Appendix 2

Final Environmental Assessment and Finding of No Significant Impact for the Folly Beach, SC Shore Protection Project, January 2005

ENVIRONMENTAL ASSESSMENT
AND
FINDING OF NO SIGNIFICANT IMPACT (FONSI)
FOR THE
FOLLY BEACH, SOUTH CAROLINA
SHORE PROTECTION PROJECT

CHARLESTON COUNTY

US Army Corps of Engineers ®
Charleston District

January 2005

Environmental Assessment

1. Purpose and Need for this Document

This Environmental Assessment (EA) represents the position of the US Army Corps of Engineers, Charleston District regarding the environmental impacts for the 2005 re-nourishment of Folly Island and has been prepared due to the change of the material borrow area for this nourishment cycle of the existing shore protection project. The April 1991 Environmental Assessment for the Folly Beach, South Carolina Shore Protection Project is incorporated in this document by reference and can be found in its entirety in Appendix 3. It is the purpose of this document to explain the design criteria for these changes. Only the subjects of the 1991 EA that need to be updated or are no longer valid are included in this document. All other findings from the 1991 EA are still valid.

2. Project Description

a. Proposed Action. This is a periodic re-nourishment of an existing project. The recommended plan provides for re-nourishment of 28,200 linear feet (5.34 linear miles) of shoreline. A berm will be constructed with a top width of 15 feet and an elevation of 9.0 feet national geodetic vertical datum (NGVD). The project extends from just below the U.S. Coast Guard Base, and includes the Charleston County Park on the west end of Folly Island (See Figure 1). The exact quantity of sand that will be placed on the beach during re-nourishment will be dependent on the existing beach profile at the time of construction; however, based on present conditions, it is estimated that approximately two million cubic yards of beach quality sand will be placed on the beach seaward of existing revetments. The Federal government will not incur cost for any material placed on private property.

Construction will be by means of a hydraulic cutter head dredge that will transport the sand through a pipeline. The pipeline will run parallel with the beach. Beach compatible material (for details see Appendix 2) from the offshore source will be pumped along the roughly 28,000 linear feet of the project and will be discharged as slurry. During construction, temporary training dikes of sand will be used to contain the discharge and control the fill placement. Fill sections will be graded by land-based equipment, such as bulldozers, articulated front-end loaders, and other equipment as necessary to achieve the desired beach profile. Equipment will be selected based on whatever proves to be the most advantageous economically, as well as what generates only minimal and acceptable temporary environmental impacts. It is anticipated construction will begin in mid-April 2005 and will require approximately 6 months for completion. This schedule could change due to contractual issues, inclement weather, equipment failure, or other unforeseen difficulties.

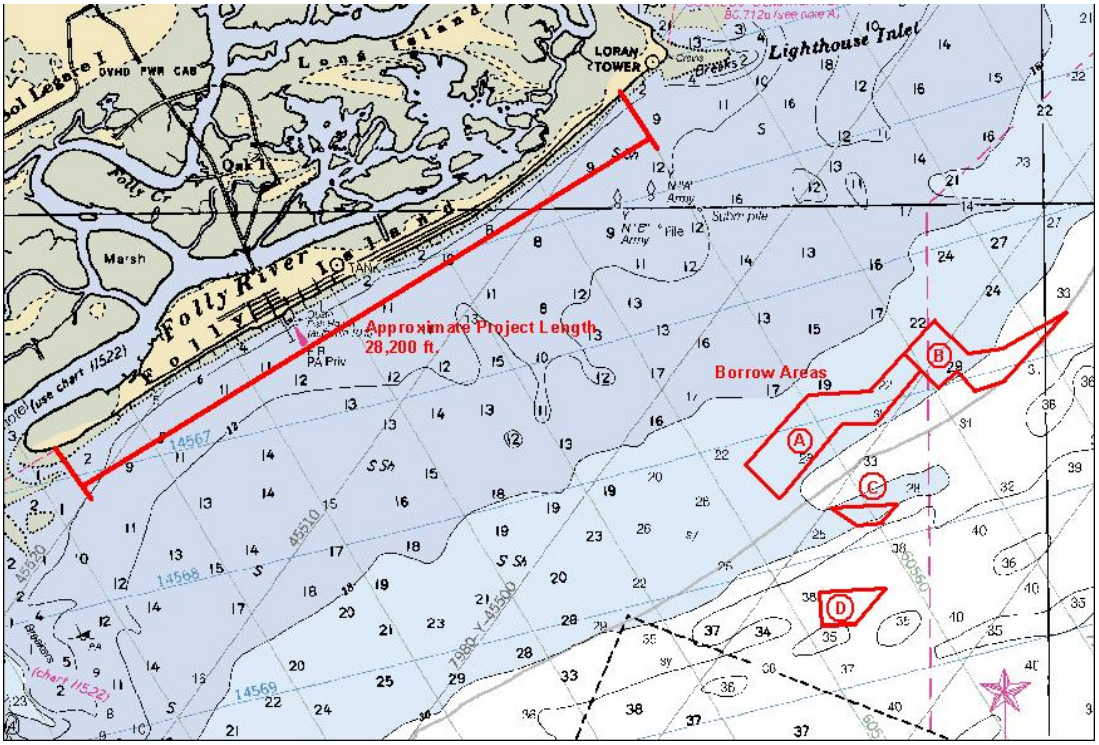

FIGURE 1: LOCATION OF NOURISHMENT AND BORROW AREAS

The borrow areas being used for beach compatible sand are designated in Figure 1. These areas total 620 acres. The borrow areas are located approximately three miles offshore of the northern end of the island. None of the four borrow areas are inside any CBRA zones. The borrow areas have been surveyed by side-scan sonar, followed by the collection of numerous vibracore samples in each of the potential borrow sites. This was done in order to avoid hard/live bottom areas during dredging, and to ensure that adequate quantities of beach compatible sand were available in the three areas. Larger areas had been evaluated but the above listed acreages are what remained after the Corps of Engineers evaluation process. The location of the borrow sites has also been coordinated the South Carolina Department of Natural Resources. The volume of sand (based on dredging to a depth of 6 feet), area, and water depths in each borrow area are as follows:

Borrow Area	Volume (cubic yd)	Area (acres)	Water Depth
A	3,130,000	310	26-36’
B	2,030,000	210	32-40’
C	320,000	30	34’
D	400,000	70	40’

Sand will be removed from the borrow areas to a depth of 6 to 8 feet. Because of the dynamic nature of the coastal area and the constant movement of sand, it is expected that the borrow areas will fill with sand of the same grain size after the dredging has been completed. For a more comprehensive discussion of the geo-technical investigation, see Appendix 2.

3. Endangered Species

Table 1 contains a list of threatened and endangered species that have been listed by the U.S. Fish and Wildlife Service as occurring or possibly occurring in Charleston County. Table 2 contains a list of threatened and endangered species in South Carolina under the jurisdiction of National Marine Fisheries Service (NMFS).

4. Coastal Barrier Resources System (CBRS)

There are no areas within the project boundaries that coincide with the designated Coastal Barrier Resources System.

5. Environmental Consequences – Mitigation Measures

Temporary degradation of water quality will occur at both the dredging and the nourishment sites due to re-suspension of silt material. A temporary reduction of benthic populations in the borrow and beach fill areas will likely occur as well as a corresponding decline in photosynthesis.

Since all aspects of the proposed work will occur either in the ocean or on the ocean beach, the project will not affect any listed species occurring in forested or freshwater habitats. Thus, species such as the bald eagle, red-cockaded woodpecker, wood stork, Bachman's Warbler, flatwoods salamander, Canby's dropwort, Pondberry, and Chaff-seed will not be affected by the proposed action.

Species that could be present in the project area during the proposed action are the blue, finback, humpback, right, sei, and sperm whales. Also, the hawksbill, Kemp's ridley, leatherback, loggerhead, and green sea turtles could occur in the project area. However, loggerheads are the primary sea turtle nesters. The Florida manatee rarely visits the area but they do pass through when moving up the coast where they have been seen in various locations throughout South Carolina. The piping plover is an occasional visitor and winters adjacent to the area. There is no designated piping plover critical habitat within the project area; however, there is piping plover critical habitat on Bird Key Stono in Stono Inlet immediately south of Folly Island. The southern terminus of sea-beach amaranth range is Folly Island. However, there are currently no known populations that occur on the island.

TABLE 1: USF&WS THREATENED AND ENDANGERED SPECIES IN CHARLESTON COUNTY

Common Name	Scientific Name	Status	Occurrence
West Indian manatee	*Trichechus manatus*	E	Known
Bald eagle	*Haliaeetus leucocephalus*	T	Known
Bachman's warbler	*Vermivora bachmanii*	E	Known
Wood stork	*Mycteria americana*	E	Known
Red-cockaded woodpecker	*Picoides borealis*	E	Known
Piping plover	*Charadrius melodus*	T/CH	Known
Kemp's ridley sea turtle	*Lepidochelys kempii**	E	Known
Leatherback sea turtle	*Dermochelys coriacea**	E	Known
Loggerhead sea turtle	*Caretta caretta*	T	Known
Green sea turtle	*Chelonia mydas**	T	Known
Flatwoods salamander	*Ambystoma cingulatum*	T	Known
Shortnose sturgeon	*Acipenser brevirostrum**	E	Known
Sea-beach amaranth	*Amaranthus pumilus*	T	Known
Pondberry	*Lindera melissifolia*	E	Known
Canby's dropwort	*Oxypolis canbyi*	E	Possible
Chaff-seed	*Schwalbea americana*	E	Known
Southern dusky salamander	*Desmognathus auriculatus*	SC	Possible
Gopher frog	*Rana capito*	SC	Known
Godfrey's privet	*Forestiera godfreyi*	SC	Known
Pondspice	*Litsea aestivalis*	SC	Known
Bachman's sparrow	*Aimophila aestivalis*	SC	Possible
Henslow's sparrow	*Ammodramus henslowii*	SC	Known
Red knot	*Calidris canutus*	SC	Possible
Swallow-tailed kite	*Elanoides forficatus forficatus*	SC	Known
American kestrel	*Falco sparverius*	SC	Possible
American oystercatcher	*Haematopus palliatus*	SC	Known
Loggerhead shrike	*Lanius ludovicianus*	SC	Possible
Swainson's warbler	*Limnothlypis swainsonii*	SC	Known
Painted bunting	*Passerina ciris ciris*	SC	Possible
Gull-billed tern	*Sterna nil*otica	SC	Known
Incised groovebur	*Agrimonia incisa*	SC	Known
Venus fly-trap	*Dionaea muscipula*	SC	Known
Southeastern myotis	*Myotis austroriparius*	SC	Known
Southern hognose snake	*Heterodon simus*	SC	Known
Angiosperm (no common name)	*Elytraria caroliniensis*	SC	Known
Creeping St. John's wort	*Hypericum adpressum*	SC	Known
Boykin's lobelia	*Lobelia boykinii*	SC	Known
Sweet pinesap	*Monotropsis odorata*	SC	Known
Savannah or Piedmont cowbane	*Oxypolis ternate*	SC	Known
Pineland plantain	*Plantago sparsiflora*	SC	Known
False coco	*Pteroglossaspis ecristata*	SC	Known
Awned meadowbeauty	*Rhexia aristosa*	SC	Known
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	SC	Known
Bull's Island white-tail deer	*Odocoileus virginianus*	SC	Known
Island glass lizard	*Ophisaurus compressus*	SC	Known

TABLE 1: USF&WS THREATENED AND ENDANGERED SPECIES IN CHARLESTON COUNTY (CONT'D)

Common Name	Scientific Name	Status	Occurrence
Black-throated green warbler	*Dendroica virens*	SC	Possible
Black rail	*Laterallus jamai*	SC	Possible
Southern myotis	*Myotis austroriparius*	SC	Known

E: Federally endangered T: Federally threatened CH: Critical Habitat

SC: Federal Species of Concern. These species are rare or limited in distribution but are not currently legally protected under the Endangered Species Act.

Species proposed for listing: None

Designated Critical Habitat: The U.S. Fish and Wildlife Service has designated critical habitat under the Endangered Species Act of 1973, as amended, for the piping plover (*Charadrius melodus*) on breeding grounds in the Great lakes and Northern Great Plains Regions, and in the wintering grounds along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. There is no designated piping plover critical habitat within the boundaries of the proposed project, however, there is piping plover critical habitat on Bird Key Stono in Stono Inlet immediately south of Folly Island.

*Contact National Marine Fisheries Service for more information on this species.

Consultation with the U.S. Fish and Wildlife Service (USFWS) concerning the effects of the proposed project on threatened and endangered species is ongoing. A Biological Assessment (BA) (see Appendix 1) has been prepared and forwarded to USFWS. The findings of the BA are that the proposed project is not likely to adversely affect any listed species or critical habitat except for the loggerhead sea turtle. Because of the potential effect of the proposed project on nesting sea turtles and/or hatchlings and their habitat, the finding of the BA is that there may be adverse affects to loggerhead sea turtles as a result of this project; however, the proposed project is not expected to jeopardize the continued existence of the species.

As a result of the findings of the BA, the following precautions will be taken to minimize the effects to sea turtles:

TABLE 2: NATIONAL MARINE FISHERIES SERVICE THREATENED AND ENDANGERED SPECIES IN SOUTH CAROLINA

Species	Scientific Name	Status	Date Listed
Listed Marine Mammals			
Blue whale	*Balaenoptera musculus*	E	12/02/70
Finback whale	*Balaenoptera physalus*	E	12/02/70
Humpback whale	*Megaptera novaeangliae*	E	12/02/70
Right whale	*Eubaleana glacialis*	E	12/02/70
Sei whale	*Balaenoptera borealis*	E	12/02/70
Sperm whale	*Physeter macrocephalus*	E	12/02/70
Listed Sea Turtles			
Green sea turtle	*Chelonia mydas*	T*	07/28/78
Hawksbill sea turtle	*Eretmochelys imbricata*	E	06/02/70
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	12/02/70
Leatherback sea turtle	*Dermochelys coriacea*	E	06/02/70
Loggerhead sea turtle	*Caretta caretta*	T	07/28/78
Listed Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	E	03/11/67
Species of Concern – Fish**			
Dusky shark	*Carcharhinus obscurus*		
Sand tiger shark	*Odontaspis taurus*		
Night shark	*Carcharinus signatus*		
Atlantic sturgeon	*Acipenser oxyrhynchus oxyrhynchus*		
Speckled hind	*Epinephelus drummondhayi*		
Warsaw grouper	*Epinephelus nigritus*		
Goliath grouper	*Epinephelus itijara*		
White marlin	*Tetrapturus albidus*		
Species of Concern – Invertebrates**			
Ivory bush coral	*Oculina varicosa*		

Species proposed for listing: None

Designated Critical Habitat: None in the area of this project

Proposed Critical Habitat: None in the area of this project

Candidate Species: None

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

** Species of Concern are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

- During the sea turtle nesting season, the dredging contractor will provide nighttime monitoring along the beach where construction is taking place to ensure the safety of female turtles attempting to nest. A buffer zone around the female will be imposed in the event of an attempt to nest.

- If any construction of the project occurs during the period between May 1 and November 30, daily nesting surveys will be conducted starting either May 1 or 65 days prior to the start of construction, whichever is later. These surveys will be performed between sunrise and 9:00 A.M. and will continue until the end of the project, or September 30, whichever is earlier. Any nests found in the area that will be impacted by construction activities will be moved to a safe location. The nesting surveys and nest relocations will only be performed by people with a valid South Carolina DNR permit.

- If any construction of the project occurs during the period December 1 to April 30, no nesting surveys will be performed.

- For construction activities occurring during the period May 1 through November 30, staging areas for equipment and supplies will be located off of the beach to the maximum extent possible.

- For construction activities occurring during the period May 1 through November 30, all on-beach lighting associated with the project will be limited to the minimum amount necessary around active construction areas to satisfy Occupational Safety and Health Administration (OSHA) requirements.

Immediately after completion of the project, the Corps of Engineers will till the newly constructed sand berm. The Corps of Engineers will also perform cone penetrometer testing of the nourished beach for 3 subsequent years, prior to May 1 of each year. If compaction testing shows sand compaction to be greater than 500 pounds per square inch (p.s.i.), the sand placed on the beach will be tilled.

Visual surveys for escarpments along the Project area will be made continuously during project performance. Any escarpments greater than 18 inches in height extending for greater than 100 feet will be leveled. Inspection for escarpments will be repeated prior to May 1 for 3 subsequent years. Results of the surveys will be submitted to the USFWS prior to any action being taken. The USFWS will be contacted immediately if subsequent reformation of escarpments exceeding 18 inches in height for a distance of 100 feet occurs during nesting and hatching season. This coordination will determine what appropriate action must be taken. An annual summary of escarpment surveys and action taken will be submitted to the USFWS.

Adherence to the above precautions should minimize the effects to nesting loggerhead sea turtles and emerging loggerhead sea turtle hatchlings. The monitoring and relocation program will minimize potential adverse affects to nesting sea turtles. Completion of the

project will recreate lost habitat and protect existing turtle nesting habitat as well as the structures on the island.

6. Essential Fish Habitat

The content of this section was coordinated with National Marine Fisheries Service representative Prescott Brownell. Our current determination is that the proposed action would not have a substantial individual or cumulative adverse impact on EFH or fisheries managed by the South Atlantic Fishery Management Council and the NMFS.

EFH Assessment

1) Description of the site: Folly Island is a coastal barrier island, characteristic of the sea island coastal region of South Carolina and Georgia, and is surrounded by sensitive coastal marine and estuarine habitats. Coastal barrier beaches, near-shore waters, inlets, and associated estuarine tidal wetlands provide high quality feeding, cover, spawning, and maturation sites for a variety of living marine resources. As such any component of the project that may directly or indirectly reduce the quality, aerial extent, or natural character of the habitats involved should be identified. The project site is located in areas identified as Essential Fish Habitat (EFH) in the 1998 Amendment to Fishery Management Plans (FMP) that was prepared by the South Atlantic Fishery Management Council (SAFMC). This Amendment was prepared in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) of 1996 (P.L. 94-265) and was approved by the Secretary of Commerce on June 3, 1999. Detailed information regarding EFH and species managed by the SAFMC can be found in the amended FMPs. EFH at the project site includes coastal marine unconsolidated sand/mud bottoms. (This description was furnished by NMFS)

2) The primary borrow area for this project is a large area covering 310 acres off the Northeast coast of Folly Island (see Figure 1). It has been surveyed by side-scan sonar, followed by the taking of numerous Vibracore samples in both potential borrow sites. This was done in order to avoid hard bottom areas during dredging, and adequate depths of sand were found to be in the core of the two areas. In addition to our own internal review where we looked for shallow depth of borings (hard bottom), deep sand deposits, and the presence of organic materials in the sample, the SC DNR also reviewed the reports and findings and helped to outline those areas that should be avoided. Because of the dynamic nature of the coastal area and the constant movement of sand, it is expected that the borrow area will fill with sand of the same grain size or slightly smaller after the pumping has been completed.

The secondary borrow area for this project is a 210 acre area adjacent to the primary borrow area (also see Figure 1). The same type of survey work was done on this site and the SC DNR also helped to eliminate those areas that might contain live bottom.

Both borrow area acreages have been adjusted to match the amount of suitable sand depth. Larger areas had been evaluated but the above listed acreages are what remained after the Corps of Engineers and SC Department of Natural Resources review and evaluation process. Monitoring of sand borrow sites is normally conducted to determine recovery rates and ecological characteristics. The customary detailed post-dredging assessment of bathymetry and biological characteristics in the borrow area will be needed for this project, even though deep depressions will not be made. Due to the large volume of sand required for this effort being drawn from a broad area(s), and the fact that there may be another cycle of dredging in the future, it was determined by the National Marine Fisheries Service that the detailed post-dredging assessment should be implemented.

3) A description of the proposed action is located in Section II above.

4) Analysis of individual and cumulative effects on EFH: Federally managed species associated with the above-mentioned habitats found at the project site include post-larval, juvenile, and adult red drum (Sciaenops ocellata), white shrimp (Litopenaeus setiferus), and brown shrimp (Farfantepenaeus aztecus). Species under jurisdiction of the Mid Atlantic Fishery Management Council also occur in the project area. These species and their associated EFH include juvenile and adult summer flounder (Paralichthys dentatus) which occur on submerged estuarine bottom and in the water column, and juvenile and adult bluefish (Pomatomus saltatrix) which occur in the water column. The project area also provides nursery and forage habitat for other species including black drum (Pogonias cromis), Atlantic menhaden (Brevoortia tyrannus), and blue crab (Callinectes sapidus) which serve as prey for other species (e.g., mackerels, snappers, and groupers) that are managed by the SAFMC, and for highly migratory species (e.g. billfishes and sharks) that are managed by the NMFS.

Macro invertebrate inhabitants of the near shore coastal zone are important components of coastal marine food webs and serve as prey for the aforementioned federally managed fishes. Characteristic benthic fauna of southeastern beaches is diverse, including tropically important representatives such as haustoriid amphipods, polychaete worms, isopods, and ghost crab (Ocypode quadrata).

5) Charleston District's views regarding effects: Based on project reviews provided by the National Marine Fisheries Service and the South Carolina Department of Natural Resources to the Charleston District, significant long-term harm to the ecologically diverse aquatic habitats, such as "live rock" and other stable bottoms are not anticipated. Although non-motile benthic animals will be adversely affected by placement of sand, re-colonization is expected to be relatively rapid, with re-establishment of the beach zone community within 1-2 years in affected areas.

Areas to be affected by excavation of beach quality sand include up to approximately 520 acres. Within sand borrow areas; benthic epifauna and infauna will be impacted by excavation and temporary turbidity that may extend beyond the excavation areas.

The majority of the sand would be drawn from the primary borrow site. Sand would be shaved off in layers until the required volumes were met, but the excavation would go no deeper than 5 to 10 feet. If additional material is needed, it will be removed from the secondary site. Both areas have been carefully mapped out to avoid live/hard bottom, and no deep depressions will be created in the borrow areas. Upon completion of the work, inter-tidal and sub-tidal zone on the beach will be covered with sand. Materials used for beach nourishment may also be transported by natural processes onto other areas that support benthic communities; however, no hard bottoms or vegetated wetlands will be affected. Other potential impacts include localized turbidity elevation and possible reduction of dissolved oxygen in the surrounding water column. Elevated turbidity can reduce photosynthesis activity of pelagic and benthic algae. Suspended sediments can cause physical damage to respiratory structures of early life history stages of fishes and invertebrates.

6) Proposed mitigation, if applicable: Not applicable in this case.

7. Cultural Resources

The South Carolina Institute of Archaeology and Anthropology (SCIAA) has pointed out, via letter of October 13, 2004, that there is a possibility of shipwrecks residing in the proposed borrow areas. Similar concerns were expressed by the State Historic Preservation Office (SHPO). These areas are being surveyed for the presence of any significant cultural resources. The findings of the survey will be coordinated with SCIAA and SHPO in order to protect the resource from possible harm during the dredging process.

8. Water Quality Certification

A modification to the water quality certification associated with this project is required due to the change of the borrow site location. The South Carolina Department of Environmental Health and Control does not require a specific public notice to initiate the modification. In lieu of a specific Section 404 public notice, letters were sent to all pertinent agencies and interests describing the proposed project and seeking their input. As a result of this letter request and phone conversations with SC Department of Health and Environmental Control, no difficulties are anticipated in granting the water quality certification and it is expected on or before February 8, 2005. The original WQ certification was granted under P/N 91-2R-022.

9. Coastal Consistency

In a letter dated January 25, 2005 the Office of Ocean and Coastal Resource Management concurred with the Charleston District that this Federal Action was consistent with the Coastal Zone Management Act.

FINDING OF NO SIGNIFICANT IMPACT
FOR THE
FOLLY ISLAND
BEACH RENOURISHMENT
FOR
STORM DAMAGE PROTECTION
CHARLESTON COUNTY, SOUTH CAROLINA

Based on the attached Environmental Assessment and a consideration of other pertinent documents, I conclude that the environmental effects of the proposed renourishment of this hurricane damage protection GI study along the 5.32 mile long reach of Folly Island, where continued erosion is threatening the structural integrity of many dwellings, are not significant and the preparation of an Environmental Impact Statement is not warranted. Specific factors considered in making the determination include the following:

a. Water quality would not be affected.

b. Wetlands would not be adversely affected, since there are none where the work would take place.

c. Cultural resources would not be affected.

d. Endangered species would not be significantly affected.

e. No significant land use changes would occur.

f. Air and noise quality would not be significantly affected.

g. Fish and wildlife would not be significantly affected.

h. Aesthetics would not be significantly affected.

i. Flood plain values would be improved.

j. Benthic invertebrate communities would not be significantly affected.

k. Construction activity would be short term and would not affect navigation or recreational boating.

Alvin B. Lee

DATE 2-1-2005

ALVIN B. LEE
Lieutenant Colonel, EN
Commander, U.S. Army Engineer District,
Charleston

404(b)(1) Evaluation

Folly Beach Shore Protection
Charleston County
South Carolina

I. PROJECT DESCRIPTION

a. Location and General Description. Folly Beach is located on Folly Island about six miles South of the Charleston Harbor Entrance (see Figure 1) and is bounded by Morris Island to the north, Kiawah Island to the south, James Island to the west, and to the east is the Atlantic Ocean. The island is six miles long, one-half mile wide, and is oriented northeast to southwest. The Town of Folly Beach lies in the middle of the island between the former U.S. Coast Guard Loran Station to the northeast and the Charleston County Park to the southwest. South Carolina Route 171 crosses the marsh between James Island and Folly Island and provides the only highway access to Folly Beach.

This is an emergency re-nourishment combined with a periodic re-nourishment of an existing project. The recommended plan provides for re- nourishment of 28,200 linear feet (5.34 linear miles) of shoreline. A berm will be constructed with a top width of 15 feet and an elevation of 9.0 feet national geodetic vertical datum (NGVD). The project extends from just below the U.S. Coast Guard Base, and includes the Charleston County Park on the west end of Folly Island (See Figure 2). The exact quantity of sand that will be placed on the beach during re- nourishment will be dependent on the existing beach profile at the time of construction; however, based on present conditions, it is estimated that approximately 2 million cubic yards of beach quality sand will be placed on the beach seaward of existing revetments. The Federal government will not incur cost for any material placed on private property.

