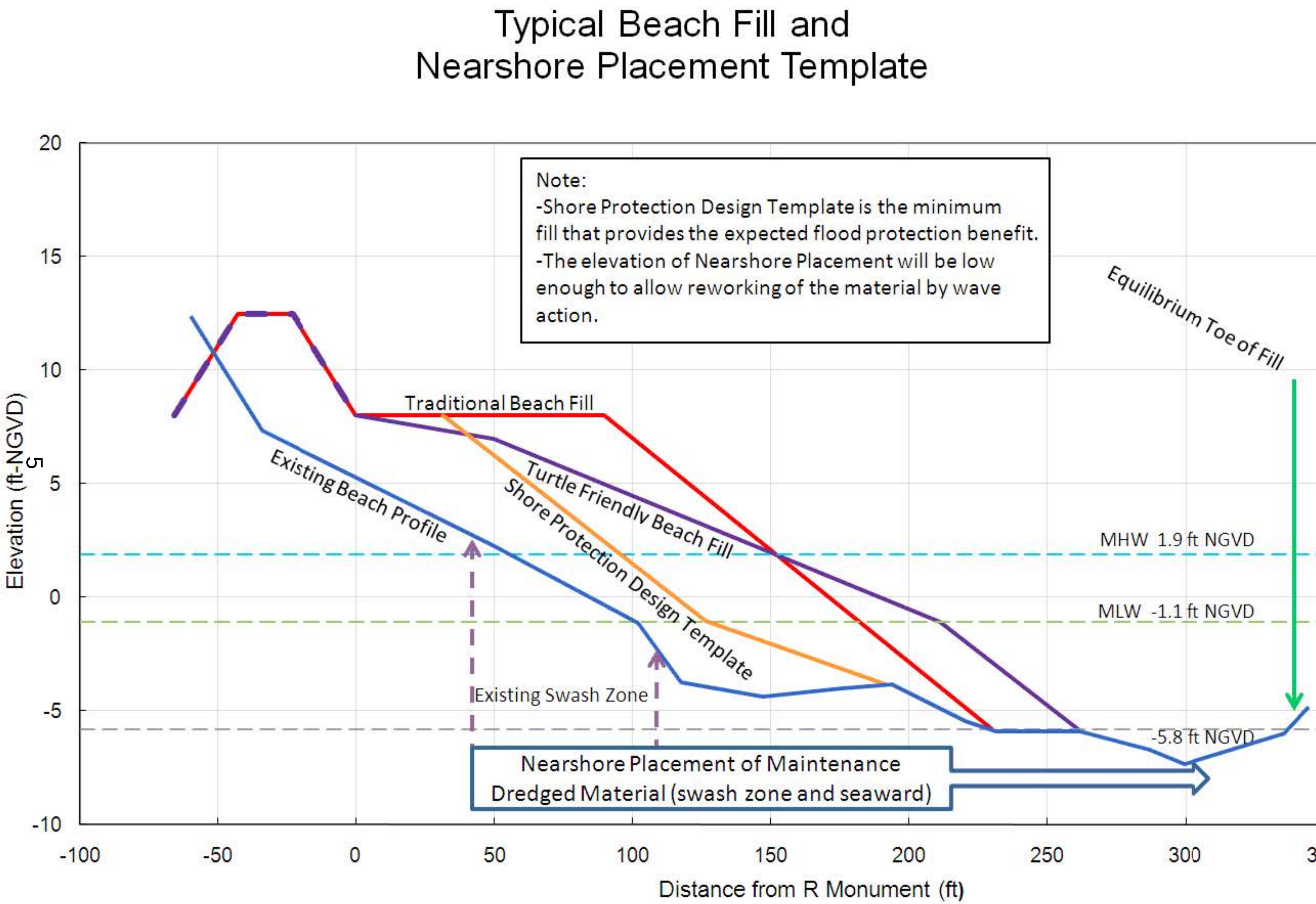


Figure 1: Typical Beach Fill and Nearshore Placement Template

(1) Beach Disposal of Suitable Material – Dredged from Federal Navigation Channels

The placement of beach compatible dredged material on the adjacent beach above mean high water is a disposal option for nearby maintenance dredging of channels. For example, dredging associated with beach disposal often occurs in inlet complexes and consists of removing littoral material from navigation channels and keeping it within the littoral system by placing the material on nearby adjacent beaches so that sediment budgets are maintained. Beach disposal of dredged material is considered a beneficial use of dredged material and does not necessarily provide or maintain the shore protection design template but may be limited by the availability of sand, capacity of the equipment, and funding. Beach Disposal or Beach Placement includes any disposal or placement in which any of the placed material is exposed at low tide.

(2) Beach Fill

Sand placed on the shoreline by mechanical means, such as dredging and pumping from offshore or inshore deposits or overland hauling and dumping by trucks. The resulting beach provides some protection to the area behind it and also serves as a valuable recreational resource.

The beach fill functions as an eroding buffer zone. As large waves strike it, sand is carried offshore and deposited in a bar. As the bar grows, it causes incoming waves to break farther offshore. The useful life of such a beach, which depends on how quickly it erodes, can be completely eliminated in a short period of time by a rapid succession of severe storms. Therefore, as erosion continues, it is necessary to periodically add more fill.

The rate at which new fill must be added depends on the relative coarseness of the fill material in relation to the native beach material. Generally, if fill material is coarser than the native material, the fill erodes more slowly and if it is finer, it erodes more quickly.

(3) Beach Grooming

The occasional redistribution or re-grading of the beach berm associated with a constructed beach project, located landward of the mean high water (MHW) line, in order to restore the appropriate project design template and prevent or alleviate ponding or the formation of swales, gullies, or escarpments.

(4) Beach Nourishment

As used in this document, beach nourishment is a term used for shore protection projects that introduce material along a shoreline to supplement the natural littoral drift. This differs from the State of Florida's Joint Coastal Program (JCP) definition of nourishment as the periodic maintenance of a restored beach by the replacement of sand (see Beach Renourishment/Periodic Nourishment discussed below) .

There are several reasons for nourishing a shore. These include: (1) controlling erosive forces by providing a sacrificial area as a source of littoral material, (2) supplementing littoral drift to offset particular actions or works, and (3) replenishing reserves of littoral material normally available in sand dunes. The effects of beach nourishment are generally short-lived (i.e. as long as the supply of material exists) (http://chl.erdc.usace.army.mil).

(5) Beach Raking.

Collecting and removing litter or debris from a beach without penetrating into the sand by more than 4 inches.

(6) Beach Renourishment / Periodic Nourishment

Terms used interchangeably for shore protection projects to describe subsequent beach fill placement of sand to re-establish the initial beach fill to provide appropriate levels of shoreline protection.

(7) Beach Restoration

Term often used in defining beach construction projects permitted through the Regulatory Division and in many cases is used interchangeably with beach nourishment. Essentially, beach restoration is the initial placement of sand on an eroded beach in order to bring the beach profile to an elevation and width that existed at some point in time prior to documented erosion events. The purpose of beach restoration is to restore recreational benefits, habitat functions, and storm protection capabilities of the beach.

(8) Beach Scraping

The excavation of sand from the foreshore beach (i.e. below the MHW line), and mechanically moving it to the eroded dune bluff or backshore side of the beach, in an effort to expedite the post-storm recovery of the beach berm.

(9) Beach Tilling

Pulling a series of tines, which penetrate approximately 24-36 inches into the surface of the beach berm in order to prevent or alleviate compaction of the sand that could otherwise hinder the nesting of marine turtles.

(10) Hard Structures

Beach stabilization structures that may be used alone or in combination with beach fill activities to retard erosion and/or increase the amount of time sediment remains on the beach. Such hard structure measures may consist of seawalls, revetments, groins, bulkheads, and breakwaters. Seawalls, revetments, and bulkheads are used to protect inland development and to armor the shoreline against erosion; whereas, groins, near shore breakwaters, and sills are beach stabilization structures designed to increase the longevity of a beach fill.

(11) Near Shore Disposal of Suitable Material – Dredged from Federal Navigation Channels

Placement of beach compatible dredged material seaward of the MHW line and (to the extent possible) within the littoral zone (such that much of the placed material is not exposed at low tide for more than a few months). This disposal method may be performed as a least cost disposal option for nearby maintenance dredging while keeping the dredged material within the littoral system and reducing beach erosion. Material can be placed in the littoral zone by hydraulic cutterhead pipeline or split-hull hopper dredge. Near shore disposal of dredged material does not necessarily provide or maintain the shore protection design template but may be limited by the availability of sand, capacity of the equipment, and funding. However, placement of material in the near shore zone (subtidal) usually allows for much of the material to be carried by currents and waves within the littoral system potentially resulting in beach accretion. "Swash zone" placement will be conducted at or below the +3-foot contour. By definition, the swash zone (Simm et al., 1996) is that region between the upper limit of wave run-up (slightly above MHW) and the lower limit of wave run-out (slightly below mean low water (MLW)). Material placed in the swash zone will be reworked by wave action at the time of placement or shortly thereafter (assuming the material is not stacked too high). This type of beach fill placement is considered an acceptable alternative for placement of the dredged beach quality sandy material. Placement of material in this manner meets established regional sediment management principles by returning the material to the littoral system, allows for the rapid incorporation of material into the littoral system (through the action of waves and currents), and minimizes impacts to federally protected species of concern. This alternative would also minimize much of the monitoring requirements and associated costs. Though an engineered design template is not a component of near shore disposal, the dredged material may replenish the eroding beach in a natural manner (Herbich, 2000).

(12) Off-loading Dredge Material Management Areas (DMMAs)

Confined upland disposal sites are used, in many cases, as a least cost disposal option for dredging operations. These sites are managed for the storage of dredge material through the use of dikes and spillways to confine material over time to allow for settling of solids and dewatering through spillways. Some DMMAs are constructed to be used as a least cost option to store dredged material over a short term period until cubic yardage capacity of the DMMA is reached. Dredge Material Management Areas that contain beach compatible material can be off-loaded to the beach at appropriate pump out intervals as a beach disposal option to restore storage capacity. Furthermore, depending on location and compatibility, DMMAs can be used as a sand source for shoreline protection projects.

(13) Sand Bypassing / Back-passing

Hydraulic or mechanical movement of sand around impediments to long-shore transport of sediment (i.e. deep inlet channels, jetty structures, etc.) from an area of accretion to a down drift area of erosion. Bypassing commonly takes place using two methods. The first method involves constructing pumping equipment and an associated pipeline route to transfer sand from the up-drift side of the littoral barrier and deposit it as a slurry of sand and water on the down-drift side. Depending on the rate of accretion on the up-drift side, this equipment can be run continuously, or on an as needed basis. The second method involves the dredging or excavation of sand from the up-drift side (or from a sediment basin in or adjacent to the channel) using dredges or heavy machinery. The material is then placed on the down-drift side by the dredge (water-based transport) or by trucks and other heavy equipment (land-based transport). In addition to its use as a mechanism to restore natural sediment transport patterns, sand bypassing is sometimes used as a method to keep navigational channels and other harbor areas free from excess sedimentation. This may reduce maintenance-dredging requirements.

Contrary to sand bypassing, sand back-passing is the mechanical or hydraulic movement of sand that artificially accretes on the up-drift side of an inlet, or within an inlet system, to a location farther up-drift, but within the same coastal cell (i.e. between the same two inlets).

The disposal of material associated with bypassing and back-passing does not necessarily provide or maintain the shore protection design template and may be limited by the availability of sand, capacity of the equipment, and funding.

(14) Sand Sharing / Sand Re-distribution

The excavation of sand from an accretional portion of a beach and placement of that sand onto an erosional portion of the beach that is normally located within the same coastal cell (i.e. between the same two inlets).

2.03 Coincident Federal Actions

2.03.01 Bureau of Ocean Energy Management (BOEM, formerly Minerals Management Service)

The Bureau of Ocean Energy Management (BOEM) is the bureau within the Department of the Interior (DOI) responsible for overseeing sand and gravel, oil and gas, alternative energy, and other mineral development on the Outer Continental Shelf (OCS). As steward for these energy and non-energy resources, the BOEM must ensure that the development of these resources is done in a safe and environmentally sound manner and that any potential adverse impacts to the marine, coastal, and human environments are avoided or minimized.

Public Law 103-426 (43 U.S.C. 1337(k)(2)) allows the BOEM to negotiate, on a noncompetitive basis, the rights to OCS sand, gravel, or shell resources for shore protection, beach or wetlands restoration projects, or for use in construction projects funded in whole or part by or authorized by the Federal government. The BOEM defines coastal restoration as the rebuilding of eroding shoreline segments, such as beaches and dunes, barrier islands, and wetlands, to forestall further erosion and/or to provide protection from hurricanes, storms, and normal coastal erosion for sensitive landward wetland areas.

Since BOEM authorizes the use of OCS sand, gravel, and shell resources, the BOEM must comply with the requirements specified in a wide range of environmental statutes, including but not limited to the Outer Continental Shelf Lands Act, National Environmental Policy Act (NEPA), and Endangered Species Act (ESA). Under Public Law 103-426, if OCS sand resources are to be used for a Corps Civil Works or other Federal agency authorized project, the BOEM and the Corps are required to enter into a Memorandum of Agreement (MOA) that addresses potential use of OCS sand and gravel resources. Prior to negotiating that agreement, the BOEM conducts an environmental review to evaluate potential environmental effects resulting from the proposed marine mineral exploration and development activities. The NEPA evaluation may be conducted jointly with another agency, in which case BOEM is either the lead or a cooperating agency. Since placement activities are interrelated to and inter-dependent on dredging operations, BOEM is also required to initiate ESA consultation with the US Fish and Wildlife Service (USFWS) or participate jointly in the consultation requirements with another agency.

Pursuant to 50 CFR 402.07, the Corps will assume the responsibility of lead agency for purposes of this ESA consultation. The Corps and BOEM anticipate that the resulting biological opinion would be issued to the Corps but be applicable to the proposed action(s) of the BOEM.

Proposed Action - BOEM

Dredging sand from the OCS must be authorized by the BOEM. For Corps Civil Works projects that make use of OCS borrow sites, the Corps and BOEM have overlapping authorities. In the case of Corps-permitted projects that involve the use of OCS borrow sites, the authorization of dredging at these borrow sites is under the exclusive jurisdiction of BOEM (unless one of the limited exceptions extending Corps Section 10 jurisdiction to the OCS applies).

2.03.02 Other Federal Actions

In addition, certain actions within the scope of this SPBA may occur on Federal lands, require other Federal consent or authorization, or be supported by another Federal civil or military entity. For example, such activities may include the placement of sand or other shore protection measures on lands owned or controlled by the Navy, Air Force, or Park Service.

2.04 Associated, Incidental, and Other Actions

Beach placement and other shoreline protection activities may involve other actions such as dune construction and re-construction, access and pipeline corridors, temporary or permanent beach access ramps, dune walkovers or crossovers, and other activities or features.

3.00 DREDGING METHODS

For the purposes of this assessment, dredging methods discussed will be those that are capable of placing sediment on the beach or in the near shore. The placement of sediment on the beach or in the near shore can be accomplished by (1) truck haul of upland sediment sources or (2) hydraulic pumping of dredged material to the beach using a hopper or cutterhead suction dredge. A more technical discussion of different dredging methods, their use, and their limitations can be found in Engineer Manual EM 1110-2-5025, Engineering and Design - Dredging and Dredged Material Disposal (USACE 1983, http://140.194.76.129/publications/eng-manuals/em1110-2-5025/toc.htm). See the Table 1 below for a brief comparison on dredging methods.

Table 1: Comparison of Dredging Methods

Type Dredge	Work in Rough Seas & Strong Currents	Long Distance to Disposal	Operate in Shallow Water	Precision of Dredging	Can Dredge Hard Material	Self-Propelled
Hopper Dredge	yes	yes	no	low	no	yes
Cutterhead Suction	no	limited	yes	moderate	depends size/type	no
Dustpan Suction	no	no	yes	moderate	no	yes
Dipper Dredge	no	yes uses barge	yes	good	yes	no
Bucket Dredge	no	yes uses barge	yes	good	some	no
Currituck Special Purpose Dredge	limited	small quantity	yes	moderate	no	yes

See Engineer Manual EM 1110-2-5025 for more detailed information.
http://140.194.76.129/publications/eng-manuals/em1110-2-5025/entire.pdf

3.01 Truck Haul

Truck hauling of sediment, for the purpose of beach nourishment, is often associated with the use of upland borrow sources. Sediment is excavated from the upland borrow site, using a backhoe or other excavation technique, and placed in dump trucks to be hauled to the disposal locations. Depending on the project design and site conditions, material is dumped on-site and distributed to fill the appropriate template using other heavy equipment (bulldozers, backhoes, etc.). With the exception of dune construction operations, truck hauled material from an upland borrow source is often saturated with water to achieve a density comparable to hydraulically placed sand.

3.02 Hydraulic Dredges

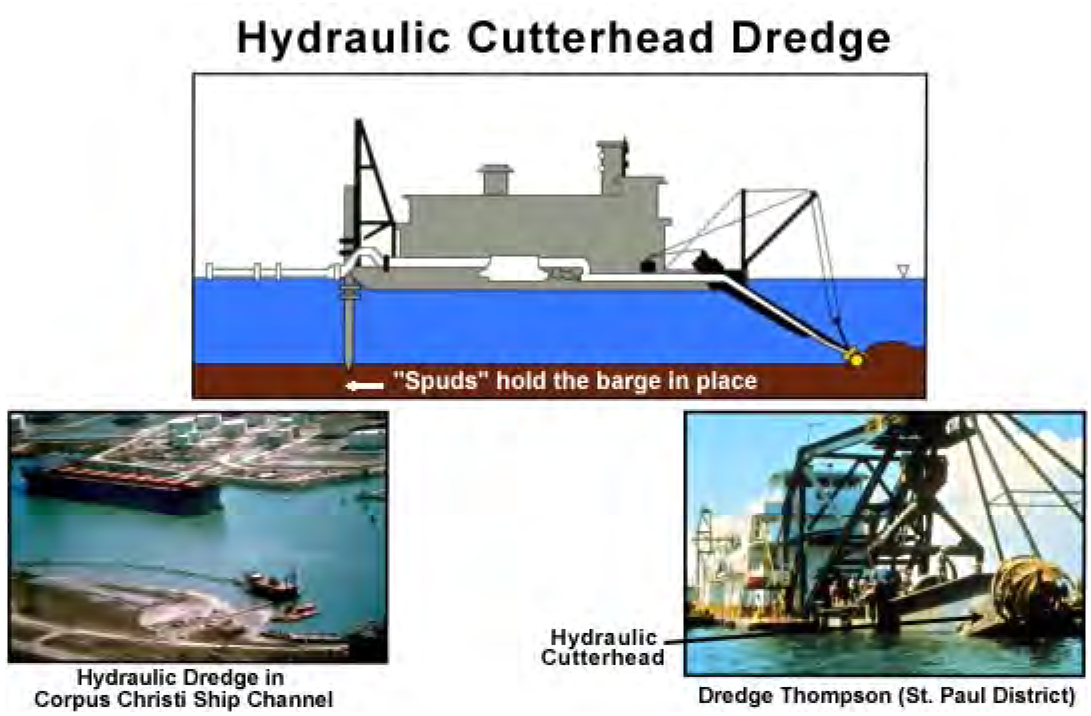
Hydraulic dredges are characterized by their use of a centrifugal pump to dredge sediment and transport a slurry of dredged material and water to identified discharge areas. The ratio of water to sediment within the slurry mixture is controlled to maximize efficiency. The main types of hydraulic dredges are pipeline and hopper dredges. Less common hydraulic dredges include side-caster and dustpan dredges.

3.02.1 Pipeline Dredges - Cutterhead Suction Dredge

Pipeline dredges are designed to handle a wide range of materials including clay, hardpan, silts, sands, gravel, and some types of rock formations without blasting. They are used for new work and maintenance in projects where suitable disposal areas are available and operate in an almost continuous dredging cycle resulting in maximum production, economy, and efficiency. Pipeline dredges are capable of dredging in shallow or deep water and can perform accurate bottom and side slope cutting. Pipeline dredges are impractical in high traffic areas. Other, limitations include relative lack of mobility, long mobilization and demobilization periods, and inability to work in high wave action and currents.

Pipeline dredges are rarely self-propelled and, therefore, must be transported to and from the dredge site. Pipeline dredge size is based on the inside diameter of the discharge pipe, which commonly range from 6" to 36." They require an extensive array of support equipment including pipeline (floating, shore, and submerged), boats (crew, work, survey), barges, and pipe handling equipment. Most pipeline dredges have a cutterhead on the suction end. A cutterhead is a mechanical device that has rotating teeth to break up or loosen the bottom material so that it can be sucked through the dredge. Some cutterheads are rugged enough to break up rock for removal (Figure 2).

Figure 2. Cutterhead pipeline dredge schematic.



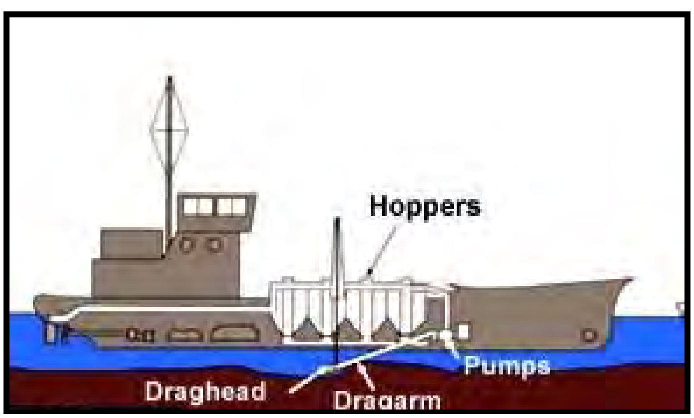
During the dredging operation a cutterhead suction dredge is held in position by two spuds at the stern of the dredge, only one of which can be on the bottom while swinging. There are two swing anchors some distance from either side of the dredge, which are connected by wire rope to the swing wenches. The dredge swings to port and starboard alternately, passing the cutter through the bottom material until the proper depth is achieved. The dredge advances by "walking" itself forward on the spuds. This is accomplished by swinging the dredge to the port, using the port spud an appropriate distance, then the starboard spud is dropped and the port spud raised. The dredge is then swung an equal distance to the starboard and the port spud is dropped and the starboard spud raised.

Cutterhead pipeline dredges work best in large areas with deep shoals, where the cutterhead is buried in the bottom. A cutterhead removes dredged material through an intake pipe and then pushes it out the discharge pipeline directly into the disposal site. Most pipeline dredging operations involve upland disposal of the dredged material, therefore, the discharge end of the pipeline is usually connected to shore pipe. When effective pumping distances to the disposal site become too long, a booster pump is added to the pipeline to increase the efficiency of the dredging operation (USACE, 1993). Depending on the nature of the material dredged, the equipment, and other factors; cutterhead dredges are generally not financially or technically feasible at a distance of around 10 miles or more (from dredge site to pipeline discharge site).

3.02.2 Hopper Dredge

The hopper dredge, also known as a trailing suction dredge, is a self-propelled ocean-going vessel with a section of the hull compartmented into one or more hoppers. Fitted with powerful pumps, the dredges suck dredged material from the channel bottom through long intake pipes, called dragarms, and store it in the hoppers. Normal hopper dredge configuration has two drag arms, one on each side of the vessel. A drag arm is a pipe suspended over the side of the vessel with a suction opening called a drag head for contact with the bottom (see Figure 3). The dredged slurry is distributed within the vessels hopper allowing for solids to settle out and the water portion of the slurry to be discharged from the vessel during operations through its overflow system. When the hopper attains a full load, dredging stops and the ship travels to an in-water disposal site, where the dredged material is discharged through the bottom of the ship by splitting the hull. Some hopper dredges are capable of pumping the material back out of the vessel and through a pipeline to a designated disposal location on the beach, near shore, or upland.

Figure 3. Hopper dredge schematic.



Hopper dredges are well suited to dredging heavy sands. They can maintain operations safely, effectively, and economically in relatively rough seas and, because they are mobile, they can be used in high-traffic areas. They are often used at ocean entrances and offshore, but cannot be used in confined or shallow areas. Hopper dredges can move quickly to disposal sites under their own power, but since the dredging stops during the transit to and from the disposal area, the operation loses efficiency if the haul distance is too far. Hopper dredges also have several limitations. Considering their normal operating conditions, hopper dredges cannot dredge continuously. A hopper dredge must cease dredging and move to the disposal or pumpout site when the "hopper" is filled with dredged material. The precision of hopper dredging is less than other types of dredges, therefore, they have difficulty dredging steep side banks and cannot effectively dredge around structures.

In order to minimize the risk of incidental takes of sea turtles, the Corps requires the use of sea turtle deflecting dragheads on all hopper-dredging projects where the potential for sea turtle interactions exist. The leading edge of the deflector is designed to have a plowing effect of at least 6 inch depth when the drag head is being operated. Appropriate instrumentation is required on board the vessel to insure that the critical "approach angle" is attained in order to satisfy the 6 inch plowing depth requirement (USACE, 1993). Dredge types other than the hopper dredge have little potential for "taking" sea turtles in the water because they are much slower moving or essentially stationary.

3.02.3 Sidecaster and Dustpan Dredges

Sidecaster and dustpan dredges are special hydraulic dredges that are used to remove loosely compacted, coarse-grained material and place it in areas close to the navigation channel. Side-casting of dredged material, utilized mainly on smaller projects, is limited to specialized situations and environments. Sidecasters were first used in the United States to dredge the small inlets in the Outer Banks of North Carolina and the barrier islands along the Atlantic Coast. Sidecasters are effective in shallow channels where reintroduction of the dredged material into the channel is limited. During dredging operations, the vessel is operated at slow speeds. The drag arm and pumping operations are similar to those of the hopper dredge. The discharge pipe is positioned outboard, at right angles to the longitudinal centerline of the dredge. The dredged material slurry is discharged through the pipe back into the water alongside the channel (USACE, 1993).

Dustpan dredges are designed to work in rapid shoaling rivers, which carry a large volume of waterborne traffic and, in the United States, are used almost exclusively on the Mississippi River system. The Dustpan dredge has also been used effectively to collect and deliver sand from off-shore borrow sites in the Gulf of Mexico in Florida where depths are typically very shallow and wave and current action is relatively low except during storm events. They are self-propelled, can move rapidly over long distances, and have a high production (the amount of material dredged per unit time). However, dustpan dredges are only suitable for loose materials; they cannot tolerate wave action, and are not well suited for situations where disposal areas are distanced from dredging areas. While dredging, dustpan dredges are anchored with two hauling anchors. The triangular shaped dustpan head is lowered with the open suction mouth located along the base parallel to the water jet manifold located at the suction mouth. High-pressure water is pumped through the manifold and a row of water jets dislodges the bottom material just forward of the suction mouth. The dredged material slurry is swept into the suction mouth of the dustpan and carried up the suction pipe, into the dredge pump, through the pipeline, and out the discharge end of the pipe.

3.03 Mechanical Dredges

Mechanical dredges are characterized by the use of some form of bucket to excavate and raise the bottom material. They remove material by scooping it from the bottom and then placing it onto a waiting barge or directly into a disposal area. Mechanical dredges work best in consolidated or hard-packed materials and can be used to clear rocks and debris. Dredging buckets have difficulty retaining loose, fine materials, which can be washed from the bucket as it is raised. Special buckets have been designed for controlling the flow of water and material from buckets and are used when dredging contaminated sediments. Mechanical dredges are rugged and can work in tightly confined areas. They are mounted on a large barge and are towed to the dredging site and secured in place by anchors or spuds. They are often used in harbors, around docks and piers, and in relatively protected channels, but are not suited for areas of high traffic or rough seas.

Dipper dredges and clamshell dredges, named for the scooping buckets they employ, are the two most common types of mechanical dredges. A bucket dredge begins the digging operation by dropping the bucket in an open position from a point above the sediment. The bucket falls through the water and penetrates into the bottom material. The sides of the bucket are then closed and material is sheared from the bottom and contained in the bucket compartment. The bucket is raised above the water surface, swung to a point over the barge, and then released into the barge by opening the sides of the bucket. Usually two or more disposal barges, called dump scows, are used in conjunction with the mechanical dredge. While one barge is being filled, another is being towed to the dumpsite by a tug and emptied. If a diked disposal area is used, the material must be unloaded using mechanical or hydraulic equipment. Using numerous barges, work can proceed continuously, only interrupted by changing dump scows or moving the dredge. This makes mechanical dredges particularly well suited for dredging projects where the disposal site is many miles away. The dipper dredge is essentially a power shovel mounted on a barge. It can dig hard materials and has all the advantages of the bucket dredge, except for its deep digging capabilities. Similar to the bucket dredge operation, the dipper dredge places material into a barge, which is towed to a disposal area (USACE, 1993).

4.00 BEACH FILL PLACEMENT ACTIVITIES

The history of beach fill placement activities throughout the Atlantic and Gulf Coasts of Florida is extensive and consists of myriad actions (See section 2.00 and Table 2) performed by local, state, and Federal entities. In addition, Appendix 2 contains a list from the USFWS of biological opinions on Sea Turtles. This list includes essentially all beach fill placement and shore protection activities including those impacting other listed species or their habitat. Many of these activities are expected to recur periodically in the future. Future beach fill placement actions addressed through this assessment may include maintenance of these existing projects or activities on beaches that have not experienced a history of beach fill placement. Non-Federal activities impacting listed species or critical habitat include shoreline construction above mean high water, dune alterations, and shoreline management (human use, driving, parking, raking, access construction, waste management, etc.) According to the Florida Department of Environmental Protection (DEP) (Clark 1993), there are 825 miles of beach along the coast of Florida. Of the 35 coastal counties all but Jefferson have either eroding or critically eroding beach and most have both (Florida Department of Environmental Protection 2009). There are Corps shore protection projects along 155 miles in 18 counties.

However, any of the 396.4 miles of critically eroded[1] or 95.5 miles of non-critically eroding shoreline could become the subject of a Corps civil works project or subject to a Corps regulatory permit action. There are also a number of deep draft and shallow draft navigation projects, the dredging of which might result in placement of sand on the beach or in the near shore (Table 2). See Appendix 1 and part 5.00 on existing conditions for additional details. Note that the list of eroding and critically eroding shoreline and inlets is updated by DEP every two years and there may be eroding shoreline that has not yet been included on the list.

[1] Florida Department of Environmental Protection (2009) defines "critically eroded" 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. Critically eroded areas may also include peripheral segment 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."

Table 2: Beach fill placement Activities, Coast of Florida

County *	Beach Length (miles)	Critically Eroded (miles)	Non-Critically Eroded (miles)	Corps Shore Protection Project (miles)	Corps Shore Protection Study ***	Navigation Placement or Sand Bypass	Potential Other Navigation Placement	Groins, Breakwater, or Revetment	Regulatory Permit (non corps project)
Nassau	12.7	10.2	0	7.7	yes	yes		potential	potential
Duval	15.0	11.1	2	5.7		yes		yes	potential
St. Johns	41.1	9.8	0.5	2.5	yes	yes		potential	potential
Flagler	18.1	5.7	0		yes			potential	potential
Volusia	48.8	22.7	1.1	5	yes	yes		potential	potential
Brevard	71.6	36.5	12.3	19.2	yes	yes		potential	yes
Indian River	22.4	15.7	0		yes			potential	yes
St. Lucie	21.5	9.4	7.9	2.3	yes	yes		yes	potential
Martin	21.4	18.0	0	3.75	yes	yes		potential	yes
Palm Beach	45.3	32.1	0.9	15.5		yes		potential	yes
Broward	24.0	21.3	0	17.1	yes	yes		potential	yes
Dade	20.8	17	1.7	11.8	yes	yes		yes	yes
Monroe	52.5	10.2	1.6	0.1				potential	yes
Collier	34.1	14.1	5.3			yes		yes	yes
Lee	47.3	22.2	5.7	12		yes	yes	yes	yes
Charlotte	12.2	5.2	0.4			yes		potential	yes
Sarasota	34.7	24.2	0.4	4.42		yes	yes	yes	potential
Manatee	12.3	13.0	0	7.5		yes		potential	potential
Hillsborough	2.1	1.6	0	4	yes	yes	yes	potential	potential
Pinellas	37.2	21.9	4.4	11.6	yes	yes	yes	yes	potential
Pasco	4.4	0.2	1.1					potential	yes
Hernando	0.8	0	0.5					potential	potential
Citrus	0.2	0.2	0					potential	potential
Levy	3.2	0.7	1.2					potential	potential
Dixie	0	0.6	0					potential	potential
Taylor	0.3	0.2	0					potential	potential
Wakulla	3.0	1.3	0.4			yes		potential	potential
Franklin	54.6	11.1	20.2			yes		potential	potential
Gulf	28.8	8.3	8.6			yes		potential	potential
Bay	41.2	19.7	10.1	17		yes		potential	potential
Walton	25.6	15.7	0					potential	Yes
Okaloosa	23.9	7.3	1.7					potential	potential
Santa Rosa	5.0	4.1	0					potential	Yes
Escambia	38.9	14.7	11.2	8.1		yes		potential	potential
TOTAL	825	393.8	100	155.27	**	**	**	**	**

* Data source for shoreline data (eroded and critically eroded shoreline and inlet): *Critically Eroded Beaches in Florida* Updated June 2009. and for total beach (excludes inlets) *Technical and Design Memorandum 89-1*, 5th Edition, December 1993. both Florida Department of Environmental Protection

** See Appendix 1 and 2 for detailed breakdown on Corps' shore protection and navigation projects and regulatory permit actions. Any eroding or critically eroding shoreline may be subject to sand placement or other measures. Most beach renourishment projects have a renourishment interval of 3 to 7 years. Corps of Engineers participation in shore protection would depend on a net national economic development benefit (primarily storm damage reduction), public access to the beach, a willing and capable non-federal sponsor, and authorization and funding by Congress. Navigation placement would depend on the suitability of the dredged material, how the cost compares to other disposal options, and whether a non-federal entity is willing to pay any cost difference.