Construction will be by means of a hydraulic cutter head dredge that will transport the sand through a pipeline. The pipeline will run parallel with the beach. Beach compatible material (sand) from the offshore source will be pumped along the roughly 28,200 linear feet of the project and will be discharged as slurry. During construction, temporary training dikes of sand will be used to contain the discharge and control the fill placement. Fill sections will be graded by land-based equipment, such as bulldozers, articulated front-end loaders, and other equipment as necessary to achieve the desired beach profile. Equipment will be selected based on whatever proves to be the most advantageous economically, as well as what generates only minimal and acceptable temporary environmental impacts. It is anticipated construction will begin in mid-April 2005 and will require approximately 6 months for completion. This schedule could change due to contractual issues, inclement weather, equipment failure, or other unforeseen difficulties.

b. Authority and Purpose. The Folly Beach re-nourishment project study was initially begun under the original project authority, Section 501 of the Water Resources Development Act of 1986. However, due to the extent of the storm damage from the 2004 hurricane season, it was combined with the authority of PL 84-99.

A final Environmental Impact Statement (including a 404(b) evaluation) for Beach Erosion Control and Hurricane Protection for Folly Beach, South Carolina was filed with CEQ on July 11, 1980, coordinated with other agencies and circulated for public review and comment. A subsequent EA and 404(b) evaluation was executed on April 25, 1991. A second EA has been prepared for the present emergency re-nourishment project.

c. General Description and Quantities of the Dredged or Fill Material. The borrow areas proposed for dredging are sand accumulation areas noted as A, B, C, & D in Figure 2. These areas total 620 acres, however, only areas A and B are going to be used for this nourishment effort since 2,000,000 cubic yards are needed to be pumped on the beach. The borrow areas are located approximately three miles offshore of the northern end of the island. None of the four borrow areas are inside any CBRA zones. The borrow areas have been surveyed by side-scan sonar, followed by the collection of numerous vibracore samples in each of the potential borrow sites. This was done in order to avoid hard/live bottom areas during dredging, and to ensure that adequate quantities of beach compatible sand were available in the four areas. Larger areas had been evaluated but the above listed acreages are what remained after the Corps of Engineers evaluation process. The location of the borrow sites has also been coordinated with the South Carolina Department of Natural Resources. The volume of beach compatible sand (based on dredging to a depth of 6 feet), area, and water depths in each borrow area are as follows:

Borrow Area	Volume (cubic yd)	Area (acres)	Water Depth
A	3,130,000	310	26-36’
B	2,030,000	210	32-40’
C	320,000	30	34’
D	400,000	70	40’

Sand will be removed from the borrow areas to a depth of 6 to 8 feet. Because of the dynamic nature of the coastal area and the constant movement of sand. It is expected that the borrow areas will fill with sand of the same grain size after the dredging has been completed.

d. Description of the Proposed Discharge Site(s). The beach compatible material will be placed on the ocean shoreline along Folly Island for a length of 28,200 feet or 5.34 miles, extending from Station 107+00 South to Station 175+00 North, as shown on Figure 1.

e. Description of Disposal Method. The material will be excavated by either a hydraulic cutter head dredge or a hopper dredge, either of which will transport the sand through a pipeline, as described in I. a. above.

II. FACTUAL DETERMINATIONS

a. Physical Substrate Determinations.

(1) Substrate Evaluation and Slope. The elevations of the developed portion of Folly Island range from 5 to 14 feet NGVD. The four borrow areas cover 620 acres and are approximately 3 miles offshore; with areas A and B within the 3-mile limit,

and areas C and D are outside the 3-mile limit (see FIGURE 2). Only areas A and B are being utilized for this renourishment effort.

(2) Sediment Type.

Site A – This site is approximately 310 acres and has 3,130,000 cubic yards of beach compatible sand available in 2 to 10 foot depths. There were a total of 19 vibracores done in this area in 2003 and 2004, 2 of which are shared with the Site B border.

Site B – This site is approximately 210 acres and has 2,030,000 cubic yards of beach compatible sand available in 2 to 10 foot depths. There were a total of 14 vibracores done in this area in 2003 and 2004, 2 of which are shared with the Site A border.

Site C – This site is approximately 30 acres and has 320,000 cubic yards of beach compatible sand available in 4 to 6 foot depths. There were a total of 5 vibracores done in this area in 2003 and 2004.

Site D – This site is approximately 70 acres and has 400,000 cubic yards of beach compatible sand available in 4 to 6 foot depths. There were a total of 7 vibracores done in this area in 2003 and 2004.

Summary of Sites A through D – No hard bottom was found during this site investigation within any of the proposed borrow areas. Cemented sands and/or limestone were encountered in some of the vibracore samples; however, those vibracores were not included in areas designated as borrow areas. In general, the sands located in all four borrow areas are coarser than the native beach sands due to a larger fraction of shells than contained on the beach. The coarser portion of the grain size distribution is typically a coarse sand and fine gravel fraction. The borrow area sands are typically more calcareous than the native beach sands. The silt and clay fraction in the proposed borrow areas was limited to approximately 10%, and much of that will be lost during excavation and placement operations. Sites C and D will not be used during this nourishment cycle.

(3) Dredged/Fill Material Movement. The material will be pumped as a slurry and shaped using land based equipment and training dikes. Some material, particularly any fine-grained sediments will be lost in the surf, but the majority of the material will remain on the island.

(4) Physical Effects on Benthos. Benthic organisms in the vicinity of the construction, either dredging or placement, will be impacted by the construction. However, the construction is temporary, and it is expected that organisms will recolonize the disturbed areas following construction activities.

(5) Actions Taken to Minimize Impacts. The amount of material removed from the borrow sites will only be that quantity necessary to accomplish the project, thereby minimizing impacts to the greatest extent possible.

b. <u>Water Circulation, Fluctuation and Salinity Determinations.</u>

(1) Water.

(a) Salinity. This activity will occur in the open ocean and on an adjacent beach. Construction will have no impact on salinity.

(b) Water Chemistry. Temporary changes in water chemistry related to increased turbidity levels at the construction site may occur. Impacts would be temporary and minimal in nature.

(c) Clarity and Color. The water may become temporarily cloudy at the construction site during construction activity due to increased turbidity levels associated with disturbance of sediments. As noted above, this is expected to return to normal levels shortly after construction ends.

(d) Odor. Construction activities may result in a release of hydrogen sulfide (rotten egg) odor from the disturbance of sediments. This should be minimal, will be a temporary impact and will not result in long-term effects.

(e) Taste. Not applicable.

(f) Dissolved Gas Levels. There may be minor impacts to dissolved oxygen levels as a result of increased turbidity levels. These would be similar to any dredging project, and the impacts will be localized and temporary.

(g) Nutrients. No impacts to nutrient loading at the dredging site or on the beach are expected to occur.

(h) Eutrophication. Not applicable.

(2) Current Patterns and Circulation.

(a) Current Patterns and Flow. This project will not change present current patterns or flow in or around Folly Island.

(b) Velocity. Not applicable.

(c) Stratification. Not applicable.

(d) Hydrologic Regime. This project will not change the present hydrologic regime.

(3) Normal Water Level Fluctuations. Water level will not change, but the increased beach elevations will provide protection to existing structures on the beach.

(4) Salinity Gradients. Salinity gradients will not change.

(5) Actions That Will Be Taken to Minimize Impacts. There are no actions needed since there are not measurable impacts to current patterns and circulation.

c. <u>Suspended Particulate/Turbidity Determinations.</u>

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. Turbidity will increase during construction/disposal operations, but will return to normal levels when construction is complete.

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

(a) Light Penetration. During construction, light penetration at the disposal site may diminish slightly due to a temporary increase in turbidity levels. Light penetration will return to normal levels following construction.

(b) Dissolved Oxygen. Dissolved oxygen (DO) levels may decrease during construction at the disposal site as a result of increased turbidity. However, this decrease will be minimal due to the dynamic characteristics of the ocean, and DO levels should return to normal conditions immediately following construction.

(c) Toxic Metals and Organics. Not applicable.

(d) Pathogens. Not applicable.

(e) Aesthetics. During construction, there would be an increase in the ambient noise levels, which will return to normal levels following construction. In addition, construction activity on the beach obstructs the visual aesthetic of the ocean, but it is a temporary effect, which will also return to normal immediately following construction.

(3) Effects on Biota.

(a) Primary Production & Photosynthesis. Although there will be some turbidity at the construction site, it is not expected that measurable impacts

to primary production and photosynthesis will occur since the area of impact is small.

(b) Suspension/Filter Feeders. Temporary impacts would include increased turbidity, which may reduce oxygen levels and impact food intake to organisms at the construction site. However, water clarity and dissolved oxygen concentrations will improve following construction.

(c) Sight Feeders. A minimal, temporary disruption due to construction disturbances is possible. A rapid recovery is expected since most sight feeders are transient and can relocate until construction activities are complete.

(4) Actions taken to Minimize Impacts. The above noted impacts are temporary and conditions should improve following construction. It is unlikely that further minimization in these areas is possible.

d. Contaminant Determinations. The borrow sites have been tested for grain size analysis and are predominantly sand. No further testing is required since contaminants would not be associated with the sandy substrates.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. Effects on plankton would be related to turbidity associated with the construction activity. Effects would be minor and temporary in duration.

(2) Effects on Benthos. Benthic activity at the construction site would be impacted as bottom sediments are disturbed or placed on the beach. These disturbances will be temporary and recolonization on the beach will occur following construction.

(3) Effects on Nekton. Not significant.

(4) Effects on Aquatic Food Web. Not significant.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Refuges. Not applicable.

(b) Wetlands. Not applicable.

(c) Mud Flats. Not applicable.

(d) Vegetated Shallows. Not applicable.

(e) Coral Reefs. Not applicable.

(f) Riffle and Pool Complexes. Not applicable.

(6) Threatened and Endangered Species. Although there are known threatened or endangered species within the project area, the potential impacts have been addressed in the environmental assessment and coordinated with pertinent state and Federal agencies. Subsequently, unacceptable adverse impacts to threatened or endangered species are not anticipated or expected.

(7) Other Wildlife. A wide variety of wildlife - birds, mammals, reptiles and amphibians - utilize the beach and ocean. Impacts to wildlife in the project area would be associated with the construction activities. Wildlife would be expected to leave the area during construction, but would return when construction is complete.

(8) Actions to Minimize Impacts. Plans and specs for the project specify requirements to ensure impacts to the environment are minimized or avoided.

f. <u>Proposed Disposal Site Determinations.</u>

(1) Mixing Zone Determination. Not applicable. The State of South Carolina Department of Health and Environmental Control (SCDHEC) does not recognize mixing zones.

(2) Determination of Compliance with Applicable Water Quality Standards. Section 401 Water Quality Certification has not been issued yet by SCDHEC, however, they have stated that it will be issued as a MOD to the existing certification for this project. OCRM, on the other hand, will need to issue a new coastal consistency statement.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. Not applicable.

(b) Recreational and Commercial Fisheries. The presence of the dredge and the pipeline may cause commercial or recreational fisherman and commercial shrimpers to utilize different routes or fishing locations since the pipeline will extend perpendicular to the coast for a distance of 3 miles. However, this should result in minimal, temporary impacts to the fishery.

(c) Water Related Recreation. Water related recreational activities may be limited on the beach and in the waters adjacent to the beach due to the presence of the pipeline and equipment. These limitations will move along the beach as the construction activity advances.

(d) Aesthetics. The construction activity will have a negative impact on visual and audible aesthetics. However, the activity will move relatively rapidly down the beach, so no one area will endure the aesthetic impacts for long.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. Beach and water related recreational activities may be temporarily limited due to the presence of the pipeline and equipment. These limitations will pass through and move along the portion of the beach fronting the park area as the construction activity advances.

g. Determination of Secondary and Cumulative Efects on the Aquatic Ecosystem.
Initial negative effects related to this project include those associated with turbidity, impacts to the benthic community, and aesthetics. These effects are considered temporary. Long-term, permanent effects will provide for the restoration of a dune system which will provide storm damage protection of structures on the island. The beneficial permanent effects outweigh the negative temporary effects associated with the construction activity.

III. FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE.

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

b. Alternatives that were considered were included in the 1991 EA. The currently proposed project is not the result of a new analysis, but rather the re-creation of the selected alternative derived from the analysis done for the original project, while using new borrow sites.

c. The proposed construction described in this evaluation would not cause or contribute to violations of any known applicable state water quality standards, which would result in permanent damage to the ecosystem.

d. The proposed project will not violate the Endangered Species Act of 1973.

e. The proposed project will not violate any specified protection measures for marine sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

f. The proposed project will not result in significant adverse affects on human health and welfare in regard to municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life states of aquatic life and other wildlife will not be adversely affected. Significant adverse affects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values will not occur.

g. Steps taken to minimize potential adverse impacts of the construction on aquatic ecosystems include limiting construction to the minimum alternative needed to provide the required protection. Plans and specs will provide guidance and requirements to avoid/minimize impacts to threatened and endangered species and other aquatic and terrestrial life.

h. The State Historic Preservation Office has expressed concern about potential cultural resources (ship wrecks) being present in the proposed borrow sites. The borrow areas will be surveyed prior to construction in order to avoid impacts to any archeological site. Any area where cultural resources are identified will be avoided during the construction activity; therefore, the proposed project will not cause unacceptable adverse impacts to any known cultural resources.

i. On the basis of the guidelines, the proposed construction is specified as complying with the requirement of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

Alvin B. Lee

1-31-05
DATE

Alvin B. Lee
Lieutenant Colonel, EN
Commanding

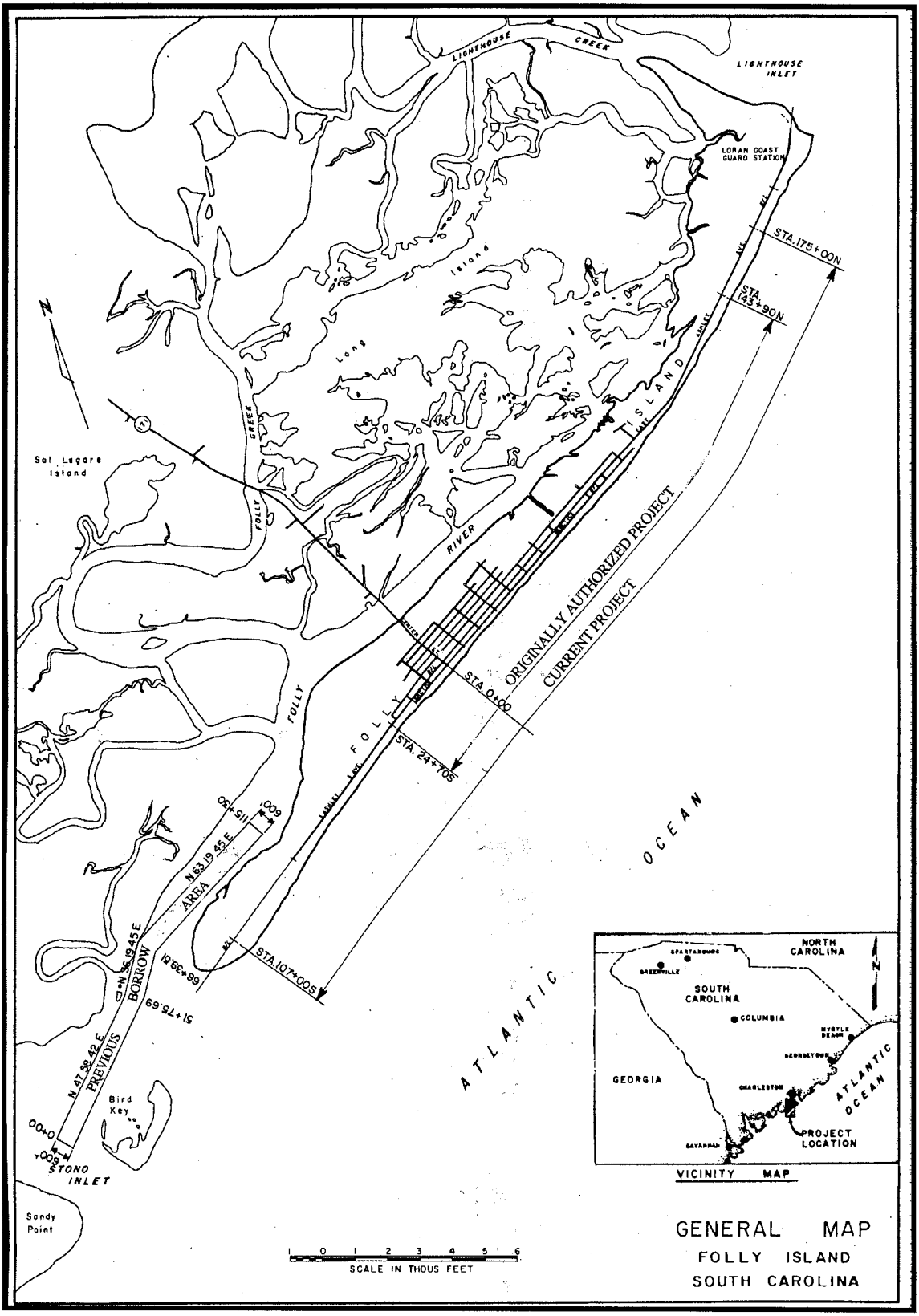
LIGHTHOUSE CREEK
LIGHTHOUSE INLET
LORAN COAST GUARD STATION
STA. 175+00N
STA. 145+90N
LONG ISLAND
FOLLY ISLAND
Sol Legare Island
FOLLY CREEK
FOLLY RIVER
ORIGINALLY AUTHORIZED PROJECT
CURRENT PROJECT
STA. 0+00
STA. 24+70S
FOLLY
OCEAN
ATLANTIC
N 63 19 45 E
AREA
PREVIOUS BORROW
N 47 58 42 E
STA. 107+00S
Bird Key
STONO INLET
Sandy Point
SCALE IN THOUS FEET
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
COLUMBIA
CHARLESTON
SAVANNAH
PROJECT LOCATION
ATLANTIC OCEAN
VICINITY MAP
GENERAL MAP
FOLLY ISLAND
SOUTH CAROLINA

FIGURE 1

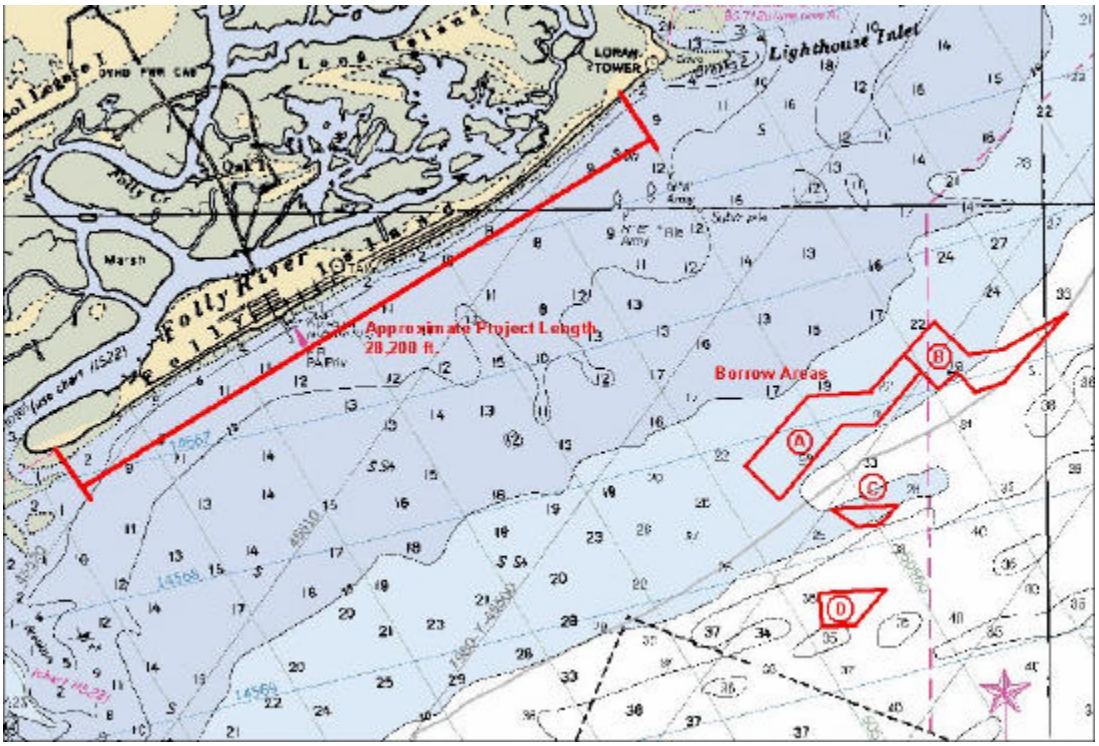
Lighthouse Inlet
LORAN TOWER
Folly River
Marsh
Approximate Project Length
20,200 ft.
Borrow Areas
A
B
C
D

FIGURE 2

Appendix 1

Biological Assessment

BIOLOGICAL ASSESSMENT
OF THE PROPOSED FOLLY BEACH STORM DAMAGE REDUCTION RE-NOURISHMENT PROJECT
FOLLY BEACH, SOUTH CAROLINA

SEPTEMBER 2004

1.0 INTRODUCTION

Folly Beach is located on the South Carolina coast in Charleston County, approximately 12 miles south of the downtown area of the City of Charleston and 9 miles southwest of Sullivan's Island (see Figure 1). The 6-mile long island reaches from the confluence of the Stono and Folly Rivers at the west end to Lighthouse Creek at the east end. The Folly Beach Storm Damage Reduction project is being conducted under authority of the Water Resources Development Act (WRDA) of 1986 (P.L. 99-662). An amendment to the previous environmental assessment (EA) is being prepared to evaluate the overall environmental impacts of the proposed project due to the proposed use of an offshore material borrow site. This document re-evaluates the impact of the proposed project on threatened and endangered species and will be incorporated in the amendment to the EA.

The purpose of this project is to protect the economic resources located on Folly Island from erosion and storm events, with a secondary benefit of providing additional beach and dune area that will facilitate sea turtle nesting, as well as providing habitat for the Wilson's plover and least tern. The majority of Folly Island is developed in the manner of a typical suburban municipality and is a mix of residential and commercial properties. The commerce of the island is primarily associated with the tourism industry. The southern end of Folly Island is designated as a Charleston County Park.

2.0 PROPOSED PROJECT DESCRIPTION

This is a periodic nourishment of an existing project. The recommended plan provides for nourishment of 28,200 linear feet (5.34 linear miles) of shoreline. A berm will be constructed with a top width of 15 feet and an elevation of 9.0 feet national geodetic vertical datum (NGVD). The project extends from just below the U.S. Coast Guard Base and extends to the Charleston County Park on the west end of Folly Island (see Figure 2). The exact quantity of sand that will be placed on the beach during re-nourishment will be dependent on the existing beach profile at the time of construction; however, based on expected erosion rates, it is estimated that 1.7 million cubic yards of beach quality sand will be placed on the beach.

Construction will be by means of either a hydraulic cutterhead dredge or a hopper dredge that will transport the sand through a pipeline. The pipeline will run parallel with the beach. Beach compatible material (sand) from the off-shore source will be pumped along the roughly 28,000 linear feet reach of the project and will be discharged as a slurry. During construction,

FIGURE 1: LOCATION OF FOLLY BEACH

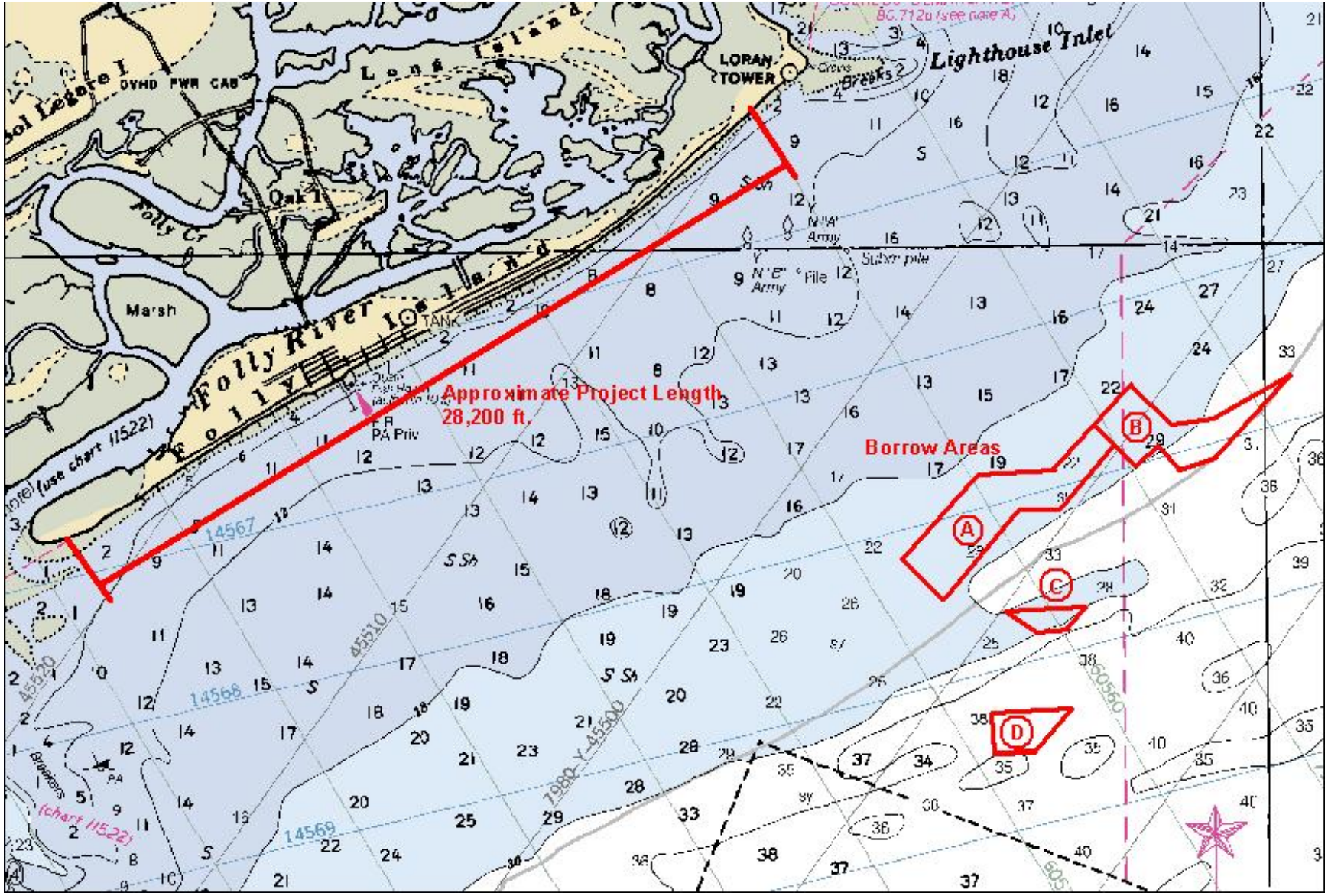

FIGURE 2: FOLLY BEACH PROJECT LIMIITS

temporary training dikes of sand will be used to contain the discharge and control the fill placement. Fill sections will be graded by land-based equipment, such as bulldozers, articulated front-end loaders, and other equipment as necessary to achieve the desired beach profile. It is anticipated that construction will begin in late-2005 (i.e., November or December) and will require approximately 6 to 8 months for completion. This construction window should minimize impacts to sea turtles, fish, shellfish, and infauna. This schedule could change due to funding constraints, contractual issues, inclement weather, equipment failure, or other unforeseen difficulties.