*** Ongoing or future Corps study to add or modify a shore protection project.

4.01 Construction Operations

For hydraulic pipeline and hopper dredge operations that include the placement of dredged material on the beach, a pipeline route is extended from the dredge plant to the beach fill placement location. Prior to the commencement of dredging, shore pipe is mobilized (or transported) to the beach in segments of varying sizes in length and diameter. The mobilization process usually requires the use of heavy equipment to transport and connect pipe segments from the beach access point to the designated placement area. The placement of shore pipe is generally on the upper beach, away from existing dune vegetation and seaward of the toe of the primary dune. The width of disturbance area required to construct the pipeline route varies depending on the size of pipe used for the project. Site context and environmental features are considered for each project so that construction activities are confined to areas with minimal impact to the environment. Once the heavy equipment and pipe is on the beach and the pipes are connected, heavy equipment operation is generally confined to the vicinity of the mean high water line, away from dune vegetation on the upper beach. Within the active disposal area, heavy equipment operates throughout the width of the beach in order to manage the outflow of sediment and construct target elevations for the appropriate beach profile. The following sections describe this process in more detail.

4.01.1 Pre-Project Coordination

Contractors have considerable latitude with respect to means and methods to best utilize available equipment and resources. Prior to bid opening for a beach fill placement project, the Corps identifies acceptable options for beach access for pipeline, pipe staging areas, and location of pipeline routes. These identified locations are a result of extensive coordination with the local, state and Federal resource agencies, and other stakeholders to identify public concerns relative to real estate easements, permit requirements, environmentally sensitive areas, etc. Contractor bids will incorporate these pre-coordinated and pre-identified sites, which ensures that the location of all equipment and operations is coordinated appropriately and approved by the Corps prior to project commencement.

4.01.2 Mobilization

Approximately 200 linear feet (or greater) of pipe segments are floated or trucked to the pre-identified staging area on the project site. Floated pipe is pressurized and moved using a tug and barge. Various pipe diameters (12”, 16”, 18”, 20”, 30”, etc) are used depending on the size of the project and the dredge performing the work. Smaller diameter pipe are often made of High Density Polyethylene (HDPE), whereas larger diameter pipe is made of steel. The ability to maneuver (i.e. bend) pipeline alignments is dependent on the size and makeup of the pipe. HDPE pipe is more agile than steel pipe. Dredging production rates decrease as the number of curves and bends in pipeline increase.

4.01.3 Staging Area

The pre-identified and coordinated staging area is often within the vicinity of the access point and may contain a majority of the materials needed for the construction and maintenance of the project such as dozers (D7-D9), loaders, cranes, vehicles, pickup trucks, dump shacks, etc. Additional equipment may include fuel tanks, generators, light plant, supply container sheds, bathrooms, etc.

In addition to the staging of equipment, the staging area is a work area for welders and grinders to prepare the pipe segments for connection. Contractors may require additional or different staging areas. Though most pipe preparation occurs during daylight hours, depending on the project schedule and urgency, pipe preparation may or may not occur at night. If nighttime operations occur, lighting will be associated with these activities and must meet Corps and the Occupational Safety and Health Administration (OSHA) standards (see Section 4.01.5 (a)). The staging area is roped off for safety considerations throughout the life of the project.

4.01.4 Pipeline Preparation and Connection

Depending on the type of pipe used for the project, pipeline preparation may entail cutting, grinding, and welding of pipe. For large projects, pipe is moved from the staging area to the pre-identified pipeline route using a wagon pulled by a piece of heavy equipment. Depending on the length of each pipe segment used for a given project, the pipe will be unloaded in piles at secondary staging areas along the designated pipeline route. These piles of pipe are temporary and in some cases are immediately assembled.

Pipe segments in the water extending from the dredge to the beach access point are typically attached using a ball and joint connecting system. From the beach access point to the pipe outflow end, the pipeline may consist of both “straight-line” pipe and “telescope” pipe. Straight-line pipe extends from the beach access to the point on the beach where the construction template is to be achieved. Depending on the material, length, and type of each section of pipe, the straight-line pipe may be bolted with a gasket, welded, or fused together using a fusing machine. The smooth connection points in straight-line pipe allow for a smooth flow of material through the pipeline maximizing production rates. Approximately every 200 feet, at the connection point for two pipe segments, a small hole may be dug to allow the contractor to connect the pipe 360 degrees around. Once the straight-line pipeline is connected and the terminal point of the line is at the pipe outflow end, a y-valve joint will be added and telescope pipe is then connected. Pipe segments are placed one inside the other to generate the telescope pipeline and cedar planks and burlap are used for leak control. These types of connections have a reduced diameter and; therefore, production rates decrease due to the restricted flow of material. The y-valve and connecting telescope pipeline enables the contractor to “walk” the pipeline down the beach as the project is underway and reduce the amount of down time for extending pipe. While material is being placed on the beach and the construction template is achieved, the contractor can extend the telescope pipe at the other end of the y-valve and switch the lines without having to shut down production to extend the pipeline. As a large portion of beach is constructed, additional straight-line pipe will be added to reduce the amount of telescope pipe used and to maintain acceptable levels of production.

4.01.5 Beach Construction.

The beach building process typically involves the use of bulldozers and sometimes backhoes to distribute the sediment as it falls out of suspension at the outflow end of the pipeline. The sediment slurry is diffused as it is released from the terminal pipe in order reduce the flow velocity onto the beach. Dikes are constructed on one or two sides of the effluent area to allow for extended settlement time of suspended solids in order to reduce turbidity levels in the near shore environment. The construction zone, which includes the active disposal area and associated heavy equipment used to redistribute sediment, generally encompasses a fenced off area of 500 feet on each side. The contractor places stakes to mark station locations and elevational requirements for the project template. As sediments fall out of suspension, dozers and backhoes are used to distribute sediment and construct the desired beach template. As target elevations for a given project and station are achieved, the designated construction area moves down the beach to the next station. Upon completion of a given section (generally 500-foot acceptance sections), stakes are removed from the beach. Throughout the duration of the pumping process, the contractor is required to inspect the pipeline route (approximately every 2 hours) in order to check and fix pipe leaks. During all aspects of the construction operation, vehicles and heavy equipment including pickup trucks, all terrain vehicles (ATV's), bulldozers, etc. may traverse the beach. No driving or construction activity is allowed within existing dune vegetation or other environmentally sensitive locations identified prior to construction.

In addition to the heavy equipment and other small vehicles located within the active construction area at the disposal site, the contractor is also required to have a dumpster for trash disposal (a solid waste disposal management plan is required from the Contractor), and bathroom facilities (port-o-john). The contractor may also have an equipment supply container that follows the progression of the disposal area.

(a) Lighting During Construction.

According to the 2003 U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1), a luminance range of 3-30 lm/ft^2 is required for general outdoor work or construction areas. In order to meet these safety standards, appropriate lighting must be provided at night during specific components of the project site (i.e. disposal site, dredge, staging area, etc.). Project construction typically occurs around-the-clock to make efficient use of expensive equipment (the cost of which constitutes a major cost of the operation). Allowing this equipment to be idle at night could double the cost and duration of the operation. Most of the equipment staging, mobilization, and demobilization of pipeline are performed during daylight hours. However, nighttime staging, mobilization, and demobilization may occur if there is a small construction window and the work schedule is tight. For projects where lighting is a concern for sensitive organisms, ample lighting can be obtained without impacting a large area by using light shields and appropriate angling of lights. In addition to staged light in the construction area, the vehicles used for transport, as well as the bulldozers moving sediment, will have lights on the front and back of the equipment. Features within the active disposal area including the dumpster, equipment storage, etc. may also have lighting associated with them. Working around heavy equipment is dangerous anytime. Injuries and fatalities have occurred in both the water and on the beach. Ample lighting of work areas at night is a major human safety consideration.

(b) Lighting from Nearby Dredge.

Dredge plants and associated tugs and barges are required to meet Corps, US Coast Guard, and OSHA lighting standards for safety. During the dredging process, if the dredge is within the vicinity of the beach (i.e. within the inlet complex) lighting from the dredge or other associated vessels may impact sensitive beach organisms (i.e. sea turtles). Furthermore, on hopper dredges, ample lighting is specifically required for the observers on board to provide safe access at night to the inflow boxes and screens. In addition to dredging within channels, inlets, etc., some dredging may be land-based (i.e. dredging of disposal islands). During these unique dredging projects, additional lighting impacts may occur on the disposal island from the dredge and associated heavy equipment working on the site to move anchors, etc. Working on a dredge is a dangerous and sometimes fatal occupation. Ample lighting of work areas at night is a major human safety consideration. In addition, vessels operating (or even if idle) at night must be properly lighted to avoid collision with other vessels (especially in or near navigation channels).

(c) Tilling

Depending on the compatibility of sediment placed on the beach and the post-project compaction levels, the contractor may be required to till the constructed beach. The process of tilling entails pulling a series of tines through the sediment using a tractor or other piece of heavy equipment in order to prevent or alleviate post-project beach compaction. The tilling device is designed to penetrate approximately 24-36 inches, relative to species specific sea turtle nest depths; however, depths can vary given site specific circumstances. Tilling is often performed after the target beach template is achieved and the project section has been accepted by the Corps Contracting Officer. Tilling is often performed (i.e. overlapping rows, parallel and perpendicular rows, etc.) so that all portions of the beach are tilled and no furrows are left behind and is often completed prior to May 1 (the beginning of the main part of the sea turtle nesting season). If the project is completed during the nesting season, all tiling operations are coordinated with the appropriate sea turtle beach monitoring representatives. Tilling is not performed in areas where nests have been left in place or relocated. After a given section of beach is tilled, the Contractor will drag a piece of fencing or other similar type object to smooth any ridges on the beach surface. This process may be done concurrently with the tilling operation or as a separate event.

4.01.6 Demobilization.

Demobilization is essentially the reverse of the mobilization process and includes the breakdown of all straight-line and telescope pipe, the removal of pipe segments in the staging area, and the removal of all equipment from the staging area. The staging area for the demobilization process is similar to the mobilization process and functions like a large production line. As the pipe is broken down, pieces of pipe are transported and stacked using trucks, wagons, cranes, etc. and prepared for transport off-site via barges, trucks, or tugs.

4.02 Associated Hard Structure Features (Seawalls, Groins, Breakwaters, Sills, etc.)

On highly developed shorelines with significant beach erosion problems, hard structure alternatives may be used as beach stabilization, in combination with beach fill activities. This combination tends to retard erosion and increase the amount of time sediment remains on the beach. Such hard structure measures may consist of seawalls, revetments, groins, bulkheads, and breakwaters. Seawalls, revetments, and bulkheads are used to protect inland development and to armor the shoreline against erosion; whereas, groins, near shore breakwaters, and sills are beach stabilization structures designed to increase the longevity of a beach fill. Beach stabilization structures alone do not provide the sand to maintain a wide protective or recreational beach. Accretion in one area, as a result of shore-perpendicular structures, is balanced by erosion elsewhere unless additional sand is introduced into the project area. Due to the effects of hard structures on adjacent beaches, site conditions and context must be considered during placement. The design of successful beach stabilization structures involves applying knowledge of the physical environment and coastal processes at a site to the selection of a type of structure, the preliminary design of the structure(s), and the subsequent analysis and refinement of the design (USACE, 1989). Beach stabilization features may be built of various materials such as rubble mound construction, sheet-pile construction (timber, concrete, or steel), gabions, sand bags, geo-tubes, etc. Also, shore perpendicular structures may be permeable or impermeable. Permeable groin features have openings or voids large enough to permit passage of appreciable quantities of littoral drift through the structure; whereas, impermeable groin features are constructed such that sand cannot pass through the structure (but sand may still move over or around it).

(1) Seawalls, revetments, and bulkheads

These structures are built parallel to the shore to protect the area immediately behind them, but afford no protection to adjacent areas or beach in front of them and can modify coastal processes such as longshore and cross-shore transport rates and prevent the normal functioning of the beach environment. In other words, these structures do little to protect the beach in front of them and as that beach becomes "starved" for sand, it may act a sink (trapping sand and blocking the transport of sand to adjacent beaches).

(2) Groins

Groins are barrier-type structures that extend from the backshore into the littoral zone and may be constructed either as a single feature or in series along the length of beach to be protected, referred to as a groin field or system. The purpose of groins is to modify the longshore movement of sand to either accumulate sand on the shore or impede sand losses. Current DEP policy is to allow the construction of groins, in association with a beach restoration project, to minimize sand loss only in a "critical erosion" area. Depending on specific site conditions (wave climate, littoral drift, offshore profiles, erosional hot spots, etc.), groins have varying applications and may be used, if necessary, in combination with beach fill to provide better shore protection features by anchoring the fill material and by modifying longshore sand transport.

Groins have been constructed, depending on the site context and conditions, in various configurations, which are classified as high or low, long or short, permeable or impermeable, and fixed or adjustable. The length of the groin will determine the rate of sediment passage around the end of the structures, whereas the design height will determine the rate of sediment passage over the structure. Groin length should be established based on the expected surf zone width with the shoreline at its desired post-construction location. Groins that initially extend beyond this point will impound more sand than desired, and erosion will extend further down coast. Short groins that do not extend across the entire surf zone will not intercept all of the longshore transport and some sand may bypass the groins outer end reducing erosion of down-drift beaches. Selection of a groin height is based on several factors analyzed to minimize the use of construction materials, control sand movement over the top of the groin, control wave reflections, and control the amount of sheltering from waves the groin provides to down-drift beaches. The groin profile generally consists of a high landward end with a horizontal crest at about the elevation of the existing or desired beach berm, a seaward sloping section that connects the high landward end with an outer or seaward section at about the slope of the beach face, and a seaward section generally with a lower elevation. A lower elevation allows for waves to carry some sediment over the structure and will reduce wave reflections from the groin. Groin permeability will also contribute to the amount of sediment moving down-drift of the structure and depending on the site conditions, sediment budget, longshore drift, etc. The desired amount of down-drift sediment movement can be controlled by the degree of groin void spacing. Usually, sheet pile groins are impermeable while rubble mound groins have some degree of permeability depending on the level of sand tightening (USACE, 1992).

Depending on site context, cost, and availability; a wide variety of materials are used in the construction of groins including stone, sheet pile, sand bags, geo-tubes, etc. Groin structures are used at various locations throughout the Atlantic and Gulf coasts of Florida as either stand alone shoreline protection features or in combination with beach fill projects. Though most groins are constructed as straight shore-perpendicular features, composite groins have shore parallel segments added to a straight groin, called the stem. Groins with composite plan shapes such as a spur, inclined, angular, Z-shape, L-shape, and T-head groins are constructed to achieve a more stable dynamic-equilibrium beach plan shape and are considered more efficient than straight groins in holding the shoreline position. Composite groins reduce rip currents, provide wave shelter, reduce wave steepness, and induce significant diffraction and refraction (Hanson and Kraus, 2001). Each groin shape functions differently depending on the specific site conditions. The shore parallel segments shelter the leeward beach, promoting accumulation of sediment as waves tend to transform from erosional to accretionary with approach to the groin stem and a salient or tombolo is formed (USACE, 1992).

For beach nourishment/restoration projects where the project area tapers or ends at an inlet, a terminal groin may be constructed to contain sand within the project area or to control the rate at which sand is lost from the project area by longshore transport. In order to reduce sand losses from the beach project and to prevent sediment from infilling the inlet, structures are sand tight, impermeable, high, and long in order to prevent sand from being carried through, over, or around them. Furthermore, the design of terminal groins is often angled, specific for the site conditions. For beach projects that taper or end within an adjacent beach, a transition reach is often needed to taper into the un-stabilized beach. The length of the groins at the end of the project is gradually decreased to form a transition from the project's typical groins to the adjacent beach (USACE, 1992).

(3) Nearshore Breakwaters.

Nearshore breakwaters can be either shore-connected or detached and may be built singly or in a series spaced along the shoreline. Crest elevation determines the amount of energy transmitted over the top of a near shore breakwater or submerged sill. High crest elevations preclude overtopping by all but the highest waves whereas low crest elevations allow frequent overtopping. The four basic forms of near shore breakwaters for shore stabilization are a single detached breakwater, a multiple detached breakwater system, artificial headlands, and a submerged sill structure intended to form a perched beach. The effectiveness of a near shore breakwater depends on the environmental conditions in which it is constructed. Detached breakwaters are constructed close to the shore to protect a stretch of shoreline from low to moderate wave action and to reduce severe wave action and beach erosion. Littoral material is carried behind the breakwater where it is deposited in the lower waver energy region. Protection from breakwaters will reduce erosion during significant storm events and promote accretion during periods of low wave activity. Nearshore breakwaters can also be constructed to create artificial headlands (USACE, 1992).

Depending on the design characteristics (length, height, nearness to shore, etc.), three different types of shorelines can develop behind a breakwater or system of breakwaters: (1) Tombolo formation (the resultant breakwater/tombolo formation functions like a T-groin), (2) a bulged shoreline (salient) landward of the structure, and (3) limited shoreline sinuosity or salient formation due to limited sediment supply.

(4) Sills

Shore parallel sills can be utilized in combination with beach fill in order to reduce the rate of offshore sand movement. Though sills provide some wave protection to the beach behind it, the sheltering effect is smaller considering the low sill crest. The primary function of submerged sills is to act as a barrier to shore-normal sediment motion rather than the reduction of wave action, as provided by breakwaters. The low profile of a sill and it's alongshore continuity differentiates submerged sills from near shore breakwaters (USACE, 1992).

5.00 EXISTING CONDITIONS

Since 1950, Florida's population has grown from 2.7 million to nearly 13 million, of which 75% live within ten miles of the coast (FCMP, 1996). The Southwest Florida coastal population has seen its population grow almost 15-fold since 1950, from 63,000 to 1 million residents (FCMP, 1998). Broward, Miami-Dade, and Palm Beach counties are expected to be among the ten leading counties in absolute population growth in the United States between 1994 and 2015 (National Oceanographic and Atmospheric Administration (NOAA), 1998). With the exception of the current economic down-turn, coastal development throughout the state of Florida is expected to continue to rise. Florida's population actually declined in 2009 by an estimated 57,000. A modest increase in population (+23,000) is projected by University of Florida researchers for 2010. However, the annual increase is expected to continue to fall short (until 2014 or later) of the nearly 300,000 per year experienced over the past 40 years (Keen C, 2010). As more money is invested along the coastline, the issue of property protection from the ocean continues to gain interest. Pressures generated by coastal development have led to disruptions of natural processes and have threatened the ecological and economic values of the coastal zone.

The economy of many coastal states is not driven by the local population, but by tourism, which contributes $260 billion to the U.S. economy and $60 billion in federal taxes (King, 1999). In Florida, beach tourism generates about $15 billion a year to the state's economy (FCMP, 1996). As much as 62 percent or $158 billion of Florida's entire Gross State Product is generated in coastal areas (NOAA, 1998). The economic stronghold of tourism on beach communities necessitates the need for attractive, large and pristine beaches to attract the tourist dollar. The beach, however, is an extremely dynamic environment, constantly eroding and accreting sediment over time. Beach erosion results in coastal land loss due to current transport of sediment (alongshore, cross-shore), wind erosion from the berm, and relative sea level rise (Finkl, 1996). With increased development, continued severe beach erosion, and an increase in the number of hurricanes, large-scale efforts are required in order to prevent or slow down this natural process of shoreline retreat. Inlet construction and related channel protection activities are one of the leading causes of beach erosion in Florida (FCMP, 1996). Erosion around inlets is being reduced through the use of inlet management plans in coordination with DEP's Bureau of Beaches and Coastal

Systems. By placing sand from maintenance dredging on or near an eroding beach, some of the erosion loss can be reduced. Florida is also a primary target for hurricanes resulting in significant erosion events. From 1900 to 1994, 36% of all U.S. hurricanes hit Florida and 71% of category 4 or higher hurricanes have hit either Florida or Texas (Hebert et. al., 1995). In 2004, four hurricanes (Ivan, Charley, Jeanne, and Frances) made landfall throughout the coast of Florida, two on the Atlantic coast (Jeanne and Francis) and two (Ivan and Charley) on the Gulf coast, resulting in significant damage and shoreline erosion throughout the state. As a result of the hurricane damage in 2005, Federal funding towards Florida's shore protection program increased from $7 million in 2004 to about $210 million in 2005. Approximately 83.4 miles of shoreline were restored consisting of approximately 18.5 million cubic yards of sand placed on the beach. Furthermore, the 2005 hurricane season was a record breaking season with 27 named storms, of which, Florida was impacted by seven (Hurricanes Dennis, Katrina, Ophelia, Rita, and Wilma and Tropical Storms Arlene and Tammy). The impact of these storms exacerbated erosion conditions in south and northwest Florida.

Since 2005, storm activity has been less but may only be a lull reflecting the cyclical nature of storm activity. According to NOAA, the current high hurricane activity era has been in place since 1995 and contrasts sharply with the low activity era of 1971-1994 (NOAA 2010). There is speculation that storm activity (frequency and/or intensity) overall may increase as a result of climate change. The U.S. Environmental Protection Agency (USEPA, 2009) recently concluded that "frequency changes in hurricanes are currently too uncertain for confident projection" but that a rise in sea level is supported by "strong evidence." It has been long recognized that sea level rise would increase the frequency and/or scope of beach nourishment and other shore protection measures to maintain existing shorelines (USEPA, 1985).

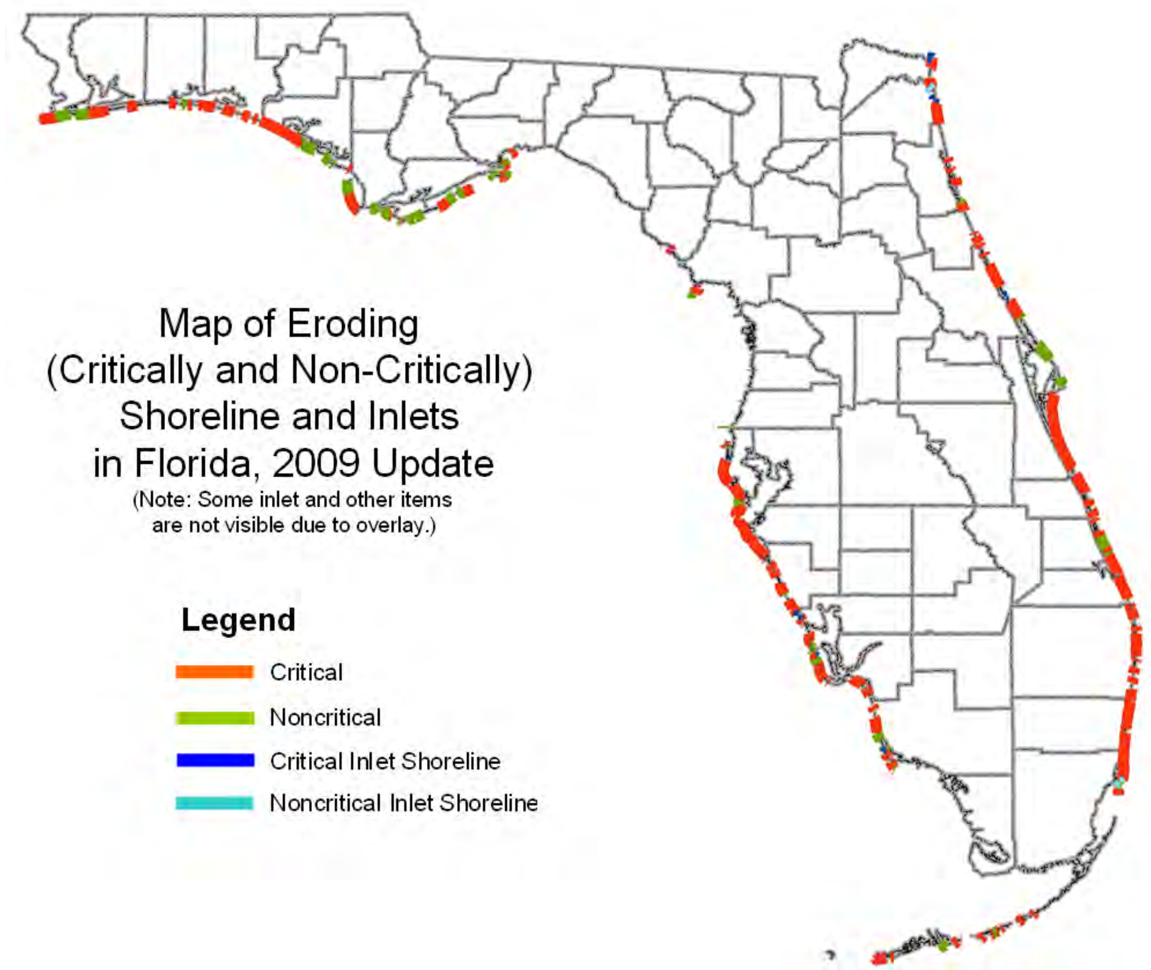
Of Florida's 825 miles of sandy beaches, 491.9 miles have experienced erosion as identified in the 2009 report, "Critically Eroded Beaches in Florida." DEP's Bureau of Beaches and Coastal Systems has defined 396.4 miles of sandy beaches as critically eroded, 8.9 miles of critically eroded inlet shoreline, 95.5 miles of non-critically eroded beach, and 3.2 miles of non-critically eroded inlet shoreline (http://www.dep.state.fl.us/beaches/programs/coasteng.htm.) (Figure 4). According to the Bureau, "critical erosion" is defined 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. 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."*

Between 1964 and 1998, the Florida Legislature has appropriated nearly $200 million for beach preservation and erosion control with matching funds provided by local government and Federal dollars (FCMP, 1998). While funding remains substantial, the current economic downturn has resulted in a reduction of revenues and expenditures for shore protection by the state. For the state fiscal year 2009-2010, approximately $15,000,000 was appropriated for beach and inlet projects. Due to budget cuts and revenue reductions, this is about half of the $30,000,000 per year that would normally be expected under more favorable economic conditions (Florida Department of

Environmental Protection, 2010). Depending on the shoreline protection measure utilized, the potential for habitat degradation may exist. However, for beach communities throughout the Atlantic and Gulf coasts of Florida, erosion rates are so severe that beachfront habitat is almost entirely lost, and therefore, restoration of habitat through beach management practices is becoming critical.

Figure 4. Erosion areas throughout the Atlantic and Gulf coasts of Florida (for more detailed information go to http://www.dep.state.fl.us/beaches/programs/coasteng.htm).



6.00 SPECIES CONSIDERED UNDER THIS ASSESSMENT

Updated lists of endangered and threatened (E&T) species for the project area were obtained from the USFWS (Florida Field Offices) (http://www.fws.gov/northflorida/Species-Accounts/North_Florida_Fed_TE_Species_Info.htm). This list contains E&T species that could be present in the proposed project area based upon their geographic range (see Table 3). However, the actual occurrence of a species in the area would depend upon the availability of suitable habitat, the season of the year relative to a species' temperature tolerance and migratory habits, and other factors.

Table 3. Threatened and Endangered Species Potentially Present Along the Atlantic and Gulf Coasts of Florida.

Species Common Names	Scientific Name	Federal Status
Mammals		
West Indian Manatee	*Trichechus manatus*	Endangered
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Endangered
Southeastern beach mouse	*Peromyscus polionotus niveiventris*	Threatened
Anastasia Island beach mouse	*Peromyscus polionotus phasma*	Endangered
St. Andrews beach mouse	*Peromyscus polionotus peninsularis*	Endangered
Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	Endangered
Birds		
Roseate Tern	*Sterna dougallii dougallii*	Threatened
Piping Plover	*Charadrius melodus*	Threatened
Snowy Plover	*Charadrius alexandrinus*	Status Review
Red Knot	*Calidris canutus rufa*	Candidate Species
Reptiles		
Green sea turtle	*Chelonia mydas*	Threatened[1]
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
Vascular Plants		
Beach jacquemontia	*Jacquemontia reclinata*	Endangered
Deltoid spurge	*Chamaesyce deltoidea ssp. deltoidea*	Threatened
Status	Definition	
Endangered	A taxon "in danger of extinction throughout all or a significant portion of its range."	
Threatened	A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."	

[1]Green turtles are listed as threatened, except for breeding populations in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

7.00 IMPACTS TO LISTED THREATENED AND ENDANGERED SPECIES

7.01 General Impacts

Dredging operations and the subsequent placement and management of sediment on the beach have the potential to adversely affect animals and plants in a variety of ways. These include actions of the dredging equipment (i.e., cutting, suction, sediment removal, hydraulic pumping of water and sediment); physical contact with dredging equipment and vessels (i.e. impact); physical barriers imposed by the presence of dredging equipment (i.e. pipelines); and placement of dredged material in various locations (i.e. covering, compaction, escarpment formation, etc.). Potential impacts vary according to the type of equipment used, the nature and location of sediment discharged, the time period in relation to life cycles of organisms that could be affected, and the nature of the interaction of a particular species with the dredging activities.

All the proposed activities (see Section 2.00) will occur along the Atlantic and Gulf coast beaches of Florida. The specific shore protection or beach fill placement actions covered by this assessment will all have varying design templates and purposes, including various alternatives for berm width, dune considerations, fill lengths, etc. Any potential impacts on federally-listed threatened and endangered species would be limited to those species that occur in habitats provided by the project areas. Therefore, the proposed work will not affect any listed species which generally reside in freshwater, forested habitats, adjacent marshes, etc.

Federally-listed threatened or endangered species, which could be present in the project area during the proposed action, are identified in Table 3.

Dredging and disposal methods associated with the proposed action are similar to current maintenance dredging methods and existing beach nourishment projects (Tables 1 and 2). These methods have been addressed in a number of previous environmental documents, including biological assessments and biological opinions rendered regarding endangered and threatened species. Since these documents are too numerous to list here, see Appendix 1 and Appendix 2 and the Jacksonville District's Environmental Documents web page (http://www.saj.usace.army.mil/Divisions/Planning/Branches/Environmental/DocsNotices_OnLine.htm).

7.02 Species Accounts

The following sub-sections individually address protected species.

7.02.2 Roseate Tern

a. Status Threatened

b. Background

The Roseate Tern population in Florida is small, has a limited range, and in recent years has experienced poor nest success. Therefore, on November 2, 1987, the Roseate Tern was federally listed as threatened throughout the entire Caribbean population. The Caribbean population of the Roseate Tern breeds from Florida through the West Indies to islands off Central America and northern South America; however, no critical habitat currently exists. During the 1970s, a loss of nesting sites, competition from other colonial nesters, and predation contributed to a significant population decline and subsequent listing in 1987 for both the northeastern and Caribbean populations. Recent surveys of the Florida population have identified only three nesting colonies containing an estimated 300 pairs (http://ecos.fws.gov/docs/recovery_plan/930924_v2.pdf).

Breeding populations for the North American subspecies of Roseate Terns are divided into two separate populations, one in the northeastern U.S. and Nova Scotia, and one in the southeastern U.S. and the Caribbean. Wintering sites are concentrated along the north and northeastern coasts of South America. The Roseate Tern is strictly a coastal species in Florida, breeding in parts of the Florida Keys during the summer and migrating throughout the South Florida coast during the spring and fall. They are colonial nesters, often associating with other terns. Open sandy beaches isolated from human activity and predators are optimal nesting habitat for the Roseate Tern. They often nest on bare sand with scant vegetation laying eggs around mid-May with hatch outs occurring around mid-June through early July. The four major nesting colony sites in Florida are Pelican Shoal, Vaca Rock, Truman Annex, and the Marathon Governmental Center. However, some nesting may occur on dredged material disposal islands and gravel rooftops. The Roseate Tern is often observed plunge-diving in the near shore surf foraging on small fish. When feeding chicks, they have been observed flying up to 20 km from the colony returning with a single fish (Nisbet, 1989).

The current recovery strategy for Roseate Terns in South Florida is to maintain or increase the estimated 300 breeding pairs by protecting, restoring, and managing the existing colony sites, provide additional colony sites, and to initiate conservation programs to maintain, protect, and enhance productivity of colony sites. Protection of known colony sites should entail posting, regular patrolling during the breeding season, limited recreational use, and techniques for predator control.

c. Project Impacts

The South Florida breeding population of Roseate Terns is experiencing both direct and indirect impacts (predation, storms, tidal inundation, flooding, habitat alteration, habitat destruction, etc.) that may affect adult birds, nests, eggs, young, and the ability for adults to produce a large clutch or feed their young. The placement of sediment and the associated beach construction activities could impact nesting, foraging, and migrating Roseate Terns. However, placement of compatible material on beaches may also restore eroded nesting habitat and potentially provide additional colony sites, fulfilling a component of the Roseate Tern recovery strategy.

Considering that the current nesting areas in Florida are the only place in the U.S. where Roseate Terns from the Caribbean population breed, beach fill placement activities will avoid breeding and nesting activities (including the four major identified nesting colony sites in South Florida on Pelican Shoal, Vaca Rock, Truman Annex, and the Marathon Governmental Center) from May through July. All beach fill placement activities that can not adhere to this breeding and nesting window will be addressed through separate coordination and amendments to this document.

Increased turbidity in the near shore environment is often associated with the beach construction process, depending on the characteristics of the material, and may affect foraging activities of Roseate Terns. As the sediment slurry is released from the outflow pipe, courser sediments fall out while finer sediment remains in suspension and are carried into the near shore water column. Turbidity is managed during the construction operation by building a dike around the outflow area allowing for more time for sediment to fall out prior to reaching the near shore environment. The resultant increase in turbidity of the near shore environment is generally short-term, isolated, and is no more significant than increased turbidity episodes associated with large-scale storm events. Though increased turbidity may impact foraging capabilities of the Roseate Tern and subsequent feeding of chicks, long-range foraging (20 km) (Nisbet, 1989) has been documented and it is likely that foraging outside of turbid areas would occur. Furthermore, beach construction activities will likely occur during periods when Roseate Terns are migrating along the South Florida coast during the spring and fall. Roosting and foraging activities may be impacted within the construction site; however, these areas are site specific and adjacent area outside of the active construction zones would be available.

d. Effect Determination.

Considering that the placement of sediment and associated construction activities will (1) avoid identified major nesting colony sites and avoid breeding and nesting time frames and (2) associated turbidity impacts to foraging are short-term and site specific, it is likely that beach construction activities may affect but are not likely to adversely affect Roseate Terns.

7.02.3 Piping Plover.

a. Status. Threatened

b. Background.

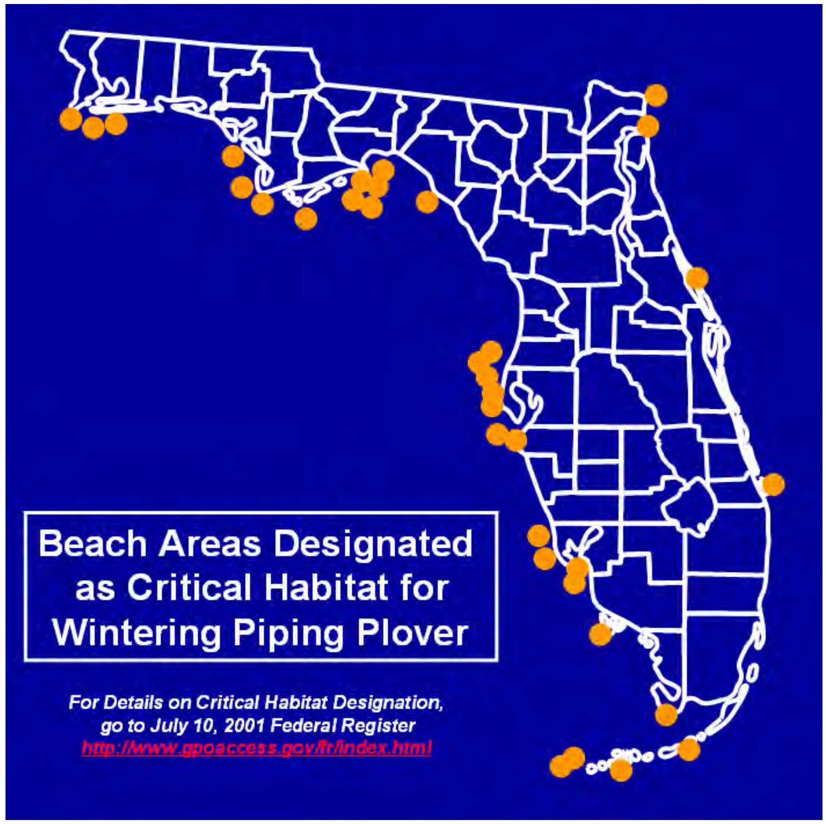
The Atlantic Coast Piping Plover population breeds on coastal beaches from Newfoundland to North Carolina (and occasionally in South Carolina) and winters along the Atlantic Coast (from North Carolina south), the Gulf coast, and in the Caribbean where they spend a majority of their time foraging. When listed as threatened in 1986, only 800 pairs were known to exist in the three major populations combined. By 1995 the number of detected breeding pairs increased to 1,350. This apparent population increase can most likely be attributed to increased survey efforts and implementation of recovery plans.

Piping Plovers typically nest in sand depressions on unvegetated portions of the beach above the high tide line on sand flats at the ends of sand spits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, sparsely vegetated dunes, and washover areas cut into or between dunes. They head to their breeding grounds in late March or early April and nesting usually begins in late April; however, nests have been found as late as July (Potter, *et al*., 1980). Feeding areas include intertidal portions of ocean beaches, washover areas, mud flats, sand flats, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes (USFWS, 1996). Prey consist of worms, fly larvae, beetles, crustaceans, mollusks, and other invertebrates (Bent, 1928).

Loss and degradation of habitat due to development and shoreline stabilization have been major contributors to the decline of Piping Plovers in Florida. The current commercial, residential, and recreational development has decreased the amount of coastal habitat available for Piping Plovers to nest, roost, and feed. Furthermore, beach erosion and the abundance of predators, including wild and domestic animals as well as feral cats, have further diminished the potential for successful nesting of this species. Since many Florida beaches are wintering area for the Piping Plover, the major threat to its occupation of the area during the winter months would be continued degradation of beach foraging habitat.

c. Critical Habitat for Wintering Piping Plover Designation.

Critical habitat receives protection under section 7 of the Endangered Species Act through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 requires consultation on Federal actions that are likely to result in the destruction or adverse modification of critical habitat.



The Piping Plover is a fairly common winter resident along the Atlantic and Gulf coasts of Florida where they spend a majority of their time foraging. When not foraging, plovers can be found roosting, preening, bathing, engaging in aggressive encounters, and moving among available habitat locations (Zonick and Ryan, 1996). On July 10, 2001, the USFWS designated 137 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas as critical habitat for the wintering population of the Piping Plover where they spend up to 10 months of each year on the wintering grounds. Piping Plovers begin arriving on the wintering grounds in July, with some late-nesting birds arriving in September. A few individuals can be found in the wintering grounds throughout the year, but sightings are rare in late May, June, and early July. Constituent elements for the Piping Plover wintering habitat are those habitat components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing these primary constituent elements within the designated boundaries are considered critical habitat. The primary constituent elements are found in coastal areas that support intertidal beaches and flats (mud flats, sand flats, algal flats, and washover passes) and associated dune systems and flats above annual high tide. Important components of intertidal flats include sand and/or mudflats with no or very sparse emergent vegetation. Adjacent non- or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting Piping Plovers. Important components of the beach/dune ecosystem include surf cast algae, sparsely vegetated back beach and salterns, spits, and washover areas. Designated critical habitat does not include existing developed sites consisting of buildings, marinas, paved areas, boat ramps, exposed oil and gas pipelines, and similar structures (Federal Register/Vol. 66, No 132, July 10, 2001).

The USFWS has defined textual unit descriptions to designate areas within the designated critical habitat boundary. These units describe the geography of the area using reference points, include the areas from the landward boundaries to the MLLW, and may describe other areas within the unit that are utilized by the Piping Plover and contain the primary constituent elements (Federal Register/Vol. 66, No 132, July 10, 2001 http://www.gpoaccess.gov/fr/index.html).

d. Project Impacts.

(1) Habitat.

A majority of the existing shoreline throughout the state of Florida is heavily developed and is experiencing significant shoreline erosion from both anthropogenic and natural causes. Habitat loss from coastal development, long-shore and cross-shore shoreline erosion, shoreline erosion impacts from hard structure protection measures (i.e. jetties, groins, etc.) (See Section 4.02), and heavy public use has led to the degradation of Piping Plover habitat throughout the State. As erosion and development persist throughout the coast of Florida, Piping Plover roosting and foraging habitat loss continues. The enhancement of beach habitat through the addition of beach fill, in highly erosive environments, may potentially restore lost roosting and beach front intertidal foraging habitat. Short-term impacts to foraging (1-3 years) and roosting (during construction) habitat may occur as a result of beach fill placement activities and associated construction operations. However, long-term foraging habitat loss may occur if existing or potential washover habitat and intertidal habitat are lost due to shoreline protection measures (i.e. dunes, groins, jetties, etc.) that prevent the formation of washover fans during large storm events or impede longshore transport, resulting in down-drift erosion.

Cross-island transport of sediment and subsequent washover fan formation is considered a primary constituent element used in defining Piping Plover critical habitat. These low lying sand flats contain sparse vegetation and offer optimum habitat for Piping Plovers. Though eroded roosting habitat may be restored with the placement of beach fill, an increase in the width and height of the constructed berm, as well as the potential incorporation of a protective dune, hard structure, etc., may function as a barrier to cross island transport of sediment during significant erosion events resulting in long-term washover foraging habitat loss.

In order to minimize long-term impacts to existing washover habitat or potential washover fan formation, beach fill placement activities will avoid impacts to the primary constituent elements of Piping Plover critical habitat to the maximum extent practicable. Pre-project surveys will be performed in feasibility studies to assess the presence of and/or potential for washover fan formation as well as its overall habitat value relative to the surrounding conditions. These identified high value habitat features will be considered during project design. The Corps will work with the appropriate resource agencies to develop shore protection design features with minimal impact to Piping Plover constituent elements. The goal of this working group will be to develop shore protection design guidelines that can be utilized during future project planning to protect and/or enhance high value Piping Plover habitat locations (i.e., washover fans). Furthermore, in the event that avoidance or innovative design features cannot be implemented, innovative mitigation measures will be developed to enhance or restore lost habitat.

The formation of sand bars and emergent sand spit islands within inlet complexes serve as valuable habitat for Piping Plovers and other shorebird species. In many cases these sites contain the important mosaic of habitat types including algal flats, sand flats, mud flats, etc. Though these formations are highly dynamic, they are often protected and isolated from human development pressures and associated disturbances; thus, they offer valuable roosting and foraging habitat. The size and frequency of occurrence is dependent on the sediment budget within an individual inlet complex and the interval period for inlet bypassing of sediment. Inlet bypassing of accreted sediments within inlet complexes is intended to mitigate down-drift erosion, and subsequent habitat loss, resulting from the interruption of longshore transport of sediments from hard structures and deep navigation channels. However, the resultant habitat from the bypassing of sediment on down-drift beaches is, in some cases, dependent on the removal of sediment accretion within the inlet. Though the bypassing of sediment to down-drift beaches may help mitigate lost intertidal foraging grounds, the isolation and protection offered by emergent sand spit and/or sand bar features within inlets is a critical, limited, and high value habitat feature for Piping Plovers and other shorebirds.

Most inlets throughout the state of Florida have an active inlet management plan, utilizing maintenance dredging to provide safe navigation and to mitigate the erosion of adjacent beaches through inlet bypassing/back-passing mechanisms. However, management of down-drift erosion through inlet bypassing/back-passing could result in the loss of emergent spit and sand bar formation. Therefore, the presence and absence of these valuable sand flat features are dependent on the frequency in which these dredging and bypassing/back-passing events occur. In recognition of these valuable habitat features as well as the balance between the need for dredging to maintain safe channels and mitigate associated erosional features, the Corps will work with DEP to consider the value and context of habitat features within each inlets management plan. These significant inlet habitat features throughout the state, particularly the Panhandle and on the southwest coast where Piping Plovers concentrate during migration and wintering, will be considered and evaluated in order to adjust future dredging frequencies, to the maximum extent practicable, so that adjacent habitats are made available and total habitat loss would not occur at one time within a given inlet complex.

The placement of sediment along Atlantic and Gulf coast beaches of Florida will adhere to appropriate windows to the maximum extent practicable. Since Piping Plovers do not nest in Florida, construction activities will not impact breeding and nesting Piping Plovers. 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 any point in time during pump out and adjacent habitat is still available, overall direct loss of foraging habitat will be minimal and short-term.

(2) Critical Habitat.

All construction activities will avoid, to the maximum extent practicable, USFWS designated critical habitat areas. In the event that construction activities cannot avoid areas of designated critical wintering habitat, the primary constituent elements for the biological needs of roosting, sheltering, and foraging may be impacted. In order to minimize impacts to the primary constituent elements, survey guidelines for non-breeding shorebirds will be implemented. Furthermore, pipeline alignment and associated construction activities may be modified to reduce impacts to foraging, sheltering, and roosting. Based on historical literature and surveys, any site identified by the USFWS as unique and high quality Piping Plover habitat will require additional consultation from this assessment in order to implement site specific habitat protection measures.

(3) Food Supply.

Piping Plovers feed along beaches and intertidal mud and sand flats. Primary prey includes polychaete worms, crustaceans, insects, and bivalves. The placement of sediment on the beach may have negative short-term impacts on surf zone intertidal macrofauna through direct burial, increased turbidity in the surf zone, or changes in the sand grain size or beach profile. The placement of sediment on the beach would be expected to move along the beach at a relatively slow rate (i.e., about a mile per month or about 200 feet per day) and only a portion of the beach is affected at any point in time. This rate of progress is slow enough that foraging Piping Plovers may move to other areas that are not affected by the nourishment operation. As the dredging operation passes by a given section of beach, that area is soon available for re-colonization by invertebrates. Therefore, un-impacted or recovering foraging habitat within a project site will be available throughout the duration of the project.

Literature dating back to the early 1970's along the southeast coast indicate that opportunistic infauna species (ex. *Emerita*, *Donax, Haustorius spp., etc.*) found in the nourished areas are subject to direct mortality from burial, however, recovery often occurs within 1-3 years, (Hayden and Dolan, 1974; Saloman, 1984; Van Dolah *et al*., 1992; Van Dolah *et al*., 1993; Jutte, P.C. *et al*., 1999) especially if compatible material is placed on the beach (Hayden and Dolan, 1974; Reilly and Bellis, 1978; Saloman, 1984; Nelson, 1989; Van Dolah *et al*., 1992; Van Dolah *et al*., 1993; Hackney *et al*., 1996; Jutte, P.C. *et al*., 1999; Peterson *et al*., 2000). A literature review of polychaete annelid species affected by beach fill placement activities, performed by Hackney *et. al.* (1996), indicates that sediment disturbance has a strong negative effect on tube-building and sedentary polychaetes; however, minimal effects and, in some cases, enhancing effects of some mobile taxa. Some studies indicate that following beach fill placement activities, a population shift may occur as an enhanced abundance of some polychaete species occurs within disturbed areas (Coastal Science Associates, 2003; Lindquist and Manning, 2001; Peterson and Manning, 2002).

Temporary impacts on intertidal macrofauna in the immediate vicinity of the beach nourishment project are expected as a result of discharges of material on the beach. Any reduction in the numbers and/or biomass of intertidal macrofauna present immediately after beach nourishment may have localized limiting effects on foraging Piping Plovers due to a reduced food supply or shift in species abundance and diversity. In such instances, these birds may be temporarily displaced to other locations.

The use of shore parallel or shore perpendicular hard structure for shoreline protection may result in more long-term loss of intertidal foraging habitat as long-shore transport of sediment is impeded and intertidal habitat becomes subtidal. However, for shoreline protection projects, hard structures are mostly used in combination with beach fill in order to minimize the risk of down drift erosion and subsequent intertidal foraging habitat loss.

e. Effect Determination.

The placement of sediment on the beach and the associated construction activities may temporarily impact foraging, sheltering, and roosting habitat and may impact the constituent elements for Piping Plover wintering habitat. Furthermore, the construction of shore protection features (i.e. dunes, groins, etc.) in combination with beach fill may result in more long-term impacts to the availability of washover habitat. Shore perpendicular structures that impede the long-shore transport of sediment may impact down-drift intertidal foraging habitat. Bypassing/back-passing inlet accreted sediment to adjacent beaches, as a mitigative component of inlet management, results in the short-term loss of valuable Piping Plover habitat provided by emergent spit and sand bar formations. Considering the potential impacts of these actions, it has been determined that the placement of sediment may affect the Piping Plover or its designated Critical Habitat.

7.02.4 Snowy Plover.

a. Status. State – Threatened; Federal - Under Review

b. Background.

Breeding populations of the Snowy Plover can be found throughout the Gulf coast of Florida where suitable habitat exists with a majority located in the Panhandle. With the increase in coastal development, continued coastal erosion, and subsequent habitat degradation, numbers and distribution have steadily decreased in the past 30 years. Therefore, the Snowy Plover is listed as a threatened species by the state and is under review by the Federal government (Wood, 1991).

Snowy Plover nesting records along the Gulf coast range from March through September; with a portion of the Panhandle population over wintering in Northwest Florida. On the Gulf coast breeding occurs from Pensacola to Marco Island and is absent from the Big Bend portion of the Gulf coast due to the lack of available nesting habitat. In central and southern Florida, breeding occurs only in a few protected parks, such as Caladesi Island, Fort DeSoto Park, and Cayo Costa and on isolated peninsulas (Howell, 1932). Snowy Plovers require open dry sand near dunes for breeding with access to inner dunes for brood protection. Open areas within the inner dunes support re-nesting opportunities after losses due to storms or other disturbance. Nests consist of a shallow open scrape on flat areas near the frontal dune and within sight of the water so hatchling chicks have access by foot to the foraging grounds. They are often associated with small objects and can be found within the vicinity of least tern nesting colonies.

Snowy Plovers feed on terrestrial and aquatic invertebrates including beetles, flies, small mollusks, and seeds (Howell, 1932). Particularly on the Gulf Coast, they feed on small crustaceans, mollusks, marine worms, aquatic insects, and seeds along Gulf beaches and flats.

c. Project Impacts.

(1) Habitat.

A majority of the existing shoreline throughout the Gulf coast of Florida is heavily developed and is experiencing significant shoreline erosion. As beachfront habitat continues to be developed into residential and recreational areas, habitat loss (roosting, foraging, breeding, and nesting) and degradation throughout the coast will persist. As a result of habitat loss to private development, a majority of the nesting populations exist in protected parks. The enhancement of beach habitat through the addition of beach fill may potentially restore lost habitat on heavily developed and severely eroding lands; however, direct short-term foraging and roosting habitat losses may occur during the placement of sediment on the beach and associated construction operations. Since only a small portion of the foraging and roosting habitat is directly affected at any point in time during pump out, and adjacent habitat is still available, overall direct loss of foraging and roosting habitat will be minimal and short-term for non-breeding birds. However, due to the physiological and behavioral requirements of nesting adults and the inability for hatchling chicks to access adjacent unimpacted habitats, foraging impacts to nesting adults and chicks may be more significant (See Section 7.02.4c(2)). Furthermore, nesting habitat requirements for Snowy Plovers include open sandy areas within the inner dunes and within sight of water so hatchling chicks have access by foot to the intertidal foraging grounds. Shore protection projects that include a dune feature should consider these habitat requirements during project design. Dune features should be constructed and planted to minimize impacts to existing breeding grounds by maintaining and enhancing existing nesting habitat features, as well as creating nesting habitat in areas that did not previously support nesting Snowy Plovers.

As identified in Section 7.02.3d(1), (1) the formation of washover fans during large storm events and (2) the formation of sand bars and emergent sand spit islands within inlet complexes serve as valuable habitat for Snowy Plovers and other shorebirds. Specific measures to minimize impacts of dredging and beach fill placement of sediment on these habitat types, as discussed in Section 7.02.3d(1), will be implemented for Snowy Plovers.

In order to avoid impacts to breeding Snowy Plovers and hatchlings, the placement of sediment along Gulf coast beaches of Florida will adhere to appropriate breeding windows, from March through September, to the maximum extent practicable. However, for severely eroding beaches that warrant shore protection actions, habitat requirements for breeding and nesting will likely already be lost or degraded. Therefore, the enhancement of beach habitat through beach fill placement activities may potentially restore lost breeding and nesting habitat. If the breeding season cannot be avoided the Corps will work with the resource agencies in order to develop a sufficient monitoring plan in order to avoid construction impacts to Snowy Plover hatchlings. For beach fill placement actions that cannot avoid the breeding and nesting window, surveys will be implemented prior to any construction activity in order to document when hatching occurs and closely monitor hatchling movements during construction in order to avoid impacts from equipment.

(2) Food Supply.

Snowy Plovers feed on small crustaceans, mollusks, marine worms, aquatic insects, and seeds along Gulf beaches and flats. The placement of sediment on the beach may have negative short-term impacts on surf zone intertidal macrofauna through direct burial, increased turbidity in the surf zone, or changes in the sand grain size or beach profile. Literature dating back to the early 1970's along the southeast coast indicate that opportunistic infauna species (ex. *Emerita* and *Donax*) found in the nourished areas are subject to direct mortality from burial, however, recovery often occurs within 1-3 years especially if compatible material is placed on the beach (See Section 7.02.3d(3)). Considering the relatively slow rate of movement during beach construction operations, availability of adjacent unimpacted foraging grounds, and rapid re-colonization rates in impacted areas, foraging habitat for non-breeding Snowy Plovers will still be available throughout the duration of the project. However, considering the physiological and behavioral requirements (i.e. incubation, brood rearing, etc.) of nesting birds, moving to un-impacted foraging grounds is not possible for both nesting adults and hatchlings. Since hatchling Snowy Plovers cannot fly, they feed themselves by walking from the nest to nearby foraging habitat about 1-2 days after hatch out. If nesting occurs before or during project construction, adult and hatchling Snowy Plovers will most likely experience lowered food supply, affecting reproductive success. Furthermore, considering that Snowy Plover chicks feed themselves upon hatch out and traverse back and forth to the foraging grounds by foot, escarpment formations that result during the post-beach fill equilibration process could act as a physical barrier to the chicks exposing them to predators and vehicles.

e. Effect Determination.

If all beach fill placement activities occur outside of the breeding and nesting window and associated dune features do not degrade habitat requirements for breeding and nesting Snowy Plovers, impacts to foraging, sheltering, roosting, breeding, and nesting habitat will be short-term; thus, the placement of sediment may affect but is not likely to adversely affect the Snowy Plover. If beach fill placement activities cannot avoid the breeding and nesting window and occur within a Snowy Plover breeding area, the placement of sediment may adversely affect the Snowy Plover. In order to minimize direct impacts to the nesting habitat as well as nesting adults and hatchling chicks, a monitoring protocol will be developed and implemented for the construction phase by the Corps and appropriate resource agencies to monitor Snowy Plover chicks upon hatch out in order to prevent them frm being run over by construction equipment. Furthermore, in order to minimize impediments to and from the intertidal foraging grounds, nesting habitat requirements will be considered during dune design, planting, and construction and escarpments will be leveled prior to the breeding season in order to avoid impacts to chicks.

7.02.5 Red Knot.

a.) Status. Federal – Candidate Species

b .) Background.

The Red Knot (*Calidris canutus rufa)* is a medium-sized shorebird that undertakes an annual 30,000 km hemispheric migration, one of the longest among shorebirds. Their migration route extends from overwintering sites in the southernmost tip of South America at Tierra del Fuego, up the Eastern coast of the Americas through the Delaware Bay, and ultimately to breeding sites in the central Canadian Arctic. Red Knots break their migration into strategically timed and selected non-stop segments, of approximately 1,500 miles, throughout the entire Atlantic coast. These staging areas consist of highly productive foraging locations which are repeatedly used year to year. As the Red Knot moves towards the northern extent of its migration route, the timing of departures becomes increasingly synchronized. One critical foraging stop for Red Knots occurs in the Delaware Bay where they feed almost exclusively on horseshoe crab eggs, due to their high fat content and ease of digestion, in order to reach threshold departure masses (180-200 grams) prior to heading for the Arctic breeding grounds. The arrival of the Red Knot in the Delaware Bay coincides with the spawning of the horseshoe crabs, which peaks in May and June. Birds arrive emaciated and can nearly double their mass (~4.6 grams/day) prior to departure if foraging conditions are favorable (Baker *et. al*., 2001), eating an estimated 18,000 fat-rich horseshoe crab eggs per day (Andres *et al*. 2003). This critical foraging stopover enables knots to achieve the nutrient store levels necessary for migration, survival, and maximizing the reproductive potential of the population (Baker *et. al*., 2004). In order to increase their body mass at such a rapid rate during their refueling stopover in the Delaware Bay, Red Knots morph their guts during their migration route from South America to Delaware. However, a population that comes up the Atlantic coast with a Florida stopover during their yearly migration does not morph their gut and are capable of processing muscle spat and/or donax for refueling (Harrington, Pers. Comm.). According to Harrington *et. al*. (1998), Red Knots that stage at Delaware Bay in the spring come mostly from South America; whereas, Red Knots that winter in Florida are underrepresented during migration in New Jersey and Massachusetts. Considering that no evidence of exchange exists between Argentina and Florida marked birds, this study suggests that wintering populations are discrete.

The location and density of the Florida wintering population has been documented through shorebird surveys dating back to 1977, with significant concentrations located between Dunedin and Naples. During the winter, the Red Knot frequents intertidal habitats, notably along ocean coasts and large bays. Considering that the Florida wintering Red Knots do not morph their guts, they are capable of foraging predominantly on coquina clams (*Donax variabilis*) along these intertidal habitats. However, Red Knots also utilize algae covered sand or mud flats within back barrier sounds, sheltered bays, or lagoons presumably feeding on bubble shells (Harrington, pers. Comm.). Red Knots are not site-specific in the foraging requirements but rather move frequently following the patchy distribution of coquina clams and, considering this mobility, are tolerant of limited disturbance. Unlike the mobile foraging behavior of Red Knots, roosting Red Knots require wide, open stretches of beach with limited human disturbance. Roosting Red Knots are more temperamental than foraging Red Knots and are less tolerant of disturbance. Beaches that have roosting habitat features but maintain consistent human activity will not be utilized by roosting Red Knots without sufficient management to prevent disturbance.

Studies by Baker *et. al.* (2004), Morrison *et. al*. (2004), Niles *et. al*. (2005), and others have documented the dramatic decline in the population of the *rufa* subspecies of the Red Knot. Baker *et al*. (2004) found that from 1997-2002 an increasing proportion of Red Knots failed to reach the threshold departure mass of 180-220 grams, suggesting that, if Red Knot populations continue to decline at their present rate, the bird could go extinct by or near 2010. Research by Niles *et. al.* (2005) confirms that this extinction trajectory remains on track. More recently, Niles *et. al.* (2009) reports continued shortage of horseshoe crab eggs at a critical stop in Delaware Bay for the Red Knot.

Over the past 10 years, heavy commercial harvest of horseshoe crabs has caused a rapid decline in the crab's breeding population in Delaware Bay, reducing the number of eggs available to shorebirds. During this time the Red Knot population has declined from over 90,000 birds counted on Delaware Bay in 1989, to 32,000 in 2002. Similar declines have been shown in the South American wintering grounds suggesting that the viability of the Red Knot is seriously threatened. Demographic modeling predicts imminent endangerment and an increased risk of extinction without urgent management (Baker *et. al*., 2004).

Morrison *et al*. (2004) have identified four factors that cause this vulnerability: (1) a tendency to concentrate in a limited number of locations during migration and on the wintering grounds, so that deleterious changes can affect a large proportion of the population at once; (2) a limited reproductive output, subject to vagaries of weather and predator cycles in the Arctic, which in conjunction with long lifespan suggests slow recovery from population declines; (3) a migration schedule closely timed to seasonally abundant food resources, such as horseshoe crab (*Limulus polyphemus*) eggs during spring migration in Delaware Bay, suggesting that there may be limited flexibility in migration routes or schedules; and (4) occupation and use of coastal wetland habitats that are affected by a wide variety of human activities and developments.

Considering the threat of extinction, petitions have been submitted to the United States Fish and Wildlife Service (USFWS) for emergency listing of the *rufa* subspecies of the Red Knot (*Calidris canutus rufa*) as endangered and to designate "critical habitat" under the Endangered Species Act ("ESA"). On September 12, 2006, the USFWS included the Red Knot as a candidate species that may warrant protection under the Endangered Species Act (ESA). The USFWS is currently reviewing the status of the Red Knot for potential listing but it is precluded by species with a higher listing priority. Although the candidate species status does not provide any regulatory protection under ESA, the USFWS recommends that, given its candidate status, all Federal agencies funding, authorizing, or conducting actions that may affect the Red Knot or its habitat, including impacts to prey resources, give full consideration to the species in project planning.

c.) Project Impacts.

The placement of sediment on the beach may have short-term impacts on benthic invertebrates. However, recovery occurs within 1-3 years depending on sediment compatibility and the frequency and size of disturbance (See Section 7.02.3d(3)). Given their mobile foraging patterns, local disruptions to foraging habitat are likely not that disruptive to Red Knots (Harrington, pers. Comm.). Therefore, disruption from construction activities associated with beach fill placement of sediment will likely result in the movement of Red Knots to an alternative foraging location. However, multiple or large scale disruptions effecting all key foraging locations at one time could have a profound impact. Though Red Knots can relocate with localized disruption, large scale disturbances that impact the entire range of foraging locations may be significant. Within the limits of foraging distribution, beach fill placement activities should be constructed in a manner as to allow for un-impacted foraging habitat locations and avoid large scale disruption to benthic invertebrates to the maximum extent practicable.

Roosting Red Knots prefer wide stretches of beach with limited disturbance. Contrary to their ability to tolerate disturbance while foraging and move among foraging habitats, Red Knots will avoid or abandon available roosting habitat adjacent to areas of disturbance. Furthermore, large scale development and continued beach erosion within their Florida wintering range has limited the availability of habitat that contains the necessary features for a suitable roosting environment. Beach fill placement actions that occur within these limited roosting locations should avoid roosting time frames or implement appropriate buffer requirements during construction to the maximum extent practicable in order to minimize impacts. Considering that roosting habitat in Florida has become increasingly degraded or lost due to erosion and development, beach fill placement of sediment may have a beneficial effect on the Red Knot's roosting habitat. Roosting habitat for Red Knots requires space between human structures and waters edge where people walk. By expanding the width of the beach, roosting habitat will be made available as long as the area is offered protection from chronic human disturbance (Harrington, pers. Comm.).

d.) Effect Determination.

Considering that construction activities will (1) avoid large scale disturbance within the limits of Red Knot foraging distribution and allow for areas of un-impacted or recovered foraging habitat within a given year, and (2) avoid roosting timeframes or provide appropriate buffers around existing roosting habitat during construction operations, the placement of sediment on the beach may affect but will not likely adversely effect the Red Knot. Any beach fill placement action that is unable to adhere to the measures identified in this assessment to avoid impacts to the Red Knot and its wintering habitat requirements may necessitate additional consultation.

7.02.6 West Indian Manatee

a. <u>Status.</u> Endangered.

b. <u>Background.</u>

The West Indian manatee (*Trichechus manatus*), also known as the Florida manatee, is a Federally-listed endangered aquatic mammal protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), the Marine Mammal Protection Act of 1972, as amended (16 U.S.C 1461 et seq.), and the Florida Manatee Sanctuary Act of 1978, as amended. Manatees inhabit both salt and fresh water and can be found in shallow (5 ft to usually <20 ft), slow-moving rivers, estuaries, bays, canals, and coastal areas (USFWS, 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 18ºC (64.4ºF) (Garrott *et al*., 1995); therefore, during winter months, when ambient water temperatures approach 20ºC (68ºF), the U.S. 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 (USFWS, 1983). 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 (Reid *et al*., 1991)

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 (USFWS, 1983). A large percent of mortality (especially for calves) is due to collisions with watercrafts. 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 (USFWS, 2001).

c. <u>Critical Habitat.</u>

The following areas in Florida (exclusive of those existing manmade structures or settlements which are not necessary to the normal needs or survival of the species) are critical habitat for the manatee: Crystal River and its headwaters known as King's Bay, Citrus County; the Little Manatee River downstream from the U.S. Highway 301 bridge, Hillsborough County, the Little Manatee River downstream from the Lake Manatee Dam, Manatee County; the Myakka River downstream from Myakka River State Park, Sarasota and Charlotte Counties; the Peace River downstream from the Florida State Highway 760 bridge, DeSoto and Charlotte Counties; Charlotte Harbor north of the Charlotte-Lee County line, Charlotte County; Caloosahatchee River downstream from the Florida State Highway 31 bridge, Lee County; all U.S. territorial waters adjoining the coast and islands of Lee County; all U.S. territorial waters adjoining the coast and islands and all connected bays, estuaries, and rivers from Gordon's Pass near Naples, Collier County, southward to and including Whitewater Bay, Monroe County; all waters of Card, Barnes, Blackwater, Little Blackwater, Manatee, and Buttonwood Sounds between Key Largo, Monroe County; and the mainland of Dade County; Biscayne Bay, and all adjoining and connected lakes, rivers, canals, waterways from the southern tip of Key Biscayne northward to and including Maule Lake, Dade County; all of Lake Worth, from its northernmost point immediately south of the intersection of U.S. Highway 1 and Florida State Highway A1A southward to its southernmost point immediately north of the town of Boynton Beach, Palm Beach County; the Loxahatchee River and its headwaters, Martin and West Palm Beach Counties; that section of the intracoastal waterway from the town of Sewalls Point, Martin County, to Jupiter Inlet, Palm Beach County; the entire section of water known as the Indian River, from its northernmost point immediately south of the intersection of U.S. Highway 1, and Florida State Highway 3, Volusia County, southward to its southernmost point near the town of Sewalls Point, Martin County; the entire inland section of water known as the Banana river and all waterways between the Indian and Banana rivers, Brevard County; the St. Johns River including Lake George, and including Blue Springs and Silver Glen Springs from their points of origin to their confluences with the St. Johns River; that section of the Intracoastal Waterway from its confluence with the St. Marys River on the Georgia-Florida border to the Florida State Highway A1A bridge south of Coastal City, Nassau and Duval Counties (http://www.fws.gov/northflorida/Manatee/Documents/Critical-Habitat-Manatee.pdf). USFWS has been petitioned to expand critical habitat for the manatee (Federal Register, September 29, 2009. pages 49842-49845).

d. Important Manatee Areas. In Florida there are a number of important manatee areas (IMAs). This includes a number of warm water refugia that are generally associated with natural springs or power plant outfalls. In addition to warm water refugia, there are important feeding and congregation areas [see http://www.myfwc.com/WILDLIFEHABITATS/Manatee_ACOEKEY.htm]. These areas may include all or only portions of the designated critical habitat and also areas that are not designated critical habitat. Activities in IMAs would be subject to additional requirements or terms and conditions [over and above the standard manatee protection measures (see the following sections below)].

d. Project Impacts.