The borrow areas being used for beach compatible sand are designated in Figure 2. These areas total approximately 620 acres. The borrow areas are located approximately three miles off-shore of the northern end of the island. None of the three borrow areas are inside any CBRA zones. The borrow areas have been surveyed by side-scan sonar, followed by the collection of numerous vibracore samples in each of the potential borrow sites. This was done in order to avoid hard/live bottom areas during dredging, and to ensure that adequate quantities of beach compatible sand were available in the three areas. Larger areas had been evaluated but the above listed acreages are what remained after the Corps of Engineers evaluation process. The location of the borrow sites will be coordinated with South Carolina Department of Natural Resources (SCDNR). The size, sand volume (based on dredging to a depth of 6 feet), and water depth of each borrow area are as follows:

Borrow Area	Area (acres)	Volume (cu. yd.)	Water Depth (ft.)
A	~310	3,130,000	26-36
B	~210	2,030,000	32-40
C	~30	320,000	34
D	~70	400,000	40

Sand will be removed from the borrow areas to a depth of 6 to 8 feet. Because of the dynamic nature of the coastal area and the constant movement of sand, it is expected that the borrow areas will fill with sand of the same grain size after the dredging has been completed.

PRIOR CONSULTATIONS

Previous Section 7 formal or informal consultations occurred in support of the 1991 Environmental Assessment and the 1980 Environmental Impact Statement that were prepared for the original Folly Beach nourishment project.

3.0 LIST OF SPECIES

Table 1 contains a list of species that have been listed by the U.S. Fish and Wildlife Service as occurring or possibly occurring in Charleston County. Table 2 contains a list of threatened and endangered species in South Carolina under the jurisdiction of NOAA Fisheries.

4.0 GENERAL EFFECTS ON LISTED SPECIES/CRITCAL HABITAT

Since all aspects of the proposed work will occur either in the ocean or on the ocean beach, the project will not affect any listed species occurring in forested or freshwater habitats. Thus, species such as the bald eagle, red-cockaded woodpecker, wood stork, Bachman's warbler, flatwoods salamander, Canby's dropwort, pondberry, and chaff-seed will not be affected by the proposed action.

Species that could be present in the project area during the proposed action are the blue, finback, humpback, right, sei, and sperm whales. Also, the hawksbill, Kemp's ridley, leatherback, loggerhead, and green sea turtles could occur in the project area. However, loggerheads are the primary sea turtle nesters. The Florida manatee rarely visits the area but they do pass through when moving up the coast where they have been seen in various locations throughout South Carolina. The piping plover is an occasional visitor and winters adjacent to the area. There is no designated piping plover critical habitat within the project area; however, there is piping plover critical habitat on Bird Key Stono in Stono Inlet immediately south of Folly Island (see Figure 3). The southern terminus of sea-beach amaranth range is Folly Island. However, there are currently no known populations that occur on the island.

5.0 SPECIES ASSESSMENTS

5.1 Blue, finback, humpback, right, sei, and sperm whales

The blue whale may be the largest mammal ever to inhabit the earth. It may reach lengths of up to 100 feet—roughly the length of a basketball court. Blue whales weigh up to 160 tons. They feed on small shrimp-like crustaceans. The whales consume up to eight tons of these animals a day during their feeding period. A blue whale produced the loudest sound ever recorded from an animal, and some scientists have speculated that they may be able to remain in touch with each other over hundreds of miles. The number of blue whales in the southern hemisphere was severely depleted by whaling. Due to commercial whaling the size of the population is less than ten percent of what it was originally.

The finback whale is the second largest whale, reaching lengths of up to 88 feet and weighing up to 76 tons. The finback whale because of its crescent-shaped dorsal fin, and obvious characteristic, is easily seen at sea. Depending on where they live, finback whales eat both fish and small pelagic crustaceans, and squids. It sometimes leaps clear of the water surface, yet it is

TABLE 1: USF&WS THREATENED AND ENDANGERED SPECIES IN CHARLESTON COUNTY

Common Name	Scientific Name	Status	Occurrence
West Indian manatee	*Trichechus manatus*	E	Known
Bald eagle	*Haliaeetus leucocephalus*	T	Known
Bachman's warbler	*Vermivora bachmanii*	E	Known
Wood stork	*Mycteria americana*	E	Known
Red-cockaded woodpecker	*Picoides borealis*	E	Known
Piping plover	*Charadrius melodus*	T/CH	Known
Kemp's ridley sea turtle	*Lepidochelys kempii**	E	Known
Leatherback sea turtle	*Dermochelys coriacea**	E	Known
Loggerhead sea turtle	*Caretta caretta*	T	Known
Green sea turtle	*Chelonia mydas**	T	Known
Flatwoods salamander	*Ambystoma cingulatum*	T	Known
Shortnose sturgeon	*Acipenser brevirostrum**	E	Known
Sea-beach amaranth	*Amaranthus pumilus*	T	Known
Pondberry	*Lindera melissifolia*	E	Known
Canby's dropwort	*Oxypolis canbyi*	E	Possible
Chaff-seed	*Schwalbea americana*	E	Known
Southern dusky salamander	*Desmognathus auriculatus*	SC	Possible
Gopher frog	*Rana capito*	SC	Known
Godfrey's privet	*Forestiera godfreyi*	SC	Known
Pondspice	*Litsea aestivalis*	SC	Known
Bachman's sparrow	*Aimophila aestivalis*	SC	Possible
Henslow's sparrow	*Ammodramus henslowii*	SC	Known
Red knot	*Calidris canutus*	SC	Possible
Swallow-tailed kite	*Elanoides forficatus forficatus*	SC	Known
American kestrel	*Falco sparverius*	SC	Possible
American oystercatcher	*Haematopus palliatus*	SC	Known
Loggerhead shrike	*Lanius ludovicianus*	SC	Possible
Swainson's warbler	*Limnothlypis swainsonii*	SC	Known
Painted bunting	*Passerina ciris ciris*	SC	Possible
Gull-billed tern	*Sterna nil*otica	SC	Known
Incised groovebur	*Agrimonia incisa*	SC	Known
Venus fly-trap	*Dionaea muscipula*	SC	Known
Southeastern myotis	*Myotis austroriparius*	SC	Known
Southern hognose snake	*Heterodon simus*	SC	Known
Angiosperm (no common name)	*Elytraria caroliniensis*	SC	Known
Creeping St. John's wort	*Hypericum adpressum*	SC	Known
Boykin's lobelia	*Lobelia boykinii*	SC	Known
Sweet pinesap	*Monotropsis odorata*	SC	Known
Savannah or Piedmont cowbane	*Oxypolis ternate*	SC	Known
Pineland plantain	*Plantago sparsiflora*	SC	Known
False coco	*Pteroglossaspis ecristata*	SC	Known
Awned meadowbeauty	*Rhexia aristosa*	SC	Known
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	SC	Known
Bull's Island white-tail deer	*Odocoileus virginianus*	SC	Known
Island glass lizard	*Ophisaurus compressus*	SC	Known

TABLE 1: USF&WS THREATENED AND ENDANGERED SPECIES IN CHARLESTON COUNTY (CONT'D)

Common Name	Scientific Name	Status	Occurrence
Black-throated green warbler	*Dendroica virens*	SC	Possible
Black rail	*Laterallus jamai*	SC	Possible
Southern myotis	*Myotis austroriparius*	SC	Known

E: Federally endangered T: Federally threatened CH: Critical Habitat

SC: Federal Species of Concern. These species are rare or limited in distribution but are not currently legally protected under the Endangered Species Act.

Species proposed for listing: None

Designated Critical Habitat: The U.S. Fish and Wildlife Service has designated critical habitat under the Endangered Species Act of 1973, as amended, for the piping plover (*Charadrius melodus*) on breeding grounds in the Great lakes and Northern Great Plains Regions, and in the wintering grounds along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. There is no designated piping plover critical habitat within the boundaries of the proposed project, however, there is piping plover critical habitat on Bird Key Stono in Stono Inlet immediately south of Folly Island (see Figure 3).

* Contact NOAA Fisheries for more information on this species.

also a deeper diver than some of the other baleen whales. The finback's range is in the Atlantic from the Arctic Circle to the Greater Antilles, including the Gulf of Mexico. In the Pacific Ocean the Finback ranges from the Bering Sea to Cape San Lucas, Baja California.

The humpback whale reaches a maximum length of about 50 feet and a maximum weight of about 37½ tons. They are mostly black, but the belly is sometimes white. Flippers and undersides of the flukes are nearly all white. They are migratory. They eat krill and schooling fish. In the Atlantic they migrate from Northern Iceland and Western Greenland south to the West Indies, including the Northern and Eastern Gulf of Mexico. In the Pacific Ocean they migrate from the Bering Sea to Southern Mexico. The humpback is one of the most popular whales for whale watching on both the east and west coasts. Scientists estimate that there are 10,000 humpbacks worldwide, only about 8% of its estimated initial population.

The sei whale is one of the largest whales. It can reach a length of 60 feet and a weight of 32 tons. They feed primarily on krill and other small crustaceans, but also feed at times on small fish. The sei whale is the fastest of the baleen whales and can reach speeds of more than 20 miles per hour. In the Atlantic Ocean the Sei whale ranges from the Arctic Circle to the Gulf of Mexico. In the Pacific Ocean the Sei whale may range from the Bering Sea to Southern Mexico. The Sei whale is endangered due to past commercial whaling.

TABLE 2: NOAA FISHERIES THREATENED AND ENDANGERED SPECIES IN SOUTH CAROLINA

Species	Scientific Name	Status	Date Listed
Listed Marine Mammals			
Blue whale	*Balaenoptera musculus*	E	12/02/70
Finback whale	*Balaenoptera physalus*	E	12/02/70
Humpback whale	*Megaptera novaeangliae*	E	12/02/70
Right whale	*Eubaleana glacialis*	E	12/02/70
Sei whale	*Balaenoptera borealis*	E	12/02/70
Sperm whale	*Physeter macrocephalus*	E	12/02/70
Listed Sea Turtles			
Green sea turtle	*Chelonia mydas*	T*	07/28/78
Hawksbill sea turtle	*Eretmochelys imbricata*	E	06/02/70
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	12/02/70
Leatherback sea turtle	*Dermochelys coriacea*	E	06/02/70
Loggerhead sea turtle	*Caretta caretta*	T	07/28/78
Listed Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	E	03/11/67
Species of Concern – Fish**			
Dusky shark	*Carcharhinus obscurus*		
Sand tiger shark	*Odontaspis taurus*		
Night shark	*Carcharinus signatus*		
Atlantic sturgeon	*Acipenser oxyrhynchus oxyrhynchus*		
Speckled hind	*Epinephelus drummondhayi*		
Warsaw grouper	*Epinephelus nigritus*		
Goliath grouper	*Epinephelus itijara*		
White marlin	*Tetrapturus albidus*		
Species of Concern – Invertebrates**			
Ivory bush coral	*Oculina varicosa*		

Species proposed for listing: None

Designated Critical Habitat: None in the area of this project

Proposed Critical Habitat: None in the area of this project

Candidate Species: None

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

** Species of Concern are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

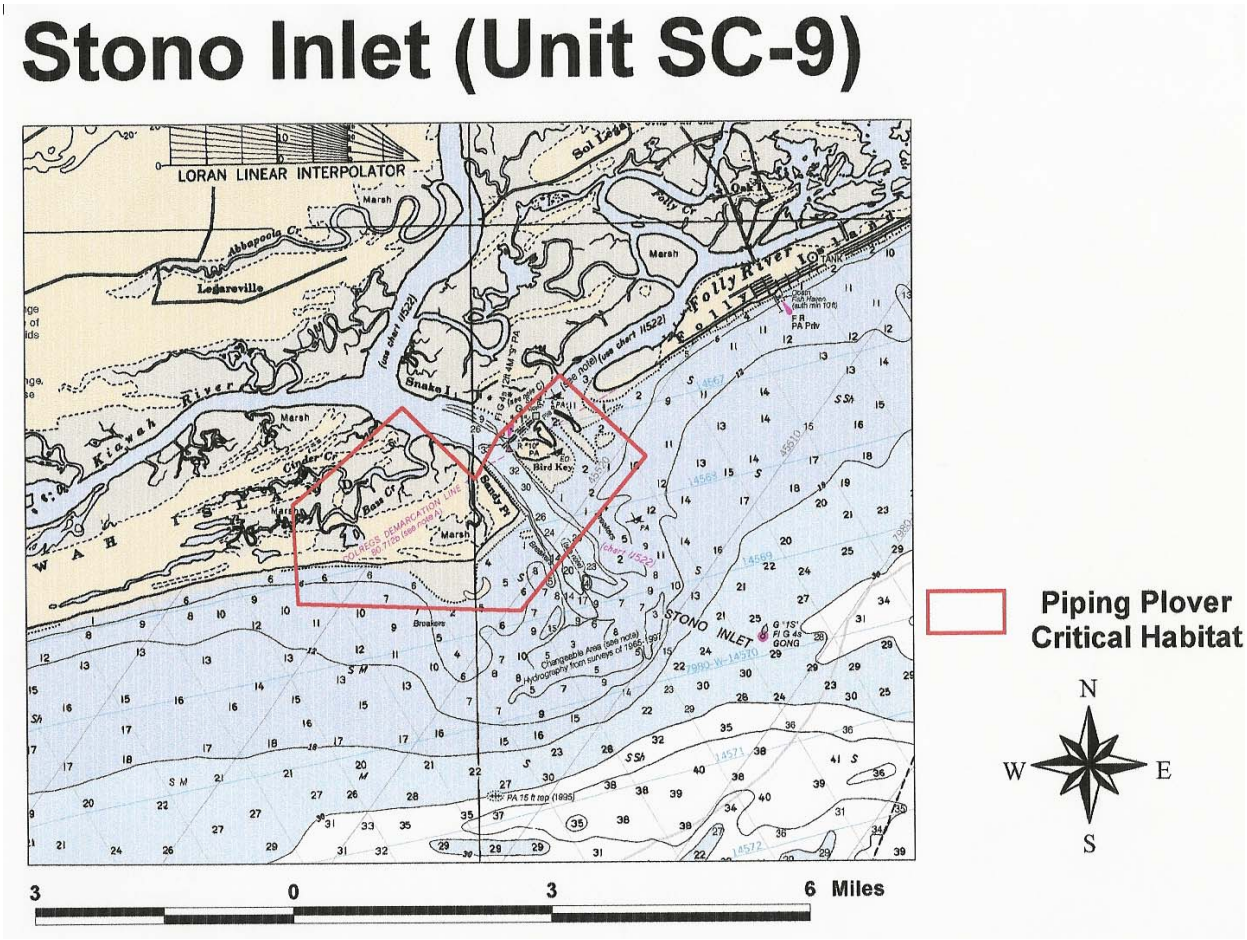

FIGURE 3: PIPING PLOVER CRITICAL HABITAT IN STONO INLET

Unlike the other great whales on the endangered species list, the sperm whale is a toothed whale. It is the largest of the toothed whales reaching a length of 60 feet in males and 40 feet in females. Sperm whales are noted for their dives that can last up to an hour and a half and go as deep as 2 miles under the surface. It is the most abundant of all the endangered whales, with an estimated population of two million. Sperm whales feed mainly on squid, including the giant squid. They range in the Atlantic Ocean from the Arctic Circle to the Gulf of Mexico. In the Pacific Ocean the sperm whale ranges from the Bering Sea to Southern Mexico. The sperm whale was almost hunted to extinction for its oil (spermaceti). This oil was used in the manufacture of ointments, cosmetics, and candles. The sperm whales usually inhabit the offshore waters.

The right whale is the most endangered species of whale off of the U.S. coasts. The right whale got its name because it was the "right" whale to hunt. It was slow moving and floated after being killed. Current estimates indicate that presently no more than a few hundred exist. Right whales can reach a length of 60 feet and a weight of 100 tons. Although the species has been internationally protected since 1937, it has failed to show any signs of recovery.

Right whales have been observed along the eastern coast of North America from the Florida Keys north to the Gulf of St. Lawrence in Canada. They are found in relatively large numbers around Massachusetts and near Georges Bank in the spring, and then they migrate to two areas in Canadian waters by mid-summer. Most cows that give birth in any given year travel in the winter to the coastal waters of Georgia and Florida to calve and raise their young for the first three months. The Bay of Fundy, between Maine and Nova Scotia, appears to serve as the primary summer and fall nursery hosting mothers and their first-year calves. The calf will stay with its mother through the first year and it is believed that weaning occurs sometime in the fall. Calves become sexually mature in about 8 years. Females are believed to calve about every three to four years. Sightings of right whales and their occurrence in the inshore waters of the State, although rare, are generally assumed to represent individuals seen during this migration.

Right whales feed primarily on copepods and euphausids. They swim very close to the shoreline, often noted only a few hundred meters offshore. Because of their habit of traveling near the coast, there is concern over impacts resulting from collisions with boats and ships. Some right whales have been observed to bear propeller scars on their backs resulting from collisions with boats (NMFS, 1984). Destruction or pollution of right whale habitat is not known to be a problem in the project area. There is no designation of critical habitat for whales in SC.

Effect Determination

Of these six species of whales being considered, only the right whale would normally be expected to occur within the project area during the construction period; therefore the other species of whales are not likely to be affected by the proposed project. The majority of right whale sightings occur from December through February. Since the proposed work is expected to occur during this time period, the dredge will be required to have endangered species observers standing watch on the bridge of the dredge to look for whales during construction. The presence of a hydraulic cutterhead pipeline or hopper dredge in this area should pose no direct impacts to the right whale, however, when relocating, the dredge and any supporting vessels are required to alter course and stop if necessary to avoid approaching whales. If whales are spotted during the day within 10 miles of the dredging operation, then the dredge is required to reduce transit speed at night, should it need to relocate during that time period. Corps contract specifications expressly require avoidance of right whales. For these reasons, it has been determined that the project as proposed is **not likely to adversely affect the right whale**. (The 29 October 1997 "National Marine Fisheries Service, Regional Biological Opinion on Hopper Dredging along the South Atlantic Coast" has jurisdiction on right whale effects)

5.2 Manatee

West Indian manatees are massive fusiform-shaped animals with skin that is uniformly dark grey, wrinkled, sparsely haired, and rubber-like. Manatees possess paddle-like forelimbs, no hind limbs, and a spatulate, horizontally flattened tail. Females have two axillary mammae, one at the base of each forelimb. Their bones are massive and heavy with no marrow cavities in the ribs or long bones of the forearms (Odell 1982). Adults average about 11.5 feet in length and 2,200 pounds in weight, but may reach lengths of up to 15 feet (Gunter 1941) and weigh as much as 3,570 pounds (Rathburn *et al*. 1990). Newborns average 4 to 4½ feet in length and about 66 pounds (Odell 1981).

The West Indian manatee (*Trichechus manatus*) was listed as endangered on March 11, 1967, under a law that preceded the Endangered Species Act of 1973, as amended (16 USC 1531 et seq.). Additional Federal protection is provided for this species under the Marine Mammal Protection Act of 1972, as amended (16 USC 1461 et seq.) The manatee population in the United States is confined during the winter months to the coastal waters of the southern half of peninsular Florida and to springs and warm water outfalls as far north as southeast Georgia (USFWS, 1996). However, during the summer months, they may migrate as far north as coastal Virginia on the East Coast and as far west as Louisiana on the Gulf of Mexico (USFWS, 1991). The manatee is an uncommon summer resident of the South Carolina coast with some visual reports in various locations along the coast.

Effect Determination

The proposed work is currently scheduled to occur during the time of year when manatees are generally not visiting the area. If schedule slippage or weather changes result in work being performed when conditions are more favorable for the presence of manatees, then precautions will be taken to ensure that any manatees in the vicinity are not harmed or harassed. In addition, since the proposed work is to be performed with either a pipeline dredge or a hopper dredge (dredge plants that are slow moving) and since manatees are uncommon in the vicinity of Folly Island, no impacts to the manatee are anticipated. For these reasons, it has been determined that the proposed project is **not likely to adversely affect the manatee**.

5.3 Kemp's ridley, leatherback, loggerhead, green, and hawksbill sea turtles

There are five species of sea turtles on the Atlantic Coast, Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas)*, and the hawksbill sea turtle (*Eretmochelys imbricata*). These five species of sea turtles are protected by the Convention on International Trade in Endangered Species (CITES). They are also listed as endangered or vulnerable in the Red Data Book by the International Union for the Conservation of Nature (IUCN). The hawksbill, Kemp's ridley and leatherback were listed as endangered by the U. S. Endangered Species Act in 1973. The green turtle and the loggerhead were added to the list as threatened in 1978.

Sea turtles vary in size from an average of 75 pounds for the olive ridley (does not occur in the project area) to the giant leatherback, which may exceed 800 pounds. Modified for living in the open ocean, they have paddle-like front limbs for swimming. The thick neck and head cannot be drawn back into the body. Sea turtles also have special respiratory mechanisms and organs to excrete excess salt taken in with seawater when they feed.

The leatherback is very different from the other sea turtle species. Instead of plates (scutes) on the shell, the leatherback's carapace has seven hard longitudinal ridges along the length of the back. Its rubber-like covering is black with white spots and a pinkish-white underside. The average length of its shell is 5 feet. The green turtle is the second largest sea turtle and the loggerhead the third. Green turtles get their name from the color of their fat, not their shells, which are grayish in older animals. The smallest sea turtle that may be present in the area of the proposed project is the Kemp's ridley; it has a drab olive to grayish-black shell. Loggerheads have rich reddish-brown shells and yellow on their undersides. The loggerhead's large skull provides for the attachment of strong jaw muscles for crushing conchs and crabs. The hawksbill has a patterned shell of brown and yellow with scutes that overlap like shingles on a roof. Its long, narrow head and beak enable it to feed among coral reefs.

Sea turtles occupy different habitats, depending upon their species, sex and age (size). Hatchlings and smaller juvenile loggerheads appear to live in floating mats of sargassum in the open ocean. This seaweed offers cover, protection from predators and a source of food. Larger juveniles are generally seen in the same coastal habitat as the adults, especially during the summer.

Leatherbacks feed entirely on jellyfish, and they often travel long distances to keep up with large concentrations of this food source drifting in the ocean currents. Green turtles are herbivorous and remain near pastures of turtle-preferred grasses. Often these pastures are not near their nesting beaches, so these turtles may migrate hundreds of miles to nest. Loggerheads usually leave the cold, coastal waters in the winter and are often seen along the edge of the Gulf Stream. Hawksbills live on coral reefs almost year-round, feeding on sponges, sea squirts and other bottom organisms. Although the Kemp's ridley nests only on Mexico's Gulf Coast, small juveniles of this species and the green turtle occur along the South Carolina coast during the summer.

Very little is known about male sea turtles since they almost never come ashore. Male loggerheads are seen in near-shore waters during the spring and early summer breeding season but apparently move back offshore once breeding is completed. Since the reproductive cycles of all sea turtles are similar, a generalized version encompasses all. Mating takes place offshore, and the turtles must only mate once to fertilize all eggs laid during the nesting season. When nesting, the female crawls onto the beach, usually at night, and digs a hole in the sand with her hind flippers. After laying about 100 (number of eggs vary among species) white, leathery eggs, she covers them and returns to the sea. A single female may nest several times a season, usually at 2-week intervals. The eggs incubate about 60 days, depending on the weather. Hatchlings dig out of the sand at night and make their way to the sea using light cues for guidance. Destruction of nests and hatchling mortality at sea are usually high. It appears sea turtles' high number of eggs per clutch and several nestings per season offset this high mortality rate. Nesting habits of

the Kemp's ridley deviate from those of other sea turtles. The Kemp's ridley is the only species that nests during the day. Most sea turtles do not nest every year. They return on either a 2- or 3-year cycle to the same general area or beach. Of these five species, only the loggerhead is considered to be a regular nester in SC. However, in September 1996, a green sea turtle nested on Garden City Beach and another also nested on Garden City Beach in September 2002. Leatherback nests were recorded on Huntington Beach State Park in 2000, at Botany Bay in June 2003 and on Folly Beach in July 2003. There is no critical habitat designation for sea turtles in SC. For purposes of this assessment, the loggerhead is considered to be the only species likely to nest in the project area.