(1) Habitat.

Direct effects on manatees from the dredging operation (see Section 3.0) and the placement of material on the beach (see Section 4.0) should be minor. However, site-specific conditions relating to habitat requirements such as sea grass beds, critical habitat designations, etc. should be addressed outside of this assessment. From 1974 through 1994, 2,456 manatee carcasses were recovered in the southeastern U.S. Eight hundred and two (33 percent) were attributed to human-related causes. Of these, 613 were caused by collisions with watercraft, 111 were flood gate/canal lock-related, and another 78 were categorized as other human-related (USFWS, 2000). In Florida, human-related mortality accounted for the greatest proportion of deaths with identifiable causes (45 percent, with another 24 percent of deaths resulting from undetermined causes) from 1986-1992. Collisions with watercraft accounted for 83 percent of human-related causes of death during this period (Ackerman *et al*. 1994, Wright *et al*. 1994). Vessel traffic, including crew boats, tugs, barges, etc., will be a component of all dredging. In January 2010, the Florida Fish and Wildlife Conservation Commission (FWC) reported a record number of manatee deaths (56) due to cold stress. Also reported were a high number of deaths due to watercraft strikes (97) and newborn deaths (114) (FWC 2010). While none of these mortalities were attributed to dredging or shore protection activities, the potential for collision with associated vessel movement may exist. To ensure that dredging does not affect manatees, the Corps has adopted the "Standard State and Federal Manatee Protection Conditions" as part of its standard operating procedures on all water related projects:

Manatee Protection Conditions (Corps Civil Works):

1. The Contractor shall instruct all personnel associated with the project of the potential presence of manatees, the need to avoid collisions with these animals and the need to be on constant lookout for manatees during all phases of operation.

2. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees and right whales which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act. The Contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

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

4. All vessels associated with the project shall operate at "no wake/idle" speeds at all times while in waters where the draft of the vessel provides less than a four foot clearance from the bottom and vessels shall follow routes of deep water whenever possible. Boats used to transport personnel shall be shallow-draft vessels, preferably of the light-displacement category where navigational safety permits.

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

6. Prior to commencement of construction, each vessel involved in construction activities shall display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8 1/2" x 11" reading, "Caution: Manatee Habitat/Idle Speed is Required in Construction Area." In the absence of a vessel, a temporary 3' x 4' sign reading "Caution: Manatee Area" will be posted adjacent to the issued construction permit. A second temporary sign measuring 8½" X 11" reading "Caution: Manatee Habitat. Equipment Must Be Shutdown Immediately If A Manatee Comes Within 50 Feet Of Operation" will be posted at the dredge operator control station and at a location prominently adjacent to the displayed issued construction permit. The Contractor shall remove the placards upon completion of construction.

7. Any collisions with a manatee or sighting of any injured or incapacitated manatee shall be reported immediately to the Corps of Engineers. The order of contact within the Corps of Engineers shall be as follows:

Order of Contact of Corps Personnel for Dredging Contractor to Report Manatee Death or Injury

Title		*Telephone Numbers*	
		Work	*After Hours*
Corps, Inspector		*On Site*	*Lodging Location*
[Area orResident] Engineer, [name] (CESAJ-[office code])		*TBP*	*TBP*
Chief, Environmental Branch Planning Division (CESAJ-PD-E)		904-232-3943	*TBP*
Chief, Construction Division (CESAJ-CD)		904-232-1118	*TBP*

The Contractor shall also immediately report any take of a manatee to the Florida Marine Patrol "Manatee Hotline" 1-888-404-FWCC (3922) as well as the U.S. Fish and Wildlife Service, [Jacksonville Field Station at 904-232-2580 for North Florida] [Vero Beach Field Office at 772-562-3909 for South Florida]

8. The Contractor shall maintain a daily log detailing sightings, collisions, or injuries to manatees occurring during the contract period. The data shall be recorded on forms provided by the Contracting Officer (sample form is appended to the end of this section). All data in original form shall be forwarded directly to the Chief of Environmental Resources Branch, P. O. Box 4970, Jacksonville, Florida, 32232-0019, within 10 days of collection and copies of the data will be supplied to the Contracting Officer. Within 15 days, following project completion, a report summarizing the above incidents and sightings, including a list and addresses of all observers utilized during the construction will be submitted to the following:

Florida Fish and Wildlife Conservation Commission
Imperiled Species Management Division
620 South Meridian Street, Mail Stop 6A
Tallahassee, Florida 32399-1600

Chief, Environmental Branch
U.S. Army Corps of Engineers (CESAJ-PD-E)
P.O. Box 4970
Jacksonville, Florida 32232-0019

[Area or Resident] Engineer, [name]
U.S. Army Corps of Engineers (CESAJ-[office code)]

U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517

or

U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32961-3559

Furthermore, during hopper dredge operations, National Marine Fisheries Service observers will be on board 24 hours a day and will serve as a lookout to alert the vessel pilot of the occurrence of manatees in the project areas. If a manatee is observed, collisions shall be avoided either through reduced vessel speed, course alteration, or both.

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK (Regulatory) 2009

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or Vero Beach (1-772-562-3909) for south Florida.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used (see MyFWC.com). One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for “Idle Speed/No Wake” and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

d. <u>Effect Determination.</u>

Considering that the “Manatee Protection Conditions” will be adhered to and NMFS approved observers will be on board all hopper dredge operations, the proposed actions may affect but are not likely to adversely affect the manatee or its critical habitat. Specific impacts to IMAs as a result of dredging operations are not covered within this assessment and should be addressed by separate (project specific) consultation or as a subsequent amendment to the Statewide Programmatic Biological Opinion. Most sand placement and shore protection projects will not occur in or impact manatee critical habitat or any IMA.

7.02.7 Beach Mice.

a. Status.

Perdido Key beach mouse	*Peromyscus polionotus trissyllepsis*	Endangered
Choctawhatchee beach mouse	*Peromyscus polionotus allophrys*	Endangered
St. Andrews beach mouse	*Peromyscus polionotus peninsularis*	Endangered
Southeastern beach mouse	*Peromyscus polionotus niveiventris*	Threatened
Anastasia Island beach mouse	*Peromyscus polionotus phasma*	Endangered

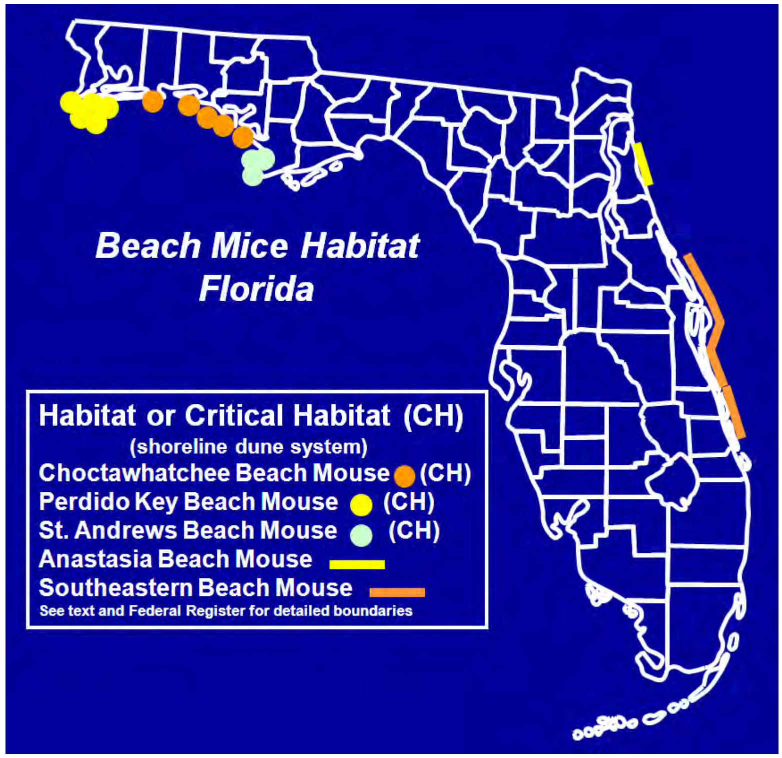
b. Background.

(1) Perdido Key, Choctawhatchee, and St. Andrews Beach Mice.

(a) Range.

The Perdido Key Beach mouse and Choctawhatchee beach mouse were listed as endangered on June 6, 1985 and the St. Andrew beach mouse was listed as endangered on December 18, 1998. The Perdido Key beach mouse, Choctawhatchee beach mouse, and St. Andrew beach mouse are three of five subspecies of the old-field mouse that inhabit coastal dune communities along the Gulf coast of Florida and Alabama. Historic distributions of the Perdido Key beach mouse extended along the entire length of the island of Perdido Key, starting in Alabama at Florida Point and continuing eastward to the Pensacola Bay inlet. However, by 1986, due to habitat fragmentation, hurricane events, etc. the number of mice remaining was believed to be less than 30 animals. After several successful relocation episodes, the population now exists on public lands in areas along 8.4 miles of coastline on Perdido Key at Gulf Islands National Seashore and Perdido Key State Park. Choctawhatchee beach mice were once present along the coastal dunes between Choctawhatchee Bay and St. Andrew Bay, Florida. Four general areas of occupancy currently exist: (1) Topsail Hill Preserve State Park (and adjacent eastern and western private lands), (2) Shell Island (includes St. Andrew State Park mainland, Tyndall Air Force Base (AFB), and private land in holdings), (3) Grayton Beach State Park (and adjacent eastern private lands), and (4) West Crooked Island (Tyndall AFB) and adjacent private lands. The geographical range of St. Andrew beach mice is identified as St. Joseph spit in Gulf County, Florida, the east entrance of St. Andrew Bay, including Cape San Blas and Money Bayou in Bay County, Florida. The St. Andrew beach mouse currently consists of two core populations, East Crooked Island (Tyndall AFB) and adjacent private lands, and St. Joseph Peninsula State Park and adjacent private lands.

(b) Habitat.



The habitat is restricted to the mature coastal barrier sand dunes along the Gulf (USFWS, 1991). According to Meyers (1983), 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 (Sneckenberger, 2001). 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 (/Vol. 70, No. 240, December 15, 2005). 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 burrows 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.

(c) Critical Habitat.

Critical habitat receives protection under section 7 of the Endangered Species Act 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. Section 7 requires consultation on Federal actions that are likely to result in the destruction or adverse modification of critical habitat.

On October 12, 2006, the USFWS issued in the Federal Register the final rule for designation of critical habitat for the Perdido Key beach mouse, the Choctawhatchee beach mouse and the St. Andrew beach mouse pursuant to the Endangered Species Act of 1973, as amended. Critical habitat for the Perdido Key, Choctawhatchee, and St. Andrew beach mice includes habitat throughout the subspecies' ranges in Baldwin County, Alabama, and Escambia, Okaloosa, Walton, Bay, and Gulf counties, Florida.

The primary constituent elements of critical habitat for the Choctawhatchee, Perdido Key, and St. Andrews beach mice 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.

Under the final rule, the USFWS has identified five units as critical habitat for the Perdido Key beach mouse, [(1) Gulf State Park Unit, (2) West Perdido Key Unit, (3) Perdido Key State Park Unit, (4) Gulf Beach Unit, and (5) Gulf Islands National Seashore Unit], five units for the Choctawhatchee beach mouse [(1) Henderson Beach Unit, (2) Topsail Hill Unit, (3) Grayton Beach Unit, (4) Deer Lake Unit, and (5) West Crooked Island/Shell Island Unit], and three units for the St. Andrew beach mouse [(1) East Crooked Island Unit, (2) Palm Point Unit, and (3) St. Joseph Peninsula Unit].

(2) <u>Southeastern Beach and Anastasia Island Beach Mice</u>.

(a) Range.

The Southeastern beach mouse and the Anastasia Island beach mouse were both federally listed as threatened and endangered species respectively on 12 May, 1989. Historically, the southeastern beach mouse occurred along about 280 km of Florida's southeast coast, from Ponce Inlet, Volusia County, southward to Hollywood, Broward County, and possibly as far south as Miami Beach in Miami-Dade County, Florida (Stout, 1992). Based on the most recent published literature, the southeastern beach mouse is currently restricted to about 80 km of beach, occurring in Volusia County (Smyrna Dunes Park), Brevard County (Canaveral National Seashore, Merritt Island National Wildlife Refuge, and Cape Canaveral Air Force Station), and in scattered areas in Indian River (Sebastian Inlet State Recreation Area) and St. Lucie counties. The historic distribution of the Anastasia beach mouse was from the vicinity of the Duval/St. Johns County line southward to Matanzas Inlet, St. Johns County, Florida. Currently, the species is limited to Anastasia Island, primarily at the north and south ends of the island.

(b) Habitat.

Based on the available literature, all subspecies of beach mice are similar in their habitat requirements (USFWS. 1987a, 1993a, 2009). Therefore, habitat requirements for Anastasia and Southeastern beach mice are similar to those identified above (Section 7.02.6 (b)(1)(b)) for the Perdido Key, Choctawhatchee, and St. Andrews beach mice.

(c) Critical Habitat.

Currently there are no areas designated by the USFWS as critical habitat for either the Southeastern beach mouse and the Anastasia beach mouse.

c. <u>Project Impacts (Beach Mice in General).</u>

Generally, the placement of sediment on the beach and associated construction operations occur seaward of the toe of the existing primary dune line (See Section 4.02) and; therefore, would not impact existing beach mouse habitat. Pipeline routes for beach construction projects will avoid identified primary constituent elements for critical habitat to the maximum extent practicable. For shoreline protection projects that include the construction of a primary dune, if dune habitat already exists, the constructed primary dune will tie into the existing dune and will not impact existing beach mouse habitat. However, depending on their seaward distance from the primary dune, small vegetated embryo dune features are utilized by beach mice as potential foraging and burrowing sites as well as refuge from predators. These embryo dunes located seaward of the primary dune may be buried during construction operations and borrowing, foraging, and refuge opportunities will be lost until new embryo dunes begin to form and are vegetated.

Severe beach erosion associated with hurricane and strong storm events has led to the degradation of beach mouse habitat and subsequent population decline. 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. Beach fill placement of sediment and, in some cases, construction of a primary dune, would help in the development of new beach mouse habitat and may aid in the enhancement and expansion of existing populations by (1) stabilizing or enhancing the existing dune communities with additional beach fill and associated aeolian transport of sediment and/or (2) protection of existing habitat from a constructed primary dune. Constructed dune features associated with shoreline protection projects often include dune grass plantings consisting of native beach grasses to help stabilize sediments. These native dune grasses would contribute to the primary constituent elements for critical habitat by providing food resources for beach mice.

d. Critical Habitat - Impacts (for Perdido Key, Choctawhatchee, and St. Andrews Beach Mice).

The placement of sediment on the beach and associated construction operations will occur seaward of the toe of the existing primary dune line and; therefore, would not impact existing beach mouse habitat. However, if the pipeline access point, pipeline staging area, pipeline route, and associated construction activities cannot avoid impacting the dune environment, the project may impact identified primary constituent elements for critical habitat (See Section 4.02). Heavy equipment, pipe, etc. may disrupt the contiguous mosaic of primary, secondary, and scrub vegetation and dune structure by disturbing dune vegetation and breaking the connectivity between habitat types. Reduced vegetation could impact foraging, refuge, and burrow opportunities. Pipe segments and the connected pipeline may function as a physical barrier to scrub dunes 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. Lighting associated with the staging area, disposal area, etc. could disturb the natural light regime within the coastal dune ecosystem, and could disrupt the nocturnal activity of beach mice.

e. Effect Determination (Beach Mice in General).

Beach fill and constructed dune features associated with shoreline protection projects may enhance existing habitat or establish new habitat for beach mice. However, though the placement of sediment on the beach and associated construction activities will avoid the primary constituent elements for critical habitat to the maximum extent practicable, the risk of direct and indirect impacts to the beach mouse and its existing habitat still exist. Therefore, the proposed actions may affect the Perdido Key, Choctawhatchee, and St. Andrews beach mice (and their designated critical habitat) on the Gulf Coast and the Southeastern and Anastasia beach mice on the Atlantic Coast. For projects where avoidance of habitat features is not a practical alternative, impacts to beach mice may be minimized through the implementation of a trapping and relocation plan. If the project avoids all habitat features, the proposed project may affect but is not likely to adversely affect the beach mouse.

The proposed project may affect the primary constituent elements of critical habitat for the Choctawhatchee, Perdido Key, and St. Andrews beach mice. There is no designated critical habitat for the Anastasia or Southeastern beach mice.

7.02.8 Sea Turtles.

a. Status.

Loggerhead *Caretta caretta* Threatened
Green *Chelonia mydas* Endangered[2]
Hawksbill *Eretmochelys imbricate* Endangered
Leatherback *Dermochelys coriacea* Endangered
Kemp's Ridley *Lepidochelys kempii* Endangered

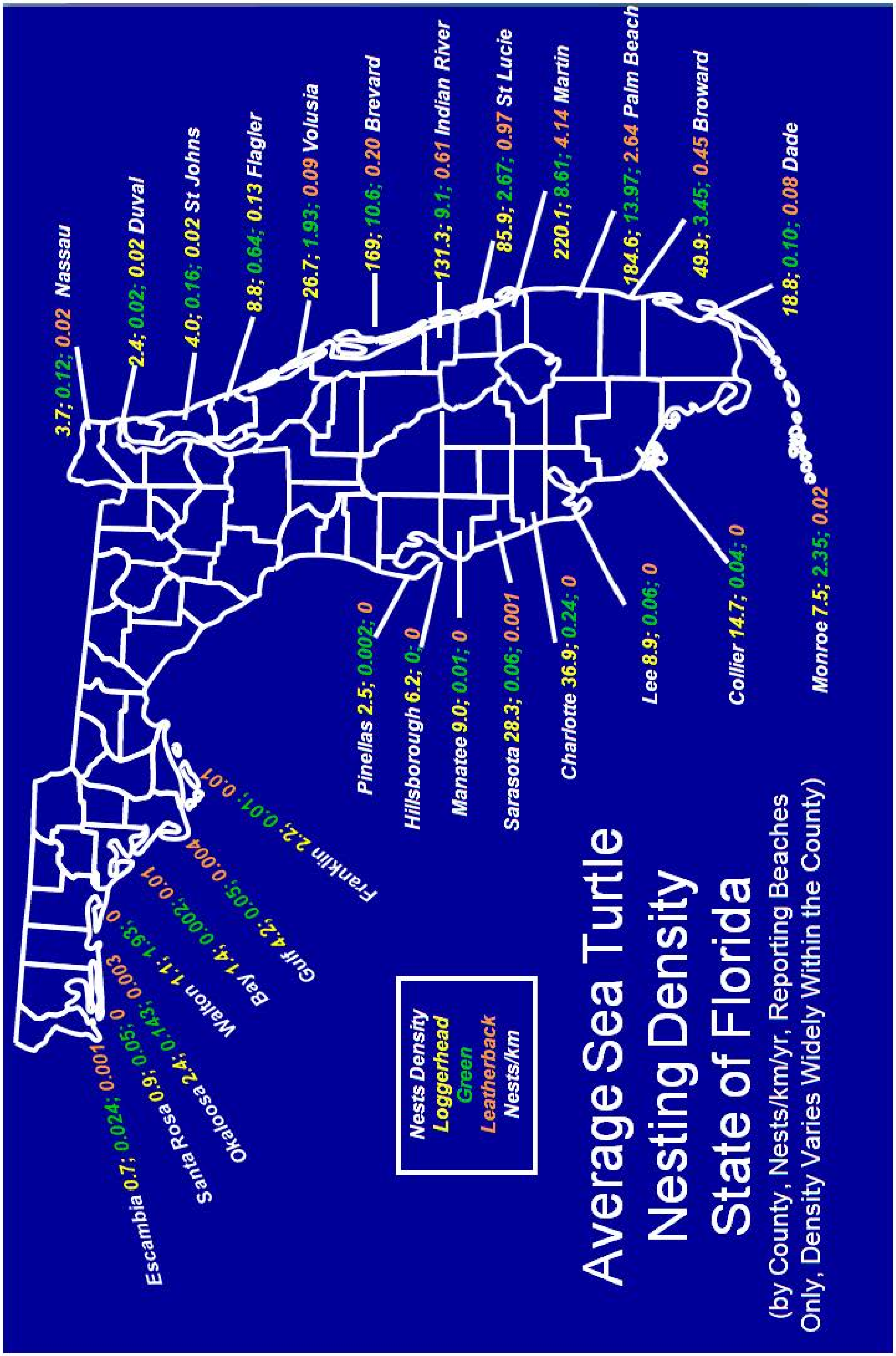
b. Background.

Three species of sea turtles, the loggerhead sea turtle (*Caretta caretta*), the green sea turtle (*Chelonia mydas*), and the leatherback sea turtle (*Dermochelys coriacea*) nest regularly on Florida beaches. Two other species, the Kemp's Ridley sea turtle (*Lepidochelys kempii)* and the hawksbill sea turtle (*Eretmochelys imbricata*) nest infrequently on Florida beaches. All five species are listed as either threatened or endangered under the Endangered Species Act. Numerous biological opinions have been provided by the USFWS. Generally, there has been one or more such opinions issued for each of the 27 of Florida's 35 coastal counties that have suitable sea turtle nesting beach. Appendix 2 (Biological Opinions from FWS Involving Sea Turtles in Florida) lists biological opinions provided by the USFWS for previous beach fill placement actions. These Biological Opinions discuss in detail the background information for sea turtles including status and distribution, behavior, life history, population dynamics, etc. Specific beach fill placement activities throughout the Atlantic and Gulf coasts of Florida (See Section 2.0) and subsequent potential impacts to the nesting activities of sea turtles including beach slope, escarpments, compaction, incubation environment, lighting, etc. are discussed in this assessment.

Sea turtle nesting occurs throughout the State of Florida in all coastal counties with the exception of those in the Big Bend area. The highest nesting densities are located along the southeastern coast from Brevard to Palm Beach counties. The Florida sea turtle monitoring program, through the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute, coordinates two sea turtle monitoring programs, the Statewide Nesting Beach Survey (SNBS) and the Index Nesting Beach Survey (INBS). The SNBS was initiated in 1979 in order to document the total distribution, seasonality, and abundance of sea turtle nesting in Florida. For the past 17 years, the INBS has coordinated a detailed monitoring program in conjunction with SNBS. The INBS program was established to measure seasonal productivity, allowing comparisons between beaches and between years. Of the 190 SNBS surveyed areas, 33 participate in the INBS program. Data are gathered through a network of permit holders and are used to evaluate and minimize the effects of human activities on turtles and their nests and to identify important areas for enhanced protection and land acquisition. The nesting activity for each county is provided by the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute at http://research.myfwc.com . The average sea turtle nesting density by county (using 1988 to 2005 data) is shown in Figure 5 .

[2] Green turtles are listed as threatened, except for breeding populations in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

Figure 5: Average Sea Turtle Nesting Density in Florida (using data up through 2005).



c. Critical Habitat.

Critical habitat has not been designated in the continental U.S.; therefore, the proposed actions would not result in an adverse modification to identified critical habitat.

d. Windows.

To the maximum extent practicable, all construction activities on the beach will be scheduled to avoid the sea turtle nesting season. The limits of the nesting season window are dependent on the known nesting sea turtle species and the earliest and latest documented nesting events for that species within the identified project area. The nesting density and the species of nesting sea turtles vary throughout the Atlantic and Gulf coasts with a majority of the nesting activity and the number of nesting species occurring along the Southeastern coast of Florida. Considering that nesting windows differ throughout various regions of the state depending on the species present and earliest recorded nesting event, some aspect of sea turtle nesting activity (nesting, incubation, hatch out, etc.) will likely occur within a given region of the state almost year round.

For any given project, if the nesting season cannot be avoided, all available data associated with the nesting activities within the project area will be utilized to consider risks of working within various portions of the nesting season. Variables to consider will include the conditions of the pre-project nesting habitat such as erosion rates, existing hard structures, development, recreational use, etc., as well as the nesting density within the project area. An evaluation of these variables will be used to potentially incorporate project modifications (i.e. modified pipeline routes, staging areas, etc.) during the nesting season that may avoid or minimize potential impacts.

Upon evaluation of site-specific conditions, if nourishment beach activities extend into portions of the nesting season, monitoring for sea turtle nesting activity will be considered throughout the construction area including the disposal area and beachfront pipeline routes. The location and operation of heavy equipment within the project area will be limited to daylight hours to the maximum extent practicable in order to minimize impacts to nesting sea turtles. Monitoring for nest activity during the period of time prior to the commencement of construction activities may be required under certain circumstances so that nests laid in a potential construction zone can be relocated outside of the construction zone prior to project commencement to avoid potential losses. Depending on the species of nesting sea turtles (i.e. leatherbacks), specific nighttime monitoring protocol may be implemented so that egg chambers can be identified. However, relocation measures should be considered as a last alternative (See Section 7.02.8e(4)).

If construction occurs during the nesting season, the following direct impacts may occur:

(1) Both stockpiled pipe on the beach and the pipeline route running parallel to the shoreline may impede nesting sea turtles from accessing more suitable nesting sites.
(2) The operation of heavy equipment on the beach may impact incubating nests.
(3) During nighttime operations, the nourishment construction process, including heavy equipment use and associated lighting, may deter nesting females from coming ashore and disorient emerging hatchlings down the beach.
(4) Burial of existing nests may occur if missed by monitoring efforts.
(5) Escarpment formations and resulting impediment to nesting females.

(6) Reduced nest success as a result of relocation efforts.

Direct impacts associated with construction activities during the nesting season as well as indirect impacts associated with changes to the nesting and incubating environment, from the placement of sediment from alternate sources on the beach, are discussed in detail in the following section.

e. Project Impacts.

Post-nourishment monitoring efforts have documented potential impacts on nesting loggerhead sea turtles for many years (Fletemeyer, 1984; Raymond, 1984b; Nelson and Dickerson, 1989; Ryder, 1993; Bagley *et al*., 1994; Crain *et al*., 1995; Milton *et al*., 1997; Steinitz *et al.*, 1998; Trindell *et al*., 1998; Davis *et al*., 1999; Ecological Associates, Inc., 1999; Herren, 1999; Rumbold *et al*., 2001; Brock, 2005). Results from these studies indicate that, in most cases, nesting success decreases during the year following nourishment as a result of escarpments obstructing beach accessibility, altered beach profiles, and increased compaction. A comprehensive post-nourishment study conducted by Ernest and Martin (1999) documented an increase in abandoned nest attempts on nourished beaches compared to control or pre-nourished beaches as well as a change in nest placement with subsequent increase in washout of nests during the beach equilibration process. Contrary to previous studies, this study suggests that a post-nourishment decline in nest success is more likely a result from changes in beach profile than an increase in beach compaction and escarpment formation. According to Brock (2005), the sediment used for the nourishment of Brevard County beaches in Florida offered little or no impediment to sea turtles attempting to excavate an egg chamber. Furthermore, the physical attributes of the nourished sediment did not facilitate excessive scarp formation and; therefore, turtles were not limited in their ability to nest across the full width of beach. However, a decrease in nest success was still documented in the year following nourishment with an increase in loggerhead nesting success rates during the second season post-nourishment. This was attributed to increased habitat availability following the equilibration process of the seaward crest of the berm. This study suggests that, if compatible sediment and innovative design methods are utilized to minimize post-nourishment impacts documented in previous studies, than the post-nourishment decrease in nest success without the presence of scarp formations, compaction, etc. may indicate an absence of abiotic and or biotic factors that cue the female to initiate nesting.

As suggested by the historical literature, there are inherent changes in beach characteristics as a result of mechanically placing sediment on a beach from alternate sources. The changes in beach characteristics often result in short-term decreases in nest success and/or alterations in nesting processes. Based on the available literature, it appears that these impacts are, in many cases, site specific. Careful consideration must be placed on pre- and post-project site conditions and resultant beach characteristics after a beach-fill episode at a given site in order to thoroughly understand identified post-project changes in nesting processes. By better understanding potential project specific impacts, modifications to project templates and design can be implemented to improve habitat suitability. The following sections review, more specifically, documented direct or indirect impacts to nesting females and hatchlings.

(1) Pipe Placement.

A general discussion of the construction activities associated with the placement of sediment on the beach, including pipeline routes, is included in Section 4.02 of this report. If construction operations extend into the sea turtle nesting season (see Section 7.02.8d), pipeline routes and pipe staging areas may act as an impediment to nesting females approaching available nesting habitat or to hatchlings orienting to the water's edge. If the pipeline route or staging areas extend along the beach face, including the frontal dune, beach berm, mean high water line, etc., some portion of the available nesting habitat will be blocked. Nesting females may either encounter the pipe and false crawl, or nest in front of the pipeline in a potentially vulnerable area to heavy equipment operation, erosion, and washover. If nests are laid prior to placement of pipe and are landward of the pipeline, hatchlings may be blocked or mis-oriented during their approach to the water.

Though pipeline alignments and staging areas may pose impacts to nesting females and hatchlings during the nesting season, several measures can be implemented to minimize these impacts. If construction activities are scheduled to begin after the start of the nesting season, monitoring should be done in advance to document all nests within the proposed area. Construction operations and pipeline placement could be modified to bypass existing nests. If bypassing is not a practical alternative for a given project, the relocation of nests outside of construction areas could be implemented as a last resort (See Section 7.02.8e(4)). Throughout the period of sea turtle nesting and hatching, construction pipe that is placed on the beach parallel to the shoreline could be placed 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. Furthermore, temporary storage of pipes and equipment can be located off the beach to the maximum extent practicable. If placement on the beach is necessary, it will be done in a manner so as to impact the least amount of nesting habitat by placing pipes perpendicular to shore and as far landward as possible without compromising the integrity of the existing or constructed dune system.

(2) Slope and Escarpments.

Beach nourishment projects are designed and constructed to equilibrate to a more natural profile over time relative to the wave climate of a given area. Changes in beach slope as well as the development of steep escarpments may develop along the mean high water line as the constructed beach adjusts from a construction profile to a natural beach profile (Nelson *et al.*, 1987). For the purposes of this assessment, escarpments are defined as a continuous line of cliffs or steep slopes facing in one general direction, which is caused by erosion or faulting. Depending on shoreline response to the wave climate and subsequent equilibration process for a given project, the slope both above and below mean high water may vary outside of the natural beach profile; thus resulting in potential escarpment formation. Though escarpment formation is a natural response to shoreline erosion, the escarpment formation as a result of the equilibration process during a short period following a nourishment event may have a steeper and higher vertical face than natural escarpment formation and may slough off more rapidly landward.

Adult female turtles survey a nesting beach from the water before emerging to nest (Carr and Ogren, 1960; Hendrickson, 1982). Parameters considered important to beach selection include the geomorphology and dimensions of the beach (Mortimer, 1982; Johannes and Rimmer, 1984) and bathymetric features of the offshore approach (Hughes, 1974; Mortimer, 1982). Beach profile changes and subsequent escarpment formations may act as an impediment to a nesting female resulting in a false crawl or nesting females may choose marginal or unsuitable nesting areas either within the escarpment face or in front of the escarpment. Often times these nests are vulnerable to tidal inundation or collapse of the receding escarpment. If a female is capable of nesting landward of the escarpment prior to its formation, as the material continues to slough off and the beach profile approaches a more natural profile, there is a potential for an incubating nest to collapse or fallout during the equilibration process. Loggerheads preferentially nest on the part of the beach where the equilibration process takes place (Brock, 2005; Ecological Associates, Inc., 1999) and are more vulnerable to fallout during equilibration. However, according to Brock (2005), the majority of green turtle nests are placed on the foredune and therefore, the equilibration process of the nourished substrate may not affect green turtles as severely.

A study conducted by Ernest and Martin (1999) documented increased abundance of nests located further from the toe of the dune on nourished verses control beaches. Thus, post-nourishment nests may be laid in high-risk areas where vulnerability to sloughing and equilibration are greatest. Though nest relocation is not encouraged (See Section 7.02.8 e(4)), nest relocation may be used to move nests that are laid in locations along the beach that are vulnerable to fallout (i.e. near the mean high water line) considering that immediately following nourishment projects the likelihood of beach profile equilibration and subsequent sloughing of escarpments as profile adjustment occurs. As a nourished beach is reworked by natural processes and the construction profile approaches a more natural profile, the frequency of escarpment formation declines and the risk of nest loss due to sloughing of escarpments is reduced. According to Brock (2005), the return of loggerhead nesting success to equivalent rates similar to those on the adjacent non-nourished beach and historical rates two seasons post-nourishment were observed and are attributed to the equilibration process of the seaward crest of the berm.

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 years following as the construction profile approaches a more natural profile, visual surveys for escarpments could 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 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 U.S. Fish and Wildlife Service.

The Corps is currently working with DEP to identify aspects of beach nourishment construction templates that negatively impact sea turtles and develop alternative design criteria that may minimize these impacts. Project design modifications to develop a more turtle friendly beach profile could potentially increase post-nourishment nest density and success. A draft final report for phase one of this study, “Assessment of Alternative Construction Template for Beach Nourishment Projects,” is currently being reviewed. Recommended design modifications from this report will be statistically evaluated to assess potential impacts of the design changes on nesting sea turtles. Based on the final results and feasibility of recommendations, the Corps will incorporate, to the maximum extent practicable, turtle friendly beach profile criteria in future project designs in order to enhance sea turtle nesting habitat requirements.

(3) Incubation Environment.

Physical changes in sediment properties that result from the placement of sediment, from alternate sources, on the beach pose concerns for nesting sea turtles and subsequent nest success. Constructed beaches have had positive effects (Broadwell, 1991; Ehrhart and Holloway-Adkins, 2000; Ehrhart and Roberts, 2001), negative effects (Ehrhart, 1995; Ecological Associates, Inc., 1998), or no apparent effect (Raymond, 1984b.; Nelson *et al*., 1987; Broadwell, 1991; Ryder, 1993; Steinitz *et. al.*, 1998; Herren, 1999) on the hatching success of marine turtle eggs. Differences in these findings are related to the differences in the physical attributes of each project, the extent of erosion on the pre-existing beach, and application technique (Brock, 2005).

If nesting occurs in new sediment following beach construction activities, embryonic development within the nest cavity can be affected by insufficient oxygen diffusion and variability in moisture content levels within the egg clutch (Ackerman, 1980; Mortimer, 1990; Ackerman *et al*., 1992); thus, potentially resulting in decreased hatchling success. Ambient nest temperature and incubation time are affected by changes in sediment color, sediment grain size, and sediment shape as a result of beach nourishment (Milton *et al.*, 1997) and; thus, affect incubation duration (Nelson and Dickerson, 1988a). Sexual differentiation in chelonians depends on the temperature prevailing during the critical incubation period of the eggs (Pieau, 1971; Yntema, 1976; Yntema and Mrosovsky, 1979; Bull and Vogt, 1979), which occurs during the middle third of the incubation period (Yntema, 1979; Bull and Vogt, 1981; Pieau and Dorizzi, 1981; Yntema and Mrosovsky, 1982; Ferguson and Joanen, 1983; Bull, 1987; Webb *et al*. 1987; Deeming and Ferguson, 1989; Wibbels *et al*., 1991), and possibly during a relatively short period of time in the second half of the middle trimester (Webster and Gouviea, 1988). Eggs incubated at constant temperatures of 28°C or below develop into males. Those kept at 32°C or above develop into females. Therefore, the pivotal temperature, those giving approximately equal numbers of males and females, is approximately 30°C (Yntema and Mrosovsky, 1982). Estimated pivotal temperatures for loggerhead sea turtles nesting in North Carolina, Georgia, and southern Florida are close to 29.2°C (Mrosovsky and Provancha, 1989). Therefore, fluctuation in ambient nest temperature on constructed beaches could directly impact sex determination if nourished sediment differs significantly from that found on the natural beach. Since, the pivotal temperatures for the northern and southern geographic nesting ranges of loggerheads in the United States are similar, a higher percentage of males are produced on North Carolina beaches and a higher percentage of females on Florida beaches. Hatchling sex ratios are of conservational significance (Mrosovsky and Yntema, 1980; Morreale *et al*., 1982) since they may affect the population sex ratio and thus could alter reproductive success in a population (Hanson *et al*., 1998).

This assessment assumes sediment being placed on the beach meets the DEP sediment compatibility requirements for beach and near shore placement (62B-41.007 (2) (j-k)) (http://www.dep.state.fl.us/legal/Rules/mainrulelist.htm) and; therefore, sediment characteristics should be compatible with native beaches. Projects that fall outside the scope of FDEP compatibility standards are not covered under this assessment.

(4) Nest Relocation.

Relocation of sea turtle nests to less vulnerable sites was once common practice throughout the southeastern U.S. to mitigate the effects of natural or human induced factors. However, the movement of eggs creates opportunities for adverse impacts. Therefore, more recent USFWS guidelines are to be far less manipulative with nests and hatchlings to the maximum extent practicable. Though not encouraged, nest relocation is still used as a management technique of last resort where issues that prompt nest relocation cannot be resolved. Potential adverse impacts associated with nest relocation include: survey error (Shroeder, 1994), handling mortality (Limpus *et al.* 1979; Parmenter 1980), incubation environment impacts (Limpus *et al*., 1979; Ackerman, 1980; Parmenter, 1980; Spotila *et al*., 1983; McGehee, 1990) (See Section 7.02.8e(3)), hatching and emergence success, and nest concentration.

Beach construction projects are scheduled, to the maximum extent practicable, to work outside of the sea turtle nesting season (See Section 7.02.8d) in order to avoid impacts to nesting females and the nest incubation environment. However, in some instances where the nesting season cannot be avoided, nest relocation is used as a management tool to relocate nests laid in the impact area to areas that are not susceptible to disturbance. For any given project, if the earliest documented nest attempt precludes the project commencement or completion date, nest relocation may be used as a last resort mitigation effort. If relocation is implemented, the proper protocol established by the FDEP and USFWS will be adhered to in order to avoid the potential adverse impacts outlined above. On leatherback nesting beaches, considering the increased risk of finding and relocating nests, additional species specific relocation requirements will be implemented (i.e. nighttime monitoring and relocation) to assure that nests are not missed.

(5) Compaction.

Sediment placed on the beach, as a component of shoreline protection projects, beach disposal, sand-bypassing, etc. (See Section 4.00) is often obtained from three main sources: inlets, channels, or offshore borrow sites (Crain *et al*., 1995) with occasional use of upland sources. Significant alterations in beach substrate properties may occur with the input of sediment types from other sources. Sediment density (compaction), shear resistance (hardness), sediment moisture content, beach slope, sediment color, sediment grain size, sediment grain shape, and sediment grain mineral content can be changed by beach nourishment. Changes in particle size can have a direct influence on the shear resistance of the sediment and therefore make the beach relatively harder after nourishment. Harder or more compact nourished beaches result primarily from angular, finer grain sediment dredged from stable offshore borrow sites, whereas less compacted beaches result from smoother, coarse sediment dredged from high energy locations such as inlets (Nelson and Dickerson, 1989). Significant reductions in nesting success (i.e. increase in number of false crawls) have been documented on severely compacted nourished beaches (Fletemeyer, 1980; Raymond, 1984b; Nelson and Dickerson, 1987; Nelson *et al.*, 1987). Hard sediment can prevent a female from digging a nest or result in a poorly constructed nest cavity. Females may respond to harder physical properties of the beach by spending more time on the beach nesting, which may result in physiological stress and increased exposure to disturbances and predation; thus, in some cases leading to a false dig (Nelson and Dickerson, 1989).

Compaction impacts can be minimized by using compatible sand. Some studies suggest that tilling compacted sand after project completion can be performed to reduce compaction to levels comparable to unnourished beaches. Under current USFWS guidelines, the decision to till a beach after sediment placement is based upon measurements of sediment compaction (Nelson and Dickerson, 1988a) using a cone penetrometer (Nelson, 1987). According to the USFWS compaction measurement guidelines outlined below, compaction measurements of 500 pounds per square inch (psi), are currently used as a threshold to assess impacts of compaction to sea turtle nesting behavior and the necessity for beach tilling to mitigate compaction impacts.

General USFWS Compaction Guidelines

Immediately after the beach construction operation is complete and prior to May 1, for three subsequent years, sediment compaction should be evaluated within the limits of the construction area in accordance with a protocol agreed to by the Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission. If the decision is made to till regardless of post-construction compaction levels, compaction monitoring will not be performed. For all circumstances where tilling is implemented, the designated area shall be tilled to a depth of 36 inches. Tilling will be performed (i.e. overlapping rows, parallel and perpendicular rows, etc.) so that all portions of the beach are tilled and no furrows are left behind All tilling activities must be completed prior to May 1. If the project is completed during the nesting season all tiling operations will be coordinated with the appropriate sea turtle beach monitoring representatives. Tilling will not be performed in areas where nests have been left in place or relocated. A report on the results of compaction monitoring shall be submitted to the Fish and Wildlife Service prior to any tilling actions being taken. An annual summary of compaction surveys and the actions taken must be submitted to the Fish and Wildlife service.

If tilling is not performed immediately following construction activities and compaction monitoring is implemented, at a minimum, the following protocol will be followed:

1. Compaction sampling stations will be located at 500-foot intervals along the project area. One station will be at the seaward edge of the dune/bulkhead line (when material is placed in this area); and one station must be midway between the dune line and the high water line (normal wrack line).

At each station, the cone penetrometer will 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. Layers of highly compact material may lie over less compact layers. Replicates will 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 will be averaged to produce final values for each depth at each station. Reports will include 18 values for each transect line, and the final 6 averaged compaction values.

2. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area must be tilled prior to May 1. 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 Fish and Wildlife Service will be required to determine if tilling is required. If a few values exceeding 500 psi are randomly present within the project area, tilling will not be required.*

Though the cone penetrometer may be effective in measuring compaction values, a study performed by Piatkowski *et al.* (2001) suggests that the cone penetrometer values are dependent on the mass of the person using the instrument in densely compacted substrates and care must be taken when comparing values among varying users. Post-nourishment compaction investigations should consider the variability among users as a variable in skewing data. Furthermore, Ferrell *et al.* (2001) investigated the strengths and weaknesses of several different types of instruments that measure sediment compaction and shear resistance suggesting that other instruments may be more suitable for measuring beach compaction relative to sea turtle nesting behavior. Because of instrument error and given that turtles do not dig vertically in the same fashion as a penetrometer moves through the sediment layers, some have concluded that penetrometers are not appropriate for assessing turtle nesting limitations (Davis *et al.*, 1999).

According to Davis et al. (1999), on the Gulf Coast of Florida (1) there was no relationship between turtle nesting and sediment compactness, (2) the compactness ranges and varies widely in both space and time with little rationale, (3) tilling has a temporary influence on compactness and no apparent influence on nesting frequency, (4) and current compactness thresholds of 500 psi are artificial. According to Brock (2005), the physical attributes of the fill sand for Brevard County beaches did not result in severe compaction and therefore did not physically impede turtles in their attempts to nest. Therefore, additional studies should be considered to evaluate the validity of this threshold (500 psi) and its general application across all beaches as a means to assess beach-tilling requirements. If sediment characteristics are similar to the native beach and sediment grain sizes are homogenous, the resultant compaction levels will likely be similar to the native beach and tilling should not be encouraged. A study by Nelson and Dickerson (1988b) documented that a tilled nourished beach will remain un-compacted for up to one year; however, this was a site-specific study and for some beaches it may not be necessary to till beaches in the subsequent years following nourishment.

In some cases, though sediment placed on the beach is compatible with the native sediment characteristics and the resultant compaction is similar to the native beach, tilling is still encouraged regardless of compaction levels. It has been suggested that, in some cases, the process of tilling a beach, with compaction levels similar to the native beach, may have an effect on sea turtle nesting behavior and nest incubation environment. Research on evaluating tilling impacts to nesting turtles is limited. Therefore, the idea of not tilling beaches (immediately following and/or during consecutive years after construction operations) where compatible sediments are used and compaction levels are similar to the native beach should be taken into consideration on a case-by-case basis in order to account for potential impacts of tilling activities on nest success.

(6) Lighting.

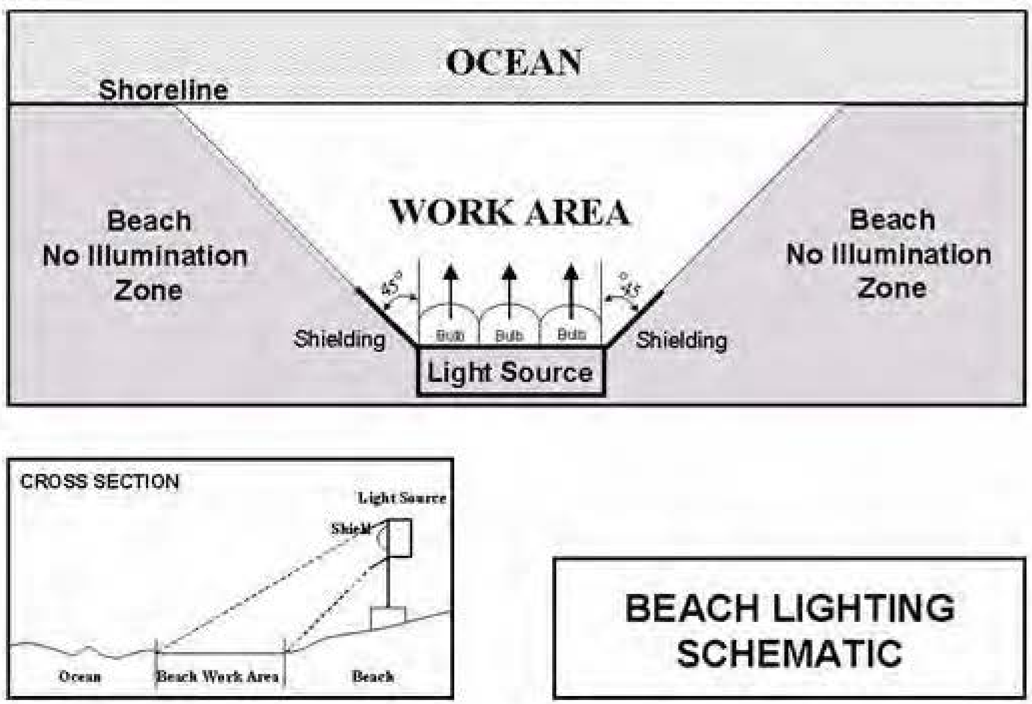
The presence of artificial lighting on or within the vicinity of nesting beaches is detrimental to critical behavioral aspects of the nesting process including nesting female emergence, nest site selection, and the nocturnal sea-finding behavior of both hatchlings and nesting females. Artificial lighting on beaches tends to deter sea turtles from emerging from the sea to nest; thus, evidence of lighting impacts on nesting females is not likely to be revealed by nest to false crawl ratios considering that no emergence may occur (Mattison *et al*., 1993; Witherington, 1992; Raymond, 1984a.)). Though nesting females prefer darker beaches (Salmon *et al.*, 1995), considering the increased development and associated lighting on most beaches, many do nest on lighted shorelines. Although the effects of lighting may prevent female emergence, if emergence, nest site selection, and oviposition does occur, lighting does not affect nesting behavior (Witherington and Martin, 2003). However, sea turtles rely on vision to find the sea upon completion of the nesting process and use a balance of light intensity within their eyes to orient towards the brightest direction (Ehrenfeld, 1968); thus, misdirection by lighting may occur resulting in more time being spend to find the ocean. Furthermore, successful nesting episodes on lighted shorelines will directly effect the orientation and sea-finding process of hatchlings during the nest emergence and frenzy process to reach the ocean. Hatchlings rely almost exclusively on vision to orient to the ocean and brightness is a significant cue used during this immediate orientation process after hatch out (Mrosovsky and Kingsmill, 1985; Verheijen and Wilschut, 1973; Mrosovsky and Shettleworth, 1974; Mrosovsky *et al*., 1979). Hatchlings that are mis-oriented (oriented away from the most direct path to the ocean) or disoriented (lacking directed orientation or frequently changing direction or circling) from the sea by artificial lighting may die from exhaustion, dehydration, predation, and other causes. Though hatchlings use directional brightness of a natural light field (celestial sources) to orient to the sea, light from artificial sources interferes with the natural light cues resulting in misdirection (Witherington and Martin, 2003).

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. If shielding of light sources is not effective, it is important that any light reaching the beach has spectral properties that are minimally disruptive to sea turtles like long wavelength light. The spectral properties of low-pressure sodium vapor lighting are the least disruptive to sea turtles among other commercially available light sources.

During construction operations that include the placement of sediment on the beach, lighting is required during nighttime activities at both the dredging site and the location on the beach where sediment is being placed. In compliance with the U.S. Army Corps of Engineers Safety and Health Requirements Manual (2003), a minimum luminance of 30 lm/ft^2 is required for dredge operations and a minimum of 3 lm/ft^2 is required for construction activities on the beach. For dredging vessels, appropriate lighting is necessary to provide a safe working environment during nighttime activities on deck (i.e. general maintenance work deck, endangered species observers, etc.). During beach construction operations, lighting is generally associated with the active construction zone around outflow pipe and the use of heavy equipment in the construction zone (i.e. bulldozers) in order to maintain safe construction operations at night. Furthermore, on newly nourished beaches where the elevation of the beach berm is raised for shoreline protection purposes, it is possible that lighting impacts to nesting females and emerging hatchlings from adjacent lighting sources (streets, parking lots, hotels, etc) may become more problematic as shading from dunes, vegetation, etc. is not longer evident (Brock, 2005; Ehrhart and Roberts, 2001). In a study on Brevard county beaches, Brock (2005) found that loggerhead hatchling disorientations increased significantly post-nourishment. This was attributed to the increase in light sources not previously visible to be seen by hatchlings as a result of the increase in profile elevation combined with an easterly expansion of the beach.

If beach construction activities occur during the sea turtle nesting and hatching season, all lighting associated with project construction will be minimized to the maximum extent practicable while maintaining compliance with all Corps, U.S. Coast Guard, and OSHA safety requirements. Direct lighting of the beach and near shore waters will be limited the immediate construction area(s). Lighting aboard dredges and associated vessels, barges, etc. operating near sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with the Corps, U.S. Coast Guard, and OSHA requirements. Lighting on offshore or onshore equipment will be minimized through reduced wattage, shielding, lowering, and/or use of low pressure sodium lights, in order to reduce illumination of adjacent beach and near shore waters will be used to the extent practicable (Figure 6). Shielded low-pressure sodium vapor lights have been identified by the FWCC as the best available technology for balancing human safety and security, roadway illumination, and endangered species protection. They provide the most energy efficient, monochromatic, long-wavelength, dark sky friendly, environmentally sensitive light of the commercially available street lights and will be highly recommended for all lights on the beach or on offshore equipment (Gallagher, 2006). To prevent on-board accidents and collision with other vessels, ample lighting is required to make color-coded warnings, hazards, and vessels visible. This is especially important at night and with foggy or rainy weather.

Figure 6. Beach lighting schematic identifying reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the sea turtle nesting beach and water.



The use of sea turtle friendly lighting has been shown to significantly improve beaches for sea turtle nesting. Implementing effective lighting ordinances or plans on major nesting beaches is a high priority for the USFWS. Therefore, in conjunction with all proposed beach projects, local lighting ordinances will be encouraged to the maximum extent practicable in order to reduce lighting impacts to nesting females and hatchlings. The applicant or local sponsor will be encouraged to work with the USFWS, local monitoring groups, and other concerned organizations to develop the best plan for each project specific environment (see Chapter 9 on commitments).

(7) Nearshore Disposal.

As discussed in Section 2.07, near shore disposal is the placement of beach compatible dredged material in the subtidal zone and entirely underwater. Some or most of the material would be placed within the littoral system. Since all of the material would be placed below the water line, the activity would not be subject to USFWS jurisdiction for sea turtles. Such activities would be subject to the jurisdiction of NMFS and one of the Regional Biological Opinions (for the South Atlantic or the Gulf of Mexico) or other consultation with NMFS. Hydraulic pipeline dredges may be used to place material in the shallower near shore, whereas the use of split-hull hopper dredges would require a greater depth for placement. Placement of material in the near shore zone helps maintain the sediment budget by restoring littoral material, potentially resulting in beach accretion. Though an engineered design template is not a component of near shore disposal, the dredged material may replenish the eroding beach in a natural manner (Herbich, 2000). If sediment placed in the near shore environment supports accretion of the adjacent beach, sea turtle nesting habitat may become available as a result of near shore disposal. Considering that the intent of near shore disposal is to keep dredged sediment within the littoral zone and allow for natural distribution with longshore drift, there is no constructed beach but rather an accretion of sediment based on natural sediment distribution. The accretion of supra-tidal nesting habitat as a result of near shore disposal of dredged sediment is unlikely. Nonetheless, if nesting habitat were created, the subsequent impact on nesting females and hatchlings would depend on sediment compatibility and sorting characteristics. Potential impacts are addressed in the previous subparagraphs of Section 7.07.8 (e).

Placement of sediments within the near shore environment could potentially impact hard bottom communities and subsequent sea turtle foraging grounds. However, hard bottom evaluations are performed prior to designating near shore disposal areas and all high relief hard bottom communities that constitute good foraging habitat for sea turtles are avoided. Therefore, no burial or sedimentation of hard bottom from near shore disposal will occur; thus, near shore disposal will not impact significant hard bottom foraging grounds. Projects that may impact hard bottom communities are not within the scope of this document and must be addressed through additional coordination and amendments to this document.

(8) Hard Structure.

On highly eroded shorelines, hard structure alternatives may be used (1) to protect upland structures against erosion (i.e. seawalls, revetments, sandbag / geo-tube structures, bulkheads, etc.) or (2) as a beach stabilization structure, in combination with beach fill activities, in order to retard erosion and increase the amount of time sediment remains on the beach (i.e. groins, breakwaters, and sills). Data summarized in 1996 indicate that 23% of Florida's east coast and 14 % of the west coast, concentrated in five areas of the state, were armored with some type of hard structure. The potential for future armoring encompasses the primary nesting beaches for sea turtles along the southeast and southwest coasts of Florida (Schroeder and Mosier, 2000; Mosier, 1998). The use of hard structures both parallel and perpendicular to the shoreline can lead to habitat loss for nesting sea turtles. In highly developed and erosive environments where hard structure is placed parallel to the shoreline for upland structure protection, without a natural dune or combined beach fill, scouring and undermining of the adjacent beach will occur resulting in total loss of habitat. Hard structures cause a reflection in wave energy which can increase erosion seaward of these structures, the intensity of longshore currents can be increased, moving sand away from the site more rapidly and in greater quantities, the natural exchange of sand between the dune and beach is prevented, and wave energy is concentrated at the ends of hard structures which can exacerbate erosion at adjacent, un-hardened beach (Schroeder and Mosier, 2000). Furthermore, accretion in one area, as a result of shore-perpendicular structures, is balanced by erosion elsewhere unless additional sand is introduced into the project area.

Hard Structures can both directly and indirectly affect sea turtles. Direct affects include (1) prevention of access to suitable nesting sites, (2) abandonment of nesting attempts due to interaction with the structure, and (3) interference with proper nest cavity construction and nest covering. Furthermore, shore parallel hard structures such as T-head and other composite groins can (4) impede and/or trap nesting females and hatchlings, (5) concentrate predators, and (6) alter current regimes and longshore sediment transport. Indirect impacts include (1) the permanent loss of nesting habitat or escarpment formation as a result of beach profile and width alteration; (2) increase in clutch mortality as a result of frequent inundation and/or exacerbated erosion, and (3) increase in hatchling and adult female energy expenditure in attempts to overcome structures.

As discussed in Section 4.03, hard structures can be shore parallel, shore perpendicular, long, short, high, low, permeable, and impermeable. Depending on its design, hard structures can physically block a nesting female from accessing a more suitable higher elevation nesting environment. In a study conducted by Mosier (1999) of three nesting beaches on the east coast of Florida, 86% of nesting females that encountered a hard structure during emergence returned to the water without nesting as a result of the inability to access higher elevation nesting habitat (Mosier, 1999). Nests that are laid in low elevation environments are vulnerable to washout and nest incubation environments may be altered resulting in nest loss or decreased nest success. According to Lucas *et. al*. (2004), in a study designed to assess sea turtle response to beach attributes (i.e. hard structures), turtles emerged onto portions of the beach where anthropogenic structures threatened to block access to optimal nesting habitat; however, upon encountering the structures, turtles abandoned the nesting sequence. This study indicated that only the most seaward structures affected sea turtle nesting. Depending on the design of shore perpendicular structures such as straight and composite groins (*i.e*. T-head), the structure may act as an impediment or a trap (Foote *et. al*., 2002) to nesting females and/or hatchlings (Davis *et. al*., 2002). Stem features of the groin may be exposed above the beach surface or may be buried by accreting sand resulting in potential impediments to the nesting process either during nest site selection or during nest digging resulting in potential false crawls or false digs and subsequent increase in energy expenditure.

In most cases, groins are used as design components, in combination with beach fill, in critical erosion or hot spot areas. Therefore, pre-project nesting conditions are generally degraded with limited sea turtle crawl activity. According to Davis *et. al.* (2002), in Ocean Ridge, Florida, eight T-head groins were constructed in 1998 in combination with beach nourishment to restore eroded shoreline. The resultant beach was crenulate between the groins with the high water line at or slightly landward of the T-head resulting in increased crawl activity on the groin field beach despite the presence of groins compared to pre-project conditions. Though the stem burial of the T-groin and resultant tombolo formation within the groin field increased the available nesting habitat, the risk for hatchlings to encounter the T-groin and get trapped before entering the water increased. In order to prevent trapping of hatchlings, fencing was used to redirect hatchlings away from the groin during hatch out resulting in 12% of the hatchlings being redirected from potential entrapment. Depending on the quantity of added beach fill, the rate of sediment accumulation, and the groin crest elevation, hatchlings may potentially be trapped by the stem or the “T-head” portion of the groin both in the water and/or on the beach. The resultant increased energy expenditure to traverse around a structure depletes the critical “frenzy” energy reserves of hatchlings necessary to reach the safety of offshore developmental areas. Furthermore, predator concentration, including bird and fish species, may occur within the vicinity of high relief hard structures. As hatchlings become trapped by the structure during egress offshore, the period of time which they are most vulnerable to predation increases resulting in increased losses.

Contrary to the accretion of beach as identified in the Ocean Ridge project from the use of groin structures, erosion of beaches may occur down-drift of a groin structure depending its design and purpose. If the structure functions as a barrier to the movement of littoral material, accretion may occur up-drift and erosion down-drift of the structure resulting in loss of nesting habitat and potential escarpment formation as down-drift erosion persists. However, groins designed with low crest elevation, weir sections, etc. allow for water and sediment to bypass through the structure to some degree and prevent or reduce the rate of down-drift erosion. Assuming that sufficient sediment is bypassed, erosion and escarpment concerns relative to approach of nesting females and incubating nests will be reduced. Furthermore, if groin crest elevation is below mean low water (MLW) or if gaps are incorporated to the structure design, the risk of hatchling entrapment during egress offshore as well as predation response will all also be reduced.

e. Effect Determination.

The proposed project could potentially affect sea turtles both directly and indirectly in the following ways (1) both stockpiled pipe on the beach and the pipeline route running parallel to the shoreline may impede nesting sea turtles from accessing more suitable nesting sites, (2) the operation of heavy equipment on the beach may impact nesting females and incubating nests, (3) associated lighting impacts from the nighttime operations and the increased beach profile elevation may deter nesting females from coming ashore and disorient emerging hatchlings, (4) burial of existing nests may occur if missed by monitoring efforts, (5) escarpment formations and resulting impediment to nesting females as well as potential losses to the beach equilibration process, (6) reduced nest success as a result of relocation efforts, (7) sediment density (compaction), shear resistance (hardness), sediment moisture content, beach slope, sediment color, sediment grain size, sediment grain shape, and sediment grain mineral content can be altered potentially effecting the nesting and incubating environment, (8) hard sediment can prevent a female from digging a nest or result in a poorly constructed nest cavity, (9) changes in sediment properties and color could alter the temperature of the beach and incubating nests; thus influencing sex ratios, and (10) hard structures (groins, breakwaters, etc.) may prevent access to suitable nesting sites, directly and indirectly interfere with the nesting process, impede and/or trap nesting females and hatchlings resulting in increased energy expenditure, concentrate predators, and alter longshore sediment transport and down-drift erosion.

To the extent authorized and subject to the availability of funds for Corps Civil Works projects, the Corps plans to alleviate impacts to nesting sea turtles in the project area by implementing steps that are now common practice including, but not limited to design modifications, contingency plans, risk assessments, sediment quality monitoring, compaction tests, tilling, leveling escarpments in the fill, monitoring for nests, etc. See Chapter 9 on commitments.

Despite the implementation of placement windows, use of compatible sediment, and other necessary precautions to the maximum extent practicable, the chance of impacting nesting sea turtles and their incubating environment still exists. Therefore, it has been determined that the proposed actions may affect the loggerhead, green, Kemp's ridley, hawksbill, and leatherback sea turtles.

7.02.9 Beach Jacquemontia.

a. Status. Endangered

b. Background.

Beach jacquemontia (*Jacquemontia reclinata*) is a perennial vine located on the barrier islands of the southeastern Florida coast from Miami to Palm Beach County specifically: Palm Beach (eight sites), Broward (two sites), and Dade (two sites) counties. It has a main stem with laterals spreading from its rootstock. Leaves are entire, alternate, estipulate, spirally arranged, and almost always petiolate. Beach jacquemontia flowers from November to May, but may vegetatively propagate at any time.

There are about 100 species of the genus Jacquemontia, of which, beach jacquemontia is the only species found along the beaches of southeastern Florida. Surveys conducted in 2003-2004 estimate the total population to be 700 individuals on nine sites (USFWS, 2004). Habitat preferences include disturbed or sunny areas in the tropical maritime hammock or the coastal strand vegetation, typically on the crest and lee sides of stable dunes; however, seedling and young beach jacquemontia grow best when shaded. Occasionally plants can be found associated with sea oats (*Uniola paniculata*) within the beach dune community.

Loss of habitat to urbanization and beach erosion led to the listing of beach jacquemontia as endangered on November 24, 1993 (USFWS, 1993). The current threats for recovery include continued loss of habitat and shading to invasive species (Australian pine, carrotwood, and Brazilian pepper) as well as urbanization and subsequent habitat loss among the barrier islands of South Florida. Considering that only a few plants may be present at any given site, viability of existing populations is uncertain. Furthermore, with continued habitat degradation and loss, limited geographic distribution, and small population sizes, population sustainability may only be attained through habitat management (i.e. exotic plant control), protection, and conservation measures (Johnson *et al*. 1990). Active management programs of propagation, germplasm conservation, and augmentation will be required for remaining populations. Successful reestablishment efforts occurred in 1989 at three sites in Crandon Park and continued success can be attained using re-establishment techniques as part of dune restoration projects. A recent study funded by the USFWS evaluated the reintroduction of beach jacquemontia, including specific recovery actions such as 1) creating new introduced populations, 2) monitoring survival and reproduction of introduced individuals, 3) continuing *ex situ* conservation seed bank storage and 4) conducting demographic monitoring (USFWS, 2004). The data from this study will help better understand the requirements for successful reintroduction techniques and evaluate long-term trends in wild and reintroduced populations.

c. Potential Impacts.

There is no critical habitat designated for beach jacquemontia; thus, no critical habitat will be impacted. Beach fill placement of sediment will not occur within the identified habitat of beach jacquemontia. Though direct placement of sediment will not affect beach jacquemontia, pipeline routes may be located within identified habitat requirements depending on site conditions. For projects where known populations of beach jacquemontia exist, plant surveys will be performed, through coordination with USFWS, during the project design phase and prior to project commencement. Appropriate survey protocol will be adhered to and all beach jacquemontia plants will be flagged. Identified pipeline routes and associated construction activities will avoid flagged sites. For projects where dune features are incorporated into the project design, additional habitat may be made available for natural recruitment and colonization as well as reintroduction of plants. Considering the limited distribution and numbers of existing populations, fragmentation and degradation of habitat, and the potential for stochastic natural events; projects that cannot avoid direct impacts to existing plants are outside the scope of this assessment and will be addressed in a separate document.

d. Effect Determination

Considering that the habitat requirements for beach jacquemontia are located outside of the beach fill placement area of sediment, direct impacts from sediment placement will not occur. In areas where known populations exist, surveys will be conducted and pipeline routes will avoid identified beach jacquemontia plants. Projects that cannot avoid direct impacts from pipeline routes and associated actions will be addressed in a separate document. Therefore, considering the implementation of these protection and avoidance measures, the placement of sediment on the beach and associated construction actions may affect but will not likely adversely affect beach jacquemontia.

7.02.10 Deltoid Spurge.

a. Status. Threatened

b. Background.

Deltoid spurge (*Chamaesyce deltoidea ssp. deltoidea*) is a shore-lived perennial herb and can be found at low elevations on thin sandy soils or directly on limestone, specifically in the pine rocklands, coastal flats, coastal grasslands, and beach ridges of Miami-Dade and Monroe counties, Florida. It is endemic to South Florida and is abundant on Cape Sable (hammock edges, open grassy prairies, and backdune swales) and is found throughout the Keys (semi-exposed limestone shores, open calcareous salt flats, pine rocklands, calcareous sands of beach ridges, and along disturbed roadsides) in small numbers. Habitat loss from development, fire suppression, and invasive exotics continues to threaten this species.

c. Potential Impacts.

The placement of sediment on the beach and associated construction operations will not occur within Deltoid spurge habitat and; therefore, will not impact existing populations or degrade potential habitat in South Florida.

d. Effect determination.

The placement of sediment on the beach will not affect Deltoid spurge.

8.00 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Past, present, and predicted future shore protection activities are described in Appendix 1. In addition, existing biological opinions for shore protection activities on Florida's beaches are listed in Appendix 2. In the following paragraphs is a general discussion of past and present shore protection and beach placement activities and expected future trends, including related non-Federal actions.

The Corps has been involved with placing sand on Florida's beaches for the past several decades. Even though there have been efforts to reduce or eliminate Federal participation in shore protection activity, Congress is likely to continue funding such efforts into the future. The Corps regulatory responsibility for such activities (for permitting both non-Corps projects and Corps projects constructed by the non-Federal sponsor for reimbursement) is also expected to continue. A large portion of Florida's beaches are in an eroding state if not "critically eroded." There is no reason to believe that the forces causing erosion and coastal flooding are likely to diminish in the foreseeable future.

Measures to counter erosion and storm damage include sand-bypassing, placement of sand from navigation dredging on the beach (or near shore or dune), placement of sand from off-shore (or other sources) for beach renourishment, and construction of groins or breakwaters. The absence of these measures would, for many eroding shorelines, result in either a loss of property (structures and natural or cultural resources) or pressure for alternative measures such as shoreline hardening.

The placement of sand on the beach can be disruptive (especially in the first year or two following construction) to threatened or endangered species and their habitat. While we will seek measures to minimize such impacts (see part 9.00 below), impacts are likely to occur for present and future sand placement activities. Many eroding shorelines require a renourishment interval of two to seven years to maintain protection from storm damage. Similarly, placement from navigation dredging often happens on a recurring basis.