Loggerhead Sea Turtle. The loggerhead sea turtle has a worldwide distribution and is found in temperate and subtropical waters. Major nesting areas in North America occur along the Southeast Coast from North Carolina to Florida. Loggerhead sea turtles regularly nest along the southern coast of South Carolina from Georgetown south, usually from mid-May to August. Nesting is preferred on remote beaches-and away from human disturbance. The loggerhead is considered a turtle of shallow water with juveniles preferring bays and estuaries. An omnivore, crustaceans, molluscs, squid, jellyfish, fish, and plant materials are desirable foods. Stranding data reveals that up to 70% of all stranded sea turtles are loggerheads with the majority of strandings occurring from May to August. Therefore, it can be surmised that the potential presence of loggerheads in the project area would most-likely occur at this time. In Georgia, South Carolina and North Carolina the nesting season generally begins in mid-May and ends by mid-August. Nesting activity is greatest, however, in June and July. Loggerheads are known to nest from one to seven times within a nesting season; the mean is approximately 4.1. The internesting interval varies around a mean of about 14 days. There is general agreement that females mate prior to the nesting season (and possibly only once) and then lay multiple clutches of fertile eggs throughout some portion of the nesting season. Mean clutch size varies from about 100 to 125 along the southeastern United States coast. Loggerheads are nocturnal nesters, but exceptions to the rule do occur infrequently. Multi-annual remigration intervals of two and three years are most common in loggerheads, but the number can vary from one to six years. The length of the incubation period is related to nest temperature. Sex determination in loggerhead hatchlings is temperature dependent and the species apparently lacks sex chromosomes. Loggerhead hatchlings engage in a "swimming frenzy" for about 20 hours after they enter the sea and that frenzy takes them about 22 to 28 kilometers offshore. At some point thereafter they become associated with sargassum rafts and/or debris at current gyres. Upon reaching about 45 cm mean straight carapace length (sCL), they abandon their pelagic existence and migrate to near-shore and estuarine waters of the eastern United States, the Gulf of Mexico and the Bahamas and begin the subadult stage. As adults, loggerheads become migratory for the purpose of breeding. Reported tag recoveries suggest a "migratory path" from Georgia to Cape Hatteras, North Carolina with a single recovery of a Georgia tagged female on the Florida Gulf Coast (Tampa Bay). Little else is known of the scheduled travels of Georgia, South Carolina, and North Carolina nesters outside of the nesting season (NMFS, USFWS, 1991).

Affected sea turtle environment. The areas of affected environment for this proposed project are the four marine areas (an approximate 625 acre total area) proposed for borrow material dredging (see Figure 2) and the placement of an estimated 1,700,000 cubic yards of sand along 28,200 feet of beach from the east terminal groin southward. This sand placement

will result in an increase in the size of the dry beach; conversion of existing intertidal beach to dry beach and shifting the intertidal zone seaward from its existing location; and conversion of some subtidal beach to intertidal beach and shifting the subtidal zone seaward from its existing location. Due to erosion, these acreages and the shifting of the intertidal and subtidal zones will change over time.

Current rangewide conditions for sea turtles. It is not possible, at present, to estimate the size of the loggerhead population in United States territorial waters if one includes subadults. There is, however, general agreement that enumeration of nesting females provides a useful index to population size and stability. It is estimated that 14,150 females nest per year in the southeastern United States. This estimate was based on aerial survey data from 1983 has been accepted as the best current approximation. Given a stochastically derived mean number of nests per female (4.1), this figure provides an estimate of approximately 58,000 nests deposited per year in the Southeast. Based on more extensive ground and aerial surveys throughout the Southeast in recent years (1987 to 1990), it is estimated that approximately 50,000-70,000 nests are deposited annually. These totals constitute about 35 to 40 percent of the loggerhead nesting known worldwide and clearly rank the southeastern United States aggregation as the second largest in the world, with the somewhat larger Oman assemblage being the only other truly large group remaining anywhere (NMFS, USFWS, 1991).

A recent review considered consequences of life tables and population models; mortality rates in the Southeast; population declines in South Carolina and Georgia; and estimates of annual mean clutch production per female. It was concluded that the stock of loggerheads represented by females that nest in the Southeast is continuing to decline (NMFS, USFWS, 1991).

Factors Impacting Nesting Success in the Area

In general, no other factor contributes to egg mortality more than nest predation. A variety of natural and introduced predators such as raccoons, foxes, ghost crabs and ants prey on incubating eggs and hatchling sea turtles. Normally, it is expected that the raccoon (*Procyon lotor*) would be the principal predator, as it is throughout the coast, followed by fox and ghost crabs. Raccoons are known to patrol primary dune lines at night and dig up nests after they were buried in the dune. Raccoons may take up to 96 percent of all nests deposited on a beach if there is no intervention. These nests may be empty or only have a few eggs remaining after predation. Any remaining eggs can be cleaned and then relocated, however, these small nests normally exhibit very low hatching success. In addition to the destruction of eggs, other predators may take considerable numbers of hatchlings just prior to or upon emergence from the sand (NMFS, USFWS, 1991).

Cumulative effects of actions in project area on sea turtles. Very little is known about sea turtle diseases or natural mortality rates. However, it is believed that declines in populations are a direct result of human actions. Erosion of nesting beaches can result in partial or total loss of suitable nesting habitat. Dynamic coastal processes, including sea level rise, influence erosion rates. Man's interference with these natural processes through coastal development and associated activities has resulted in accelerated erosion rates and interruption of natural shoreline

migration. Where beachfront development occurs the site is often fortified to protect the property from erosion. Virtually all shoreline engineering is carried out to save structures, not dry sandy beaches, and ultimately, this results in environmental damage. One type of shoreline engineering, collectively referred to as beach armoring, includes sea walls, rock revetments, riprap, sandbag installations, groins and jetties. Beach armoring can result in permanent loss of a dry nesting beach through accelerated erosion and prevention of natural beach/dune accretion and can prevent or hamper nesting females from accessing suitable nesting sites. Clutches deposited seaward of these structures may be inundated at high tide or washed out entirely by increased wave action near the base of these structures. As these structures fail and break apart they spread debris on the beach that may further impede access to suitable nesting sites (resulting in higher incidences of false crawls) and trap hatchlings and nesting turtles. Sandbags are particularly susceptible to rapid failure and result in extensive debris on nesting beaches. Rock revetments, riprap and sand bags can cause nesting turtles to abandon nesting attempts or to construct improperly, sized and shaped egg cavities when inadequate amounts of sand cover these structures. Approximately 21 percent (234 km) of Florida's, 10 percent (18 km) of Georgia's and 10 percent (30 km;) of South Carolina's beaches are armored (NMFS, USFWS, 1991).

Groins and jetties are designed to trap sand during transport in longshore currents or to keep sand from flowing into channels in the case of the latter. These structures prevent normal sand transport and accrete beaches on one side of the structure while starving neighboring beaches on the other side thereby resulting in severe beach erosion and corresponding degradation of suitable nesting habitat. Beach nourishment consists of pumping, trucking or scraping sand onto the beach to rebuild what has been lost to erosion. Beach nourishment can impact turtles through direct burial of nests and by disturbance to nesting turtles if conducted during the nesting season. Sand sources may be dissimilar from native beach sediments and can affect nest site selection, digging behavior, incubation temperature (and hence sex ratios), gas exchange parameters within incubating nests, hydric environment of the nest, hatching success and hatchling emergence success. Beach nourishment can result in severe compaction or concretion of the beach. Trucking of sand onto project beaches may increase the level of compaction (NMFS, USFWS, 1991).

Significant reductions in nesting success have been documented on severely compacted nourished beaches. Compaction levels that have been evaluated at ten re-nourished east coast Florida beaches concluded that 50 percent were hard enough to inhibit nest digging, 30 percent were questionable as to whether their hardness affected nest digging and 20 percent were probably not hard enough to affect nest digging. In general, beaches nourished from offshore borrow sites are harder than natural beaches, and, while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more. However, it is not known if these conclusions on Florida beaches are applicable to South Carolina beaches, since informal observations and sporadic cone penetrometer testing throughout the state has shown nesting occurring where sand compaction is over 500 pounds per square inch. In light of this limited amount of information, the Charleston District proposes to test sea turtle (loggerheads) nesting preferences by tilling only alternate sections of the beach after sand placement, as described in the Effect Determination Section. Nourished beaches often result in severe escarpments along the mid-beach and can hamper or prevent access to nesting sites.

Nourishment projects result in heavy machinery, pipelines, increased human activity and artificial lighting on the project beach. These activities are normally conducted on a 24-hour basis and can adversely affect nesting and hatching activities. Pipelines and heavy machinery can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls (non-nesting emergences). Increased human activity on the project beach at night may cause further disturbance to nesting females. Artificial lights along the project beach and in the nearshore area of the borrow site may deter nesting females and disorient or misorient emergent hatchlings from adjacent non-project beaches (NMFS, USFWS, 1991).

Beach nourishment projects require continual maintenance (subsequent nourishment) as beaches erode and hence their potential negative impacts to turtles are repeated on a regular basis. Beach nourishment projects conducted during the nesting season can result in the loss of some nests which may be inadvertently missed or misidentified as false crawls during daily patrols conducted to identify and relocate nests deposited on the project beach. Nourishment of highly eroded beaches (especially those with a complete absence of dry beach) can be beneficial to nesting turtles if conducted properly. Careful consideration and advance planning and coordination must be carried out to ensure timing, methodology and sand sources are compatible with nesting and hatching requirements (NMFS, USFWS, 1991).

Extensive research has demonstrated that the principal component of the sea finding behavior of emergent hatchlings is a visual response to light. Artificial beachfront lighting from buildings, streetlights, dune crossovers, vehicles and other types of beachfront lights has been documented in the disorientation (loss of bearings) and misorientation (incorrect orientation) of hatchling turtles. The results of disorientation or misorientation are often fatal. As hatchlings head toward lights or meander along the beach their exposure to predators and likelihood of desiccation is greatly increased. Misoriented hatchlings can become entrapped in vegetation or debris, and many hatchlings are found dead on nearby roadways and in parking lots after being struck by vehicles. Hatchlings that successfully find the water may be misoriented after entering the surf zone or while in nearshore waters. Intense artificial lighting can even draw hatchlings back out of the surf (NMFS, USFWS, 1991).

The problem of artificial beachfront lighting is not restricted to hatchlings. It has been indicated that adult loggerhead emergence patterns were correlated with variations in beachfront lighting in south Brevard County, Florida, and that nesting females avoided areas where beachfront lights were the most intense. It has also been noted that loggerheads aborted nesting attempts at a greater frequency in lighted areas. Problem lights may not be restricted to those placed directly on or in close proximity to nesting beaches. The background glow associated with intensive inland lighting, such as that emanating from nearby large metropolitan areas, may deter nesting females and disorient or misorient hatchlings navigating the nearshore waters. Cumulatively, along the heavily developed beaches of the southeastern United States, the negative effects of artificial lights are profound (NMFS, USFWS, 1991).

Residential and tourist use of developed (and developing) nesting beaches can also result in negative impacts to nesting turtles, incubating egg clutches and hatchlings. The most serious threat caused by increased human presence on the beach is the disturbance to nesting females.

Night-time human activity can cause nesting females to abort nesting attempts at all stages of the behavioral process. It has been reported that disturbance can cause turtles to shift their nesting beaches, delay egg laying, and select poor nesting sites. Heavy utilization of nesting beaches by humans (pedestrian traffic) may result in lowered hatchling emergence success rates due to compaction of sand above nests and pedestrian tracks can interfere with the ability of hatchlings to reach the ocean. Campfires and the use of flashlights on nesting beaches misorient hatchlings and can deter nesting females (NMFS, USFWS, 1991).

Nest loss due to erosion or inundation and accretion of sand above incubating nests appear to be the principal abiotic factors that may negatively affect incubating egg clutches. While these factors are often widely perceived as contributing significantly to nest mortality or lowered hatching success, few quantitative studies have been conducted. Studies on a relatively undisturbed nesting beach indicated that, excepting a late season severe storm event, erosion and inundation played a relatively minor role in destruction of incubating nests. Inundation of nests and accretion of sand above incubating nests as a result of the late season storm played a major role in destroying nests from which hatchlings had not yet emerged. Severe storm events (e.g., tropical storms and hurricanes) may result in significant nest loss, but these events are typically aperiodic rather than annual occurrences. In the southeastern United States, severe storm events are generally experienced after the peak of the hatching season and hence would not be expected to affect the majority of incubating nests. Erosion and inundation of nests are exacerbated through coastal development and shoreline engineering. These threats are discussed above under beach armoring (NMFS, USFWS, 1991).

The effects of dredging are evidenced through the degradation of habitat and incidental take of marine turtles. Channelization of inshore and nearshore habitat and the disposal of dredged material in the marine environment can destroy or disrupt resting or foraging grounds (including grass beds and coral reefs) and may affect nesting distribution through the alteration of physical features in the marine environment. Hopper dredges are responsible for incidental take and mortality of marine turtles during dredging operations. Other types of dredges (clamshell and pipeline) have not been implicated in incidental take (NMFS, USFWS, 1991). Incidental takes of sea turtles by hopper dredges comes under the jurisdiction of NOAA Fisheries and is covered by a separate Biological Opinion (NMFS, 1997).

Of all commercial and recreational fisheries conducted in the United States, shrimp trawling is the most damaging to the recovery of marine turtles. The estimated number of loggerheads killed annually by the offshore shrimping fleet in the southeastern United States Atlantic and Gulf of Mexico is 5,000 to 50,000. Incidental capture and drowning in shrimp trawls is believed to be the largest single source of mortality on juvenile through adult stage marine turtles in the southeastern United States. Most of these turtles are juveniles and subadults, the age and size classes most critical to the stability and recovery of marine turtle populations. Quantitative estimates of turtle take by shrimp trawlers in inshore waters have not been developed, but the level of trawling effort expended in inshore waters along with increasing documentation of the utilization of inshore habitat by loggerhead turtles suggest that capture and mortality may be significant. Trawlers targeting species other than shrimp tend to use larger nets than shrimp trawlers and probably also take sea turtles, although capture levels have not been developed. These fisheries include, but are not limited to bluefish, croaker, flounder, calico

scallops, blue crab and whelk. Of these, the bluefish, croaker and flounder trawl fisheries likely pose the most serious threats. The harvest of sargassum by trawlers can result in incidental capture of post hatchlings and habitat destruction (NMFS, USFWS, 1991).

Effect Determination

Loggerhead sea turtle nesting activities have been recorded within the project area on Folly Island. The placement of sand and construction activities associated with the placement of that sand on this reach of beach could adversely affect any existing sea turtle nests and sea turtles attempting to nest. Placement of the dredged material is currently scheduled to occur during the months of November through April; however, it is possible that the start of construction work will be delayed until nesting season or that completion of the project will be delayed and construction will extend into the nesting season. If any construction work occurs during sea turtle nesting season, then the following precautions will be taken to minimize the effects to sea turtles:

- If any construction of the project occurs during the period between May 1 and November 30, daily nesting surveys will be conducted starting either May 1 or 65 days prior to the start of construction, whichever is later. These surveys will be performed between sunrise and 9:00 A.M. and will continue until the end of the project, or September 30, whichever is earlier. Any nests found in the area that will be impacted by construction activities will be moved to a safe location. The nesting surveys and nest relocations will only be performed by people with a valid South Carolina DNR permit.

- If any construction of the project occurs during the period December 1 to April 30, no nesting surveys will be performed.

- For construction activities occurring during the period May 1 through November 30, staging areas for equipment and supplies will be located off of the beach to the maximum extent possible.

- For construction activities occurring during the period May 1 through November 30, all on-beach lighting associated with the project will be limited to the minimum amount necessary around active construction areas to satisfy Occupational Safety and Health Administration (OSHA) requirements.

Immediately after completion of the project, the Corps of Engineers will perform cone penetrometer compaction testing of the newly constructed sand berm. This compaction testing will be repeated for 3 subsequent years, prior to May 1 of each year. If compaction testing shows sand compaction to be greater than 500 pounds per square inch (psi), then the following tilling protocol will be performed:

For a period of 3 years, starting at the most northern reach of the project, the sand placed on the beach will be tilled/untilled in alternating sections of 500 feet each. Sea turtle nesting data and false crawls will be monitored for this

3-year period and analyzed to determine if tilling (or lack of tilling) has an effect on nesting behavior.

This tilling protocol is being proposed because informal observations and sporadic cone penetrometer testing throughout the State of South Carolina has frequently shown nesting occurring where sand compaction is much greater than 500 psi. Since most previous turtle nesting/sand compaction research has been done in Florida, it is questionable as to whether those test results are applicable to South Carolina's shores. This tilling protocol, when combined with other data being collected in the state, should help answer the question of whether tilling is necessary on re-nourished beaches.

Visual surveys for escarpments along the project area will be made immediately after completion of the project and prior to May 1 for 3 subsequent years. Results of the surveys will be submitted to the USFWS prior to any action being taken. Since construction of the project should not occur during the sea turtle nesting season, escarpment leveling will not be performed until immediately prior to the nesting season. The USFWS will be contacted immediately if subsequent reformation of escarpments exceeding 18 inches in height for a distance of 100 feet occurs during nesting and hatching season. This coordination will determine what appropriate action must be taken. An annual summary of escarpment surveys and action taken will be submitted to the USFWS.

Adherence to the above precautions should minimize the effects to nesting loggerhead sea turtles and emerging loggerhead sea turtle hatchlings. The monitoring and relocation program will minimize potential adverse affects to nesting sea turtles. Completion of the project will recreate lost habitat and protect existing turtle nesting habitat as well as the structures on the island. However, because of the possibility of missing a sea turtle nest during the nest monitoring program or inadvertently breaking eggs during relocation, it has been determined that the proposed project **may adversely affect the loggerhead sea turtle**.

5.4 Shortnose sturgeon

The Shortnose Sturgeon occurs in Atlantic seaboard rivers from southern New Brunswick to northeastern Florida. Department of Commerce studies have shown that the shortnose sturgeon exists in many of the large coastal river systems in South Carolina. Little is known about the shortnose sturgeon population level, life history or ecology. Their status is probably due to exploitation, damming of rivers and deterioration of water quality. Because there is no coastal river associated with this project, there is a lack of suitable freshwater spawning areas for the sturgeon in the immediate project area.

Effect Determination

It is unlikely that the shortnose sturgeon occurs in the project area, however, should it occur, its habitat would be only minimally altered by the proposed project. Any shortnose sturgeons in the area should be able to avoid being taken by a slow moving pipeline dredge or hopper dredge. For these reasons, it has been determined that the proposed project is **not likely to adversely affect the shortnose sturgeon**.

5.5 Piping plover

Piping plovers are small shorebirds approximately six inches long with sand-colored plumage on their backs and crown and white under parts. Breeding birds have a single black breast band, a black bar across the forehead, bright orange legs and bill, and a black tip on the bill. During the winter, the birds lose the black bands, the legs fade to pale yellow, and the bill becomes mostly black.

The piping plover breeds on the northern Great Plains, in the Great Lakes, and along the Atlantic coast (Newfoundland to North Carolina); and winters on the Atlantic and Gulf of Mexico coasts from North Carolina to Mexico, and in the Bahamas West Indies.

Piping plovers nest along the sandy beaches of the Atlantic Coast from Newfoundland to North Carolina, the gravelly shorelines of the Great Lakes, and on river sandbars and alkali wetlands throughout the Great Plains region. They prefer to nest in sparsely vegetated areas that are slightly raised in elevation (like a beach berm). Piping plover breeding territories generally include a feeding area, such as a dune pond or slough, or near the lakeshore or ocean edge. The piping plover winters along the coast, preferring areas with expansive sand or mudflats (feeding) in close proximity to a sandy beach (roosting). The primary threats to the piping plover are habitat modification and destruction, and human disturbance to nesting adults and flightless chicks. A lack of undisturbed habitat has been cited as a reason for the decline of other shorebirds such as the black skimmer and least tern (USFWS, 1996a).

The piping plover is an occasional visitor along the South Carolina coast during the winter months and individuals are occasionally sighted in the project area. However, there are no large wintering concentrations in the state. Piping plovers are considered threatened species under the Endangered Species Act of 1973, as amended, when on their wintering grounds. The species is not known to nest in the project area.

Effect Determination

Placement of the dredged material is currently scheduled to occur during the months of November through April. Direct loss of nests from the disposal of the dredged material should not occur, as the species is not known to nest in the project area. Piping plover foraging distribution on the beach during the winter months may be altered as beach food resources may be affected by placement of material along the project area. Such disruptions will be temporary and of minor significance. Any shorebird habitat area originally existing along the length of the island has suffered severe erosion. Dredged material will likely help restore the habitat lost to erosion in this area while the protective berm is being constructed. The placement of dredged material into the intertidal zone will provide additional foraging habitat for the wintering piping plover. For these reasons, it has been determined that the proposed project is **not likely to adversely affect the piping plover**. It has also been determined that the proposed project is **not likely to adversely modify critical habitat for wintering piping plovers**.

5.6 Seabeach Amaranth

Seabeach amaranth (*Amaranthus pumilus*) is an annual plant historically native to the barrier island beaches of the Atlantic coast from Massachusetts to South Carolina. No other vascular plant occurs closer to the ocean. The species was Federally listed as threatened by the U.S. Fish and Wildlife Service in 1993 (COE, 2001). Seabeach amaranth is listed as threatened and of national concern in South Carolina.

Germination takes place over a relatively long period of time, generally beginning in April and continuing at least through July. Upon germinating, this plant initially forms a small-unbranched sprig but soon begins to branch profusely into a clump, often reaching a foot in diameter and consisting of 5 to 20 branches. Occasionally a clump may get as large as a yard of more across, with hundreds of branches. The stems are fleshy and pink-red or reddish, with small rounded leaves that are 1.3 to 2.5 centimeters in diameter. The leaves are clustered toward the tip of the stem, are normally a somewhat shiny, spinach-green color, and have a small notch at the rounded tip. Flowers and fruits are relatively inconspicuous and are borne in clusters along the stems. Flowering begins as soon as plants have reached sufficient size, sometimes as early as June in the Carolinas but more typically commencing in July and continuing until their death in late fall or early winter. Seed production begins in July or August and reaches a peak in most years in September; it likewise continues until the plant dies (COE, 2001).

Seabeach amaranth occurs on barrier island beaches, where its primary habitat consists of overwash flats at accreting ends of islands and lower foredunes and upper strands of non-eroding beaches. It occasionally establishes small temporary populations in other habitats, including sound side beaches, blowouts in foredunes, and in dredged material placed for beach re-nourishment or disposal. Seabeach amaranth appears to be intolerant of competition and does not occur on well-vegetated sites. The species appears to need extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner. These characteristics allow it to move around in the landscape as a fugitive species, occupying suitable habitat as it becomes available (COE, 2001).

Seabeach amaranth is a "fugitive" species that cannot compete with dense perennial beach vegetation and only occurs in the newly-disturbed habitat of a high-energy beach. It occurs on barren or sparsely-vegetated sand above the high water line, an area classified as marine wetland. This habitat usually disappears completely when seawalls or other hard structures are built along the shoreline. This loss of habitat from seawall construction and global sea level rise are thought to be major factors in the species' extirpation throughout parts of its historic range. It has been postulated that estuarine and coastal shore plants will suffer some of the most significant impacts as a result of global climate changes. Coastal development will prevent these species from migrating up slope to slightly higher ground if sea levels rise. To a large extent, this is already occurring as beaches are being fortified to prevent erosion. Beach re-nourishment projects eliminate existing plants if conducted during the summer and may bury the seed needed to reestablish the plant the following year if conducted during the winter. However, beach re-nourishment projects often rebuild the habitat this species requires. Fortification with seawalls and other stabilization structures or heavy vehicular traffic may eliminate seabeach amaranth populations locally. Any given site will become unsuitable at some time because of

natural forces. However, if a seed source is no longer available in adjacent areas, seabeach amaranth will be unable to reestablish itself when the site is once again suitable or new favorable habitat is created. In this way, it can be progressively eliminated even from generally favorable stretches of habitat surrounded by permanently unfavorable areas (COE, 2001).

Historically, seabeach amaranth occurred in 31 counties in 9 states from Massachusetts to South Carolina. It has been eliminated from six of the States in its historic range. The only remaining large populations are in New York and North Carolina. Surveys in South Carolina found that the number of plants along our coast dropped by 90% (from 1,800 to 188) as a result of Hurricane Hugo, subsequent winter storms and beach rebuilding projects that occurred in its wake. South Carolina populations are still low and exhibit a further downward trend although 1998 and 2003 were better years than most with 279 plants identified along the coast in 1998 and 1381 identified in 2003. The remaining populations in areas with suitable habitat are in constant danger of extirpation from hurricanes, webworm predation, and other natural and anthropogenic factors (COE, 2001). At the present time, there are no known populations of seabeach amaranth in the project area.

Effect Determination

Because there are no know populations of seabeach amaranth in the project area, there is also no viable seed source. As such, the proposed project is **not likely to adversely effect seabeach amaranth**.

6.0 SUMMARY OF PROTECTIVE MEASURES

Manatee

Should a change in the schedule necessitate work during the manatee migration period, personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing manatees. The Contractor may be held responsible for any manatee harmed, harassed, or killed as a result of vessel collisions or construction activities. Failure of the Contractor to follow these specifications is a violation of the Endangered Species Act and could result in prosecution of the Contractor under the Endangered Species Act or the Marine Mammals Protection Act. The standard manatee conditions apply annually from 1 June to 30 September. The Contractor will be instructed to take necessary precautions to avoid any contact with manatees. If manatees are sighted within 100 yards of the dredging area, all appropriate precautions will be implemented to insure protection of the manatee. The Contractor will stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than 100 yards of the manatee. Operation of equipment closer than 50 feet to a manatee will necessitate immediate shutdown of that equipment.

Right Whales

Since the construction is anticipated to be scheduled during the right whale migration period, personnel will be advised that there are civil and criminal penalties for harming,

harassing, or killing right whales. The Contractor may be held responsible for any whale harmed, harassed, or killed as a result of vessel collisions or construction activities. Failure of the Contractor to follow these specifications is a violation of the Endangered Species Act and could result in prosecution of the Contractor under the Endangered Species Act or the Marine Mammals Protection Act. The time when most right whale sightings occur is December, January, and February. The Contractor will be instructed to take necessary precautions to avoid any contact with whales. If whales are sighted within 1000 feet of the borrow area, all appropriate precautions will be implemented to insure protection of the whale. In addition, the Contractor will stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than this distance.

Sea Turtles

Should the schedule necessitate work during the sea turtle nesting time period, in order to minimize impacts to nesting sea turtles a beach monitoring and nest relocation program for sea turtles will be implemented. This program will include daily patrols of sand placement areas at sunrise, relocation of any nests laid in areas to be impacted by sand placement, and monitoring of hatching success of the relocated nests. Sea turtle nests will be relocated to an area suitable to both the USFWS and the SCDNR. The Corps will perform any necessary maintenance of beach profile (tilling and shaping or knocking down escarpments) during construction and prior to each nesting season.

During construction of this project, staging areas for construction equipment will be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all dredge pipes that are placed on the beach will be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes will be off the beach to the maximum extent possible. Temporary storage of pipes on the beach will be in such a manner so as to impact the least amount of nesting habitat and will likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline will be recommended as the method of storage).