Whether the amount or frequency of beach renourishment and other storm damage reduction measures will increase in the future depends largely on the future level of erosion and hydrodynamic forces such as the frequency and intensity of storm events and the rise in sea level. We can not eliminate the possibility that these forces will trend upward in the future resulting in an increase in the magnitude and/or frequency of storm damage reduction activities. For planning purposes, the Corps treats sea level rise in accordance with Engineer Circular EC 1165-2-211, Water Resource Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs (http://140.194.76.129/publications/eng-circulars/ec1165-2-211/toc.html) The strategy to combat erosion and storm damage (verses retreat) will likely continue (especially for areas of high economic or social value) unless it becomes economically impractical or politically unacceptable.

In addition to changes in sea level and storm frequency, changes in the climate could result in changes in water temperature, salinity, current patterns, seasonality, rainfall patterns, etc.

Other factors influencing shore protection measures include the availability of suitable sand and the continued ability of state and local entities to either share the cost with the Corp or undertake shore protection without Federal participation. As nearby sources of suitable sand are depleted, alternate sources from further away become increasingly costly. Revenue and expenditures of the state and local governments vary with the economic conditions at the time and may not always be available. Other shore protection measures to augment or replace beach nourishment are being pursued such as groins, breakwaters, and sand by-passing (see earlier discussions in this document, Sections 2.02 and 4.02) but none have been found to completely replace the need for beach nourishment.

Other than a construction easement, the Corps generally does not own the shoreline or have the authority to regulate many activities therein. It is up to the state, county, municipality, or underlying fee owner to determine how the beach is managed. A number of practices may impact listed species and their habitat such as shorefront lighting, driving/parking on the beach, refuse collection/management, management of wildlife and domestic animals, zoning, and access restrictions (see also the discussions for individual species earlier in this document).

9.00 Commitments to Reduce Impacts to Listed Species

The following list is a summary of environmental commitments to protect listed species related to the construction and maintenance of the proposed actions. These commitments address agreements with the USFWS, mitigation measures, and construction practices.

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.

Species	Commitments to Reduce Impacts to Listed Species
Roseate Tern	(1) Avoid identified major nesting colony sites and avoid breeding and nesting time frames [limited to certain known nesting colonies in the Keys].
Piping Plover	(2) Adhere to appropriate windows to the maximum extent practicable.
	(3) 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 this Section 9.00, "funded" means subject to availability and allotment).
	(4) Pipeline alignment and associated construction activities may be modified to reduce impacts to foraging, sheltering, and roosting.
	(5) Avoid impacts to the primary constituent elements of Piping Plover critical habitat to the maximum extent practicable.
	(6) Pre-project surveys will be performed to assess the presence of and/or potential for washover fan formation.
	(7) The USACE will work with the USFWS 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.

(8) The USACE will work with the State of Florida DEP to consider the value and context of inlet habitat features (i.e. emergent spits, sand bars, etc.) within each inlets 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.

Snowy Plover	(9) Adhere to appropriate breeding windows to the maximum extent practicable.

(10) Dune features will be constructed and planted, to the maximum extent practicable, to minimize impacts to known existing breeding grounds by maintaining existing nesting habitat features. For Corps Civil Works projects, this must be limited to the extent that work on dune features is authorized and funded.

(11) The USACE will work with the State of Florida DEP to consider the value and context of inlet habitat features (i.e. emergent spits, sand bars, etc.) within each inlets management plan and adjust future dredging frequencies, to the maximum extent practicable, so that adjacent habitats are made available and total habitat loss would not occur at one time within a given inlet complex.

(12) Except for O&M disposal actions, if the breeding season can not be avoided, the USACE will work with the resource agencies in order to develop and implement a sufficient monitoring plan during construction in order to avoid construction impacts to Snowy Plover hatchlings.

(13) Except for O&M disposal actions, escarpments will be leveled immediately following sand placement on the beach prior to the breeding and nesting season (March through September) at known significant breeding grounds located on the Gulf of Mexico on isolated peninsulas and the protected parks at Caladesi Island, Fort DeSoto Park, and Cayo Costa.

Red Knot	(14) Beach fill placement activities will be constructed to allow for un-impacted foraging habitat locations and avoid large scale disruption to benthic invertebrates to the maximum extent practicable.

(15) Avoid roosting timeframes or provide appropriate buffers around existing roosting habitat during construction operations. [Mostly limited to portions of wider beaches not disturbed by people.]

Manatee

(16) Adhere to the “Manatee Protection Conditions”.

(17) Use of observers during hopper dredge operations.

Beach Mice

(18) Pipeline routes for beach construction projects will avoid identified primary constituent elements for critical habitat to the maximum extent practicable.

(19) Implementation of a trapping and relocation plan if avoidance alternatives are not practical.

(20) 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.

Sea turtles

(21) Avoid sea turtle nesting season to the maximum extent practicable.

(22) Except for O&M disposal actions, implement sea turtle nest monitoring and relocation plan during construction if nesting window cannot be adhered to.

(23) 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 ft.) 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 USFWS. 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.

(24) 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.

(25) Temporary storage of pipes and equipment will be located off the beach to the maximum extent practicable.

(26) The USACE will continue to work with the Florida DEP 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.

(27) Except for O&M disposal actions, USFWS compaction assessment guidelines will be followed and tilling will be performed where appropriate. For Corps Civil Works projects, assessment of compaction and tilling would be limited to the term of the construction or as otherwise may be authorized and funded.

(28) All lighting associated with project construction will be minimized to the maximum extent practicable, through reduction, shielding, angling, etc., while maintaining compliance with all Corps, U.S. Coast Guard, and OSHA safety requirements.

Beach Jacquemontia

(29) For projects where known populations of beach jacquemontia exist, plant surveys will be performed, through coordination with USFWS, during the project design phase and prior to project commencement. Appropriate survey protocol will be adhered to and all beach jacquemontia plants will be flagged. For Corps Civil Works projects, these plant surveys would be limitied to the term of the construction or as otherwise may be authorized and funded.

(30) Identified pipeline routes and associated construction activities will avoid flagged sites.

10.00 Summary Effect Determination

We propose that the proposed actions with appropriate conditions and requiring separate biological opinion for certain activities in certain locations (e.g., high use shore bird habitat and high value manatee habitat) as described herein:

-**may adversely affect** the hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, green sea turtle, Piping Plover, beach mice (if impacts to critical habitat features cannot be avoided), and Snowy Plover (if breeding and nesting windows cannot be adhered to).

-**may affect but will not likely adversely affect** the Roseate Tern, Red Knot, manatee, beach jacquemontia, the five species of listed beach mice (if impacts to critical habitat features can be avoided), and Snowy Plover (if breeding and nesting windows are adhered to).

-**will not affect** the deltoid spurge.

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APPENDIX 1

PAST AND PRESENT SHORE PROTECTION ACTIVITIES

NOTE: This appendix along with appendix 2 is used to estimate impact and potential take. Neither are necessarily a comprehensive list of shore protection and beach placement activities and the scope of this consultation is not limited to those actions listed therein.

	County	Nassau	
	Project	*Nassau County SPP at Amelia Island*	*South Amelia Island Beach Restoration Project*
	Activity	SPP (Beach Nourishment)	Beach Restoration
	Authority	WRDA 1988; WRDA 1999	Non-Federal
Initial Nourishment	**Year**	2004	1994
	Template	20 foot berm; 13 ft. above MLW	Berm Width - 194 ft.
	Estimated Quantity (CY)	3,000,000	2,600,000
	Miles	3.6	
	Location/Segment	Vicinity of South Jetty at St. Marys inlet to Sadler road	R61-R80
	Re-nourishment Interval	5	8
Re-nourishment	**Re-Nourishment Year**	2008	2002
	Template		
	Estimated Quantity (CY)	1,725,000	1,900,000
	Miles	4.3	3.4
	Location/Segment	South Jetty at St. Marys Inlet to Sadler Road (R10-R35)	R50-R80
	Comments		

	County	Duval							
	Project	*Little Talbot Island*	*Duval County SPP*						
	Activity	SPP (Revetment)	SPP (Beach Nourishment)						
	Authority	WRDA 1999; Section 101 (b)	River and Harbor Act 1965; PL 89-298, 94-587 and 99-662						
Initial Nourishment	Year	2004	1980						
Initial Nourishment	Template		60 foot berm; ll ft. above MLW						
Initial Nourishment	Estimated Quantity (CY)		2,877,000						
Initial Nourishment	Miles		10						
Initial Nourishment	Location/Segment		St. Johns River Jetties to the Duval/St. Johns County line (R31-R80)						
Initial Nourishment	Re-nourishment Interval		4						
Re-nourishment	Re-Nourishment Year		1985	1986	1987	1991	1995	2003	2005
Re-nourishment	Template								
Re-nourishment	Estimated Quantity (CY)		1985 - 640,000	309,000	850,000	370,688	1,187,300	200,000	1,000,000
Re-nourishment	Miles		1985 - 2.3	2.5	3.7	1.7	5	1.2	8
Re-nourishment	Location/Segment		Reach 2 & 3	Reach 3	Reach 3 & 4	Reach 2	Rch 2,3,4	Reach 4	R43-R52 (Atlantic Bch) R57-R80 (Jacksonville Bch)
	Comments							Material from Jacksonville Harbor	

	County	***St. Johns***
	Project	*St. Johns County SPP at St. Augustine beach*
	Activity	SPP (Beach Nourishment)
	Authority	WRDA 1986; WRDA 1999; PL 99-662; include navigation material
Initial Nourishment	Year	2001
Initial Nourishment	Template	60 foot berm; 12 ft. above MLW; 1 on 20 seaward slope
Initial Nourishment	Estimated Quantity (CY)	2,410,000
Initial Nourishment	Miles	2.5
Initial Nourishment	Location/Segment	Southern 0.7 m of Anastasia State Recreation Area to the Northern 1.8 miles of St. Augustine Beach (R137-R150)
Initial Nourishment	Re-nourishment Interval	5
Re-nourishment	Re-Nourishment Year	2001-2003; 2005; 2010-2011
Re-nourishment	Template	
Re-nourishment	Estimated Quantity (CY)	2001-2003 - 4,383,000; 2005 - 2,300,000; 2010-2011 - 3,100,000
Re-nourishment	Miles	2001-2003 - 3.8; 2005 - 2.5; 2010-2011 - 2.6
Re-nourishment	Location/Segment	2001-2003 - T132-R152; 2005 - R137A (Anastasia State Park) - R150 (St. Augustine Beach) ; 2010-2011 - R137-R151
	Comments	

	County	***Flagler***
	Project	*Flagler County SPP*
	Activity	SPP (Beach Nourishment)
	Authority	Pending Congressional Authorization
Initial Nourishment	**Year**	2011
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Re-nourishment Interval	
Re-nourishment	**Re-Nourishment Year**	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Comments	

	County	Volusia			
	Project	*Volusia County SPP*	*FEMA*		*New Smyrna/Silver Sands Dune Restoration*
	Activity	SPP (Beach Nourishment)	Emergency Sand Berm		Emergency Dune Restoration
	Authority	Pending Congressional Authorization			Non-Federal
Initial Nourishment	Year	2000	2000	2004	2006
	Template				30' to 50' berm; 5' to 7' ft. dune
	Estimated Quantity (CY)		31,000	75,000	750,000
	Miles		1	2	5
	Location /Segment				R161-R175
	Re-nourishment Interval				
Re-nourishment	Re-Nourishment Year	2004			
	Template				
	Estimated Quantity (CY)				
	Miles				
	Location /Segment				
	Comments				Material from AIWW disposal Island

	County	Brevard						
	Project	Brevard County Beach Erosion Control at Cape Canaveral, Indialantic, and Melbourne Beaches	Brevard County Beach Erosion Control - North Reach and South Reach				Non-Federal Beach Nourishment	Patrick Air Force Base
	Activity	(Beach Nourishment)	(Beach Nourishment)					Beach Nourishment
	Authority	Authorized 1968	Re-authorized - WRDA 1996				Permit - City/Port Authority (Co-Sponsors)	
Initial Nourishment	Year	1975	North Reach - 2001; South Reach - 2002				1994; 1996	1980-1995
	Template	50 foot berm; 10 ft. above MLW;	50 foot berm; 10 ft. above MLW;					
	Estimated Quantity (CY)	Canaveral - 1,250,000 (1975); Indialantic and Melbourne - 540,000 (1981);	North Reach - 3,204,900; South Reach - 1,182,900				1994 - 100,000; 1996 - 40,000	380,000
	Miles	Authorized - 2.8 (Cape Canaveral), 2.0 (Indialantic), 2.0 (Melbourne)	North Reach - 9.4; South Reach - 3.02					4.2
	Location/Segment	1975 - 2.1 miles (Cape Canaveral (R1-R12)); 1980 - 2.0 miles (Indialantic-Melbourne Beach (R122-R135))	North Reach - South jetty to Northern boundary of Patrick AFB (R3-R54.5); South Reach - North of Indialantic (R122.5) to Spesard Holland Park (R139)				1994 - R5-R11; 1996 - R34-R38	R53-R75
	Re-nourishment Interval	Periodic for Indialantic and Melbourne	5	South Reach Segment II	North and South Reach Segments	Mid Reach Dune/Beach Fill		6
Re-nourishment	Re-Nourishment Year	1980	2005	2003	2005	2005	2010	1996-1998 2000-2001
	Template							
	Estimated Quantity (CY)	540,000	1,598,000 (North and South Reaches)	230,900	North - 680,000; South -	300,000	550K to 850K	250,000 515,000+83,000
	Miles		North Reach - 9.4; South Reach - 3.4	0.94			4	4.2 2.1 + 1
	Location/Segment	R126-R136	R1 - R54.5	R118.3 - R123.5	North - (R5-R20; R33-R53); South - (R118.3-R137.5)	R75-R118	R118-R139	R53-R75 R53-R64 + R64.5-R70
	Comments				Flood Control Coastal Emergency Program	Flood Control Coastal Emergency Program		

	County	***Indian River***	
	Project	*Indian River County SPP - Sebastian Inlet State Park and Vero Beach*	*Ambersand Beach*
	Activity	SPP (Beach Nourishment)	Non-Federal Beach Restoration
	Authority	Sebastian Inlet and Vero Beach Authorized in WRDA 1999 (Section 364)	Permit
Initial Nourishment	**Year**		2003
	Template		
	Estimated Quantity (CY)		536,500
	Miles	Sebastian Inlet - 0.8; Vero Beach 2.2	13,200 ft.
	Location/Segment		R3-R17
	Re-nourishment Interval		
Re-nourishment	**Re-Nourishment Year**		
	Template		
	Estimated Quantity (CY)		
	Miles		
	Location/Segment		
	Comments		

	County	St. Lucie	
	Project	*Fort Pierce SPP*	*St. Lucie County Beaches - Reconnaissance Study*
	Activity	SPP (Beach Nourishment)	SPP
	Authority	WRDA 1965; WRDA 1996; WRDA 1999 (Section 313)	Authorized (awaiting funding)
Initial Nourishment	Year	1971	
	Template	50 foot berm; 10 ft. above MLW;	
	Estimated Quantity (CY)	1970 - initial construction (718,000)	
	Miles	2.3	
	Location/Segment	South jetty at Ft. Pierce Inlet to Surfside Park (R34-R46)	St. Lucie County Beaches
	Re-nourishment Interval	4 (see comments in last row)	
Re-nourishment	Re-Nourishment Year	1980; 1999; 2003; 2005	
	Template		
	Estimated Quantity (CY)	1980 - 346,000; 1999 - 830,000; 2003 - 336,000; 2005 - 517,000	
	Miles	1980 - 1.3; 1999 - 1.3; 2003 - 0.4; 2005 - 1.3	
	Location/Segment	1999 - R34-R41 & R41-R46; 2003 - R34-R41; 2005 - R34-R41	
	Comments	A 2-year renourishment interval may be more realistic here below the inlet. This area acts as a feeder beach to downdrift beaches to the south	

	County	Martin			
	Project	*Martin County SPP - Hutchinson Island*			*Jupiter Island Beach Restoration Project*
	Activity	SPP (Beach Nourishment)			Beach Restoration
	Authority	WRDA 1990			Non-Federal
Initial Nourishment	Year	1996			1973-1974
	Template	Restoration of Primary Dune; 35 foot wide berm; Designed to reduce env. Impacts			
	Estimated Quantity (CY)	1,269,000			
	Miles	3.75			
	Location/Segment	Northern most 4 miles - Hutchinson Island; St. Lucie/Martin County line to Stuart Beach Park (R1-R23); Extension to R25 (non-Federal)			Town of Jupiter Island; R75-R117
	Re-nourishment Interval	11			3-4 (through 1996)
Re-nourishment	Re-Nourishment Year	2001	2005	2011	1996; 1999
	Template		2005 - Dune Enhancement to Protect Sea Turtles From Artificial Light	Corps Study and DOA Permit	Inlet flood shoal sand bypassing
	Estimated Quantity (CY)	1,100,000	810,000	589,600	1996 - 1,740,000
	Miles	3.75	3.75	4	1996 - 5.1
	Location/Segment	Hutchinson Island; St. Lucie/Martin County line to Stuart Beach Park (R1-R23)	R1-R24; R25-R25.6	R1-R25	1996 - R77-R106; 1999 - R78-R84; R92-R100
	Comments				

Palm Beach County

	Project		*1958 Authorization - Palm Beach Island*	*1962 Authorization - Jupiter/Carlin, Ocean Ridge, Delray, North Boca Raton, and Central Boca Raton Segments*	*Jupiter/Carlin Segment*	*Ocean Ridge Segment*	*Delray Beach Segment*					*Boca Raton Segment*	*Boca Raton (Central) Beach Restoration project*	*Boca Raton (South) Beach Restoration Project*		*Palm Beach - Tequesta, Juno Beach, S. Singer Island, Palm Beach, Sloan/Widner Lake Worth*	*Palm Beach Island Feasiblity Study*	*Coral Cove Park*	*Juno Beach Restoration Project*	*Mid-Town Beach Restoration Project*	*Phipps Ocean Park Beach Restoration*
	Activity		Constructed by Non-Fed interests	SPP (Beach nourishment)	SPP (Beach nourishment) - Reimbursable project	SPP (Beach nourishment and groin construction) - Reimbursable project	SPP (Beach nourishment) - Reimbursable project					SPP (Beach nourishment) - Reimbursable project	Beach Restoration	Beach Restoration/Feeder Beach			Feasibility Study	Dune restoration - Trucked sand from upland borrow	Beach Restoration	Beach Restoration and groin construction	Beach Restoration
	Authority			WRDA 1962		WRDA 1996	WRDA 1996					WRDA 1996	Non-Federal	Non-Federal		Authorized		Non -Federal	Non -Federal	Non -Federal	Non-Federal
Initial Nourishment	**Year**				1995	1998	1973					1988	2004	1985		2001		1993	2001	1995	Pending
	Template			100 foot wide berm; 10 ft. above MLW										Restore 1975 shoreline; 10 ft. above MLW				Dune Construction	50 foot wide berm; 9 ft. above MLW	25 foot wide berm; 9ft above MLW	9 ft. above MLW
	Estimated Quantity (CY)				603,000	939,886	1,634,500					1,102,000	747,000	220,000					1,000,000	880,000	1,500,000
	Miles		15.5	Martin County line - Jupiter inlet (1.3 mi); Jupiter Inlet - Lake Worth Inlet (2.5 mi); South Lake Worth Inlet - Boca Raton Inlet (8.4 mi)	1.1	1.4	2.7					1.45	2.3	0.6		6.2		1.2`	2.4	1	1.9
	Location/Segment				Jupiter/Carlin Segment (R13.5-R19)	Ocean Ridge Segment (R152-R160)	Delray Beach Segment (R175-R188)					Boca Raton Segment (R205-R212)	R216-R222	R223-R225.6			Reach 2 (R78-R90.4); Reach 5 (R102.3-R110.1); Reach 8 (R126-R134)	R5-R7.6	R26-R38	R95-R100	R116-R126
	Re-nourishment Interval			periodic re-nourishment for a 10 year period after initial construction	7	6	8					8		6					5	8	8 (only req. for R116-R118)
	Re-Nourishment Year				2002	2005	1978	1984	1992	2002	2005	1998, 2009		1996	2002					2003	
Re-nourishment	**Template**				Berm Width - 163 ft.; 10 ft. elevation						100 ft. Berm Width at +9 ft. Elevation above MLW										
	Estimated Quantity (CY)				625,000	551,657	701,266	1,300,000	1,196,500	1,230,000	326,804	1998- 650,000 2009- 780,000		220,000	300,000					1,400,000	
	Miles				1.14	1.1	1.95	2.7	1.95	1.9	2.7	1.45		0.6	1					2.5	
	Location/Segment				R13-R19	R153-R159	R177.2-R182.7; R185.5-R188.5	R175.5-R188.5	R180-R188.5	R180-R188.5	R175-R184	R205-R212		R223-R225.6	R223-R227.9					R90.4-R101.4	
	Comments																			Expanded project area	

			Broward										
	Project		*Broward County and Hillsboro Inlet, Florida Beach Erosion Control and Navigation*	*Deerfield Beach - Segment I*	*Pompano - Segment II*	*Lauderdale by the Sea - Segment II (extension)*	*Fort Lauderdale - Segment III*	*Hollywood/Hallandale - Segment III*	*Dania - Segment III*	*J.U. Lloyd Beach State Park - Segment III*	*J.H. Lloyd State Park*	*Hillsboro Beach Restoration Project*	*Hallandale Beach Restoration Project*
	Activity		SPP (beach nourishment) and navigation improvements - Reimbursable project								nourishment and sand tightening of S. Jetty	Non-Federal Beach Nourishment	Non-Federal Beach Nourishment
	Authority		WRDA 1965; WRDA 1996; S.311									Local Sponsor - Town of Hillsboro Beach	Local Sponsor - City of Hallandale
Initial Nourishment	**Year**				1970	1983		1981		1979	1989	1972; 1998	1971
Initial Nourishment	**Template**		Beach erosion control - 100 foot wide berm and 10 ft. above MLW; Sand transfer plant		Beach Berm - +9.0 ft. NGVD; 1970 MHW shoreline extended 134 ft. seaward			Beach Berm - +7.0 NGVD; extended MHW shorleine 178 ft. seaward		Beach Berm - +10.0 ft. NGVD; extended MHW shoreline 140 ft. seaward	Beach Berm - elevation +10.0 ft. NGVD; extended MHW 100 ft. seaward; 5 yrs. Advanced nourishment	Restoration of 30' beach berm; elevation +9.0 ft. NGVD; beach fill equal to 10 yrs. Advance nourishment	
Initial Nourishment	**Estimated Quantity (CY)**				1,100,000	1,800,000		2,000,000		1,090,000		1972 - 360,000; 1998 - 555,000	350,000
Initial Nourishment	**Miles**				3	5.2		5.2		1.6		1972 - 1.0 ; 1998 - 1.2	southernmost 4,000 ft. of Broward County
Initial Nourishment	**Location/Segment**				R32-R49	R25-R53		R101-R128		R86-R93		1972 - R7-R12; 1998 - R6-R12	R-128
Initial Nourishment	**Re-nourishment Interval**				13	13				11			
Re-nourishment	**Re-Nourishment Year**				1984; 2005	2005	2005	1991; 2005		1989; 2005			
Re-nourishment	**Template**							Beach Berm - +7.0 NGVD; extended MHW shoreline 51 ft. seaward					
Re-nourishment	**Estimated Quantity (CY)**				2005 - 300,000 (Segment II Combined)	2005 - 300,000 (Segment II Combined)		1991 - 1,100,000; 2005 - 196,000 (Segment III)		1989 - 604,000; 2006 - 196,000 (Segment III)			
Re-nourishment	**Miles**				2005 - 1.3 (Segment II Combined)	2005 - 1.3 (Segment II Combined)		5.2		1.6			
Re-nourishment	**Location/Segment**							2002 - R98-128		2002 - R86-92			
	Comments							2005 - Emergency		2005 - Emergency			

	County	*Dade*												
	Project	*Dade County, Florida Beach Erosion Control and Hurricane Protection - Government Cut to Haulover Beach Park*						*Beach Fill - From Truck Haul of Upland Site Material*	*Beach Fill - From Truck Haul of Upland Site Material*	*Key Biscayne Section 103 Project (Along Southern End of Key Biscayne)*	*Virginia Key and Key Biscayne Section 103 Shoreline Protection Project*	*Beach Erosion Control - Fisher Island*	*Village of Key Biscayne*	*Fisher Island Beach Restoration*
	Activity	Shoreline Protection Project (SPP)	SPP - Bal Harbour Village segment	SPP - Haulover Beach Park	SPP - Indian Beach Park (Haulover Beach Park to Government Cut)	SPP - Sunny Isles	Surfside and Miami Beach	Sunny Isles Restoration	Miami Beach Restoration	Shoreline Erosion and Recession Protection	Shoreline Erosion and Recession Protection	Privately Funded Beach Erosion Protection	Non-Federal Beach Nourishment Project	Non-Federal Beach Restoration
	Authority	1968 (H.Doc. 335/90/2); 1974; 1986 and 1986 (WRDA) (H.Report 99-236 and P.L. 99-662)	Constructed by local Interests (Metropolitan Dade County)							Section 103	Section 103	Permit	Permit	Permit
Initial Nourishment	**Year**		1975	1978	1978-1980	1988	1978-1982	1997	1994	1987	1969	1991	2002	1991
Initial Nourishment	**Template**	Protective dune (20 ft. crown) at 11.5 ft. elevation; Berm - 50 ft. wide 9 ft. MLW.	50 ft. berm w/o 45 ft. dune width	50 ft. berm w/o 45 ft. dune width	50 ft. berm w/o 45 ft. dune width	20 ft. wide berm at elevation +8.2 ft. NGVD (10 yrs. Advanced nourishment)	20 ft. wide dune at elevation +10.7 ft. NGVD and 50 ft. wide berm at +8.2 ft. NGVD			25 ft. berm width at elevation +7ft. MLW (Additional Beach Fill for 7 Yrs. Advanced Nourishment)	Key Biscayne - 50 ft. Berm at elevation +7 ft. NGVD; Virginia Key - 50 ft. Berm Width (elevation +6 ft. MLW)		35 ft. Berm Width at elevation +7.0 ft. NGVD	
Initial Nourishment	**Estimated Quantity (CY)**		1,625,000		11,603,000	1,373,188	12,247,100	9,000		420,000	Key Biscayne - 196,000; Virginia Key - 180,000		121,000	24,980
Initial Nourishment	**Miles**	9.3 and 1.2	0.85	1.2	9.3	2.5	8.6	7,000 ft.	1994 - 5,000 ft.	2.4 miles of beachfill and 150 foot long terminal groin	Key Biscayne - 1.9; Virginia Key - 1.8		1.3	0.39
Initial Nourishment	**Location/Segment**	Government Cut to Bakers Haulover Inlet / Haulover Beach Park	R27-R31			R7-R20	R31-R74			R101-R113.7 (Gap at R111-R112.3)	R92.5-R96; R99-R101	R75-R78		
Initial Nourishment	**Re-nourishment Interval**		4		4						5		8 - 10	
Re-nourishment	**Re-Nourishment Year**		1990;1997; 2003	1987; 2002		1997; 2001	1985; 1987-1990; 1994; 1997-2001; 2003 (North Miami Test Beach)		1997; 1998		Virginia Key - 1974;1979; 1984			
Re-nourishment	**Template**			1987 - 50 ft. berm at +8.2 ft. NGVD										
Re-nourishment	**Estimated Quantity (CY)**		1990 - 225,000	1987 - 220,000; 2002 - 200,000		1997 - 80,130; 2001 - 835,000	1985 - 160,000; 1994 - 120,000; 1997-2001 - 1,471,200; 2003 - 1,000,000				1974 - 110,000; 1979 & 1984 - 144,000 (Total)	25,000		
Re-nourishment	**Miles**		1990 - 0.8	1987 - 1.3		1997 - 0.6; 2001 - 2.4			1997 - 2,400 ft.; 1998 - 18,000 ft.					
Re-nourishment	**Location/Segment**		1990 - R27-R31	R20-R26		1997 - R7-R10; 2001 - R7-R19	1985 - R41-R46 & R57-R60; 1994 - R55-R56; 1997-2001 - R53-R58; R31-R36; R73-R74; R44-R46A							
	Comments					Submerged breakwater constructed in 2002				Terminal Groin - R113.7	1974 Re-nourishment Included a Groin Field	imported oolitic aragonite sand		Oolitic Aragonite Mined in the Bahamas

	County	*Monroe*	
	Project	*Monroe County Shore Protection - Key West to Smathers Beach*	*Smathers Beach*
	Activity	Federal SPP	Non-Federal Shore Protection
	Authority	WRDA 1986; Public Law 99-662; WRDA 1990	Permit
Initial Nourishment	Year	2000	2000
	Template	Smathers Beach - 100 ft. Berm Width; elevation 4 ft. NGVD; 25 ft. Berm Width east and west of Smathers Beach	Berm Width - 68 ft.
	Estimated Quantity (CY)	23,603	36,000
	Miles	Smathers Beach - 3000 ft.; East - 2,370 ft.; West - 3,400 ft.	3,000 ft.
	Location/Segment		PL-J4-W to PL-J1-W
	Re-nourishment Interval		
Re-nourishment	Re-Nourishment Year	2001	
	Template	85 ft. Berm Width	
	Estimated Quantity (CY)	4,664	
	Miles	470 ft.	
	Location/Segment		
	Comments	145 ft. Groin at West End; 115 ft. Groin at East End	

	County	Collier		
	Project	*Marco Island Beach Restoration Project*		*Collier County Beach Restoraion Project*
	Activity	Non-Federal Beach Restoration - Hideaway Beach	Non-Federal Beach Restoration	Non-Federal Beach Restoration
	Authority	Permit	Permit	Permit
Initial Nourishment	**Year**	1991	1991	1996
	Template			
	Estimated Quantity (CY)	1,264,299		Naples - 759150; Park Shore - 90,700; Vanderbilt - 322,800
	Miles	2.64		Naples - 3.4; Park Shore - 0.7; Vanderbilt - 1.6
	Location/Segment	Hideaway Beach (North - M3 to 7, Central - R135 to 139, South - R143 to 148)	R135-R139; R143-R149	Vanderbilt Beach (R22-R30); Park Shore (R50-R54); Naples (R58-R78)
	Re-nourishment Interval			
Re-nourishment	**Re-Nourishment Year**	Periodic Re-nourishment Using Sand From Upland Borrow Sites	1997(Caxambas Pass Borrow Area); Periodic Re-nourishment Using Sand From Upland Borrow SItes	Annual Maintenance Using Upland Borrow
	Template			
	Estimated Quantity (CY)			
	Miles			
	Location/Segment		R143-R149	
	Comments	1997 - Temporary Geotextile Groins Constructed	Included Terminal Groins at Southwest End of Island (R149); 1997 - Breakwaters Constructed Offshore of Groins	Removal of Degraded Groins and Construction of Six Rock Groins and a Timber Pile Groin; 2000 - T-head Groin Near Gordan Pass

	County	***Lee***					
	Project	*Lee County Shore Protection Project (Re-imbursable Project)*			*Bonita Beach Restoration Project*	*Sanibel Island Beach Restoration (In Conjuction With Captiva Island)*	*Gulf Pines Beach Restoration (In Conjuction With Captiva Island)*
	Activity	Federal Beach Erosion Control (Gasparilla, Captiva, and Estero Islands) - And Associated Protection Structures	Captiva Island Shore Protection Project	Non - Federal Beach Restoration - Estero Island & Lovers Key	Non-Federal Beach Restoration	Non-Federal Beach Restoration	Non-Federal Beach Restoration
	Authority	S.R. 1970; H.R. 1970; H.Doc. 91-395/91/2	1981 - 100% Non-Federal; 1989 & 1996 Federal Reimbursement		Permit	Permit - City of Sanibel (199403952 (IP-MN)	Permit - City of Sanibel
Initial Nourishment	**Year**	Captiva - 1981 (Performed by Captiva Erosion Prevention District); 1999 GRR for Gasparilla and Estero Segments	1981	2002	1995	1996	1996
	Template	Berm Width 50 ft.; Elevation 4 ft. above MLW	Berm Width 50 ft.; Elevation 4 ft. above MLW				
	Estimated Quantity (CY)		750,000		217,000	237,100	229,000
	Miles	Gasparilla - 2.7; Captiva - 4.7; Estero - 4.6	1.9		0.78	0.74	0.64
	Location/Segment	Gasparilla - R11-R24		Estero Island (R208-R210); Lover's Key (R215-R221)	R225.5-R230	R110.5-R114	R129-R133
	Re-nourishment Interval	10	8			9-Jul	
Re-nourishment	**Re-Nourishment Year**	Captiva - 1989; 1996; Estero & Gasparilla - 2002	1989; 1996; 2005		2002	2005	
	Template						
	Estimated Quantity (CY)		1989 - 1,600,000; 1996 - 817,000; 2005 - 1,305,000			1,600,000	
	Miles		1989 - 4.5; 1996 - 4.7; 2005 - 1.0				
	Location/Segment		1981 - Captiva Island (R84-R109); 1996 (R84-109); 2005 - (R85-R86, R93-R96)		Northern Gulf Shore of Little Hickory Island (R226-R230)	R83-R109; R110-R114; R116-R118	
	Comments	2,400 ft. Revetment and Groin at Southerly End of Gasparilla and Northerly End of Estero Islands;	1988 - Extension of Groin at South End of Captiva; 1989 - Federal Share - $1,800,000 Under Section 215; 1996 - Federal Share - $1,200,000 Capped by 215 Agreement		Two Terminal Groins at North Limits	Rehab. And Extension of Existing Groin at Redfish Pass	

	County	*Charlotte*	
	Project	*Charlotte County Shore Protection Project - Manasota Key*	*Knight Island Beach Restoration*
	Activity	Shore Protection Project	Shoreline Restoration
	Authority	WRDA 1986; De-authorized 1999	Permit - Charlotte County
Initial Nourishment	Year	2003	1995
	Template		
	Estimated Quantity (CY)	925,000	Stump Pass Ebb Tidal Shoal - 255,451
	Miles	3.2	0.6
	Location/Segment	Sarasota County Line to Stump Pass (R14.5-R17; R22-R25.5; R29-R40)	R27.5-R30.5
	Re-nourishment Interval		
Re-nourishment	Re-Nourishment Year		1998; 2000
	Template		
	Estimated Quantity (CY)		
	Miles		
	Location/Segment		Beach Placement Below MHW Contour at Southern Limit
	Comments		

	County	Sarasota		
	Project	*Sarasota County Shore Protection Project*	*Lido Key Shore Protection Project*	
	Activity	Shore Protection Project - Longboat and Venice Beach	Shore Protection Project - Middle Gulf Shore of Lido Key	Lido Key - Coolridge Park
	Authority	Section 110 of the Rivers and Harbor Act of 1962; WRDA 1986; Public Law 99-662	WRDA 1970; H. Doc. 91-320/91/2; De-authorized - 1990; Re-authorized - 1999	Authorized Project Completed by City of Sarasota for Future Reimbursment of Federal Share
Initial Nourishment	Year	Longboat Key - 1993 (Non-Federal Expense); Venice - 1996		1970
Initial Nourishment	Template	Longboat - Berm Width 50 ft. at +9 ft. above MHW; Manasota - Berm Width 50 ft. (northern) and 20 ft. (southern) at +9 ft. above MHW	Berm Width 125 ft. at +5 ft. above MLW	
Initial Nourishment	Estimated Quantity (CY)	1,321,600		
Initial Nourishment	Miles	Longboat - 12,600 ft.; (2.4) Manasota - 21,020 ft. (5.6)	1.2	
Initial Nourishment	Location/Segment	Longboat - R46ME - R29ST; Venice - R116-R133		R35-R38.4
Initial Nourishment	Re-nourishment Interval	10	Periodic for Initial 10 yrs.	
Re-nourishment	Re-Nourishment Year	1997; 2001; 2003/2004; 2005	2005	1974; 1977; 1998; 2001; 2003
Re-nourishment	Template			
Re-nourishment	Estimated Quantity (CY)	1997 - 891,000; 2001 - 105,280; 2003/2004 - 500,000; 2005 - 672,028	2005 - 1,100,000	1998 - 285,000; 2001 - 360,000; 2003 - 125,000
Re-nourishment	Miles	1997 - 3.1; 2001 - 0.7; 2005 - 2.5 miles		1998 - 0.84; 2001 - 1.36; 2003 - 1.17
Re-nourishment	Location/Segment	1997 - Interim Nourishment (Central Segment) - R62ME-R14ST; 2001 - R10.5-R14; 2005 - Venice Beach (R115-R134)		1998 - R35-R40; 2001 - R38-R44; 2003 - R35.5-R43.2
	Comments	Periodic Renourishment of Initial Fill w/ Additonal 8,380 ft. to South as Needed; 1997 - Included Geo-textile Sill and Groins		

	County	***Manatee***
	Project	*Manatee County Shore Protection Project*
	Activity	SPP - Beach Erosion Control Measures
	Authority	Flood Control Act 1965; S.R. 1974; H.R. 1975; S.Doc. 93-37/93/1
Initial Nourishment	Year	1993
	Template	Berm Width 50 ft. at +6 ft. elevation above MLW
	Estimated Quantity (CY)	2,198,624
	Miles	4.7
	Location/Segment	Anna Maria Island / Anna Maria, Holmes, and Bradenton Beachs (R12-R36)
	Re-nourishment Interval	Periodic Nourishment of Entire Island (7.5 miles)
Re-nourishment	Re-Nourishment Year	2002/2003; 2005
	Template	
	Estimated Quantity (CY)	2002/2003 - 1,900,000; 2005 - 212,922
	Miles	2002/2003 - 5.2; 2005 - 4.2 miles
	Location/Segment	2002/2003 - R7-R10 and R12-R36; 2005 - R12-R36
	Comments	1991 General Design Memo. - Authorized 4.2 m. Iniital Fill Along Middle of Anna Maria Key; 1999 - Re-nourishment Conducted on Federal Reimbursement Basis

	County	***Pinellas***							
	Project	*Pinellas County Shore Protection Project - Clearwater Beach Island, Sand Key, Treasure Island, and Long Key*					*Mullet Key*	*Egmont Key*	*Honeymoon Island*
	Activity	SPP - Fed. Participation for Improving Shorelines of Clearwater, Sand Key, Treasure Island, and Long Key (Beach Restoration and Periodic Nourishment)	*Clearwater Beach Island*	*Sand Key*	*Treasure Island*	*Long Key*	Federal Beach Erosion Control	1997 Feasibility Study - Erosion Protection of Historical and Natural Resources	
	Authority	WRDA 1966; H. Doc. 519/89/2; Report of Board of Engineers for Rivers and harbors 1985; P.L. 99-662; 99th Cong. 2nd. Sec. 1986	Awaiting Sponsor	WRDA 1986			De-authorized in 1990	WRDA 2000 Study Authority	
Initial Nourishment	**Year**		1998	1988-1993 (Three Phases)	1969; 1996; 2000	1980	1973	Underway	1969
Initial Nourishment	**Template**	Berm Width 40 ft. at Elevation +6 ft. above MLW							
Initial Nourishment	**Estimated Quantity (CY)**			1988 (Redington Beach) - 529,150; 1990 (Indian Rocks) - 1,300,000	1969 - 790,000				
Initial Nourishment	**Miles**	Clearwater - 5,000ft; Sand Key - 41,700 ft.; Treasure Island - 10,700 ft.; Long Key - 5,600	1	1992/1993 - 7.9 miles	1969 - 10,700				
Initial Nourishment	**Location/Segment**			1988 - Redington Shores / N. Redington Beach (R99-R107); 1990 - Indian Rocks Beach (R72-R85); 1992/1993 - Indian Shores (R85-R99); Redington Shores and N. Redington (R99-R107); 1998 - Belleair Beach and S. Clearwater Beach (R56-R66)	1969 - (R126-143); 1996 & 2000 - (R138-140)	1980 - St. Petersburg Beach (R144-R147)	1973 - (R173-179)		R8-R12
Initial Nourishment	**Re-nourishment Interval**			5	3-5 years (Using Nav. Maintenance Material and Offshore Borrow)	5 years (Sediment from Glind Passs, Pass-A-Grille, and Egmont Channel Shoal)			
Re-nourishment	**Re-Nourishment Year**			1992/1993; 1999; 2005; 2010	1971; 1973; 1976; 1983; 1996; 2000	1986; 1991; 1996; 2000; 2010	1977 (Sediment from Tampa Harbor Channel Deepening)		1989 (upland sand source)
Re-nourishment	**Template**								
Re-nourishment	**Estimated Quantity (CY)**			1992/1993 - 3,005,000; 1999 - 2,612,166; 2005 - 2,170,937; 2010 - 260,000	1971 - 75,000; 1973 - 155,000; 1976 - 380,000; 1978 - 32,000; 1983 - 220,000; 1996 - 51,280; 2000 - 348,722	1980 - 250,000; 1986 - 97,000; 1991 - 230,000; 1996 - 252,950; 2000 - 358,900; 2010 - 145,000			
Re-nourishment	**Miles**			1992/1993 - 7.9; 1999 - 8.7; 2005 - 2.0; 2010 - 1.55	1971 - 2,000 ft.; 1973 - 2,000 ft.; 1976 - 1.5 miles; 1978 - 2,000 ft.; 1983 - 4,200 ft.; 1996 - 2,500 ft.; 2000 - 2.0	1980; 1986; 1991; 1996 - 0.45; 2000 - 2,800 ft. ; 2010 - 0.7			
Re-nourishment	**Location/Segment**			1999 - (R56-R66; R72-R107); 2005 - (R114-R125); 2010 R126-R128, R136-R142	1996 - R138-R140; 2000 - R136-R141	1996 - R144-R146; 2000 - R144-R146; 2010 - R144-R148	R181-R191		
	Comments	Construction of 600 ft. Revetment on Long Key; Authorization for Construction Together or Independently		1986 - Breakwater Constructed at Redington Shores (R101)	2000 - Terminal Groin at N. End of Island		Included Groin and Revetment at SW Portion of Island		1969 - Groin Constructed at S. End of Beach Fill; 1999 - Feasibility Study Completed

	County	***Pasco***
	Project	*Non-Federal Beach Erosion Control*
	Activity	Beach Erosion Control Using Upland Sources
	Authority	Permit
Initial Nourishment	Year	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	Hudson Beach
	Re-nourishment Interval	
Re-nourishment	Re-Nourishment Year	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Comments	

	County	*Florida Panhandle - Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin, and Wakulla Counties*
	Project	*Post Hurricane Opal and Georges Beach and Dune Recovery*
	Activity	Beach and Dune Construction - Upland Source of Material
	Authority	Federal and State Disaster Funds
Initial Nourishment	Year	1995; 1998
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	Escambia - (R107-R139); Santa Rosa - (R192.5-R210); Okalossa - (R1-R15; R17-R32; R39-R50); Walton - (R1-R18; R41-R48; R109-R127); Bay - (R127.8-R144); Gulf - (R83-R85; R95.5-R111.5); Franklin - (R110-R142); Wakulla - (Mashes Sands County Park)
	Re-nourishment Interval	
Re-nourishment	Re-Nourishment Year	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Comments	

	County	***Escambia***
	Project	*Pensacola Beach Restoration*
	Activity	Beach Restoration
	Authority	
Initial Nourishment	Year	2002/2003
	Template	
	Estimated Quantity (CY)	4,248,300
	Miles	8.1
	Location/Segment	R107-R151
	Re-nourishment Interval	
Re-nourishment	Re-Nourishment Year	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Comments	

	County	***Santa Rosa***
	Project	*Navarre Beach Restoration Project*
	Activity	Beach Restoration
	Authority	Permit - (Public Notice SAJ-2003-10496-IP-EPS
Initial Nourishment	**Year**	2005
	Template	
	Estimated Quantity (CY)	2,400,000
	Miles	4.1
	Location/Segment	Navarre Beach and Navarre Beach State Park (R192.5-R213.5)
	Re-nourishment Interval	
Re-nourishment	**Re-Nourishment Year**	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Comments	length and quantity as permitted for beach and dune restoratoin, see permit modification, 29 July 2005

	County	***Walton and Okaloosa***
	Project	*Walton County Destin Beach Restoration Project*
	Activity	Beach Restoration
	Authority	Permit
Initial Nourishment	Year	2004
	Template	210 ft. Wide Berm at +8ft. NGVD; Dune Width 20 ft. at Elevation +12 NGVD
	Estimated Quantity (CY)	3,000,000
	Miles	
	Location/Segment	R39 (Destin) to R-21.93 (Walton County)
	Re-nourishment Interval	One Time Initial Construction
Re-nourishment	Re-Nourishment Year	
	Template	
	Estimated Quantity (CY)	
	Miles	
	Location/Segment	
	Comments	

		County	Bay		
		Project	*Panama City Beaches Shore Protection Project*		*Mexico Beach Canal Sand Bypass*
		Activity	Beach/Dune Restoration Restoration Project (Post Hurricane Opal and Georges)	Beach Erosion Control and Storm Damage Reduction	Dredging Mexico Beach Canal w/ Beach Placement
		Authority	WRDA 1986; Permit 199701891(IP-DH) and Modifications	WRDA 1986	Permit 200100140 (IP-DHB)
Initial Nourishment		Year	1995; 1999	1999	2001
		Template	Repair of Beach and Dunes - Using Maintenance Material from St. Andrews Inlet	Berm Width 50 ft.	
		Estimated Quantity (CY)		7,915,000	11,500
		Miles		16.3	
		Location/Segment	St. Andrews State Recreation Area and along Spyglass Drive; Southfield St. to E. Boundary of Camp Helen State Park	1999 - Between Philips Inlet and the State Recreation Area Pier (R1-R93)	1,100 ft. E. of Canal extending for 2,500 ft. (Typdall AFB)
		Re-nourishment Interval		6	
Re-nourishment		Re-Nourishment Year		2005	
		Template			
		Estimated Quantity (CY)		1,200,000	
		Miles		17	
		Location/Segment			
		Comments	State and Local Funds to Build Federally Authorized Project - Reimbursement	Project Construction on Federal Reimbursement Basis	

	Navigation - Placement					
County	**Project**	**Activity**	**Authority**	**Placement Area**	**Quantity**	**Year**
Nassau						
	Fernandina Harbor	Navigation (Deep Draft) - Disposal		Ft. Clinch (R1-R9)		
	Fernandina Inlet	Navigation Project		Ft. Clinch (R1-R9)	2002 - 265,000; 2003 - 40,000; 2004 - 225,000	2002; 2003; 2004
	IWW - Sawpit Creek Cut	Navigation (Shallow Draft) - Disposal		Southern Amelia Island (R73.5-R78)	1997 - 300,000; 2005 - 444,000	1997; 2005
	St. Mary's River Entrance	Inlet Bypassing		Ft. Clinch (R1-R9)		
Duval						
	Jacksonville Harbor	Navigation (Deep Draft) - Disposal		Shoreline downdrift of entrance channel - Jacksonville Beach (2003)	2003 - 200,000	1996; 1998; 1999; 2003
St. Johns						
	St. Augustine Harbor	Navigation (Deep Draft) - Disposal		Downdrift beaches both N and S of revetment at St. Augustine Beach		
	IWW - St. Augustine Inlt to Salt Run Navigation Channel	Navigation (Shallow Draft) - Disposal		Anastasia State Recreation Area and St. Augustine Beach		1997; 1998
	IWW - Matanzas Inlet	Navigation (Shallow Draft) - Disposal		South of Matanzas Inlet at Summerhaven R200-R208 (1.5 mi)	286,529 183,000	2004 2007
	FIND SJ-1 Dredged Material Management Site	Offloading		Summerhaven	844,000	2001
Flagler						
Volusia						

County	Project	Activity	Authority	Placement Area	Quantity	Year
	Ponce De Leon Inlet	Navigation (Shallow Draft) - Disposal		Shorelines North (until modififcation fo N. Jetty in 1989) and South of the Inlet; (R016-R148)	1984 (813,000); 1989 (869,000); 1993 (Rockhouse Creek (215,000)); 1994 (beach west of N. Jetty w/in inlet); 1996	1972; 1974; 1978; 1984; 1989; 1993; 1994; 1996
	IWW, Volusia	IWW maintenance dredging disposal		2008, R161-R174 (New Smyrna Bch)	2008 (41,649) 2.6 mi	2008
Brevard						
	Canaveral Harbor	Inlet Bypassing		1995 and 1998 - Bypassing from nearshore zone N. of inlet to Segments R1-R14 S. of inlet	1995 - 832,000; 1998 - 757,000	1994; 1995; 1998; 2000; 2001; 2005
Indian River						
	Sebastian Inlet	Inlet Bypassing (maintained by Sebastian Inlet Tax District)		On downdrift beaches		1986; 1989; 1990; 1993; 1994; 1996-1997; 1998
St. Lucie						
	Ft. Pierce Harbor	Navigation (Deep Draft) - Disposal		South of inlet to downdrift beach; 1997 & 1998 (R031-R033); 1987, 1989, 1990, 1994; 1995; 1996 (R34-41)	1987 - 29,000; 1989 - 47,000; 1990 - 55,700; 1994 - 7,190; 1995 - 166,650; 1997 - 240,579; 1998 - 86021	1987; 1989; 1990; 1994; 1995; 1996; 1997; 1998
Martin						

County	Project	Activity	Authority	Placement Area	Quantity	Year
	St. Lucie Inlet	Navigation (Shallow Draft) - Disposal	Authorized 1982	1-mile segment of shoreline immediately S. of Inlet	2006, 560,052, R59-R69, 1.3 mi	1982 (4yr intervals)
			Design Memorandum - 2000	Disposal of maintenance material 5,000 ft. S. of Inlet; R78-84; R92-R100		2000
		DEP - 1995 inlet management plan	bypassing from FIND's M-5 DMMA and IWW channels	R59-R65; R75-R82		1997
		DEP - 1995 inlet management plan	bypassing from inlet flood shoal	R78-R84; R92-R100		1999
Palm Beach						
	Palm Beach Harbor	Federal Navigation Project		Downdrift within 3,000 ft. of South jetty (R151-R152)	100,000 to 200,000	annually
	Lake Worth sand transfer plant	Sand bypassing	WRDA 1996	Downdrift within 3,000 ft. of South jetty (R151-R152)	annually - 60,000 - 88,000; 2004 - 100,000	annually; 2003
	Jupiter Inlet Sand Bypassing	DEP - 1997 Inlet management plan		R12-R13	annually - 75,000; 2004 - 150,000	annually; 2004
	Boca Raton Inlet Sand Bypassing	DEP - 1997 Inlet management plan		Downdrift beach south of inlet	annually - 71,300; 1996 - 220,000; 2002 - 343,000	annually; 1996; 2002
	Palm Beach IWW					
Broward						
	Hillsboro Inlet Sand Bypassing	DEP - 1997 Inlet management plan	Hillsboro Inlet District - District owned floating hydraulic dredge	Downdrift beach south of inlet	120,000	annually

County	Project	Activity	Authority	Placement Area	Quantity	Year
	Port Everglades Harbor	Port Everglades Inlet (Sand Bypassingb); DEP - 1999 Inlet management plan; Beach Disposal for Federally Maintained Channel to Port Everglades Harbor		Downdrift of beach south of inlet; John U. Lloyd Beach Stae Recreation Area (BRO-R-87 to BRO-T-89)	DEP - 44,000 cy/year (unsuccessfull); USACE - 100,000 (done under Brevard SPP instead)	3 Yr. Basis or As Needed
Dade						
	Bakers Haulover Inlet	Federal Navigation Disposal		1975, 1980, 1984, and 1994 - Haulover Beach Park; 1990 - Sunny Isles; 1998 - Bal Harbor	1975 - 59,000; 1980 - 43,163; 1984 - 35,000; 1994 - 24,560; 1990 - 32,000; 1998 - 142,000	1975; 1980; 1984; 1994; 1990; 1998
	Government Cut	Federal Navigation Disposal	DEP - Strategic Managemen Plan - Beach placement of Compatible Dredged Material	Downdrift beach south of inlet	15000/year	
Monroe						
	Key West Harbor	Federal Navigation				
Lee						
	Charlotte Harbor - Boca Grande Pass	Federal Navigation	1991 Section 933 - Public Law 99-662	Offshore; 1981, 1993, & 1997 Beach Placement on Gasparilla Island; 1991 USACE Recommended Section 933 (Gasparilla Island)		1912 - Initial Harbor Deepening; Maintenance Since 1971 (every 2-3 yrs.)

County	Project	Activity	Authority	Placement Area	Quantity	Year
	Redfish Pass	Natural Deep Inlet (formed 1921)	DEP - 1993 Inlet Management Study (Captiva Erosion Prevention District)	1981 and 1988/89 - Ebb Shoal Used as Sand Source for Captiva Island		
	Ft. Myers	Federal Navigation - Estero Pass; Matanzas Pass				
	Matanzas Pass	Federal Navigation - Extension of Ft. Myers Channel		1986 & 1998 - Beach Placement at Northern Gulf Shoreline of Estero Island		1986 & 1998
Collier						
	Wiggins Pass	Non-Federal Navigation - Collier County Periodic Maintenance	Permit	Beach Placement North and South of Inlet		
	Doctors Pass	Non-Federal Navigation - City of Naples; DEP - 1997 Inlet Management Plan	Permit	Beach Placement and Inshore Zone South of Inlet	1997 DEP - 10,000/yr	1996 (Maintenance Every 4 yrs.)
	Gordon Pass	Federal Navigation - Including Interior Channel from Naples to Big Marco Pass; DEP - 1998 Inlet Management		Beach Placement South of Inlet	2009, 61,000, 0.7 mi, R90-R94	1962 (Maintenance Every 7 yrs.)
Charlotte						
	Stump Pass	1980 - Navigation Channel Dredged		1980 - Beach Placement North of the Pass Within the Port Charlotte Beach State Rec. Area; 1998 - Beach Placement on Knight Island Shoreline		1980; 1998; 2000
Sarasota						
	Venice Inlet	Federal ICW Navigation Channel; DEP 1998 Inlet Management Plan		DEP - Beach Placement of Compatible Material on Downdrift Beaches	DEP - 64,620 / yr.	1938

County	Project	Activity	Authority	Placement Area	Quantity	Year
	New Pass	Federal Navigation Channel		1997 - Beach Placement Along Gulf Shorelines of Lido Key and Longboat Key; 2003 - T22-R28	1997 - 171,000; 2003 - 99,800	1964 (Maintenance Every 3-5 yrs.); 1997; 2003
Manatee						
	Manatee Harbor					
	Longboat Pass	Federal Navigation Channel		Beach Placement at Anna Maria Island and Longboat Key; 1997 - R45 and R48-R51	1997 - 109,000	1977 (Maintenance Every 3-5 yrs.); 1997
	Bear can Island	Navigation Channel Dredging		North of N. Shore Drive (near R45)	2,000	1998
Pinellas						
	Johns Pass	Federal Navigation Channel		1988 - Beach Placement at Redington Beach; 2000 - Beach Placement at Treasure Island Beaches (Ebb Shoal to Sand Key)	1988 - 529,150; 2000 - 348,722	Maintenance Every 2-3 yrs.)
	Tampa Harbor	*Egmont Channel*	WRDA 1970		1990 - 1,300,000; 1996 - 51,280	1990; 1993; 1996
	Blind pass	Non-Federal Navigation Channel (Use of Channel and Ebb Shoal Material for Federal Shore Protection)		Beach Placement for Pinellas County SPP - Treasure Island and Long Key		
	Pass-A-Grille	Federal Navigation Project		2000 - Beach Placement for Pinellas County SPP - Long Key	2000 - 358,900	1966; 2000
	Hurricane Pass	Natural Inlet / Navigation channel Dredged		1999 Feasibility Study Recommended Beach Placment of Maintenance Material to Honeymoon Island		1989

County	Project	Activity	Authority	Placement Area	Quantity	Year
	Clearwater Pass	Federal Navigation Project		1973 & 1977 - Beach Placement on Sand Key; 1981-1984 - Nav. Improvement / Beach Placement on Sand Key (R51-R60)	1981-1984 - 1,000,000 cy	1961; 1973; 1977; 1981-1984
	St. Petersburg Harbor	Federal Deep-Draft Navigation		Egmont Key: Nourishment Using Dredged Material from St. Petersburg Harbor Navigation Project; Construction of 2 Geotextile groins	600,000	1999
Escambia (Through 2005)						
	Pensacola Pass	Federal Navigation Project - Pensacola Harbor		1959 - Beach Placement on Santa Rosa Island; 1985 - Beach Placement on Perdido Key		1881-1958; 1959; 1985; 1991
Okaloosa (Through 2005)						
	East Pass	Federal Navigation Project		By-Pass/Placement W/in the Surf Zone, for Jetty Maintenance/Stability, and on Norriego Point	82,000 / yr.	1969 (Maintenance Every 18 Months)
Bay (Through 2005)						
	St. Andrews Inlet	Federal Navigation Project - Panama City Harbor		1972, 1982, and All Maintenance Events Since 1984 - Beach Placement on Downdrift Beach West of Inlet; 2003		1934 (Maintenance Every 18-24 Months)
	East Pass	Natural Inlet to St. Andrews Bay - Dredged for Navigation Until 1934 - Closed in 1999				
	Mexico Beach Inlet	Shallow Draft Vessel Access		Bypssing of Sediment to Downdrift Beaches (City Owned Dredge)		
Gulf (Through 2005)						

County	Project	Activity	Authority	Placement Area	Quantity	Year
	St. Joseph Bay Entrance Channel	Federal Navigation Project - Port St. Joe Harbor		1970, 1973, 1986 - Beach Placement on N. End of Gulf Shoreline of St. Josephs Peninsula (Authorized -37' Depth Not Maintianed Since 1986)		1962
Franklin (Through 2005)						
	West Pass	Navigation		Open Water Disposal		Maintenance Through 1948
	Sikes Cut	Federal Apalachicloa Bay Navigation Project		Beach Placement on Inlet Shorelines; Nearshore or on the Beach West of the Inlet		
	East Pass	Federal Carrabelle Harbor Navigation Project		Beach Placement on Adjacent Beaches When Maintenance is Necessary		
Wakula (Through 2005)						
	Panacea Harbor	Federal Navigation Channel from Panacea Harbor through Dickerson Bay to Apalachee Bay				1963
	St. Marks River	Federal St. Marks River Navigation Project				Last Dredged - 1994

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YEAR	COUNTY	PROJECT NAME	SERVICE FEDERAL ACTIVITY CODE	CORPS PERMIT APPLICATION NUMBER	PROJECT LOCATION	PROJECT TYPE	PROJECT START DATE	PROJECT END DATE	LENGTH OF TAKE (months, years)	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	Post-disasters	3 months to 3 years	Ongoing	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	On-going activities	On-going activities		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			Every 5 years	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	On-going activities		On-going activities	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			One-time event	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 (South Reach)			R-123.5 to R-139	Beach nourishment			One-time event	3.02 miles
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	June 2002	March 2003	One-time event	500 feet
2003	Brevard	Brevard County Shore Protection Project (South Reach)			R-118.3 to R-123.5				One-time event	0.94 mile
2004	Brevard	Canaveral Harbor Federal Sand Bypass and Beach Placement	04-0077	200309051 (IP-TSB)	R-14 to R-20	Inlet bypass and beach nourishment			Every 6 years	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			One-time event	13.2 miles
2005	Brevard	Brevard County FEMA Berm and Dune Restoration	05-1054		R-75 to R-118	Dune repair	December 2004	March 2005	One-time event	12 miles
2005	Brevard	Patrick Air Force Base Beach Restoration	05-0258		R-54.5 to R-75.3	Beach nourishment			One-time event	
2005	Brevard	Sloped Geotexile Revetment Armoring Structures	05-0454		5 tubes along north and south	Protec tube installation	Summer 2005	Fall 2005	One-time event	4,600 linear feet

					Melbourne beach					
2006	Brevard	Brevard County FEMA Berm and Dune Restoration	41910-2006-F-0189		R-75 to R-118	Dune repair	December 2005	February 2006	One-time event	12 miles
2006	Brevard	Amended Lighting at Cape Canaveral Air Force and Patrick Air Force Station	41910-2006-F-0841			Sea turtle lighting	On-going activities	On-going activities	On-going activities	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	March 1, 2008	April 30, 2008	One-time event	6,000 linear feet
25 Jan 2008	Brevard	Brevard County's Dune Restoration	41910-2008-F-0189	SAJ-2008-00103 (NW-IS)	R-75 to R-118 and R-138 to R-202	Dune restoration	March 1, 2008	April 30, 2008	One-time event	140,000 cy along 3,000 linear feet
2009	Brevard	Brevard County's Dune Restoration	41910-2009-F-0125	SAJ-2008-00103 (NW-IS).	R 75.4 to R 118.3 and R-139 to R-213	Dune restoration	January 2009	March 31, 2009	One-time event	22 miles
2009	Brevard	Mid Reach		FEMA DR-1785, PW 453	R-75 to R119	Beach berm repair (permanent)	5 Dec 2008	6 June 2009	One-time event	40,748 linear feet
2009	Brevard	South Beach		FEMA DR-1785, PW 453	R-139 to R-215	Beach berm repair (permanent)	5 Dec 2008	6 June 2009	One-time event	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	2010	2010		8,500 linear feet for dune restoration and 11,235 linear feet for beach nourishment.
2009	Brevard	Brevard Dune Restoration	41910-2009-F-0125	SAJ-2008-00103 (NW-IS)	R-75.4 to R-118.3, R-139 to R-213	Dune restoration	December 2008	February 2009		Periodically on no more than 22 miles.
2009	Brevard	Mid Reach Shore Protection	41910-2008-F-0547		R-119 to R-75.4	Sand placement	2010	2020		7.7 linear miles
2009	Brevard	Canaveral Harbor Sand Bypass	41910-2008-F-0547		Canaveral Harbor	Sand bypass	Ongoing, no more than once every 2 years	Ongoing, no more than once every 2 years		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			One-time event	9,000 linear feet
1996	Duval	Duval County Beach Erosion Control			R-47 to R-80	Beach nourishment			One-time event	5 miles
2003	Duval	Duval County Beach Erosion Control			R-72 to R-80	Beach nourishment			One-time event	
2005	Duval	Duval County Beach Erosion Control	05-1544		R-43 to R-53 and R-57 to R-80	Beach nourishment			One-time event	5.7 miles
2010	Duval	Duval County Hurricane and Storm Damage Reduction	2010-CPA-0045		V-501 to R-80	Beach nourishment			One-time event	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	2009	2011		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			One-time event	8,000 linear feet
1993	Manatee	Anna Maria Island Beach Restoration			R-2 to R-36	Beach nourishment			One-time event	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			One-time event	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	SAJ-2005-9068 (IP-MN)	R-44.5 to R-46	Beach nourishment			One-time event	0.34 mile
2007	Manatee	Longboat Key Groin Installation	41910-2007-F-0521	SAJ-2005-679 (IP-MNF)		Groin installation			One-time event	2,210 linear feet
2009	Manatee	Anna Maria Island Beach Nourishment	41910-2008-F-456	SAJ-2000-03874 (IP-CJW)	R-7 to R-10, R-35 +790 feet and R-41 +365 feet	Sand placement	2010	2010		8,000 linear feet
2010	Manatee	Longboat Key North End Nourishment	41910-2010-F-0301							4,015 linear feet of beach
1994	Nassau	South Amelia Island Beach Restoration			R-60 to R-78	Beach nourishment			One-time event	
1997	Nassau	Dredging of Sawpit Creek Cut and Beach Disposal			R-73.5 to R-78	Dredge and beach nourishment			Annually	2,900 linear feet
2002	Nassau	South Amelia Island Beach Restoration			R-50 to R-80	Beach nourishment			One-time event	3.4 miles
2002	Nassau	Fernandina Harbor Dredge and Beach Disposal			R-1 to R-9	Dredge and beach nourishment			Yearly (2003, 2004)	8,000 linear feet
2004	Nassau	Nassau County Shore Protection Project at Amelia Island	05-1355		R-9 to R-33	Beach nourishment			One-time event	3.6 miles
2005	Nassau	Nassau County Shore Protection Project at Amelia Island	05-1355		R-11 to R-34	Beach nourishment			Annually	4.3 miles
2005	Nassau	Dredging of Sawpit Creek Cut and Beach Disposal	41910-2006-F-0254	SAJ-1992-1854-BAL	R-73.5 to R-78	Dredge and beach nourishment			Annually	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			One-time event	
1999	Pinellas	Sand Key Beach Restoration			R-71 to R-107	Beach nourishment			One-time event	
2000	Pinellas	Treasure Island Beach Restoration			R-136 to R-141	Beach nourishment			One-time event	2.0 miles
2000	Pinellas	Terminal Groin at North End of Treasure Island				Groin construction			One-time event	
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 Beach Restoration			R-10 to R-12	Dredge disposal and sand placement				
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	February 2006	May 2006	One-time event	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			One-time event	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			One-time event	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	2009	2009		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				Every 2 years	
2001	St. Johns	Maintenance Dredging of Matanzas Inlet and Sand Placement at Summer Haven	98-171D						Every 2 years	

2002	St. Johns	St. Johns County Shore Protection Project at St. Augustine			R-137 to R-152	Beach nourishment			One-time event	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			Every 2 years	
2005	St. Johns	St. Johns County Shore Protection Project at St. Augustine	05-0446		R-137 to R-150	Beach nourishment	August 2005	November 2005	One-time event	2.5 miles
2006	St. Johns		TE091980-0			Beach driving			20 years	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	May 2007	August 2007	Every 2 years	4,000 linear feet
2009	St. Johns	Beach berm repair		FEMA DR-1785, PW-985	R-201 to R-203, R-207 to R-208	Beach berm repair	15 January 2009	26 February 2009	One-time event	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	November 2009	November 2009		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	January 2010	May 2010		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			One-time event	3,000 linear feet
2005	Volusia		TE811813-11			Beach driving			25 years	50 miles
2006	Volusia	New Smyrna/Silver Sands Dune Restoration	05-1007		R-161 to R-175	Beach restoration	May 2006	September 2006	One-time event	5.4 miles
2006	Volusia	Volusia County FEMA Berm	41910-2006-F-0831			Repair of right of way and beach placement			One-time event	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			One-time event	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	August 2009	December 2009		8,000 linear feet
PANAMA FIELD OFFICE										
8 April 1998	Bay	Panama City Beach Beach Nourishment	4-P-97-108	19970189 (IP-DH)	R-4.4 and R-93.2	Beach nourishment new project	Summer 1998	Spring 1999	8 months	16 miles
24 June 1998	Bay	Tyndall AFB Driving on the Beach	4-P-98-020	none	V-9 (virtual) to R-122	Driving on the beach for military missions	1998	ongoing	continuous	18 miles
31 July 1998	Bay	Lake Powell Emergency Opening	4-P-97-089	199504512 (LP-DG)	R- 0.5	Emergency outlet opening	1998	2008	As needed lake reaches trigger level	1,500 feet
16 April 1999	Bay	Panama City Beach Beach Nourishment Amendment 1	4-P-97-108	19970189 (IP-DH)	R-0.5 to R-9	Beach nourishment completion	1999	1999	One-time event	16 miles (no additional take provided from original)
9 March 2000	Bay	Panama City Beach Beach Nourishment Amendment 2	4-P-97-108	19970189 (IP-DH)	R-35 to R-71	Relief from tilling requirement beach nourishment	2000	2000	One-time event	16 miles (no additional take provided from original)
10 April 2000	Bay	Panama City Beach Beach Nourishment Amendment 3	4-P-97-108	19970189 (IP-DH)	R-35 to R-71	Relief from tilling requirement beach nourishment	2000	2000	One-time event	16 miles (no additional take provided from original)
18 December 2000	Bay	Panama City Beach Beach Nourishment Amendment 4	4-P-97-108	19970189 (IP-DH)	R-35 to R-71	Relief from tilling depth requirement and compaction testing sample numbers beach nourishment	2001	2002	One-time event	16 miles (no additional take provided from original)
4 January 2001	Bay	East Pass Re-Opening	4-P-00-211	20000350 (IP-DHB)	No R-monuments	Dredging of a closed inlet and dredged material placement on beach	2001	2001	One-time event	2 miles