During construction of this project, all on-beach lighting associated with the project will be limited to the immediate area of active construction only. Such lighting will be shielded, low-pressure sodium vapor lights to minimize illumination of the nesting beach and nearshore waters. Red filters will be placed over vehicle headlights (i.e., bulldozers, front end loaders). Lighting on offshore equipment will be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded, low pressure sodium vapor lights will be highly recommended for lights on any offshore equipment that cannot be eliminated.

7.0 SUMMARY OF EFFECT DETERMINATIONS

This assessment has examined the potential impacts of the proposed project on the habitat and listed species of plants and animals that are, or have been, present in the project area. Both primary and secondary impacts to habitat have been considered. Critical habitat has not been designated for whales, manatees, sea turtles, or sturgeon in South Carolina; therefore, none would be affected. Based on this analysis, the following determinations have been made.

- It has been determined that the proposed project is not likely to adversely affect the blue, finback, humpback, right, sei, or sperm whales.
- It has been determined that the proposed project is not likely to adversely affect the manatee.
- It has been determined that the proposed project is not likely to adversely affect Kemp's ridley, leatherback, green, or hawksbill sea turtles.
- It has been determined that the proposed project is not likely to adversely affect the shortnose sturgeon.
- It has been determined that the proposed project is not likely to adversely affect the piping plover.
- It has been determined that the proposed project is not likely to adversely affect seabeach amaranth.
- It has been determined that the proposed project is not likely to adversely modify critical habitat for wintering piping plovers.
- It has been determined that the proposed project may adversely affect the nesting loggerhead sea turtle.

8.0 List of Contacts Made

Extensive use was made of the research, communication, and coordination that was part of the March 2003 Biological Assessment prepared for the Pawleys Island Hurricane and Storm Damage Reduction project in Georgetown County, South Carolina and the August 2004 Biological Assessment prepared for the Hunting Island Ecosystem Restoration and Protection Project in Beaufort County, South Carolina.

In addition to all the coordination that occurred with the development of those documents, most of which equally applies to this project area, there is continuous contact with USFWS, SCDNR, SCDHEC, and NOAA Fisheries with regard to this coastal project and the development of the supporting EA and water quality work (all of which is utilized in this document). Extensive communication and coordination will continue to occur with USFWS, SCDNR, SCDHEC-OCRM, and NOAA Fisheries to adequately address environmental concerns until the beach re-nourishment project is completed.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

March 11, 2005

Mr. Joseph A. Jones
Chief, Planning Branch
Department of the Army
U.S. Army Corps of Engineers
69A Hagood Avenue
Charleston, SC 29403-5107

Attn: Alan Shirey

Re: Folly Beach Renourishment
Charleston County, South Carolina
FWS Log No. 4-6-04-F-111R

Dear Mr. Jones:

This document is the Fish and Wildlife Service's (Service) revised biological opinion based on additional information obtained regarding the original incidental take statement and on our review of the proposed sand relocation project located in the waters of the Atlantic Ocean along the shoreline of Folly Beach in Charleston County, South Carolina, and its effects on the loggerhead sea turtle (*Caretta caretta*), the leatherback sea turtle (*Dermochelys coriacea*), the piping plover (*Charadrius melodus*) and designated critical habitat, and the seabeach amaranth (*Amaranthus pumilus*) per section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your September 30, 2004, request for formal consultation was received on December 9, 2004.

This biological opinion is based on information provided in the September 30, 2004, biological assessment, the September 30, 2004, draft environmental assessment, the January 12, 2005, re-nourishment meeting, other sources of information, and further communication with related parties. A complete administrative record of this consultation is on file at the Charleston Field Office, 176 Croghan Spur Road, Suite 200, Charleston, South Carolina 29407.

CONSULTATION HISTORY

September 30, 2004 - The Service received the biological assessment.

December 9, 2004 – The Service provided a letter to the Department of the Army that acknowledged receipt of all information necessary to initiate formal consultation on the proposed action, as required in the regulations governing interagency consultations (50 (Code of Federal Regulations [CFR] 402.14)

January 10, 2005 - The Service received a letter from the Department of the Army that informed us of changes to the authority, quantity of sand, and time frame for the proposed project.

January 12, 2005 - The Service attended a meeting with other state and local agencies at the U.S. Army Corps of Engineers (Corps) to discuss the changes addressed in the letter received on January 10, 2005.

FWS Log No: 4-6-04-F-111
Application No: PL84-99
Date Started: December 9, 2004
Ecosystem: 75j
Applicant: Town of Folly Beach
Action Agency: Corps and Federal Emergency Management Administration
Project Title: Folly Beach Renourishment
County: Charleston

Table 1. Species and critical habitat evaluated for effects and those where the Service has concurred with a "not likely to be adversely affected" determination.

SPECIES or CRITICAL HABITAT	PRESENT IN ACTION AREA
Piping plover	No
Piping plover critical habitat	No
Seabeach amaranth	No

The above species and critical habitat not impacted by this action will not be discussed further in this biological opinion.

Also, this opinion does not address potential impacts of this project on loggerhead or leatherback sea turtles while in the open ocean. The Service's endangered species jurisdiction only extends to nesting turtles. Turtles in the open ocean are the jurisdiction of the Department of Commerce's National Marine Fisheries Service (NMFS).

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Project Description

The proposed project consists of the nourishment of 28,200 linear feet (5.34 linear miles) of shoreline. The project extends from just below the U.S. Coast Guard Base and extends to the Charleston County Park on the west end of Folly Island. The exact quantity of sand that will be placed on the beach during re-nourishment will be dependent on the existing beach profile at the time of construction; however, based on expected erosion rates, it is estimated that two million cubic yards of beach quality sand will be placed on the beach.

Construction will be by means of hydraulic cutterhead dredge that will transport the sand through a pipeline. The pipeline will run parallel with the beach. Beach compatible material (sand) from the off-shore source will be pumped along the roughly 28,000 linear feet reach of the project and will be discharged as a slurry. During construction temporary training dikes of sand will be used to contain the discharge and control the fill placement. Fill sections will be graded by land-based equipment, such as bulldozers, articulated front-end loaders, and other equipment as necessary to achieve the desired beach profile. It is anticipated that construction will begin in March 2005 and will require from six to eight months for completion.

The borrow areas being used for beach compatible sand are about 620 acres and are located about three miles off-shore of the northern end of the island. None of the three borrow areas are inside any CBRA zones. The borrow areas have been surveyed by side-scan sonar, followed by the collection of numerous vibracore samples in each of the potential borrow sites. This was done to avoid hard/live bottom areas during dredging, and to ensure that adequate quantities of beach compatible sand were available in the three areas. The size, sand volume (based on dredging to a depth of six feet), and water depth of each borrow area are as follows:

Borrow Area	Area (Acres)	Volume (Cubic yards)	Water Depth (Feet)
A	~310	3,130,000	26-36
B	~210	2,030,000	32-40
C	~30	320,000	34
D	~70	400,000	40

Sand will be removed from the borrow areas to a depth of six to eight feet. Because of the dynamic nature of the coastal area and the constant movement of sand, it is expected that the borrow areas will fill with sand of the same grain size after the dredging has been completed.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*), listed as a threatened species on July 28, 1978, (Federal Register [FR] 1978), inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. Loggerhead sea turtles nest within the continental U.S. from Louisiana to Virginia. Major nesting concentrations in the U.S. are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (Hopkins and Richardson, 1984).

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

Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*) listed as an endangered species on June 2, 1970, (FR 1970), nests on shores of the Atlantic, Pacific, and Indian Oceans. Non-breeding animals have been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard, 1992). Nesting grounds are distributed worldwide, with the Pacific Coast of Mexico supporting the world's largest known concentration of nesting leatherbacks. The largest nesting colony in the wider Caribbean region is found in French Guiana, but nesting occurs frequently, although in lesser numbers, from Costa Rica to Columbia and in Guyana, Surinam, and Trinidad (NMFS and Service, 1992; National Research Council [NRC], 1990a).

The leatherback regularly nests in the U.S. in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (NMFS and Service, 1992). Leatherback turtles have been known to nest in Georgia, South Carolina, and North Carolina, but only on rare occasions (Murphy, 1996; Winn, 1996; Boettcher, 1998). Leatherback nesting also has been reported on the northwest coast of Florida (LeBuff, 1990; Florida Fish and Wildlife Conservation Commission; unpublished data); a false crawl (non-nesting emergence) has been observed on Sanibel Island (LeBuff, 1990).

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

Life history

Loggerhead Sea Turtle

Loggerheads are known to nest from one to seven times within a nesting season (Talbert et al., 1980; Richardson and Richardson, 1982; Lenarz et al., 1981); the mean is about 4.1 (Murphy and Hopkins, 1984). The interval between nesting events within a season varies around a mean of about 14 days (Dodd, 1988). Mean clutch size varies from about 100 to 126 along the southeastern United States coast (NMFS and Service, 1991b). Nesting migration intervals of two to three years are most common in loggerheads, but the number can vary from one to seven years (Dodd, 1988). Age at sexual maturity is believed to be about 20 to 30 years (Turtle Expert Working Group [TWEG], 1998).

Leatherback Sea Turtle

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 (NMFS and Service, 1992). The interval between nesting events within a season is about nine to ten days. Clutch size averages 101 eggs on Hutchinson Island, Florida (Martin, 1992). Nesting migration intervals of two to three years were observed in leatherbacks nesting on the Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald and Dutton, 1996). Leatherbacks are believed to reach sexual maturity in six to ten years (Zug and Parham, 1996).

Population dynamics

Loggerhead Sea Turtle

Total estimated nesting in the Southeast is approximately 68,000 to 90,000 nests per year (Florida Fish and Wildlife Conservation Commission statewide nesting database, 2002; Georgia Department of Natural Resources statewide nesting database, 2002; South Carolina Department of Natural Resources [SCDNR] statewide nesting database, 2002; North Carolina Wildlife Resources Commission statewide nesting database, 2002). In 1998, there were over 80,000 nests in Florida alone. From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to that which nests on islands in the Arabian Sea off Oman (Ross, 1982; Ehrhart, 1989; NMFS and Service, 1991b). The status of the Oman colony has not been evaluated recently, but its location in a part of the world that is vulnerable to disruptive events (e.g., political upheavals, wars, catastrophic oil spills) is cause for considerable concern (Meylan et al., 1995). The loggerhead nesting aggregations in Oman, the southeastern U.S., and Australia account for about 88 percent of nesting worldwide (NMFS and Service, 1991b). About 80% of loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties) (NMFS and Service, 1991b).

Leatherback Sea Turtle

Recent estimates of global nesting populations indicate 26,000 to 43,000 nesting females annually (Spotila *et al.*, 1996). The largest nesting populations at present occur in the western Atlantic in French Guiana (4,500 to 7,500 females nesting/year) and Colombia (estimated several thousand nests annually), and in the western Pacific in West Papua (formerly Irian Jaya) and Indonesia (about 600 to 650 females nesting/year). In the United States, small nesting populations occur on the Florida east coast (35 females/year), Sandy Point, U.S. Virgin Islands (50 to 100 females/year), and Puerto Rico (30 to 90 females/year).

Status and distribution

Loggerhead Turtle

Genetic research involving analysis of mitochondrial DNA has identified five different loggerhead subpopulations/nesting aggregations in the western North Atlantic: (1) the Northern Subpopulation occurring from North Carolina to around Cape Canaveral, Florida (about 29° N.); (2) South Florida Subpopulation occurring from about 29° N. on Florida's east coast to Sarasota on Florida's west coast; (3) Dry Tortugas, Florida, Subpopulation, (4) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and (5) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen, 1994; 1995; Bowen et al., 1993; Encalada et al., 1998; Pearce, 2001). These data indicate that gene flow between these five regions is limited. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation. The Northern Subpopulation has declined substantially since the early 1970s, but most of that decline occurred prior to 1979. No significant trend has been detected in recent years (TEWG, 1998; 2000). Adult loggerheads of the South Florida Subpopulation have shown significant increases over the last 25 years, indicating that the population is recovering, although a trend could not be detected from the State of Florida's Index Nesting Beach Survey program from 1989 to 2002. Nesting surveys in the Dry Tortugas, Northwest Florida, and Yucatán Subpopulations have been too irregular to date to allow for a meaningful trend analysis (Turtle Expert Working Group 1998, 2000).

Threats include incidental take from channel dredging and commercial trawling, longline, and gill net fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease. There is particular concern about the extensive incidental take of juvenile loggerheads in the eastern Atlantic by longline fishing vessels from several countries.

Leatherback Sea Turtle

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

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

Analysis of the Species/Critical Habitat Likely to be Affected

Loggerhead and Leatherback Sea Turtle

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

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

ENVIRONMENTAL BASELINE

Status of the species within the action area

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for South Carolina beaches extends from May 1st through November 30th. Incubation ranges from about 45 to 95 days. Loggerhead turtle nesting along South Carolina beaches varies from less than one nest per 0.62 miles at Turtle Island to more than 200 nests per 0.62 miles at Cape Island (Hopkins and Richardson 1984). Loggerhead nesting at Folly Beach averages 47 nests/year (unpublished data).

Leatherback Sea Turtle

The leatherback sea turtle nesting and hatchling season for South Carolina beaches extends from April 15th through September 30th. Leatherback turtle nesting is rare in Georgia, South Carolina, and North Carolina (Murphy 1996; Winn 1996; Boettcher, 1998). In 2003, there was one successful leatherback nest on Folly Beach (unpublished data).

EFFECTS OF THE ACTION

Factors to be considered

Proximity of the action

The proposed project is in the immediate vicinity of habitats important to nesting loggerhead sea turtles. Specifically, the proposed project will potentially impact habitat for the loggerhead sea turtles from the Northern subpopulation. In addition, the proposed action has the potential to directly impact 28,200 feet of shoreline (including pipeline placement and fill).

Distribution

Disturbance activities that will impact listed species will primarily occur on the ocean front shoreline of Folly Beach and the Atlantic Ocean. As mobile species, sea turtles may also be affected in nearby waterways and on adjacent islands by intraspecific competition, excessive energy expenditure, and marginally suitable habitat selection.

Timing

The timing of the proposed project will result in direct impacts occurring during the nesting season of loggerhead and leatherback sea turtles.

Nature of the Effect

The effects of the action are likely to destroy, alter, or diminish the nesting success of sea turtles. Any reduction in productivity and/or survival rate will contribute to a vulnerability to extinction in sea turtles.

Duration

The duration of the direct impacts resulting from construction operations could be short-term, lasting about six to eight months.

Analyses for effects of the action

Loggerhead Sea Turtle

Beneficial Effects

The placement of sand on a beach with reduced dry fore-dune habitat may increase sea turtle nesting habitat if the placed sand is compatible (i.e., grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project.

Direct Effects

Placement of sand on a beach in and of itself may not provide suitable nesting habitat for sea turtles. Although beach nourishment may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Nourishment construction during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program or a nest mark and avoidance program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, and/or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about seven percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (1994).

1. Nest relocation

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

Comparisons of hatching success between relocated and *in situ* nests have noted significant variation ranging from a 21% decrease to a nine percent increase for relocated nests (Florida Department of Environmental Protection, unpublished data). Comparisons of emergence success between relocated and *in situ* nests have also noted significant variation ranging from a 23% decrease to a five percent increase for relocated nests (DEP, unpublished data). A 1994 Florida Department of Environmental Protection study of hatching and emergence success of *in situ* and relocated nests at seven sites in Florida found that hatching success was lower for relocated nests in five of seven cases with an average decrease for all seven sites of 5.01% (range = 7.19% increase to 16.31% decrease). Emergence success was lower for relocated nests in all seven cases by an average of 11.67 percent (range = 3.6 to 23.36%) (Meylan, 1995).

2. Equipment

The placement of pipelines and the use of heavy machinery or equipment on the beach during a construction project may also have adverse effects on sea turtles. They can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure. The equipment can also create impediments to hatchling sea turtles as they crawl to the ocean.

3. Artificial lighting

Visual cues are the primary sea-finding mechanism for hatchling sea turtles (Mrosovsky and Carr, 1967; Mrosovsky and Shettleworth, 1968; Dickerson and Nelson, 1989; Witherington and Bjorndal, 1991). When artificial lighting is present on or near the beach, it can misdirect hatchlings once they emerge from their nests and prevent them from reaching the ocean

(Philibosian, 1976; Mann 1977; DEP, unpublished data). In addition, a significant reduction in sea turtle nesting activity has been documented on beaches illuminated with artificial lights (Witherington, 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest, misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings from adjacent non-project beaches. Any source of bright lighting can profoundly affect the orientation of hatchlings, both during the crawl from the beach to the ocean and once they begin swimming offshore. Hatchlings attracted to light sources on dredging barges may not only suffer from interference in migration, but may also experience higher probabilities of predation to predatory fishes that are also attracted to the barge lights. This impact could be reduced by using the minimum amount of light necessary (may require shielding) or low pressure sodium lighting during project construction.

Indirect Effects

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

1. Increased susceptibility to catastrophic events

Nest relocation may concentrate eggs in an area making them more susceptible to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater predation rates from both land and marine predators, because the predators learn where to concentrate their efforts (Glenn, 1998; Wyneken *et al.*, 1998).

2. Increased beachfront development

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

3. Changes in the physical environment

Beach nourishment may result in changes in sand density or compaction, beach shear resistance or hardness, beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson 1988a). These changes could result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings (Nelson and Dickerson, 1987; Nelson 1988).

Beach compaction and unnatural beach profiles that may result from beach nourishment activities could negatively impact sea turtles regardless of the timing of projects. Very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson *et al.*, 1987; Nelson and Dickerson, 1988a). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Fletemeyer, 1980; Raymond, 1984; Nelson and Dickerson, 1987, Nelson *et al.*, 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and also cause increased physiological stress to the animals (Nelson and Dickerson, 1988c). Nelson and Dickerson (1988b) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for ten years or more. These impacts can be minimized by using suitable sand and by tilling compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson, 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain uncompacted for up to one year. Therefore, the Service requires multi-year beach compaction monitoring and, if necessary, tilling to ensure that project impacts on sea turtles are minimized.

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

4. Escarpment formation

On nourished beaches, steep escarpments may develop along their water line interface as they adjust from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center, 1984; Nelson *et al.*, 1987). In addition, escarpments may develop on the crenulate beaches located between groins as the beaches equilibrate to their final positions. These escarpments can hamper or prevent access to nesting sites (Nelson and

Blihovde, 1998). Researchers have shown that female turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (e.g., in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

Species' Response to the Proposed Action

Loggerhead Sea Turtle

Ernest and Martin (1999) conducted a comprehensive study to assess the effects of beach nourishment on loggerhead sea turtle nesting and reproductive success. The following findings illustrate sea turtle responses to and recovery from a sediment disposal project. A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on Control or pre-nourished beaches. This reduction in nesting success was most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics associated with the sediment disposal project (e.g., beach profile, sediment grain size, beach compaction, frequency and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on the untilled, hard-packed sands of one treatment area increased significantly relative to control and background conditions. However, in another treatment area, tilling was effective in reducing sediment compaction to levels that did not significantly prolong digging times. As natural processes reduced compaction levels on nourished beaches during the second post-construction year, digging times returned to background levels.

During the first post-construction year, nests on the nourished beaches were deposited significantly farther from both the toe of the dune and the tide line than nests on control beaches. Furthermore, nests were distributed throughout all available habitat and were not clustered near the dune as they were in the Control. As the width of nourished beaches decreased during the second year, among-treatment differences in nest placement diminished. More nests were washed out on the wide, flat beaches of the nourished treatments than on the narrower steeply sloped beaches of the Control. This phenomenon persisted through the second post-construction year monitoring and resulted from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping, occurred as the beach equilibrated to a more natural contour.

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

profile, beach compaction and the frequency of escarpment formation decline, and nesting and nesting success return to levels found on natural beaches

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.

Beach bulldozing and sandbagging (i.e., above the high tide line and not requiring a Federal permit) by private individuals or local groups and governments is another activity that may adversely affect sea turtles using project area beaches. The purpose of the proposed beach disposal is to protect beachfront buildings; however, the effort creates the impression that beachfront property will be protected from time to time by government action. Sandbagging while sea turtle nests are present on action area beaches has the potential to destroy these nests or create artificial barriers that prohibit hatchlings from reaching the shore. In addition, beach bulldozing activities could create escarpments and sandbags could create barriers that hinder females from accessing suitable nesting habitat.

CONCLUSION

After reviewing the current status of the loggerhead and leatherback sea turtle, the environmental baseline for the action area, the effects of the proposed Folly Beach renourishment project and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence the loggerhead or leatherback sea turtle. No critical habitat has been designated for the loggerhead or leatherback sea turtle in South Carolina; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

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

to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps: (1) fails to assume and implement the terms and conditions or (2) fails to require a contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Loggerhead and Leatherback Sea Turtles

The Service expects incidental take of sea turtles will occur on 28,200 feet of sea turtle nesting beach but will be difficult to detect for the following reasons:

(1) the turtles nest primarily at night and all nests are not found because
[a] natural factors, such as rainfall, wind, and tides may obscure crawls and
[b] human-caused factors, such as pedestrian traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program;
(2) the total number of hatchlings per undiscovered nest is unknown;
(3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown;
(4) an unknown number of females may avoid the project beach and be forced to nest in another area;
(5) lights may misdirect an unknown number of hatchlings and cause death; and
(6) escarpments may form and prevent an unknown number of females from nesting.

However, the level of take of these species can be anticipated by the disturbance of renourishment construction because: (1) turtles nest within the project site; (2) beach nourishment construction will likely occur during a portion of the nesting season; (3) beach nourishment will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting may misdirect nesting females and hatchlings.

The take is expected to be in the form of: (1) destruction of some nests and eggs that may be missed by a nest survey and marking program; (2) destruction of some nests deposited after nest surveys and marking programs are completed; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of

disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches; (5) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area; and (7) destruction of nests from escarpment leveling within a nesting season.

Table 2 below represents the level of take that could occur if the reasonable and prudent measures were not implemented. However, due to the implementation of the sea turtle protection measures, we anticipate that the take will not exceed seven percent of the nesting average in the project area. According to Schroeder, 1994, there is an average survey error of seven percent; therefore, there is a possibility that some of the nests on Folly Beach may be missed. This number is not the level of incidental take exempted, because the exact number cannot be predicted nor can the level of incidental take be monitored.

Table 2. The average number of sea turtle nests, based on the best available commercial and scientific information.

SPECIES	NESTS**	TAKE TYPE	CRITICAL HABITAT AFFECTED
Loggerhead sea turtle	37*	Harm/Harassment	None
Leatherback sea turtle	1	Harm/Harassment	None

* This number is the average number of nests within the project area
**Not the parameter that will be monitored for tracking compliance with the Incidental Take Statement

Table 3 below represents the amount of turtle nesting habitat that will be affected by the project.

Table 3. Monitoring the incidental take for the proposed project will be done by amount of habitat affected

SPECIES	CRITICAL HABITAT AFFECTED	HABITAT AFFECTED
Loggerhead sea turtle	None	28,200 feet of nesting
Leatherback sea turtle	None	28,200 feet of nesting

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the loggerhead or leatherback sea turtle. Critical habitat has not been designated in the project area; therefore, the project will not result in destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures are necessary and minimize impacts of incidental take of the Loggerhead and Leatherback sea turtle:

1. Only beach compatible sand should be deposited on Folly Beach as part of this project.

2. Sea turtle protection measures, as defined in the following terms and conditions, must be employed to minimize the likelihood of take.

3. Immediately after completion of the project and prior to the next three nesting seasons, beach compaction will be monitored.

4. After completion of the project and prior to the next three nesting seasons, monitoring must be conducted to determine if escarpments are present, and escarpments must be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

5. The applicant must make sure that contractors conducting the nourishment construction work fully understand the sea turtle protection measures detailed in this incidental take statement.

6. During the sea turtle nesting, construction equipment and materials must be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.

7. During the sea turtle nesting season, lighting associated with the project must be minimized to reduce the possibility of disrupting and misdirecting nesting and/or hatchling sea turtles.

TERMS AND CONDITIONS

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

1. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Service's Charleston Field Office, 176 Croghan Spur Road, Suite 200, Charleston, South Carolina 29407 within 60 days of completion of the proposed work. This report will include the status of the species (nesting loggerhead and leatherback sea turtles) addressed in this opinion. This report will include the dates of actual construction activities, names and qualifications of

personnel involved in surveys (sea turtle nests) and relocation activities, descriptions and locations of self-release beach sites, nest survey and relocation results, and hatching success of nests for sea turtles. The report will also include any known impacts, either beneficial or adverse, of the project upon completion of the construction phase and following each maintenance phase, inclusive of the years between each operational event.

2. The dates of actual construction activities and the names and qualifications of personnel involved in species surveys should also be included.

3. The biological and geographical scope of these reports will not be limited to areas of actual disposal and pipeline activity, but each report shall encompass all areas within the project action area.

4. All fill material placed on beaches will be sand that is similar to that already existing at the beach site in both coloration and grain size distribution. All such fill material must be free of construction debris, rocks, organic materials, or other foreign matter and will generally not contain, on average, greater than ten percent fines (i.e., silt and clay; passing the # 200 sieve) and must not contain, on average, greater than five percent coarse gravel or cobble, exclusive of shell material (retained by the # 4 sieve).

5. Daily early morning surveys for sea turtle nests will be required if any portion of the beach nourishment project occurs during the period from May 1 to November 30. Nesting surveys must be initiated 65 days prior to nourishment activities or by May 1, whichever is later. Nesting surveys must continue through the end of the project or through November 30, whichever is earlier. If nests are constructed in areas where they may be affected by beach nourishment activities, eggs must be relocated per the following requirements.

   5a. Nesting surveys and egg relocations will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must be trained by SCDNR and have a valid SCDNR permit. Nesting surveys must be conducted daily between sunrise and 9 a.m. Surveys must be performed in such a manner so as to make sure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures. At a minimum, the following protocol must be followed:
   - The number of nests, in situ and relocated, as well as false crawls, should be counted and recorded on a daily basis.
   - Methods used for marking and screening nests should also be noted.
   - The dates of first and last nesting should be recorded.
   - Emergence activity should be calculated including duration of each nest, date of first emergence, date of evaluation (inventory).
   - Percent of hatching and nest success rate of in situ and relocated nests.