29 March 2001	Bay	Panama City Beach Beach Nourishment Amendment 5	4-P-97-108	19970189 (IP-DH)	R-35 to R-71	Relief from tilling depth requirement beach nourishment	2001	2001	One-time event	16 miles (no additional take provided from original)
7 Sept 2001	Bay	City of Mexico Beach Sand Bypass System	4-P-01-178	200100140 (IP-DHB)	Mexico Beach canal	Dredging and spoil disposal	2001	2006	continuous	3,700 feet 2.0 acres
14 January 2005	Bay	Panama City Beach Beach Nourishment Amendment 5	4-P-97-108	19970189 (IP-DH)	R-4.4 and R-93.2	Post hurricane restoration	2005	2005	One-time event	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	2007	5 year plans	5 year intervals	18 miles
26 March 2006	Bay	Mexico Beach Canal Sand By Pass Amendment 1	4-P-05-281 2007-F-0205	SAJ-2001-140 (IP-DEB)	R-127 to R-129	By pass system improvements	2007	2012	Continuous 5 years	5,000 feet
24 May 2007	Bay	Panama City Beach Beach Nourishment Amendment 6	4-P-97-108 2007-TA-0127	19970189 (IP-DH)	R-4.5 to R-30 and R-76 to R-88	New work and post hurricane restoration	2007	2008	One-time event	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	January 2008	May 2008	One-time event for 2008 & covers future project work over entire project length.	17.9 miles
29 Feb 2008	Bay	Panama City Harbor (revised BO)	2008-F-0168	Mobile Corps navigational channel	R-97	Navigation channel maintenance dredging and beach placement of dredged material.	2008	8 Mar 2008	One-time event for 2008.	500 ft of beachfront at St. Andrew State Park
8 June 2009	Bay	Panama City Harbor Navigation Channel Amendment 1	2009-F-0175	Mobile Corps	R-92 to R-97	Maintenance navigation channel dredging and dredged material placement	2009	2009	On going every 1-2 years	0.85 mile
2009	Bay	City of Mexico Beach		FEMA DR-1806, PW-13	R-128.5 to R-138.2	Beach berm repair (emergency)	13 April 2009	7 August 2009	One-time event	9,393 linear feet
06 Jan 2010	Bay	Lake Powell Outlet Emergency Opening	2009-F-0226	SAJ-1995-04512(IP-MMW)	R-0-A and R-1	Emergency opening of the outlet to the Gulf of Mexico	2009	2010	As needed 10-year permit	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	Mineral Management Service lease sale	Gulf of Mexico federal waters	Oil and gas offshore exploration	2000	2030	Lease sale, exploration, development and production	Formal consultation with no take
3 June 2002	Escambia	Pensacola Beach Beach Nourishment	4-P-02-056	200105838 (IP-CP)	R-108 to R-143	Beach nourishment	2002	2003	One-time event	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	SAJ-2007-764 (IP-MBH)	R-1 to R-34	New beach nourishment	2009	2009	One-time event	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	2010	2010	One-time event	6.3 miles
11 Jan 2010	Escambia	FEMA Perdido Key Upland Berm	Using statewide programmatic 41910-2010-F-0547	FEMA DR-1806, PW 17	R-21.5 to R-31.5	Post Tropical Storm Gustav berm	2010	2010	One-time event	2.0 miles
8 April 2005	Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf	FEMA Beach Berms Post Hurricane Ivan Emergency Coordination (consultation incomplete)		4-P-05-064	UK	Emergency beach berms	2005	2006	One-time event	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	2004	One-time event	Never completed	2,500 feet Loggerhead,: 2 nests, green 1 nest; leatherback 1 nest
17 May	Gulf	St. Joseph Peninsula Beach Nourishment	4-P-07-056	SAJ-2006-4471 (IP-DEB)	R-67 to R-105.5	Beach nourishment	2007	2008	7 to 8 year interval	7.5 miles

2007			2007-F-0220							
31 Jan 2008	Gulf	St. Joseph Peninsula Beach Nourishment; Amendment 2	2008-F-0161	SAJ-2006-4471	R-67 to R-105.5	Beach nourishment – change from work in 2 to 1 season.	2008	Mar – Nov 2008	One-time event for 2008 & covers future project work over entire project length.	7.5 miles; no increase in IT.
2009	Gulf	St. Joseph Peninsula Beach		FEMA DR-1806, PW-6	R-95.3 to R-105.5	Beach berm repair (emergency)	10 March 2009	19 May 2009	One-time event	10,300 linear feet
25 April 2001	Okaloosa	Eglin AFB Porous Groin within Season	4-P-00-207	199905053 (IP-DH)	Eglin AFB Test Sites 1 and 3	Experimental porous groin system	2001	2001	One-time event	
18 June 2002	Okaloosa	Eglin 737 Sensor Test Site 13-A SRI	4-P-02-088		V-507	Military testing	2002	2002	One-time event	0.01 acre 0.12 mile
2009	Okaloosa	City of Destin		FEMA DR-1806, PW-3	R-17.37 to R-19	Beach berm repair (emergency)	7 March 2009	15 May 2009	One-time event	1,260 linear feet
23 Dec 2009	Okaloosa	East Pass at Destin Navigation Channel	2009-F-0096	SAJ-2008-08095(IP-SWA); SAJ-2008-3595(IP-MBH)	R-17 to R-25.5	Navigational channel maintenance	2009	2009	One-time event	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	2003	Ongoing	perpetual	
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	2003	Ongoing	Perpetual	7 miles
25 February 2004	Okaloosa, Santa Rosa	Eglin AFB Advance Skills Training	4-P-03-264		R-502 to R-534	Military training	2004	ongoing	perpetual	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	2004	One-time event	2004	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	2005	Ongoing	Perpetual	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	2007-2008	2008	One-time event	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 V-518	Beach nourishment including dune restoration (new)	2009-2011	2010	One-time, but in two phases	5.0 miles
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	2008	2009	One-time construction	0.57 miles
21 April 2009	Okaloosa, Santa Rosa	East Pass Destin Navigation Channel	2009-F-0295	Mobile, Corps	V-619.5 to V-621 and R-17	Maintenance navigation channel dredging and dredged material placement	2009	2009	Ongoing every 1-2 years	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.	2009	2009	One-time event	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.	2009	2009	One-time event	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	2005	2007	5 year intervals	17 miles
19 July 2005	Santa Rosa	Navarre Beach Nourishment Emergency Coordination (consultation incomplete)	4-P-04-244	SAJ-2003-10496-IP-EPS	R-192.5 to R-213.5	Emergency beach nourishment	2005	2006	One-time event	4.1 miles
24 Aug 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139	SAJ-2003-10496-IP-EPS		Walkover construction associated with beach nourishment	2006	Not completed	One-time event	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	SAJ-2003-10496-IP-EPS		Walkover construction associated with beach nourishment	2006	Not completed	One-time event	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	SAJ-2003-10496-IP-EPS		Walkover construction associated with beach nourishment	2006	Not completed	One-time event	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	2009	2010	One-time event	0.57 mile
7 Dec 2006	Santa Rosa	Navarre Beach Restoration Amendment 1	4-P-04-244 2007-F-0139	SAJ-2003-10496-IP-EPS		Walkover construction associated with beach nourishment	2006	Not completed	One-time event	4.1 miles (no additional take provided from original)
9 October 2009	Santa Rosa	Navarre Beach Restoration Amendment 7	2010-F-0036	SAJ-2003-10496-IP-EPS	R-192 to R-194	Emergency beach restoration	2009	2009	One-time event	1,800 feet
30 April 2004	Walton, Okaloosa	Walton County-Destin Beach Nourishment	4-P-01-149	SAJ-2003-8314-IP-TLZ	R-39 (Okaloosa Co.) to R-21.93 (Walton Co.)	New beach nourishment	2004	2006 & 2007 ongoing	One-time event	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	SAJ-2003-11099-IP-TLZ	R-72 to R-73	Emergency outlet opening	2007	5 years	Continuous	0.5 miles 3.0 acres
26 October 2007	Walton	Eastern Lake Emergency Opening	2007-F-0627	SAJ-2003-11069 (IP-TLZ)	R-94 to R-95	Emergency opening of coastal dune lake to GOM	2008	As needed	Ongoing	0.5 mile
9 November 2007	Walton	Alligator Lake Emergency Opening	2007-F-0031	SAJ-2001-815-IP-TLZ	R-68 to R-70	Emergency opening of coastal dune lake to GOM	2008	As needed	Ongoing	0.5 mile
2 October 2008	Walton	Walton County Beach Nourishment Phase 2	2008-F-060	SAJ-2007-5152 (IP-DEB)	R-41 to R-67, R-78 to R-98, R-105.5 to R-127	Beach nourishment (new)	2010	2011	One-time event	13.5 miles
SOUTH FLORIDA FIELD OFFICE										3,390 feet
11 March 2003	Broward	Broward County Shore Protection Project	4-1-99-F-506	199905545 (IP-DSG)		Port Everglades dredging and beach nourishment				
4 Dec 2003	Broward	Diplomat Beach Nourishment	4-1-00-F-743	200003489		Nourishment and 200 feet of riprap				
25 Aug 2004	Broward	Fishermen's Pier	4-1-04-F-8366	SAJ-2004-7343		Pier repair			One-time event	14,910 square feet
18 June 2007	Broward	Hillsboro Inlet Maintenance Dredging and Sand Placement	41420-2006-FA-0896	SAJ-1993-1995 (IP-LAO)	315 feet of the Inlet and 500 feet of shoreline at R-25.	Inlet dredging and sand nourishment			One-time event	500 feet
10 Dec 2007	Broward	Town of Hillsboro Beach Pressure Equalizing Modules (PEMs) Pilot Project	41420-2007-F-0859	SAJ-2006-7167	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	Installed in late Nov 2007 or early 2008		Take exceeded if the PEMs result in >25% beach erosion along test site compared to control sites over 3 yr	1 mile
7 Mar 2008	Broward	Broward County Glass Cullet Pilot Project	41420-2007-FA-0599	SAJ-2007-585 (IP-MJW)	Centered at R-103	Pilot project to examine the effectiveness of glass cullet as potential beach fill supplement material for shoreline stabilization.	November 1, 2008	February 28, 2009	One-time event	333 feet
28 April 2008	Broward	Town of Hillsboro Truck Haul Beach Nourishment Project	41420-2008-FA-0187	SAJ-1997-2355 (IP-KLV)	330 feet north and 100 feet south of R-7	Temporary beach nourishment	May 1, 2008	June 15, 2008	One -time event	0.08 mile (430 feet)
3 Sept 2008	Broward	Hillsboro Inlet Maintenance Dredging	41420-2006-FA-0896	SAJ-1993-1995 (IP-LAO)	500 feet south of	Inlet dredging and sand placement. This is	NA	NA	Sand bypassing and	500 feet

		and Sand Placement			R-25	an amended BO in regard to the original BO completed on 18 June 2007.			placement allowed throughout the year. The incidental take statement will expire with DEP's permit expiration date of 1 September 2018.	
28 May 2010	Broward	Port Everglades Jetty Repair	41420-2010-CPA-0144	Civil Works – no permit	South Jetty	Repair of the south jetty.	NA	NA	One-time event	0.15 mile
18 June 2010	Broward	Hillsboro Beach Sand Placement	41420-2008-FA-0187	SAJ-1997-2355 (IP-KLV)	R-5 +300 to R-12 +450 feet	Beach nourishment			One-time event	1.35 miles
23 March 2005	Charlotte	Manasota Key Groin Construction	4-1-04-F-8338	199705200 (IP-MN)	R-19 to R-20	Stump Pass dredging (material placed on beach); and groin construction			One-time event	1,000 feet
29 March 2006	Charlotte	Stump Pass Dredging and Beach Nourishment	4-1-04-F-8338	SAJ-1997-5200 (IP-MN)	R-16.5 to R-18	Stump Pass dredging and beach nourishment			One-time event	1,500 feet
26 April 2010	Charlotte	Stump Pass Dredging and Sand Placement	41420-2008-FA-0425	SAJ-1997-5200 (IP-MJD)	R-14.4 to R-20 R-22 to R-23 R-29 to R-39	Stump Pass dredging and sand placement			One-time event	3.5 miles
3 April 2003	Collier	Keewaydin Island Limited Partnership T-Groin Project	4-02-F-1099	200103434 (IP-MN)	R-90 to R-91	Gordon Pass – maintenance dredge; nourish the section of beach where groins are to be constructed; construct three t-groins			One-time event	1,000 feet
14 March 2005	Collier	Hideaway Beach	4-1-04-F-6342	SAJ-1988-290 (IP-MN)	H-1 to H-5 and H-9 to H-12	Beach nourishment and t-groin construction			One-time event	1.4 miles
20 Sept 2005	Collier	Collier County Beach Re-Nourishment Project	4-1-04-TR-8709	200312405 (IP-MN)	Segments within R-22 and R-79	Beach nourishment			One-time event	13.4 miles
14 Nov 2005	Collier	South Marco Island Beach Re-Nourishment	4-1-04-TR-11752	SAJ-2005-2726 (IP-MN)	R-144 to G-2	Beach nourishment			6 year nourishment interval	0.83 mile
28 August 2008	Collier	Doctor's Pass North Jetty Repair	41420-2008-FA-0432	SAJ-2008-450 (NW-MN)	R-57 plus 500 feet south	Removing the existing 240 feet of existing jetty and constructing a new jetty within generally the same footprint.			One-time event	0.25 mile
27 October 2009	Collier	Hideaway Beach Erosion Control	41420-2008-FA-0935	SAJ-1988-290 (IP-MFN)	H-4 to H-9	Sand placement and construction of six T-head groins.			Sand placement once every 2 years over the course of Corps permit; one-time event for groin construction.	0.47 mile
18 August 2010	Collier	Gordon Pass Erosion Control Project – Phase 2 (T-head groins)	41420-2008-FA-0765	SAJ-2001-3434	R-91 to R-92	Construction of two T-head groins.			One-time event	0.19 mile
28 Oct 2010	Collier	Collier County Truck Haul Sand Placement (Park Shore & Naples Beach)	41420-2010-F-0225	SAJ-2003-12405 (IP-SJF)	R-45 +600 feet to R-46 +400 feet; R-58A -500 feet to R-58	A truck haul sand placement project			One-time event	0.37 mile
12 Oct 2004	Indian River	Issuance of Permits to Homeowners for Emergency Coastal Armoring	10(a)(1)(B) permit						30-year period	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			One-time event	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	SAJ-2003-6106	R-97 to R-108	Beach nourishment			6 year nourishment interval	2.2 miles
31 Oct 2006	Indian River	Indian River County Beach Nourishment – Sectors 1 and 2	41420-2006-FA-1491	SAJ-2000-1872 (IP-IS)	R-3.5 to R-12	Dune enhancement and beach nourishment			One-time event	1.62 miles
10 Sept 2007	Indian River	Sebastian Inlet Channel and Sand Trap Dredging, Sectors 1 and 2 Beach	41420-2007-F-0864	SAJ-1992-1224 (IP-IS)	R-3 to R-12	Sand trap dredging and beach nourishment	Nov 2008 to April 2009,		One-time event every 2 years over a period	1.61 miles

		Nourishment					or 2010		of 10 years	
10 October 2008	Indian River	Baytree and Marbrisa Condominium Dune Restoration	41420-2008-FA-0007	SAJ-2007-5161 (NW-IS)	200 feet south of R-46 to 200 feet south of R-48	Dune restoration/enhancement	November 1, 2008	February 28, 2009	One-time event	0.38 mile
16 October 2009	Indian River	City of Vero Beach, Outfall Pipe Installation	41420-2009-FA-0255	SAJ-2009-0012 (LOP-TSD)	220 feet north and 930 feet south of R-83	Outfall pipe installation	November 2009	January 2010	One-time event	0.22 mile
2 December 2009	Indian River	Indian River County Beach Nourishment Sector 3	41420-2007-F-0839	SAJ-2007-1645 (IP-IS)	Phase 1 = R-32 to R-55 Phase 2 = R-20 to R-32	Beach and dune nourishment	February 1, 2010 (Phase 1) November 1, 2010 (Phase 2)	April 30, 2010 (Phase 1) April 30, 2011 (Phase 2)	One-time event	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			7 year nourishment interval	3.2 miles
19 June 2003	Lee	Bonita Beach Re-nourishment	4-1-02-F-1736	199002600 (IP-MN)		Beach nourishment			One-time event	3,922 feet
4 March 2005	Lee	Sanibel and Captiva Island Beach Nourishment	4-1-04-F-9180	199403952 (IP-MN)	R-83 to R-109 and R-110 to R-118	Beach nourishment			50 year Corps permit; 7 to 9 year nourishment interval	6.0 miles
14 March 2007	Lee	Gasparilla Island Beach Nourishment (BO amendment)	41420-2007-FA-0509		South of R-26A	Beach nourishment			7 year nourishment interval	
27 August 2007	Lee	North Captiva Island Beach Nourishment	41420-2007-FA-1023	SAJ-2006-1716 (IP-MFN)	R-81 and 208 feet south of R-81A	Beach nourishment	Oct/Nov 2007		One-time event	0.23 mile
5 August 2009	Lee	Matanzas Pass Reopening	41420-2009-FA-0132	SAJ-1995-7482 (IP-MJD)	North end of Estero Island	Channel dredging	May 2009	2-6 months later	One-time event	0.14 mile
21 March 2008	Lee	Blind Pass Reopening	41420-2006-FA-1549	SAJ-2006-3865 (IP-MFN)	R-109 to R-114	Reopening Blind Pass and then nourishing the shoreline between R-112 and R-114.	Summer 2008	6 months later	One-time event	0.95 mile
7 Dec 2009	Lee	Sanibel Island Sand Placement	41420-2009-FA-0066	SAJ-2007-5213 (IP-MFN)	R-174A to Bay 1A	Beach nourishment			One-time event	0.25 mile
15 Sept 2010	Lee	Big Hickory Island Sand Placement and Groin Construction	41420-2010-CPA-0100	SAJ-2009-03807 (IP-LBD)	R-222.3 to R-223.8	Beach nourishment and groin construction			One-time event	0.47 mile
31 Jan 2002	Martin	Jupiter Island	4-1-05-TR-13281	SAJ-1992-1740 (IP-TKW)	R-75 to R-117	Beach nourishment		April 2003	One-time event	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			One-time event	4.1 miles
2 Dec 2005	Martin	Jupiter Island Modification	4-1-05-TR-13281	199201740	R-76 to R-84 and R-87 to R-11	Beach nourishment			One-time event	5 miles
2 Feb 2007	Martin	Sailfish Point Marina Channel Dredging and Beach Nourishment	41420-2007-FA-0196	SAJ-1996-7239 (IP-MAM)	R-36 to R-39	Channel dredging and beach nourishment			Annual for the next 5 years (permit up for renewal in 2012).	0.66 mile
6 October 2009	Martin	Bathtub Beach Park Sand Placement	41420-2009-FA-0110	SAJ-2008-1107 (IP-GGL)	R-34.5 to R-36	Beach nourishment			No more than once every 2 years over the course of the 10-year Corps permit.	0.24 mile
8 June 2010	Martin	Martin County Beach Erosion Control Project	41420-2009-FA-0190		R-1 to R-25	Beach nourishment	2012		One-time event over the course of the 10-year Corps permit.	~ 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			One-time event	0.85 mile
11 Oct	Miami-Dade	Bakers Haulover AIW Maintenance	4-1-04-TR-8700		R-28 to R-32	Dredging and beach nourishment			One-time event	0.85 mile

2005		Dredging								
7 June 2006	Miami-Dade	Miami-Dade Beach Nourishment	41420-2006-FA-0028	SAJ-1999-3761 (IP-PC)	3 segments within R-48.7 and R-61	Beach nourishment			One-time event	3,716 feet
25 July 2007	Miami-Dade	Miami Beach Nourishment	41420-2006-F-0028	SAJ-1999-3761 (IP-PC)	R-67 to R-70	BO modification to June 7, 2006 BO	45 to 60 days		One-time event	3,000 feet
5 Nov 2008	Miami-Dade	Baker's Haulover Dredging and Sand Placement	41420-2008-FA-0729	Civil Works project	R-28 to R-32	BO modification to the October 11, 2005 BO. Dredging and sand placement events will be biannual.		October 21, 2015	Biannual events until October 21, 2015.	4,000 feet
12 Nov 2008	Miami-Dade	DERM Truck Haul Sand Placement	41420-2008-FA-0776	SAJ-2008-1648 (IP-INS)	R-27 to R-29 R-7 to R-12 R-43 to R-44+500 feet	Beach nourishment	November 2008	April 2009	One-time event	1.78 miles
25 Nov 2009	Miami-Dade	DERM 27th Street Sand Placement	41420-2009-FA-0045	SAJ-2008-3953 (IP-SMB)	R-60 to R-61	Beach nourishment			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	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			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	2.14 miles
31 March 2010	Miami-Dade	55th Street Sand Placement	41420-2009-FA-0046	SAJ-2008-3955 (IP-SMB)	R-48.7 to R-50.7	Sand placement			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	0.38 mile
30 April 2010	Miami-Dade	44th Street Sand Placement	41420-2009-FA-0047	SAJ-2008-3952 (IP-SMB)	R-53.7 to R-55.5	Sand placement			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	0.34 mile
25 June 2010	Miami-Dade	Bal Harbour Sand Placement	41420-2009-FA-0593	SAJ-2009-02468 (IP-IF)	R-29 to R-32	Sand Placement – truck haul			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	0.60 mile
28 June 2010	Miami-Dade	Sunny Isles BeachSand Placement	41420-2009-FA-0594	SAJ-2009-02469 (IP-IF)	R-12 to R-15)	Sand Placement – truck haul			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	0.58 mile
30 July 2010	Miami-Dade	Miami Beach sand placement	41420-2009-FA-0595	SAJ-2009-02470 (IP-IF)	R-45 to R-48 +700 feet	Sand Placement – truck haul			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	0.78 mile
13 Sept 2010	Miami-Dade	Miami Beach sand placement	41420-2009-FA-0527	SAJ-2009-02038 (IP-IF)	R-43 to R-44 + 500 feet	Sand Placement – truck haul			Will not exceed one event every 2 years over the course of the 10-year Corps permit.	0.26 mile
8 October 2010	Miami-Dade	Sunny Isles Beach Sand Placement	41420-2009-FA-0526	SAJ-2009-02039 (IP-IF)	R-7 to R-12	Sand Placement – truck haul			Will not exceed one event every 2 years over the course of the 10-year Corps permit	0.95 mile
8 October 2010	Miami-Dade	Bal Harbour Sand Placement	41420-2009-FA-0525	SAJ-2009-02040 (IP-IF)	R-27 to R-29	Sand Placement – truck haul			Will not exceed one event every 2 years over the course of the 10-year Corps permit	0.38 mile
2009	Monroe	Reclaimed sand placement and sand cleaning (seaweed removal)	41420-2010-F-0006	FEMA DR-1785, PW-1320	No R-monuments	Sand placement and cleaning	20 February 2009	16 June 2009	One-time event	1,462 linear feet
2009	Monroe	City of Key West (South Beach)	41420-2010-F-0013	FEMA DR-1785, PW-	No R-monuments	Beach repair (emergency)	30 April	13 July 2009	One-time event	235 linear feet

				2051			2009			
2009	Monroe	City of Key West (Rest Beach)	41420-2010-F-0014	FEMA DR-1785, PW-2053	No R-monuments	Beach repair (emergency)	30 April 2009	13 July 2009	One-time event	640 linear feet
2009	Monroe	City of Marathon, Sombrero Beach	41420-2010-F-0001	FEMA DR-3293, PW-6	No R-monuments	Beach repair (emergency)	29 December 2009	21 May 2009	One-time event	1,380 linear feet
5 March 2010	Monroe	City of Key West – Simonton Beach	41420-2010-FC-0412	FEMA DR-2082	Approximately 350 feet ENE of V-416 (latitude 24.562, longitude -81.8054	Emergency beach repair	1 October 2009	5 March 2010	One-time event	95 linear feet
5 March 2010	Monroe	City of Key West – Dog Beach	41420-2010-FC-0413	FEMA DR-2084	Between V-414 and V-413 (latitude 24.5473, longitude -81.7929	Emergency beach repair	1 October 2009	5 March 2010	One-time event	35 linear feet
13 May 2010	Monroe	City of Key West, Smathers Beach	41420-2008-FA-0185	SAJ-1998-1677 (IP-MLC)	No R-monuments	Sand placement	Summer 2010	Summer 2010	One-time event	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			One-time event	200 feet
16 March 2004	Palm Beach	Boca Raton Inlet Sand Bypassing	4-1-04-F-4688	200208890 (IP-SLN)	200 feet south of R-223	Inlet sand bypassing and beach nourishment			Annual event	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			One-time event	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 May 2005	6 year nourishment interval	1.12 miles
11 April 2005	Palm Beach	South Lake Worth Inlet Sand Transfer Plant Reconstruction and Bypassing	4-1-04-F-8640	200310337 (IP-SLN)	135 feet south of R-151, to 275 feet south of R-152	STP reconstruction and bypassing			Reconstruction once; bypassing annually	900 feet
5 Dec 2005	Palm Beach	Mid-Town Beach Nourishment Project (Reach 3 & 4)	4-1-00-F-742	199503779 (IP-DEB)	R-90.4 to R-101.4	Beach nourishment			One-time event	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			Annual	3,450 feet
23 Feb 2006	Palm Beach	Boca Raton Central Beach Nourishment Project	4-1-01-F-1795	SAJ-1994-1196 (IP-KLV)	R-216 to R-222	Dredge shoal fronting Boca Raton Inlet and beach nourishment		Completed in 2006	One-time event	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	SAJ-1994-1196 (IP-KLV)	R-223.3 to R-227.9	Dredge shoal fronting Boca Raton Inlet and beach nourishment		Scheduled to occur in Nov 2007	One-time event	Approx. 1 mile
28 April 2006	Palm Beach	Palm Beach Nourishment Project – Reach 8	41420-2006-F-0018	SAJ-2005-7908 (IP-PC)	R-125 to R-134	Beach nourishment			One-time event	2.17 miles
31 July 2006	Palm Beach	Sea Dunes Condominium Seawall	41420-2006-FA-1108			Seawall construction			One-time event	0.03 acre
15 Dec 2006	Palm Beach	North Ocean Boulevard Rock Revetment	41420-2006-FA-1490	SAJ-2005-1130 (IP-PC)	290 feet north of R-84; 1,150 feet south of R-85	Rock revetment construction			One-time event	0.34 mile
5 Feb 2007	Palm Beach	Palm Beach Sand Transfer Plant Reconstruction	41420-2006-FA-1447	PN-CO-PB-279	R-76 to R-79	Sand transfer plant reconstruction and discharge pipe extension			One-time event	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			One-time event	400 feet
25 May 2007	Palm Beach	Singer Island and South Palm Beach Emergency Dune Restoration	41420-2007-FA-1001	FEMA was the federal nexus; no permit number	385' south of R-137 to 500' north of R-136; 500'south of R-60 to 850' south of R-65	Dune Restoration	May 25, 2007	July 6, 2007	One-time event	6,135 feet

25 May 2007	Palm Beach	Jupiter Island ICWW Maintenance Dredging and Beach Nourishment	41420-2006-FA-1582	No permit number as this was a Corps project	16,000 feet (130,000 cy) of the ICWW dredged; material placed between R-13 and R-19.	Channel dredging and beach nourishment	Expected to begin Feb 15, 2008	Expected to be completed by April 30, 2008	One-time event	1.04 miles
20 July 2007	Palm Beach	North Boca Raton Beach Nourishment	41420-2007-FA-0477	SAJ-1986-479 (IP-LAO)	T-205 to 181 feet south of R-212	Beach nourishment	Expected to begin Nov 2007; 60 to 75 days		One-time event annually over the next 10 years	1.45 miles
9 Nov 2007	Palm Beach	Jupiter Inlet and channel dredging	41420-2006-FA-1582	NA	R-13 to R-17	Dune restoration		Expected to be completed by 30 April 2008	One-time event	~ 4,000 linear feet
14 Nov 2007	Palm Beach	Jupiter Inlet Sand Trap Dredging and Sand Placement	41420-2007-FA-0600	SAJ-1989-506 (IP-LAO)	Maintenance dredging of the inlet; beach compatible placed R-13 to R-19	Inlet dredging and beach nourishment	Between Nov 2007 and April 2008; 85 days	April 2008	One-time event annually over the next 10 years	1.02 miles
28 Nov 2007	Palm Beach	Modification to a Sheet Pile and Rubble-Mound T-Head Groin System	41420-2007-FA-0574	SAJ-1992-31578	500 feet north of R-94 south to R-95	T-groin repair, extension, construction	December 2007	February 2008	One-time event	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			One-time event	2.17 miles
9 Sept 2008	Palm Beach	Juno Beach Sand Placement	41420-2008-FA-0081	SAJ-1997-6559(JWH)	R-26 to R-38	Sand placement	November 2008	March 2009	One-time event	2.45 miles
4 Nov 2008	Palm Beach	Palm Beach Harbor M&O and Sand Placement	41420-2008-FA-0524	Civil Works	R-76 to R-79	Biannual Inlet dredging and sand placement events.	December 2008	March 17, 2015	Biannual events until March 17, 2015.	3,450 feet
2009	Palm Beach	Beach berm repair	41420-2010-F-0008	FEMA DR-1785, PW-1515	R-60 to R-68	Beach berm repair (permanent work)	26 February 2009	16 June 2009	One-time event	6,880 linear feet
2009	Palm Beach	Beach berm repair	41420-2010-F-0009	FEMA DR-1785, PW-1533	R-135 to R-138	Beach berm repair (permanent work)	28 February 2009	19 May 2009	One-time event	3,590 linear feet
2009	Palm Beach	Beach berm repair	41420-2010-F0010	FEMA DR-1785, PW-1701	R-137 to R-138	Beach berm repair (emergency)	14 March 2009	16 June 2009	One-time event	125 linear feet
21 June 2010	Palm Beach	Mid-Town Reaches 3 & 4 Sand Placement	41420-2006-F-0011-R001	SAJ-1995-03779 (IP-DWP)	R-95 to R-100	Beach nourishment			One-time event	0.95 mile
2 July 2010	Palm Beach	Phipps Ocean Park Reaches 7&8	41420-2010-CPA-0110	SAJ-2000-00380 (IP-DWP)	R-116 to R-125	Sand Placement			One-time event	3.4 miles
3 Sept 2010	Palm Beach	Singer Island Breakwater	41420-2008-FA-0019	SAJ-2006-5344 (IP-JWH)	R-60.5 to R-66	Segmented, submerged breakwater	April 2011	Oct 2012	One-time event	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	SAJ-2006-1212 (IP-AAZ)	R-98 to R-115 R-88 to R-90	Wetland restoration and beach nourishment			One-time event	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			Nourishment every 2 (without groins) or 4 (with groins) years until 22 February 2017.	1.3 miles
25 Aug 2004	Sarasota and Manatee	Longboat Key Beach Nourishment	4-1-04-F-4529	199100296	R-46A to R-29.5	Beach nourishment			8 year nourishment interval	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	Beach nourishment			One-time event	0.47 mile

					R-46A to R-44.5					
20 Oct 2005	Sarasota	South Siesta Key	4-1-05-TR-12691	SAJ-2004-12003 (IP-MN)	R-67 to R-77 plus 200 feet	Beach nourishment			10 year nourishment interval	2.1 miles
7 Dec 2007 (original BO) 28 July 08 (BO mod)	Sarasota	Lido Key Beach Fill Placement Project	41420-2007-F-0841	SAJ-1999-3508 (IP-MN)-2007	R-35.5 to R-44.2 2.27 miles	Beach nourishment with 425,000 cy of fill material.	Commence between Nov 2008 and Feb 2009		One-time event within a 5 year period	2.27 miles
13 August 2008	Sarasota	Longboat Key Permeable Adjustable Groins	41420-2007-FA-0205	SAJ-2005-9068 (IP-MFN)	R-13 to R-13.5	Construction of two permeable adjustable groins.	November 1	By March 1 the following year	One-time event over the course of a 5 year DEP permit.	0.09 mile project area 0.43 mile action area
2009	Sarasota		41420-2010-F-0003	FEMA DR-1785, PW-675	R-77 to midpoint between R-77 and R-76	Beach restoration	29 December 2008	19 May 2009	One-time event	700 linear feet
2009	Sarasota	Longboat Key Beach	41420-2010-F-0007	FEMA DR-1785, PW-1342	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	12 February 2009	16 June 2009	One-time event	951, 1,197, and 1,142 linear feet, respectively