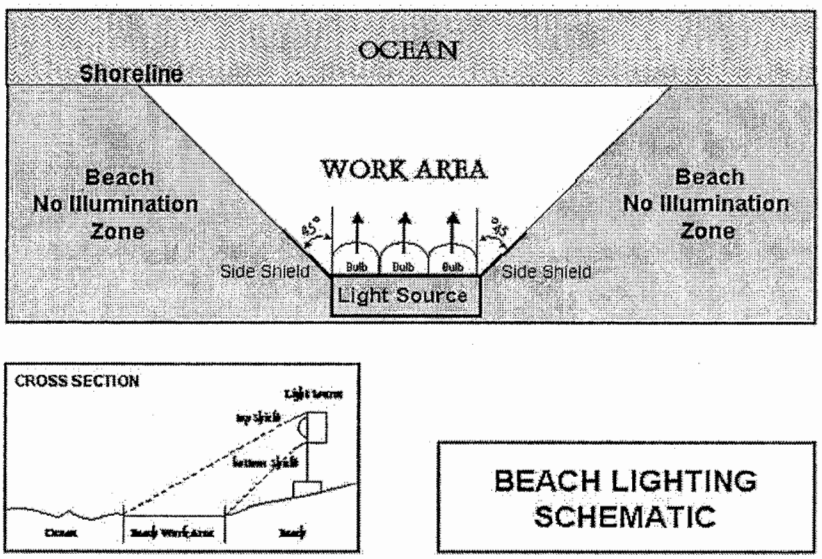
- Information should also be gathered on predation, erosion, and lighting disorientation problems.

5b. Only those nests that may be affected by beach nourishment activities will be relocated. Nests requiring relocation must be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Nest relocations in association with construction activities must cease when beach nourishment activities no longer threaten nests.

6. From May 1 through November 30, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach must be located as far landward as possible while still allowing for heavy equipment traffic on the landward side of the pipe without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes must be off the beach to maximum extent practicable. Temporary storage of pipes on the beach must be in such a manner as to impact the least amount of nesting habitat and must likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

7. From May 1 to November 30, direct lighting of the beach and near shore waters must be limited to the immediate construction area and must comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters' surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for general construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (see figure below).

Figure 1. Lighting Diagram



8. No permanent exterior lighting will be installed in association with this construction project.

9. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project must be notified so the eggs can be moved to a suitable relocation site.

10. Upon locating a sea turtle adult, hatchling, or egg harmed or destroyed as a direct or indirect result of the project, initial notification must be made to the Service Law Enforcement Office at (843) 727-4707 ext. 28 or (843) 297-9829. Additional notification must also be made to the Charleston Service Field Office at 843-727-4707. Care should be taken in handling injured turtles or eggs to make sure that effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

11. Immediately after completion of the beach nourishment project and prior to May 1 for three subsequent years, sand compaction must be monitored in the area of restoration following a protocol agreed to by the Service, the State regulatory agency, and the applicant. At a minimum, the protocol provided under 11a and 11b below must be followed. If required, the area must be tilled to a depth of 24 inches. All tilling activity must be completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. An annual summary of compaction surveys and the actions taken must be submitted to the Service. (NOTE: The requirement for

compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Also, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.)

11a. Compaction sampling stations shall be located at 500 feet intervals along the project area. One station must be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station must be midway between the dune line and the high water line (normal wrack line).

At each station, the cone penetrometer must 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 make sure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lay over less compact layers. Replicates must 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 all 18 values for each transect line, and the final six averaged compaction values.

11b. 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 immediately 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 Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

12. Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment and prior to May 1 for three subsequent years. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet must be leveled to the natural beach contour by May 1. If the project is completed during sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service must be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes the methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted to the Service. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach.)

13. A 100 foot buffer must remain around any sea turtle attempting to nest in the project area and all heavy equipment must be shut down until the turtle returns to the ocean.

14. All construction personnel must complete and sign-off on a training session provided by the Service before beginning work on the project.

15. Project initiation will begin at the north end of Folly Beach where the pipeline will come ashore at the washout and proceed north and south from that point.

16. The Corps will purchase all supplies and provide the labor necessary to construct a hatchery for the Folly Turtle Crew if needed. Such hatchery, if needed, will be fenced, locked, and patrolled by staff of the town of Folly Beach.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Fish and Wildlife Service Law Enforcement Office at (843) 727-4707 ext. 211 or (843) 297-9829. Additional notification must be made to the Fish and Wildlife Services Field Office at (843) 727-4707 ext. 204. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that the sea turtles that nest, are young or as eggs on 28,200 feet of beach will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

For the benefit of the loggerhead and leatherback sea turtle, the Service recommends the following conservation recommendations:

1. Construction activities for similar future projects should be planned to take place outside the sea turtle nesting and hatching season.

2. Surveys for nesting success of sea turtles should be continued for a minimum of three years following project construction to determine whether sea turtle nesting success has been adversely impacted.

3. More in-depth research should be conducted to assess the potential of the beach nourishment to impact nesting sea turtles, nest incubation, and movement of hatchlings from the nest to the ocean.

4. Educational signs should be placed where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area.

5. Fire ant eradication on the beaches of the town of Folly Beach should be implemented and monitored for success in order to reduce turtle hatchling mortality.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

This concludes formal consultation on the action outlined in your request for formal consultation on the Folly Beach re-nourishment project. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Corps involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take, to be monitored by the nourishment of 28,200 feet of beach, is exceeded; (2) new information reveals effects of the Corps' action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the Corps' action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this biological opinion the incidental take would be exceeded when the beach nourishment of 28,200 feet of beach on which the incidental take of an undetermined number of young or eggs of sea turtles have been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the Corps during this consultation. We would like to continue

working with you and your staff regarding this project for Folly Beach renourishment. For further coordination please contact Melissa Bimbi at (843) 727-4707, ext. 204. In future correspondence concerning the project, please reference FWS Log No 4-6-03-F-111.

Sincerely,

Timothy N. Hall
Field Supervisor

TNH/MKB

cc: USFWS, Atlanta, GA (Joe Johnston) (via email)
USFWS, Jacksonville, FL (Sandy MacPherson)
SCDNR, Charleston, SC (Sally Murphy)
FEMA, U.S. Department of Homeland Security, Region IV, Atlanta, GA

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Appendix 2

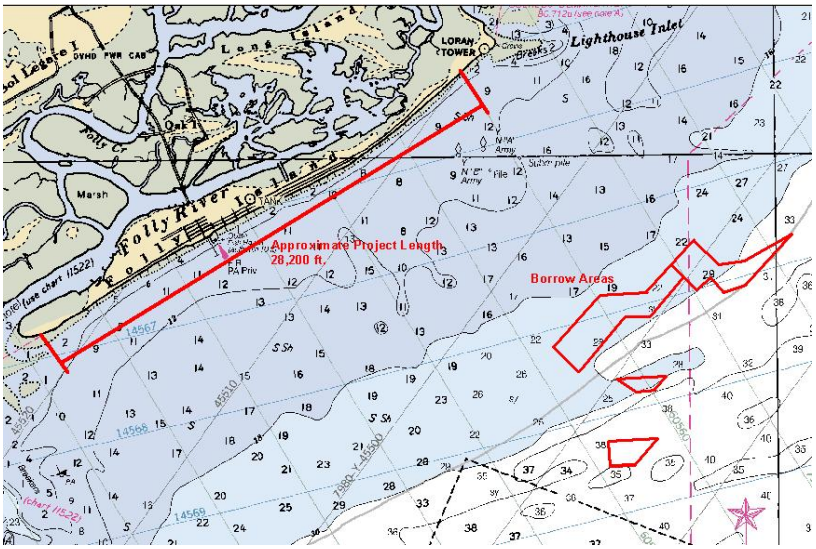
Geo-technical Report

DRAFT REPORT

Geotechnical Report

Folly Beach Storm Protection Project
Folly Beach, South Carolina

Search for Beach Compatible Sands
Offshore Borrow Area Study



September 30, 2004

Folly Beach Storm Damage Protection Project

Search for Compatible Sands
Offshore Borrow Area Study

Introduction

The US Army Corps of Engineers, Charleston District (COE) has completed the Geotechnical Offshore Investigation at Folly Beach, South Carolina. This report presents the results of a geotechnical exploration for beach quality sands offshore of Folly Beach. Figure 1 shows the location of the vibracores with respect to the Folly Beach shoreline. The vibracore locations on this figure include vibracores performed by Coastal Science and Engineering, LLC and the US Army Corps of Engineers, as detailed in the following paragraphs. The investigation concluded that borrow material is available in four potential borrow areas (labeled Area A, B, C and D in Figure 2) containing beach compatible sand of significant depth to excavate with conventional dredging equipment. Figure 2 also shows the approximate bathymetry of the ocean bottom based on the depth of water at the vibracore locations, corrected for tidal variations.

Within these borrow areas suitable sands do exist, however, in variable layer thickness. Isopachs (contours of equal thickness) of the sand deposits are shown on Figure 3. The thickness of the sand layer was obtained from the individual vibracores, and the computer program “InRoads” was used to extrapolate between borings to contour the layer thickness. The sands encountered in the potential borrow areas contain more shell material than previously sampled on the beach; the borrow materials are also coarser, and more well graded than the native materials. Quantity estimates were made for the four areas using “InRoads”. These are shown on Figure 4. A caution regarding the quantities presented is in order. The quantities are based on a linear interpolation of depth of suitable sand between borings, where thickness of suitable sand layer information is available. The thickness of the sand layer between borings (made on 1000’ to 2000’ centers) is bound to vary. Depending on the magnitude of the variation from the linear assumption, there may be significantly more or less sand available. Additional borings split-spacing existing borings is the only way to refine the quantity calculations. Figure 4 also shows the Northings and Eastings on the corners of the proposed borrow areas.

The quantities reported are maximum quantities based on excavating all the material available within the boundaries of the borrow area, irrespective of the top or bottom sand layer elevation. The capability of the contractor to remove the sand between variable elevations without excavating unsuitable underlying material will determine the actual quantity of sand available. One final point on quantities, it may be possible to increase the available quantity by including some vibracore locations that were deemed marginally satisfactory based on median grain size, D_{50} greater than or equal to 0.18 mm. A lower D_{50} was not considered, but its consideration could impact

boundary areas and thereby increase quantities, though it is not recommended that the value drop below a mean value of 0.15 mm.

Native Beach Sands

Finding adequate sources of sand that are compatible with native beach sands is at the heart of the borrow area investigations. A borrow area that is readily accessible, contains sufficient quantities of compatible materials, and can be quarried cost-effectively is the ideal source for beach sands. Native beach sand samples for Folly Beach were not collected for this study. Instead, original data presented in the 1991 General Design Memorandum were used to determine a compatible D_{50}. The table below presents beach sand data collected from the previous study; near shore material was not used in the computation for a beach compatible D_{50}.

Table 1

Sample	D_{50}	D_{84}	D_{16}	PHI D_{50}	PHI D_{84}	PHI D_{16}	mean	mm	difference	%difference
5+00 N1	0.18	0.13	0.19	2.47	2.94	2.40	2.60	0.16	-0.02	-9.47
5+00 N2	0.18	0.11	0.22	2.47	3.18	2.18	2.61	0.16	-0.02	-10.22
5+00N3	0.17	0.12	0.2	2.56	3.06	2.32	2.65	0.16	-0.01	-6.39
30+00 N1	0.18	0.14	0.2	2.47	2.84	2.32	2.54	0.17	-0.01	-4.99
30+00 N2	0.19	0.13	0.22	2.40	2.94	2.18	2.51	0.18	-0.01	-8.07
30+00 N3	0.18	0.13	0.21	2.47	2.94	2.25	2.56	0.17	-0.01	-5.88
59+20 N1	0.13	0.1	0.14	2.94	3.32	2.84	3.03	0.12	-0.01	-6.48
59+20 N2	0.17	0.13	0.22	2.56	2.94	2.18	2.56	0.17	0.00	-0.35
59+20 N3	0.19	0.15	0.26	2.40	2.74	1.94	2.36	0.19	0.00	2.54
80+00 N1	0.18	0.14	0.2	2.47	2.84	2.32	2.54	0.17	-0.01	-4.99
80+00 N2	0.18	0.14	0.22	2.47	2.84	2.18	2.50	0.18	0.00	-1.70
80+00 N3	0.16	0.12	0.21	2.64	3.06	2.25	2.65	0.16	0.00	-0.53
105+00 N1	0.18	0.13	0.2	2.47	2.94	2.32	2.58	0.17	-0.01	-7.61
105+00 N2	0.16	0.12	0.2	2.64	3.06	2.32	2.67	0.16	0.00	-2.17
105+00 N3	0.16	0.12	0.19	2.64	3.06	2.40	2.70	0.15	-0.01	-3.94
135+00 N1	0.17	0.14	0.2	2.56	2.84	2.32	2.57	0.17	0.00	-1.06
135+00 N2	0.18	0.14	0.19	2.47	2.84	2.40	2.57	0.17	-0.01	-6.80
135+00 N3	0.17	0.12	0.2	2.56	3.06	2.32	2.65	0.16	-0.01	-6.39
160+00 N1	0.22	0.18	0.23	2.18	2.47	2.12	2.26	0.21	-0.01	-5.35
160+00 N2	0.17	0.13	0.2	2.56	2.94	2.32	2.61	0.16	-0.01	-3.59
160+00 N3	0.18	0.14	0.28	2.47	2.84	1.84	2.38	0.19	0.01	6.15
179+71 N1	0.19	0.17	0.22	2.40	2.56	2.18	2.38	0.19	0.00	1.17
179+71 N2	0.21	0.17	0.27	2.25	2.56	1.89	2.23	0.21	0.00	1.32
179+71 N3	0.18	0.16	0.19	2.47	2.64	2.40	2.50	0.18	0.00	-2.15
5+00 S1*										
5+00 S2	0.16	0.12	0.2	2.64	3.06	2.32	2.67	0.16	0.00	-2.17
5+00 S3	0.2	0.14	0.48	2.32	2.84	1.06	2.07	0.24	0.04	15.88
35+00 S1	0.17	0.13	0.19	2.56	2.94	2.40	2.63	0.16	-0.01	-5.37
35+00 S2	0.17	0.13	0.19	2.56	2.94	2.40	2.63	0.16	-0.01	-5.37
35+00 S3	0.17	0.13	0.26	2.56	2.94	1.94	2.48	0.18	0.01	5.09
65+00 S1	0.18	0.14	0.2	2.47	2.84	2.32	2.54	0.17	-0.01	-4.99
65+00 S2	0.17	0.12	0.23	2.56	3.06	2.12	2.58	0.17	0.00	-1.55

65+00 S3	0.14	0.12	0.19	2.84	3.06	2.40	2.76	0.15	0.01	4.92
75+00 S1	0.16	0.12	0.2	2.64	3.06	2.32	2.67	0.16	0.00	-2.17
75+00 S2	0.18	0.14	0.2	2.47	2.84	2.32	2.54	0.17	-0.01	-4.99
75+00 S3	0.18	0.13	0.29	2.47	2.94	1.79	2.40	0.19	0.01	4.92
90+00 S1	0.18	0.15	0.19	2.47	2.74	2.40	2.54	0.17	-0.01	-4.37
90+00 S2	0.18	0.15	0.2	2.47	2.74	2.32	2.51	0.18	0.00	-2.60
90+00 S3	0.17	0.12	0.22	2.56	3.06	2.18	2.60	0.16	-0.01	-3.06
110+00 S1	0.15	0.12	0.19	2.74	3.06	2.40	2.73	0.15	0.00	0.44
110+00 S2	0.17	0.13	0.2	2.56	2.94	2.32	2.61	0.16	-0.01	-3.59
110+00 S3	0.15	0.12	0.23	2.74	3.06	2.12	2.64	0.16	0.01	6.58
Average	0.17	0.13	0.22	2.53	2.92	2.23	2.56	0.17	0.00	-2.18

*No sample taken at this location

The analysis above indicates that a mean PHI of 2.56, corresponding to a mean grain diameter of 0.17 mm was obtained from the samples collected from the upper beach profile (above mean low water). Incorporation of the near shore grain size distributions results in a finer composite mean grain diameter of 0.149 mm. Dr. Tim Kana, in his 2002 report to the City of Folly Beach, indicated that the mean grain diameter at two transects on the beach was 0.185 mm. The data for this determination came from elevations between the fore dune and low water. Considering the fineness of the offshore materials and the effect on the erosion rates, a larger mean grain size was used for the compatibility criteria. It was determined to use a mean grain size equal to 0.17 mm. The actual comparisons were done based on the median grain diameter, D_{50}, using a D_{50} of 0.18 mm, as this could be accomplished much more rapidly. Therefore, as a first estimate of available borrow, vibracore samples with a median grain size, D_{50}, of 0.18 mm or greater were considered as potential sources of compatible sand for Folly Beach.

Exploration Program

The first step in the sand search was accomplished by identifying potential borrow locations using seismic surveying techniques (side scan sonar and sub-bottom profiling). The United States Geological Service (USGS) performed this work under contract to the Charleston District. The equipment, procedures, results and recommendations of the survey are presented in Appendix A. The primary value of the seismic survey lies in the hope that the interpretation of the data will pinpoint areas of potential sand bearing units within the very large offshore area without having to physically sample all areas. As part of the scope of services provided by the USGS, they identified 45 proposed vibracore locations where the potential for compatible beach sand was the greatest, based on their interpretation of the seismic profiles. A potential sand deposit still needs to be sampled though, because the seismic record can only give a vague idea of the material present; it cannot distinguish between grain sizes within a coarse fraction, nor can it know the amount of fines present in a grain size distribution, or its mineralogical composition. USGS proposed three priority areas for future sampling, as shown in Figure 5. With this information in hand, the City of Folly Beach hired Coastal Science and Engineering, LLC. to perform preliminary vibracoring, while the Charleston District waited for project funding. The City of Folly Beach shared the results of that investigation with the USACE. The results of CSE's study are attached in Appendix B. CSE's vibracore program only sampled in 10 of the 45 vibracore locations recommended by USGS, but those 10 vibracores were preformed in the three priority areas, Figure 6. The results of CSE's limited study indicated that priority areas 1 and 2 did not contain beach quality sand; it was either too fine (D_{50} was smaller than the native beach soils), or the sands contained more than 10% silt and clay size soils. However, Priority Area 3 showed some promise regarding beach compatible sands. Based on the preliminary vibracoring effort by CSE, and in consultation with Tim Kana, the USACE developed a new vibracoring plan that included 36 vibracores located on a grid pattern approximately 2000' on center in Priority Area 3. The locations of the Phase 1 vibracores are shown on Figure 7. The Phase 1 final report was completed in October 2003 under contract to Gulf Engineers and Consultants, Inc. The phase 1 vibracores were split, photographed, sampled on specified intervals and tested in the soils laboratory for grain size distribution and percent carbonate. The Phase 1 vibracore logs and results of laboratory testing are presented in Appendix C. The results of the laboratory testing were then compared to the native beach sands for compatibility. A compatibility criteria was established consisting of: median grain diameter of 0.18 mm, less than 10% passing the No. 200 standard sieve, and a carbonate content of less than 35%. This criterion was compared to the vibracore sample test results to determine which vibracores contained beach compatible sands. A further refinement in the decision analysis included the thickness of the sand layer, and the practicality of excavating the materials with conventional dredging equipment. Once a vibracore was determined to have suitable sand of sufficient thickness, it was compared to surrounding vibracores to see if the area were large enough for production purposes.

The results of that analysis concluded that some areas contained beach compatible sands, however, the 2000 ft. grid spacing was too coarse to permit quantity

determinations. Additionally, some areas on the perimeter of Phase 1 vibracores showed promise, and those areas would be sampled in Phase 2. The second phase exploration program was designed to split-space the Phase 1 vibracores, and prove other areas on the perimeter of the initial borrow field investigation. The second phase exploration program consisted of 55 additional vibracores sampled to 10' depth. Figure 8 shows the locations of the second phase vibracores (FB-04-37 through FB-04-91). The Phase 2 vibracoring and laboratory testing was contracted to GEC, Inc, and the report on Phase 2 was completed in May, 2004. The Phase 2 vibracore logs and results of laboratory testing are presented in Appendix D.

The same compatibility criteria used to select suitable sand from the Phase 1 vibracoring study was used for the Phase 2 vibracores. The results of applying these criteria to Phase 1, Phase 2 and CSE vibracore results are shown in Table 2. Color-coding the vibracores aids in quickly identifying which locations contain suitable sand, or sufficient thickness of sand layer, for beach nourishment. The color code is: Green represents compatible sand in sufficient quantity (Satisfactory); Yellow represents marginal compatibility due to not meeting one criteria, usually too small median grain size, or too shallow thickness of fill (Marginal); and Red indicates more than one critical criteria not met (Unsatisfactory).

Table 2

Folly Beach Vibracoring

	Easting	Northing	Corr. El.	Elev. Bott. Sand	Depth Sand ft.	% fines	Remarks
CSE Cores							
FB-01	2320799.48	277305.77	-25	-25	0		
FB-04	2329507.34	282148.95	-27.7	-27.7	0		
FB-08	2336807.34	287871.02	-20.5	-20.5	0		
FB-11	2352976.03	298712.98	-21.2	-24.2	3		
FB-12	2338944.23	288166.59	-23.7	-23.7	0		
FB-15	2340306.11	287987.08	-26	-26	0		
FB-18	2360263.51	301214.26	-34.5	-42	7.5		
FB-19	2343844.84	289153.04	-26.1	-29.1	3		d_{50} too small = 0.15
FB-20	2356055.33	297237.35	-31.9	-37.9	6		
FB-25	2362093.14	300016.15	-34.9	-39.9	5		
FB-26	2350988.30	291480.81	-25.6	-33.1	7.5		
Phase 1							
FB-03-01	2346367.85	291195.14	-31.61	-37.6	6	7	
FB-03-02	2347878.23	289855.34	-29.1	-34.1	5	3	
FB-03-03	2349404.00	288549.78	-36.64	-42.6	6	9	
FB-03-04	2350924.93	287234.49	-39.46	-47.5	8	11	
FB-03-05	2347688.97	292672.81	-32.36	-33.4	1	9	
FB-03-06	2349207.37	291357.71	-30.37	-31.4	1	8	
FB-03-07	2350726.24	290024.80	-37.63	-37.6	0		cemented
FB-03-08	2352217.93	288730.83	-35.99	-41	5	4	
FB-03-09	2348981.33	294215.10	-26.83	-31.8	5	5	
FB-03-10	2350544.10	292876.97	-34.21	-35.7	1.5	6	

FB-03-11	2352052.19	291585.97	-27.04	-35	8	2	
FB-03-12	2353555.22	290256.71	-36.1	-36.1	0		cemented
FB-03-13	2350339.59	295712.39	-28.36	-37.4	9	4	
FB-03-14	2351835.71	294400.27	-35.11	-35.1	0		<0.18mm
FB-03-15	2353352.74	293082.99	-29.84	-32.8	3	2	
FB-03-16	2354873.94	291753.15	-33.8	-35.8	2	3	
FB-03-17	2351664.09	297230.41	-24.08	-25.6	1.5	8	high silt content 1.5' - 3.2'; good sand 5' - 10'
FB-03-18	2353177.03	295894.88	-30.25	-35.3	5	5	
FB-03-19	2354684.69	294583.63	-30.99	-35	4	9	
FB-03-20	2356192.48	293272.44	-35.18	-35.2	0		cemented
FB-03-21	2352992.00	298768.87	-24.93	-29.9	5	2	
FB-03-22	2354489.04	297407.30	-31.14	-39.1	8	4	
FB-03-23	2355991.56	296096.05	-32.12	-32.1	0		too fine in upper 3'
FB-03-24	2357504.46	294784.99	-34.75	-34.8	0		no recovery
FB-03-25	2354333.82	300227.36	-30.04	-32	2	2	
FB-03-26	2355830.52	298891.84	-34.92	-42.4	7.5	3	
FB-03-27	2357303.62	297590.39	-33.03	-37.5	4.5	3	
FB-03-28	2358816.58	296273.33	-35.33	-36.3	1	3	
FB-03-29	2355638.14	301722.21	-26.96	-27	0		too fine for 10'
FB-03-30	2357150.50	300417.19	-33.93	-33.9	0		too fine
FB-03-31	2358645.28	299084.21	-36.06	-40.6	4.5	2	
FB-03-32	2360148.96	297774.08	-35.6	-35.6	0		high % of fines
FB-03-33	2356963.38	303225.36	-26.15	-27.2	1	1	underlain by too fine sand
FB-03-34	2358433.86	301942.92	-33.04	-33	0		too fine; too high %200
FB-03-35	2359954.41	300603.44	-37.14	-41.6	4.5	10	Underlain by silt
FB-03-36	2361467.69	299273.16	-39.24	-40.2	1	2	Underlain by >>10% fines
Phase 2							
FB-04-37	2349522.10	287154.30	-39.02	-42.1	3.1	4	
FB-04-38	2348015.20	288465.30	-37.86	-37.9	0		>>%fines
FB-04-39	2346507.20	289792.50	-26.13	-29.6	3.5	3	d_{50} too small
FB-04-40	2345768.60	290430.00	-30.94	-30.9	0		>>%fines; d_{50} too small
FB-04-41	2345002.70	291104.70	-29.72	-29.7	0		>>%fines; d_{50} too small
FB-04-42	2350170.00	287943.20	-36.12	-38.6	2.5	2	underlain by cemented sand >>%fines
FB-04-43	2348650.70	289203.10	-36.8	-36.8	0		>>%fines; underlain by cemented sand
FB-04-44	2347152.00	290536.60	-29.65	-29.7	0		>>%fines; d_{50} too small
FB-04-45	2345620.30	291888.90	-29.83	-37.8	8	9	d_{50} small = 0.17
FB-04-46	2344769.20	292550.80	-28.5	-35	6.5	7	d_{50} too small = 0.16
FB-04-47	2349330.80	289970.90	-35.83	-40.8	5	10	>>%fines; d_{50} too small
FB-04-48	2348552.80	290612.70	-29.49	-33.5	4	4	d_{50} too small
FB-04-49	2347824.00	291289.90	-32.43	-32.4	0		>>%fines; d_{50} too small
FB-04-50	2347068.90	291980.40	-32.06	-40.1	8	10	d_{50} too small = 0.16
FB-04-51	2346272.80	292625.40	30.53	30.53	0		>>%fines
FB-04-52	2348479.10	292049.40	-33.25	-33.3	0		>>%fines; d_{50} too small
FB-04-53	2346222.80	294026.10	-26.96	-34.5	7.5	5	
FB-04-54	2349892.00	292130.20	-34.46	-40.7	6.25	8	surface d_{50} and %fines outside criteria
FB-04-55	2349137.20	292812.60	-34.07	-34.1	0		>>%fines
FB-04-56	2348362.50	293443.40	-33.55	-38.1	4.5	6	overlies cemented sand
FB-04-57	2347611.20	294106.40	-27.89	-36.9	9	5	d_{50} too small = 0.16
FB-04-58	2349796.20	293536.80	-34	-37.5	3.5	6	d_{50} small = 0.17
FB-04-59	2347525.20	295522.60	-21.64	-23.6	2	2	

FB-04-60	2350438.20	294288.60	-33.08	-33.1	0		d_{50} too small
FB-04-61	2349686.10	294942.30	-30.2	-37.2	7	7	d_{50} small = 0.17
FB-04-62	2348937.90	295604.80	-26.3	-34.3	8	7	d_{50} = .18; 1.25 thick layer of 30% fines at 1.25'
FB-04-63	2348863.40	297018.40	-23.7	-33.7	10	6	average d_{50} = .18
FB-04-64	2353270.60	294507.90	-34.88	-34.9	0		cemented
FB-04-65	2351760.90	295819.50	-31.88	-37.4	5.5	8	>>%fines below 3'
FB-04-66	2351002.40	296457.70	-27.1	-36.1	9	4	
FB-04-67	2350274.30	297113.90	-27.49	-37.5	10	6	1.25' - 2.33' d_{50} = .14
FB-04-68	2352436.10	296554.80	-31.71	-37.2	5.5	6	
FB-04-69	2350180.20	298538.50	-26.62	-26.6	0		>>%fines
FB-04-70	2354606.50	296007.80	-32.5	-37	4.5	3	shallow depth underlain by SC
FB-04-71	2353854.50	296648.20	-31.97	-32	0		d_{50} too small = 0.14
FB-04-72	2353098.20	297305.80	-31.57	-36.6	5	6	d_{50} too small < 0.17
FB-04-73	2352352.40	297978.90	-26.39	-36.4	10	10	0.83' - 3' contains 35% fines
FB-04-74	2351592.90	298608.20	-27.59	-27.6	0		>>%fines
FB-04-75	2355257.80	296758.20	-34.8	-34.8	0		>>%fines; d_{50} too small
FB-04-76	2353748.20	298088.60	-30.81	-40.8	10	6	
FB-04-77	2356645.40	296813.80	-35.9	-37.4	1.5	3	
FB-04-78	2355900.8	297474.1	-32.61	-40.6	8	4	
FB-04-79	2355260.90	298066.90	-32.52	-41.5	9	6	
FB-04-80	2352329.80	299360.80	-26.93	-26.9	0		>>%fines
FB-04-81	2356572.30	298241.60	-35.23	-39.2	4	7	
FB-04-82	2357984.60	298325.60	-35.43	-38.9	3.5	3	d_{50} too small = 0.17
FB-04-83	2357221.80	298988.50	-33.5	-40.5	7	4	
FB-04-84	2353916.40	295243.90	-35.35	-37.4	2	6	underlain by cemented sand
FB-04-85	2355353.70	295335.40	-33.54	-34.5	1	2	below 1', too fine; too high %200
FB-04-86	2354033.80	293813.60	-32.76	-34.3	1.5	2	
FB-04-87	2351976.00	292972.60	-33.88	-34.9	1	1	underlain by very fine sand with too high %200
FB-04-88	2352733.30	292331.10	-30.91	-35.4	4.5	2	
FB-04-89	2351311.30	292236.00	-29.7	-34.2	4.5	2	
FB-04-90	2350827.80	288649.40	-38.37	-40.9	2.5	6	underlain by finer material
FB-04-91	2351576.00	288025.90	-40.29	-42.8	2.5	6	underlain by cemented sands

Legend

Beach Compatible Soils
Marginally Compatible
Not Suitable Beach Fill

Potential Borrow Areas

Potential offshore borrow areas are based on the results of testing sands recovered during this study and the work of Dr. Tim Kana (2002). Figure 2 graphically depicts those areas designated as Area A – D. Below is a summary of the four potential borrow sources.

Borrow Area A

Borrow Area A is about 3 miles offshore and is approximately 312 acres in size. The thickness of suitable soils in Area A varies from 2 ft. to 10 ft. as shown on Figure 3. It is evident that a variable depth of cut will have to be made across the site. Excavation over most of the area could be made with either a hopper dredge or a cutter head dredge. A small portion of the borrow would not be available to a cutter suction dredge due to the minimum thickness of 5 ft. to 6 ft. required for efficient dredging with the cutterhead dredge. Based on INROADS® quantity calculations, it is estimated that there is approximately 3.13 million cubic yards of beach compatible sand in Borrow Area A. The Northings and Eastings at the corners are shown in Table 3 and Figure 4.

Table 3

Borrow Area A	
Easting	Northing
2346222.80	294026.10
2348863.40	297018.40
2351664.09	297230.41
2352992.00	298768.87
2353796.94	298036.77
2351760.90	295819.50
2350339.59	295712.39
2347688.97	292672.81

Borrow Area B

Borrow Area B is about 3 miles offshore and is approximately 212 acres in size. The thickness of suitable soils in Area A varies from 2 ft. to 10 ft. as shown on Figure 3. A variable depth of cut will have to be made across the site. Excavation over most of the area could be made with either a hopper dredge or a cutter head dredge, however, a hopper dredge would be better able to mine more of the borrow since it is able to excavate the soils in layers of one foot rather than requiring a 5 foot vertical face for the cutter suction dredge. Based on INROADS® quantity calculations, it is estimated that approximately 2,030,000 cubic yards of beach compatible sand is available in Borrow Area B. The Northings and Eastings are shown in Table 4 and Figure 4.

Table 4

Borrow Area B	
Easting	Northing
2352992.00	298768.87
2354286.97	300269.17
2355830.52	298891.84
2357221.80	298988.50
2359846.36	300703.52
2360029.77	300533.64
2357303.62	297590.39
2356055.33	297237.35
2354489.04	297407.30
2353796.94	298036.77

Borrow Area C

Borrow Area C is about 3.5 miles offshore and is approximately 32 acres in size. The thickness of suitable soils in Area A varies from 4 ft. to 6 ft. as shown on Figure 3. A variable depth of cut will have to be made across the site. Excavation over most of the area could be made with either a hopper dredge or a cutter head dredge, however, a hopper dredge would be better able to mine more of the borrow since it is able to excavate the soils in layers of one foot rather than requiring a 5 foot vertical face for the cutter suction dredge. Based on INROADS® quantity calculations, it is estimated that approximately 320,000 cubic yards of beach quality sand is available in Borrow Area C. The Northings and Eastings are shown in Table 5 and Figure 4.

Table 5

Borrow Area C	
Easting	Northing
2350988.30	291480.81
2349892.00	292130.20
2352733.30	292331.10
2352052.19	291585.97

Borrow Area D

Borrow Area D is about 3.5 miles offshore and is approximately 68 acres in size. The thickness of suitable soils in Area D varies from 4 ft. to 6 ft. as shown on Figure 3. A variable depth of cut will have to be made across the site. Excavation over most of the area could be made with either a hopper dredge or a cutter head dredge, however, a hopper dredge would be better able to mine more of the borrow since it is able to excavate the soils in layers of one foot rather than requiring a 5 foot vertical face for the cutter suction dredge. Based on INROADS® quantity calculations, it is estimated that there are approximately 400,000 cubic yards of beach compatible sand in Borrow Area D.

Table 6

Borrow Area D	
Easting	Northing
2349522.10	287154.30
2349404.00	288549.78
2352217.93	288730.83
2350924.93	287234.49

Construction Considerations

Feasible Equipment

Due to the distance from shore, the depth of water, and sea state, working offshore at any of the four borrow areas will require an ocean-certified 27-inch or 30-inch compensated, cutter-suction dredge or hopper dredge. The water depths range from a 24 ft. to 38 ft. in Borrow Area A; 30 ft. to 42 ft. in Borrow Area B, 34 ft. in Borrow Area C, and 34 ft. to 40 ft. in Borrow Area D. The ocean certified hopper dredge and cutterhead-suction dredge would have sufficient depth of water to operate. The bank height in some portions of the borrow areas is not sufficient for the cutter head dredge to work efficiently (requires 5 ft. to 6 ft. of bank for efficient operation). The hopper dredge will be able to mine more of the available material since it can remove an incremental thickness (1 ft.) of the sand layer. Borrow Areas C and D are probably too small for a hopper dredge given the short run lengths.

Hard Bottom

No hard bottom was found during this site investigation within any of the proposed borrow areas, and buffers will be established around the borrow Areas to avoid disturbing ecologically sensitive areas.

Cemented Sands

Cemented sands and/or limestone were encountered in some of the vibracore samples; however, those vibracores were not included in areas designated as borrow areas (see Table 2 above). However, some cemented sands may be encountered during the dredging process. This usually manifests itself as large cobbles and boulders making their way to the beach during dredging. If this occurs it can be remedied by raking the larger pieces of rock off the beach. If the cemented materials make up a significant volume of the placement, it may be necessary to direct the contractor to a different section of the borrow area or an entirely different borrow area. Experience with cemented sands at Charleston Entrance Channel can create boulder size particles with unconfined compressive strengths on the order of 100 psi to 5000 psi.

Conclusions

In general, the sands located in Borrow Areas A, B, C and D are coarser than the native beach sands due to a larger fraction of shells than contained on the beach. The coarser portion of the grain size distribution is typically a coarse sand and fine gravel fraction. The borrow area sands are typically more calcareous than the native beach sands (presumably caused by the shell content). The silt and clay fraction in the proposed borrow areas was limited to approximately 10%, and much of that will be lost during excavation and placement operations.

Borrow Area A has approximately 3.13 million cubic yards of suitable beach quality sand. Actual quantities may vary due to the actual conditions between borings. The same is true for Borrow Areas B, C and D.

At a nourishment rate of approximately 110 cubic yards per foot along approximately 28,200 feet (5.34 miles) of beach, approximately 3.102 million cubic yards of sand at will be required. With approximately 5.880 million cubic yards of beach quality sand estimated to be available in borrow areas A and B, approximately two full nourishment cycles will be possible.

Appendix A

GEOPHYSICAL SURVEY REPORT

Appendix B

RECONNAISSANCE BORINGS REPORT

Appendix C

PHASE 1 VIBRACORE REPORT

Appendix D

PHASE 2 VIBRACORE REPORT

Appendix 3

Folly Beach Storm Damage Reduction Project Environmental Assessment
April 1991

APPENDIX 4
ENVIRONMENTAL ASSESSMENT
404 (b) EVALUATION
401 WATER QUALITY CERTIFICATION

FOLLY BEACH, SOUTH CAROLINA
SHORE PROTECTION PROJECT
GENERAL DESIGN MEMORANDUM

ENVIRONMENTAL ASSESSMENT

Shoreline Protection
Folly Beach, South Carolina

1. Introduction. This environmental assessment addresses an extension and modifications to the authorized shoreline protection project at Folly Beach, S.C. A final Environmental Impact Statement for Beach Erosion Control and Hurricane Protection for Folly Beach, S.C. was filed with CEQ on July 11, 1980, coordinated with other agencies, and circulated for public review and comment. The 1980 authorized Folly Beach protection plan recommended nourishment of 16,860 feet of beach with five year periodic renourishments. A 25 foot wide berm would be constructed four feet NGVD and fronted by a beach with a face slope of 30' horizontal to 1' vertical. Near shore sand borrow sites were located adjacent to the lighthouse and bird key inlets. The 1991 Folly Beach General Design Memorandum provides for extending the Folly Beach shoreline protection project approximately 3,000 feet north and 8,000 feet south. This environmental assessment addresses in detail the extended portions of the project, modifications to the proposed beach profile along the entire reach of the project, relocation of the borrow sites and addresses the impact of new environmental laws and regulations on the entire project since filing of the Environmental Impact Statement in 1980.

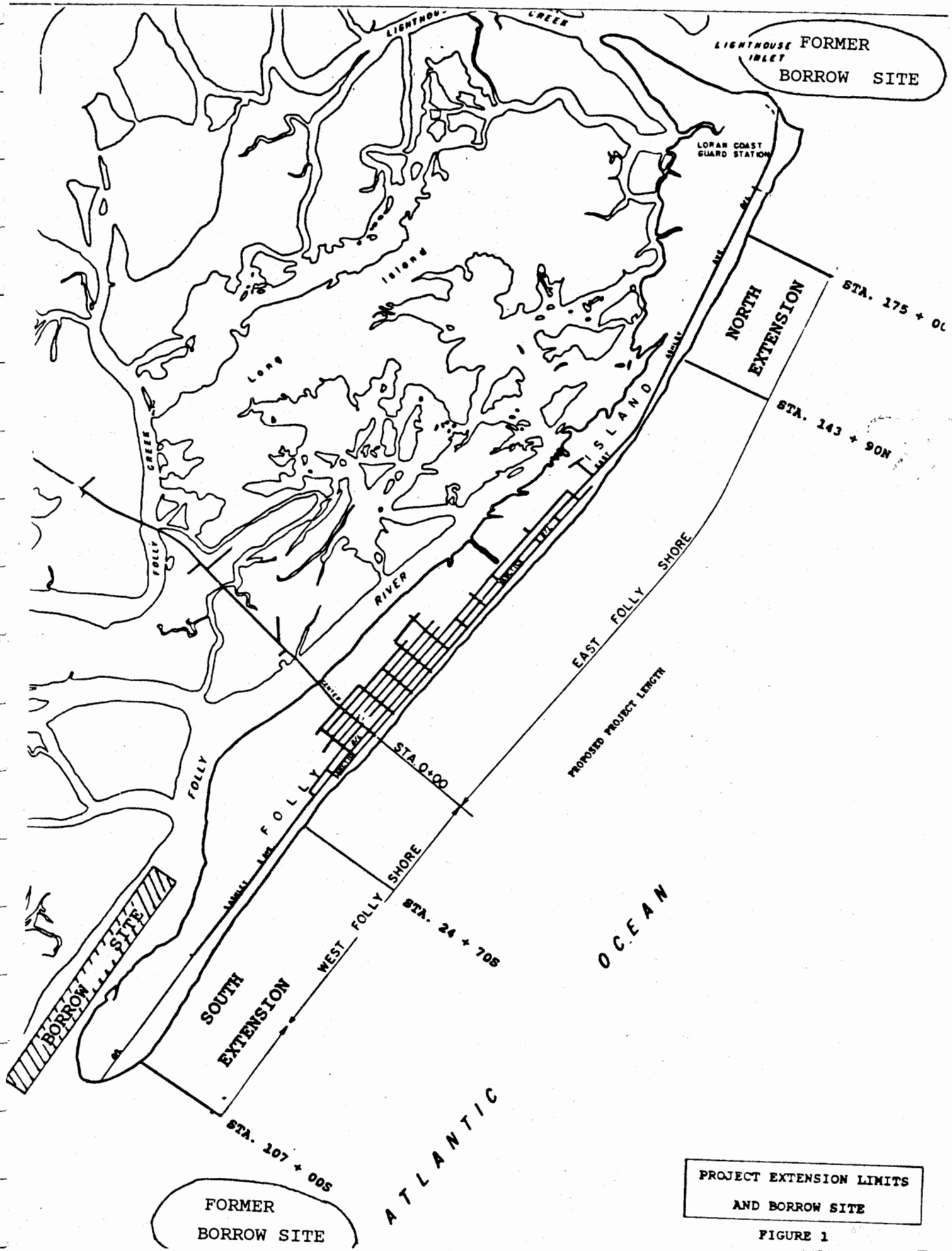
Supplemental information concerning the environmental impacts of Shoreline Protection on Folly Beach may be found in:

a. Folly Beach, South Carolina, Special PED Report to Reevaluate Federal Justification for Storm Damage Reduction; U.S. Army Corps of Engineers, Charleston District, South Carolina, August 1988.

b. Final Detailed Project Report, Charleston Harbor, Folly Beach, South Carolina; U.S. Army Corps of Engineers, Charleston District, South Carolina, August 1987.

2. Project Description.

a. Location. Folly Beach is located on Folly Island about six miles South of the Charleston Harbor Entrance (Figure 1). The island is six miles long, one-half mile wide, and is oriented northeast to southwest. The Town of Folly Beach lies in the middle of the island between the former U.S. Coast Guard Loran Station to the northeast and the Charleston County Park to the southwest. South Carolina Route 171 crosses the marsh between James Island and Folly Island and provides the only highway access to Folly Beach.



PROJECT EXTENSION LIMITS AND BORROW SITE

FIGURE 1

b. Proposed Action. The modified plan of improvement provides for extending the shoreline protection northeastward from Station 143+90N to Station 175+00N and southwestward from Station 24+70S to Station 107+00S (Figure 1). Total project length would be 28,200 feet or 5.34 linear miles of shoreline. A berm will be constructed with a top width of 15 feet and an elevation of 9.0 feet NGVD. The project extends from just below the former U.S. Coast Guard base (station 175+00 north), and includes the Charleston County Park on the west end of Folly Island (station 107+00 south). 2.5 million cubic yards of beach quality material will be placed during the initial effort. This material will be placed seaward of existing revetments.

Periodic nourishment will require 1.7 million cubic yards of material every eight years with one periodic nourishment effort occurring at the last 10 year interval. This last periodic nourishment will require 2.1 million cubic yards of material. Actual quantities of periodic nourishment will be based on a monitoring plan which will be implemented immediately upon completion of initial construction.

The Corps of Engineers', Coastal Enginering Research Center determined that the nine groins immediately north of the Holiday Inn (meeting a 90 percent impermeability criteria) would substantially reduce the quanitity of sand required for shoreline protection. As a part of the recommended plan these nine groins will be rehabilitated to meet this criteria. The groin design is explained in detail in the Engineering Design and Cost Estimates appendix of the General Design Memorandum.

Adequate quantities of sandy borrow material exist in the borrow site located in lower Folly River which is designated for the total project length. Core borings of the insitu material within the borrow area characterize the material as a fine sand classification under the Unified Soils Classification system. Grain size for the sand samples varied from 0.10 millimeters (3.39 phi) to 0.28 millimeters (1.85 phi) with a composite mean grain size of 0.15 millimeters (2.75 phi).The initial 1980 approved near shore borrow sites (located adjacent to Stono Inlet and Lighthouse Inlet) were eliminated based on environmental concerns and the potential diversion of sand from Bird Key and Kiawah Island.

Construction would be by means of a pipeline dredge. The pipeline would run adjacent to and parallel with revetments on the beach. Navigation on Folly River would be minimally affected by the presence of the dredge. Sand would be pumped along the 28,200 linear feet reach of the project. Sand would be discharged as a slurry to a design elevation of +9.0 feet NGVD. Temporary training dikes of sand would be used to contain the discharge and control the fill placement. Fill sections

will be graded by landbase equipment. Scraps and any hardpan that may develop during or after project completion will be graded and raked as necessary in coordination with recommendations and requirements from regulatory agencies. All work will be performed between October 15 and May 15 to minimize impacts to sea turtles, fish, shellfish and infauna. It is anticipated construction will take 5 to 6 months including mobilization.

3 Topography and Soils. Folly Beach lies on the lower coastal plain which was once a submerged portion of the continental shelf. The island is fronted by gently sloping beaches on the seaward side and backed by productive salt marshes. Elevations of the developed section of the island range from 5 to 14 feet NGVD. Soils are white, medium-to fine-grained siliceous sands with some sea shells and shell fragments. The soils have alkaline tendencies and low fertility due to excessive nutrient leaching.

4 Surface Waters - The principal surface waters in the planning area are the Folly River and Stono River and the Atlantic Ocean. The Folly and Stono Rivers are classified by the State of South Carolina as SA or waters suitable for shellfishing for market purposes and other uses requiring waters of lesser quality.

5 Biotic Communities - A detailed description of the individual biotic communities and fish and wildlife resources is found in the final EIS.

6 Other Environmental Factors:

7 Endangered Species - Comprehensive coverage of Endangered Species which may occur in the Folly Beach Project area was discussed in the 1980 EIS. However, following is the most current list of endangered or threatened species which may be present in the Folly Beach area:

West Indian manatee (Trichechus manatus) - E
Bald eagle (Haliaeetus leucocephalus) - E
Bachman's warbler (Vermivora bachmanii) - E
Wood stork (Mycteria americana) - E
Red-cockaded woodpecker (Picoides borealis) - E
Arctic peregrine falcon (Falco peregrinus tundrius) - T
Piping plover (Charadrius melodus) - T
Kemp's ridley sea turtle (Lepidochelys kempii) - E
Loggerhead sea turtle (Caretta caretta) - T
Shortnose sturgeon (Acipenser brevirostrum) - E
Canby's dropwort (Oxypolis canbyi) - E
Pondberry (Lindera melissifolia) - E

Seven species are currently listed which are under status review.

American swallow-tailed kite (Elanoides forficatus forficatus) - SR
Bachman's sparrow (Aimophila aestivalis) - SR
Flatwoods salamander (Ambystoma cingulatum) - SR
Incised groovebur (Agrimonia incisa) - SR
Sea-beach pigweed (Amaranthus pumilus) - SR
Cypress knee sedge (Carex decomposita) - SR
Chaff-seed (Schwalbea americana) - SR

Recent coordination with the U.S. Fish and Wildlife Service (USFWS) and S.C. Wildlife and Marine Resources Department (SCWMRD) has shown that the loggerhead sea turtle nests on Folly Beach adjacent the project zone on the north and south ends of the island where high tide beach exists.

8 Cultural Resources - A review of the National Historical Register indicates no known historical or archeological sites are located within the proposed project zone. The nearest identified site adjacent to the project is a civil war encampment located at the northeast end of Folly Island within the former Coast Guard compound. The Folly Beach project will have no impact on the site.

9 Coastal Barrier Resources System (CBRS) - The lower reach of Folly River lies within the Bird Key Complex, M07, of the CBRS. Approximately 30% of the designated borrow site falls within the Bird Key Complex. Formal consultation with the USFWS (October 1, 1990) has determined that the proposed project is consistent with purposes of the CBRA. However, the USFWS stipulated that the Corps 1) implement a monitoring plan to assess the integrity of Bird Key; 2) make a concerted effort to perform beach nourishment outside turtle nesting season; and 3) maintain coordination with the Service and SCWMRD throughout the life of the project.

10 Other Environmental Factors - There are no wildlife preserves, important agricultural lands, wild and scenic rivers, natural landmarks, recognized scenic areas, or any other environments of special interest located where they could be impacted by the proposed project.

Existing Beach Conditions - Folly Beach has and continues to experience severe erosion problems. The historic shoreline erosion rate for Folly Island was 4.2 feet per year before the construction of revetments and bulkheads. Groin fields and an array of hard shore protection devices constructed by local property owners have afforded only a limited level of protection of shoreline recession. The mean tidal range is 5.3 feet with a significant wave height of about 4.2 feet. Hardened shoreline

protection coupled with continued erosion have almost eliminated a high tide beach area over most of the island except the extreme north and south ends of the beach.

12 Need for Proposed Actions - The recommended project provides for beach restoration and periodic nourishment of 28,200 feet of beach at Folly Island. The beach fill section would provide an average usable width above mean high water of 90 feet, which would provide shore protection as well as wildlife and recreational usage., Advance nourishment would proivde an additional sacrifical usable beach approximately 110 feet wide.

13 Alternative Analysis - The Final Detailed Project Report, Charleston Harbor, Folly Beach, S.C., 1987, evaluated a total of 6 nonstructural and 6 structural alternatives and the no action alternative. The extension of the beach nourishment lengths was addressed in the initial alternative analysis.

14 Environmental Consequences - Mitigative Measures

The proposed project will immediately benefit the environment by providing shore line protection benefits and land loss prevention. A beach will be maintained which will provide a diverse habitat for wildife and benthic populations, enhance aesthetic beauty and add to recreational enjoyment.

Temporary degradation of water quality will occur at both the dredging and the nourishment sites due to the re-suspension of silty material. A temporary reduction of benthic populations in the borrow and beach fill areas will likely occur as well as a corresponding decline in photosynthesis.

During dredging and filling operations, motile members of the invertebrate and fish communities can be expected to avoid the area. Re-colonization of disturbed areas of benthic organisms can be expected to occur once dredging and beach nourishment operations are completed.

Even though sea turtle nesting habitat does not currently exist in the proposed nourishment project zone, turtle nesting activity could be expected to occur after the beach has been nourished. The proposed project will provide more than five miles of beach habitat suitable for turtle nesting. All construction activities will be restricted during the active turtle nesting season.

15 Alternatives To Proposed Action.

Alternatives to the proposed project were identified and discussed in detail in the FEIS and Final Detailed Project Report, Folly Beach, August 1987.

Conclusion

The proposed action has been thoroughly assessed and coordinated and will not significantly affect the environment, therefore, the Corps of Engineers issues a Finding of No Significant Impact (FONSI).

404(b) EVALUATION FOR THE SHORELINE PROTECTION OF FOLLY BEACH, SOUTH CAROLINA

1. Project Description.

a. Description of the proposed discharge of dredged or fill materials.

(1) General: This 404(b) Evaluation addresses an extension and modifications to the authorized shoreline protection project at Folly Beach, South Carolina. A final Environmental Impact Statement (including a 404(b) evaluation) for Beach Erosion Control and Hurricane Protection for Folly Beach, South Carolina was filed with CEQ on July 11, 1980, coordinated with other agencies and circulated for public review and comment.

(2) General characteristics of material: Clean sand from nearby shoals.

(3) Quantity of material proposed for discharge: Initial beach nourishment operations would require 2.5 million cubic yards. Renourishment would require replacement of 1.7 million cubic yards of fill at 8-year intervals.

(4) Source of material: Sandy shoals in the lower Folly River (see Figure 1).

b. Description of the proposed disposal site for dredged or fill materials.

(1) Location: The ocean shoreline along Folly Island, South Carolina. Total project length would be 28,200 feet or 5.34 miles extending from Station 107+00 South to Station 175+00 North.

(2) Type of disposal site: Undiked nourishment area on the above-mentioned beach. This is not a "disposal" site in the usual sense because the primary purpose is to build up an eroding beach, rather than to dispose of unwanted material.

(3) Method of discharge: Hydraulic pipeline.

(4) When will disposal occur: Scheduling will occur after project authorization.

(5) Projected life of disposal site: Not applicable. (See b(2) above).

(6) Bathymetry: Not applicable.

2. Physical Effects (40 CFR 230.4-1(a)).

a. Potential destruction of wetlands - effects on 40 CFR 230.4-1 (a)(1)(i-vi): The intertidal nourishment area would not be considered wetlands under the definition given in 33 CFR 323.2. The area could possibly be considered "wetlands" as defined in Executive Order 11990. In any case, the nourishment area cannot be considered "highly productive" or said to "perform important functions" as described in 40 CFR 230.4-1(a)(1).

(1) Food chain production: Not significant.
(2) General habitat: Not significant.
(3) Nesting, spawning, rearing and resting sites for aquatic or land species: Not significant for the area affected.
(4) Those set aside for aquatic environment study or sanctuaries or refuges: Not applicable.
(5) Natural drainage characteristics: Not significant.
(6) Sedimentation patterns: Not significant.
(7) Salinity distribution: Not significant.
(8) Flushing characteristics: Not significant.
(9) Current patterns: Not significant, except that existing currents and waves erode the beach severely.
(10) Wave action, erosion or storm damage protection: Highly eroded beach would be restored. Renourishment would be required at 8-year intervals to maintain the beach as erosion continues.
(11) Storage areas for storm and flood waters: Not applicable.
(12) Prime natural recharge areas: Not applicable.

b. Impact on water column (40 CFR 230.4-1(a)(2)). Because of the nature of the nourishment area, the clean nature of the material to be dredged and its large particle size, impacts on the water column are not significant.

(1) Reduction in light transmission: Temporary, not significant.
(2) Aesthetic values: Temporary, not significant.
(3) Direct destructive effects on nektonic and planktonic populations: Temporary, not significant.

c. Covering of benthic communities (40 CFR 230.4-1(a)(3)).

(1) Actual covering of benthic communities: The beach benthic community consists of many individuals of relatively few species. Many inhabitants are relatively immobile and would experience suffocation and mortality from beach fill. Initial losses could be large, but recovery would be rapid due to recruitment from adjacent areas. Long term effects would be minor.

(2) Changes in community structure or function: Not significant (see c(1) above).

d. Other effects (40 CFR 230.4-1(a)).

(1) Changes in bottom geometry and substrate composition: Not significant, except for improvement to existing beach.

(2) Water circulation: Not significant.

(3) Salinity gradients: Not significant.

(4) Exchange of constituents between sediments and overlying water with alterations of biological communities: Not significant.

3. Chemical-Biological Interactive Effects (40 CFR 230.4-1(b)).

a. Does the material meet the exclusion criteria? Yes. The material is predominantly sand and shell with particle sizes larger than silt. The material would be dredged only from sandy shoals in the lower Folly River and would be compatible with native beach sand upon which it would be deposited as nourishment. Both exclusions (b)(1)(i) and (b)(1)(ii) are met.

b. Water column effects of chemical constituents (40 CFR 230.4-1(b)(2)): Not applicable.

c. Effects of chemical constituents on benthos (40 CFR 230.4-1(b)(3)): Not applicable.

4. Description of Site Comparison (40 CFR 230.4-1(c).

a. Total sediment analysis (40 CFR 230.4-1(c)(1)): Not required (see 3.a above).

b. Biological community structure analysis (40 CFR 230.4-1(c)(2)) Not required (see 3.a above).

5. Review Applicable Water Quality Standards.

a. Compare constituent concentrations: Not applicable (see 3.a).

b. Consider mixing zone: Not applicable.

c. Based on a and b above will disposal operation be in conformance with applicable standards? Yes.

6. Selection of Disposal Sites (40 CFR 230.5) for Dredged or Fill Material.

a. Need for the proposed activity: The beach has experienced severe shoreline erosion resulting in significant loss of recreational beach and threat of loss to oceanfront property.

b. Alternatives considered: All nonstructural plans considered were either inadequate or inappropriate for meeting project objectives, or had already been implemented. Of all structural plans considered, the only alternatives which sufficiently addressed the planning objectives were beach development and beach plus dune development. The selected plan is the smallest of 9 such beach or beach and dune plans considered. Hence, its requirements for borrow material and beach fill are the lowest capable of meeting the project objectives. Borrow sites would be in areas least subject to environmental degradation and the material is clean and compatible with native beach sand.

c. Objectives to be considered in discharge determination (40 CFR 230.5(a)):

(1) Impacts on chemical, physical, and biological integrity of aquatic ecosystem (40 CFR 230.5(a)(1)): Not significant.
(2) Impact on food chain: Not significant.
(3) Impact on diversity of plant and animal species: Not significant.
(4) Impact on movement into and out of feeding, spawning, breeding and nursery areas: Not significant.
(5) Impact on wetland areas having significant functions of water quality maintenance: Not applicable or not significant.
(6) Impact on areas that serve to retain natural high waters or flood waters: Not applicable.
(7) Methods to minimize turbidity: The borrow area of clean, large particles would be utilized to minimize turbidity.
(8) Methods to minimize degradation of aesthetic, recreational and economic values: The project has as its primary purposes shoreline protection and the improvement of recreational and economic features. Aesthetic enhancement would also result from project construction.

(9) Threatened and endangered species: None adversely affected. Although loggerhead sea turtle nesting habitat does not currently exist in the proposed nourishment project zone, turtle nesting activity could be expected to occur after the beach has been nourished. The proposed project will provide more than five miles of beach habitat suitable for turtle nesting. In order to avoid potential conflicts with turtle nesting, all work will be performed between October 15 and May 15 to minimize impacts to sea turtles, fish, shellfish and infauna.

(10) Investigate other measures that void degradation of aesthetic, recreational, and economic values of navigable waters: Not applicable (see 6.b and 6.c(8)).

d. Impacts on water uses as proposed disposal site (40 CFR 230.5(b)(1-10)):

(1) Municipal water supply intakes: Not applicable.
(2) Shellfish: Not significant.
(3) Fisheries: Not significant.
(4) Wildlife: Not significant.
(5) Recreation activities: Recreational activities would be greatly improved.
(6) Threatened and endangered species: None adversely affected (see 6.c(9)).
(7) Benthic life: Not significant (see 2.c(1)).
(8) Wetlands: Not applicable/not significant.
(9) Submersed vegetation: Not applicable.
(10) Size of disposal site: This project plan was chosen over others that would require more material placed over a larger area.
(11) Coastal Zone Management programs (40 CFR 230.3(e)): The proposed action is consistent with the South Carolina CZM program.

e. Considerations to minimize harmful effects (40 CFR 230.5(c)(1-7)):
(1) Water quality criteria: No legally applicable criteria would be exceeded.
(2) Investigate alternatives to open water disposal: Not applicable.

(3) Investigate physical characteristics of alternative disposal sites: Not applicable.

(4) Ocean dumping: Not applicable.

(5) Where possible, investigate covering contaminated dredged material with cleaner material: Not applicable. Material is clean.

(6) Investigate methods to minimize effect of runoff from confined areas on the aquatic environment: Not applicable.

(7) Coordinate potential monitoring activities at disposal site with EPA: Not applicable. No monitoring would be required as material is clean sand and biotic impacts would be minor.

7. Statement as to contamination of fill material if from a land source (40 CFR 230.5d): Not applicable.

8. Determine mixing zone: Not applicable.

9. Conclusions and determinations:

a. Feasible alternatives to the proposed discharge have been considered and none that are practicable will have less adverse impact on the aquatic and semi-aquatic ecosystem.

b. There are no unacceptable environmental impacts on the aquatic and semi-aquatic ecosystem as a result of the-discharge.

c. The discharge of the dredged (or fill) material will be accomplished under conditions which will minimize, to the extent practicable, adverse environmental effects on the aquatic and semi-aquatic ecosystem.

10. Findings: Based on the above evaluation and determinations, the proposed discharge site for the Folly Beach Project has been specified through the application of the Section 404(b) Guidelines.

JAMES T. SCOTT
LTC, Corps of Engineers
District Engineer

FINDING OF NO SIGINIFICANT IMPACT
SHORELINE PROTECTION EXTENSION
FOLLY BEACH, SOUTH CAROLINA

The proposed Folly Beach shoreline protection extension project has been thoroughly assessed and coordinated with local, state and federal agencies. Based upon the attached environmental assessment, 404(B) evaluation, and environmental coordination, I conclude that the environmental affects of the proposed shoreline protection extension and periodic nourishment are not significant, and that the preparation of an Environmental Impact Statement is not warranted. Specific factors considered in making the determination include the following:

- An EIS was prepared and filed with CEQ in 1980 for the base nourishment project at Folly Beach. This NEPA document discusses the need, alternatives, and selected plan in detail.

- Water quality impacts would be temporary and not significant.

- Cultural resources would not be affected.

- No endangered species would be adversely affected. Conversely, over five miles of loggerhead sea turtle habitat would be created and maintained.

- Construction and renourishment activities would not significantly affect fish and wildlife.

- No significant land use changes would occur.

APR 25 1991
Date

James T. Scott
LTC, Corps of Engineers
District Engineer

Appendix 4

Agency Coordination Letters

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

October 15, 2004

Mr. Joseph Jones
Chief, Planning Branch
U.S. Army Corps of Engineers
69A Hagood Avenue
Charleston, SC 29403-5107

Dear Mr. Jones:

The Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment (EA) Amendment and Finding of No Significant Impact for the Charleston District's Folly Beach Shore Protection Project, Charleston County, South Carolina. The proposed project consists of the re-nourishment of about 28,200 feet of beach from the old Coast Guard Station to Folly Beach County Park. Consultation under Section 7 of the Endangered Species Act, as amended (16 U.S.C. 1531-1543) is underway and a Biological Opinion will be provided under separate cover.

The DEA is generally adequate in its description of the existing fish and wildlife resources and the evaluation of project impacts. Service concerns related to the proposed experimental tilling protocol will be addressed in the Biological Opinion.

We appreciate the opportunity to review these documents. If you have any questions please contact Ed EuDaly at 843-727-4707 ext. 13.

Sincerely,

Timothy N. Hall
Field Supervisor

TNH/EME

South Carolina Department of
Natural Resources

John E. Frampton
Director
John V. Miglarese
Deputy Director for
Marine Resources

December 16, 2004

Mr. Shawn Boone
U. S. Army Corps of Engineers
69-A Hagood Avenue
Charleston, SC 29403-5107

REF: Draft Amendment to the Environmental Assessment (EA) and Finding of No Significant Impact for the Folly Beach Shore Protection Project

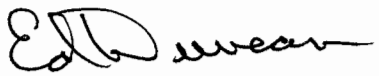
Dear Mr. Boone:

Personnel with the South Carolina Department of Natural Resources have reviewed the above referenced DEA and offer the following comments.

With a few exceptions, our department finds the submitted Draft Environmental Assessment sufficient in addressing the full range of potential environmental impacts associated with the proposed project. Of outstanding concern are potential impacts to sea turtles resulting from the project. While the DEA addresses actions to be taken to minimize impacts to turtles in the event work is conducted during turtle nesting season, it does not take into consideration the full range of potential impacts. We recommend a comprehensive sea turtle protection plan be developed and submitted for our review. Such a plan should provide for continuous monitoring of the beach during all renourishment operations conducted during the turtle nesting season. Impacts to nesting females and hatchlings resulting from on-beach lighting should also be addressed. We understand that discussions with our department concerning the proper location of offshore borrow sites are on-going. We recommend this coordination continue until the final borrow locations are selected.

Provided the above recommendations are addressed in the DEA, we concur that the proposed project will not result in significant impacts to natural resources.

Sincerely,



Robert E. Duncan
Environmental Programs Director

Cc: SCDHEC/Epps
OCRM/Joyner
USEPA/Campbell
USFWS/Hall
NMFS/Rackley

D H E C
PROMOTE PROTECT PROSPER

Office of Ocean & Coastal Resource Management
1362 McMillan Avenue, Suite 400
Charleston, South Carolina 29405

(843) 744-5838 (843) 744-5847 (fax)

November 1, 2004

Mr. Joseph A. Jones
Chief, Planning Branch
Charleston District, Corps of Engineers
69A Hagood Ave.
Charleston, SC 29403

RE: Draft EA and Draft FONSI, Folly Beach Shore Protection Project

Dear Mr. Jones;

DHEC-OCRM has reviewed the draft EA and FONSI for the Folly Beach Shore Protection Project. We concur that the proposed project will have no significant adverse affect on human health and welfare or the environment, and that preparation of an Environmental Impact Statement is not warranted. We do offer the following comments:

1. The document states that side-scan sonar surveys and extensive vibracore sampling have identified offshore borrow sites with "beach-compatible" sand. It would be helpful to include a grain size analysis summary for the borrow sites, as compared to the native beach sand.

2. The text of the document refers to three borrow areas, but the figure and table on page 3 identify the borrow areas as A, B, C, and D. A and B are contiguous, but if they are considered to be separate borrow areas then it might be better for the text of the report to refer to four borrow areas.

3. At the top of Page 4, the document states "It is expected that the borrow areas will fill with sand of the same grain size after the dredging has been completed." Post-project monitoring of offshore borrow sites used for renourishment at Hilton Head Island and Hunting Island have revealed that these sites may actually infill with much finer-grained material. Some acknowledgement of this phenomenon should be noted in the EA.

Pease fee free to contact me if you need any additional information.

Sincerely,

William C. Eiser
Staff Oceanographer

February 4, 2005

US Army Corps of Engineers
Charleston District
69A Hagood Avenue
Charleston, SC 29403-5107
Attn: Joseph A. Jones

RE: P/N 91-2R-022;
U.S. Army Corps of Engineers
Folly Beach Shore Protection Project

Dear Mr. Jones,

This letter is in response to a request for a confirmation that the 401 Water Quality Certification is still valid for the above-mentioned project. The proposed work consists of beach renourishment by placing approximately 2,500,000 cubic yards of sand along 5.34 miles of shoreline along Folly Beach in Charleston County, South Carolina. This work was authorized by issuance of the State Certification referenced above. You originally requested to change the location of the borrow site from a location in the Folly River to a location approximately three miles off shore in the Atlantic Ocean. From this location, approximately 1.7 million cubic yards of sand was proposed to be removed from this site, however, in light of the severity of the 2004 hurricane season this amount has now been revised to 2.0 million cubic yards of sand. The original State Certification issued for this project is still valid. The Department has reasonable assurance that the proposed modification will not contravene water quality standards and the existing and classified uses of the Atlantic Ocean will not be impacted. Therefore the Department offers no objection to the proposed modification provided that all terms and conditions of the original permit are adhered to.

This letter should be attached to and made a part of the original permit issued on May 28, 1991.

If you have any questions, please feel free to call Robert H. Ridgell at (803) 898-4179 or e-mail at ridgelrh@dhec.sc.gov.

Sincerely,

M. Rheta Geddings, Director
Division of Water Quality

MRG:rhr

Cc: Curtis Joyner, OCRM
Trident District EQC Office

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

May 28, 1991

Copy

Mr. James Preacher
Charleston District, Corps of Engineers
334 Meeting Street, Room 621
P. O. Box 919
Charleston, S. C. 29402

Re: Certification in Accordance with Section 401 of the Clean Water Act, as amended.

Charleston District, Corps of Engineers
permit to perform beach nourishment by placing approximately 2,500,000 cubic yards of sand along 5.34 miles of shoreline of Folly Beach
Atlantic Ocean
Charleston County
P/N 91-2R-022, Revised

Dear Sir:

We have reviewed plans for this project and determined that there is a reasonable assurance that the proposed project will be conducted in a manner consistent with the Certification requirements of Section 401 of the Federal Clean Water Act, as amended. In accordance with the provisions of Section 401, we certify that this project, subject to the indicated conditions, is consistent with applicable provisions of Section 303 of the Federal Clean Water Act, as amended. We also hereby certify that there are no applicable effluent limitations under Sections 301(b) and 302, and that there are no applicable standards under Sections 306 and 307.

This certification is subject to the following conditions:

1. Beach nourishment must be performed between October 15th and May 15th to minimize the impacts to the benthic communities and sea turtles and to avoid disruption of commercial shrimping activity.

2. The applicant must notify Mr. Ken Moore, Manager of the Shellfish Section, SCDHEC, prior to initiation of the beach nourishment.

3. All possible efforts must be made to perform the work in a manner that will minimize increases in turbidity in the water. Temporary training dikes must be used to contain the discharge from the dredge pipeline.

4. The applicant must develop and implement a benthic monitoring plan acceptable to the SCWMRD, USFWS, NMFS, and SCDHEC for the 11,530' x 200' borrow site located in the Folly River. If the results of the benthic monitoring study indicate that there are detrimental effects on the fishery or other aquatic resources, this borrow site must be eliminated from future uses.

Sincerely,

Chester E. Sansbury

Chester E. Sansbury, Director
Division of Water Quality
and Shellfish Sanitation

CES:NJNF
cc: Charleston District, Corps of Engineers
Trident EQC District Office
SCCC
File:401022

D H E C
PROMOTE PROTECT PROSPER

Office of Ocean & Coastal Resource Management
1362 McMillan Avenue, Suite 400
Charleston, South Carolina 29405

(843) 744-5838 (843) 744-5847 (fax)

Christopher L. Brooks, Deputy Commissioner

January 25, 2005

Mr. Joseph A. Jones
Chief, Planning Branch
Charleston District, Corps of Engineers
69A Hagood Ave.
Charleston, SC 29405

RE: Folly Beach Renourishment Project
Federal Consistency
Charleston County

Dear Mr. Jones,

The staff of the South Carolina Department of Health and Environmental Control Office of Ocean and Coastal Resource Management has reviewed the information provided to us in your letter of January 6, 2005, regarding the Folly Beach Renourishment Project. We have also reviewed the Draft Amendment to the Environmental Assessment and Finding of No Significant Impact document for this project dated September 2004. Based on this information, the staff of the Office of Ocean and Coastal Resource Management concurs that this Federal Action is consistent with the SC Coastal Zone Management Act.

Interested parties are provided ten day from receipt of this letter to appeal this action.

Sincerely,

William C. Eiser
Project Manager

EFIS #15636

JAN 27

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702-2432

January 25, 2005

Lt. Colonel Alvin B. Lee
District Engineer, Charleston District
Department of the Army, Corps of Engineers
69A Hagood Avenue
Charleston, South Carolina 29403-5107

Dear Colonel Lee:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed the supplementary information provided with your letter dated January 6, 2005, regarding the proposed Folly Island, South Carolina, Emergency Beach Restoration Project. We have also reviewed the January 12, 2005, interagency meeting minutes and action items concerning mitigation of project effects on fishery and wildlife resources. The project consists of placing approximately 2.0 million cubic yards of sand on the front beach of Folly Island. The source of sand includes four borrow sites, located approximately three miles offshore, and totaling approximately 620 acres in size. The proposed work as a part of the congressionally authorized Folly Beach Shore Protection Project. The proposed 2005 work is being pursued under the emergency preparedness, response, and recovery authority of Public Law 84-99 and is necessitated as a result of severe beach erosion experienced in late summer and fall 2004.

NOAA Fisheries does not anticipate that the project will result in long-term or severe adverse effects on fishery resources under our purview. We support the borrow site monitoring program recommended by South Carolina Department of Natural Resources at the January 12, 2005, meeting since such monitoring is needed to properly evaluate effects on living marine resources and habitats. Additionally, NOAA Fisheries should be notified of any required changes in project construction methodologies or timing since such changes could impact fishery resources and/or Essential Fish Habitat.

With regard to potential effects on species afforded protection under the Endangered Species Act, you should contact Mr. David Bernhart of our Protected Resources Division at the letterhead address, or at (727) 570-5312.

Thank you for an opportunity to provide comments on this project. Related questions or comments should be directed to the attention of Mr. Prescott Brownell at our Charleston Field

Office. He may be reached at P.O. Box 12559, Charleston, South Carolina 29422, or at (843) 953-7204.

Sincerely,

David H. Rackley

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc:
Ed Duncan, SCDNR
Tim Hall, FWS
Rob Mikell, OCRM
Quinton Epps, SCDHEC
EPA, Atlanta
F/SER4
F/SER3

UNIVERSITY OF SOUTH CAROLINA

SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY AND ANTHROPOLOGY

13 October 2004

Shawn Boone
Department of the Army
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston SC 29403-5107

Dear Mr. Boone,

This letter is in response to correspondence, including a draft EA and FONSI, dated 30 September 2004 from Joseph Jones, Chief-Planning Branch, concerning the Folly Beach renourishment project. We notice that a remote sensing survey took place using side scan sonar to document potential live bottom areas in the three borrow sites (p. 3). What about submerged cultural resources? In correspondence with Robert Chappell around April 2004, we stated the need for a submerged cultural resource survey of the three borrow sites. While sonar is good for observing potential archaeological resources protruding from the substrate, it cannot penetrate below the surface, especially in areas of sandy bottoms. The primary underwater archaeological tool for locating submerged cultural resources is the magnetometer. As long as ferro-magnetic material is present, the magnetometer will detect a buried or exposed object. The survey of these three borrow sites should include a magnetometer and any comments we have regarding the potential effect at these three sites on potential submerged cultural resources await the results of this survey. We look forward to learning the results of the survey. If you have any questions or concerns about this matter please contact Christopher Amer or me.

Sincerely,

James D. Spirek
Deputy State Underwater Archaeologist
Review and Compliance

1321 Pendleton Street • Columbia, S.C. 29208-0071 • (803) 777-8170 • 734-0567 • 799-1963 • FAX 254-1338

EASTERN SHAWNEE TRIBE
OF OKLAHOMA

P.O. Box 350 · Seneca, MO 64865 · (918) 666-2435 · FAX (918) 666-2186

January 13, 2005

Re: Construction of a Beach Renourishment Project on Folly Island, SC in Charleston South Carolina

Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, South Carolina 29403-5107

To Whom It May Concern:

Thank you for notice of the referenced project(s). The Eastern Shawnee Tribe of Oklahoma is currently unaware of any documentation directly linking Indian Religious Sites to the proposed construction. In the event any items falling under the Native American Graves Protection and Repatriation Act (NAGPRA) are discovered during construction, the Eastern Shawnee Tribe request notification and further consultation.

The Eastern Shawnee Tribe has no objection to the proposed construction. However, if any human skeletal remains and/or any objects falling under NAGPRA are uncovered during construction, the construction should stop immediately, and the appropriate persons, including state and tribal NAGPRA representatives contacted.

Sincerely,

Jo Ann Beckham
Administrative Assistant

Charles Enyart, Chief
Eastern Shawnee Tribe of Oklahoma

UNIVERSITY OF SOUTH CAROLINA

SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY AND ANTHROPOLOGY

18 February 2005

Alan Shirey
Department of the Army
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston SC 29403-5107

Re: Folly Beach Renourishment Project.

Dear Alan,

After review of the letter report dated 10 February 2005 from Wes Hall, archaeological contractor, to Richard Kimmel, US Army Corps of Engineers, we find that all concerns related to the protection of submerged cultural resources have been met by the results of the underwater archaeological survey off Folly Beach at Borrow Sites A and B. The results of the survey indicate the presence of a shipwreck in Borrow Site B, which through previous discussions will be avoided by the placement of a 3000-foot diameter dredging exclusion area. This exclusion zone may be reduced in diameter upon additional study of the magnetic and acoustic data. We agree with the archaeological contractor that all other areas show no obvious signs of archaeological materials and therefore are cleared for dredging operations from an archaeological perspective. We look forward to reviewing the draft report of the project's findings. Thank you for your cooperation in protecting the submerged cultural resources on the bottomlands of South Carolina.

Sincerely,

James D. Spirek
Deputy State Underwater Archaeologist
Maritime Research Division/Review and Compliance

C: Chad Long, SHPO
Richard Sidebottom, SHPO
Richard Kimmel, USACE

1321 Pendleton Street • Columbia, S.C. 29208-0071 • (803) 777-8170 • 734-0567 • 799-1963 • FAX 254-1338

Jena Band of Choctaw Indians

P. O. Box 14 • Jena, Louisiana 71342-0014 • Phone: 318-992-2717 • Fax: 318-992-8244

October 18, 2004

Department of the Army
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, South Carolina 29403-5107

RE: FIRST PERIODIC RE-NOURISHMENT OF THE FOLLY BEACH SHORE PROTECTION PROJECT
FOLLY BEACH, CHARLESTON COUNTY, SOUTH CAROLINA

To Whom It May Concern:

Reference is made to your letter dated September 30, 2004, concerning the above-proposed project.

After thorough review of the document submitted, it has been determined that there will be no significant impact in regards to the Jena Band of Choctaw Indians. We have no objections to its implementation.

If I may be of any further assistance, please do not hesitate to call.

Sincerely,

Lillie Strange

Lillie Strange
Environmental Director
Jena Band of Choctaw Indians
Lilliestrange72@aol.com
318-992-8258

Choctaw Nation of Oklahoma

Drawer 1210 • Durant, Oklahoma 74702-1210 • (580) 924-8280

Gregory E. Pyle
Chief

Mike Bailey
Assistant Chief

1-11-05

Shawn Boone
Department of The Army
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, South Carolina 29403-5107

Dear Mr. Boone:

We have reviewed the following proposed projects as to its effect on Choctaw Nation of Oklahoma concerns regarding properties, ceremonial or burial grounds.

ENTITY REQUESTING SERVICE: Department of The Army, Charleston District

PROJECT: Beach nourishment project – Folly Island

COUNTY: Charleston County

After further review of the above mentioned project, to the best of our knowledge it will not have any adverse effects on any Choctaw Nation of Oklahoma properties, and ceremonial materials. However, should construction activities expose buried archaeological or building materials such as chipped stone, tools, pottery, bone, historic crockery, glass or metal items, this office should be contacted immediately at 1- 800-522-6170, extension 2243 or 2125. A member of our staff will be sent to evaluate the significance of these remains.

Sincerely,

Olin Williams

Olin Williams
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma