United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
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Vero Beach, Florida 32960

August 25, 2004

Colonel Robert M. Carpenter
District Engineer
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Log No.:	4-1-04-F-4529
Corps Application No.:	199100296 (IP-MN)
Dated:	September 2, 2003
Project:	Longboat Key Renourishment
Applicant:	Town of Longboat Key
Counties:	Sarasota and Manatee

Dear Colonel Carpenter:

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Longboat Key Beach Renourishment Project located in Sarasota and Manatee Counties, Florida, and its effects on the threatened loggerhead sea turtle (*Caretta caretta*), endangered green sea turtle (*Chelonia mydas*), endangered leatherback sea turtle (*Dermochelys coriacea*), and endangered West Indian manatee (*Trichechus manatus*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) and the Fish and Wildlife Coordination Act of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*).

This biological opinion is based on information provided in the U.S. Army Corps of Engineers' (Corps) Public Notice dated September 2, 2003; the applicant's agent, Coastal Planning and Engineering (CPE); the Florida Department of Environmental Protection (DEP), Bureau of Beaches and Coastal Systems; the Florida Fish and Wildlife Conservation Commission (FWC); telephone conversations and email correspondence with the Corps and CPE, field investigations, and other sources of information. A complete administrative record of this consultation is on file at the South Florida Ecological Services Office, Vero Beach, Florida.

In the September 2, 2003, Public Notice, the Corps determined that the proposed project "may affect, but is not likely to adversely affect" the endangered West Indian manatee. Since the Corps has agreed to include the *Standard Manatee Construction Conditions* as protection measures in the Federal permit, the Service concurs with the Corps' determination.

Fish and Wildlife Resources

In addition to sea turtles, the beaches of northern Longboat Key support an active shorebird nesting colony dominated by the State-listed threatened least tern (*Sterna antillarum*) (R. Trindell personal communication 2004). The colony is located immediately south of Longboat Pass in the vicinity of DEP monument R-44.5. Though the colony is located north of the proposed sand placement footprint, the applicant has agreed to implement the following measures to avoid potential impacts to shorebirds and their nesting colony by: (1) ensuring that construction activity or storage of equipment will not occur on the beach north of the project area; (2) implementing a 300-foot buffer zone around any locations within the project area where shorebirds have been engaged in courtship or nesting behavior, (3) increasing the buffer zone size in the event that the shorebirds continue to demonstrate agitated behavior as a result of construction activities, and (4) posting shorebird nesting sites per FWC specifications. In addition, the DEP permit indicates that daily shorebird surveys by authorized personnel will be conducted from April 1 through September 1 (or 45 days prior to construction) during the year of construction and for one nesting season post-construction. The surveys will be conducted by trained individuals using approved ecological survey procedures (*e.g.*, the U.S. Geological Survey's *Breeding Season Population Census Techniques for Seabirds and Colonial Waterbirds throughout North America*.

Investigations of the nearshore habitat of Longboat Key in 2002 and 2003 indicate that the project area supports approximately 2.5 acres of low-relief hardbottom reef habitat dominated by macroalgae *(e.g.*, *Caulerpa mexicana*, *Gracilaria spp*. and *Hypnea* spp.) (CPE 2004). It is estimated that 1.5 acres of hardbottom habitat will be buried as the constructed berm reaches equilibrium after construction. The overall average percent cover of macroalgae on the reef is approximately 30 percent. According to the DEP's Consolidated Notice of Intent to Issue for the Longboat Key Nourishment Project, File number 0202209-001-JC, dated May 11, 2004, scattered small colonies and recruits (less than 0.75 inch diameter) of scleractinian corals were recorded along the inshore portions of the cross-shore transects in the impact area within water depths between 8 to 10 feet, including starlet corals (*Siderastrea* spp.) and star corals (*Solenastrea* spp). A low density of octocoral colonies (*Leptogorgia* spp.) greater than 10 centimeters in height was observed, along with scattered sponges (*Cliona celata*), tunicates (*Trididemum solidum* and *Didemnum* sp.) and hydroids. Larger individuals of *Solenastrea* spp. occur further offshore on the larger, slightly deeper and more stable, hardbottom formations (approximately 12 to 14 feet of water) to the south of the impact area. An increased scleractinian coral richness (*S. hyades* and *S. bournoni*, *Oculina* sp., *Cladocora abruscula*, and *Phyllangia americana*) and abundance of larger *Leptogorgia* colonies was also observed on the large, hardbottom formation offshore of R-51 (DEP 2004 website).

During construction, direct impact to nearshore hardbottom habitat is not anticipated; however, secondary impacts may occur as a result of turbidity and sediment plumes. Epibenthic communities within the project area may be exposed to prolonged periods of turbidity and sedimentation during beach fill placement. The inshore portion of the larger hardbottom formation (R-51) is located within the DEP's turbidity mixing zone: As a result, the DEP and the Corps will require that the applicant implement a biological monitoring program to document hardbottom impacts, particularly to epibenthic communities, as a result of short-term and long-term turbidity and sedimentation exposure located within the expanded turbidity mixing zone and immediately west (offshore) of the equilibrium toe of fill. The DEP and Corps permits will require that a network of nearshore monitoring stations and transects will be maintained to specifically identify and address potential effects from sediment and turbidity movement to the adjacent, more stable nearshore hardbottom communities (DEP 2004 website).

After construction, 1.5 acres of nearshore hardbottom is expected to be unavoidably impacted as a result of burial as the beach reaches equilibrium over-time. As a result, the applicant has agreed to construct a 1.5 acre artificial reef as mitigation for unavoidable impacts to hardbottom reef habitat. The Service supports the proposed mitigation.

CONSULTATION HISTORY

On March 22, 1991, the Corps published Public Notice number 199100296 (IP-MN) for the initial nourishment of a 9.4-mile section of Longboat Key shoreline between DEP monuments R-29 and R-47, which straddles the boundaries of Sarasota and Manatee Counties. The project was constructed in 1992, but subsequently the material eroded during the active hurricane season of 1995.

During February through August 1993, the initial Longboat Key Beach Restoration Project was constructed.

In the Public Notice dated March 28, 1996, the Corps stated that the applicant proposed to renourish the shoreline of Longboat Key between DEP monuments R-14 and R-65 during the sea turtle nesting season. The Corps determined that the proposed project "may affect" threatened and endangered nesting sea turtles within the project area.

On May 23, 1996, the Service concurred with the Corps' determination of "may affect" for the loggerhead and green sea turtles and initiated formal section 7 consultation.

On October 16, 1996, the Service provided the Corps with our Biological Opinion, Service Log Number 4-1-96-F-396.

In February 1997, the second renourishment of Longboat Key was constructed.

In a letter dated March 21, 1999, the Corps requested reinitiation of formal section 7 consultation with the Service. The Corps stated that the applicant had proposed to renourish Longboat Key within the original project footprint, but the applicant requested to increase the amount of fill material by 100,000 cubic yards (cy) in the southern portion of the project.

On April 3, 2001, the Service provided a letter to amend our 1996 Biological Opinion to reflect the modification of the project description. The Terms and Conditions of our 1996 Biological Opinion remained the same.

In April 2001, the third renourishment of the Longboat Key project was initiated.

In the Corps' Public Notice dated September 2, 2003, the applicant proposed to place material obtained from offshore borrow sites along 9.4 miles of Longboat Key shoreline. The Corps determined that the construction activities related to the proposed project "may affect, but are not likely to adversely affect" the West Indian manatee and "may affect" listed sea turtles.

In accordance with the ESA, the Service is providing the following biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Proposed Action

The applicant has proposed to place 1,388,000 cy of material obtained from four offshore borrow sites along 9.45 miles (49,900 linear feet) of Gulf of Mexico shoreline in Sections 22, 23, 24, 25, 26, and 36, Township 35 South, Range 16 East; Section 31, Township 35 South, Range 17 East; and Sections 6, 7, 8, 16, 17, 27, and 28, Township 36 South, Range 17 East, Longboat Key, Manatee, and Sarasota Counties, Florida. Specifically, Longboat Key is located in southern Manatee and northern Sarasota Counties (Figure 1). The proposed dredged material placement area extends from DEP monument R-46A in Manatee County, to R-29.5 in Sarasota County. As proposed, the constructed beach will include a berm height of plus 6 feet National Geodetic Vertical Datum (NGVD) and a design shoreline width of 130 feet from the baseline established in the 1995 Longboat Key Comprehensive Management Plan by CPE to the 0 foot NGVD contour of the filled berm.

The material will be obtained by a hopper dredge from four offshore borrow sites identified as Borrow Areas VIA, VIB, VIII, and IX. Borrow site VIII is located approximately 4.3 miles offshore of the south end of Anna Maria Island, which is immediately north of Longboat Key while Borrow Area IX is located approximately 2 miles offshore of Passage Key Inlet, at the north end of Anna Maria Island. Borrow Areas VIA and VIB were previously dredged during the 1996 to 1997 and 2001 nourishment projects on Longboat Key (Table 1). Some cap layer material may be stockpiled and placed later. It is likely that the project will be constructed within the sea turtle nesting season, which extends from April 1 to November 30. The applicant anticipates an 8-year renourishment interval.

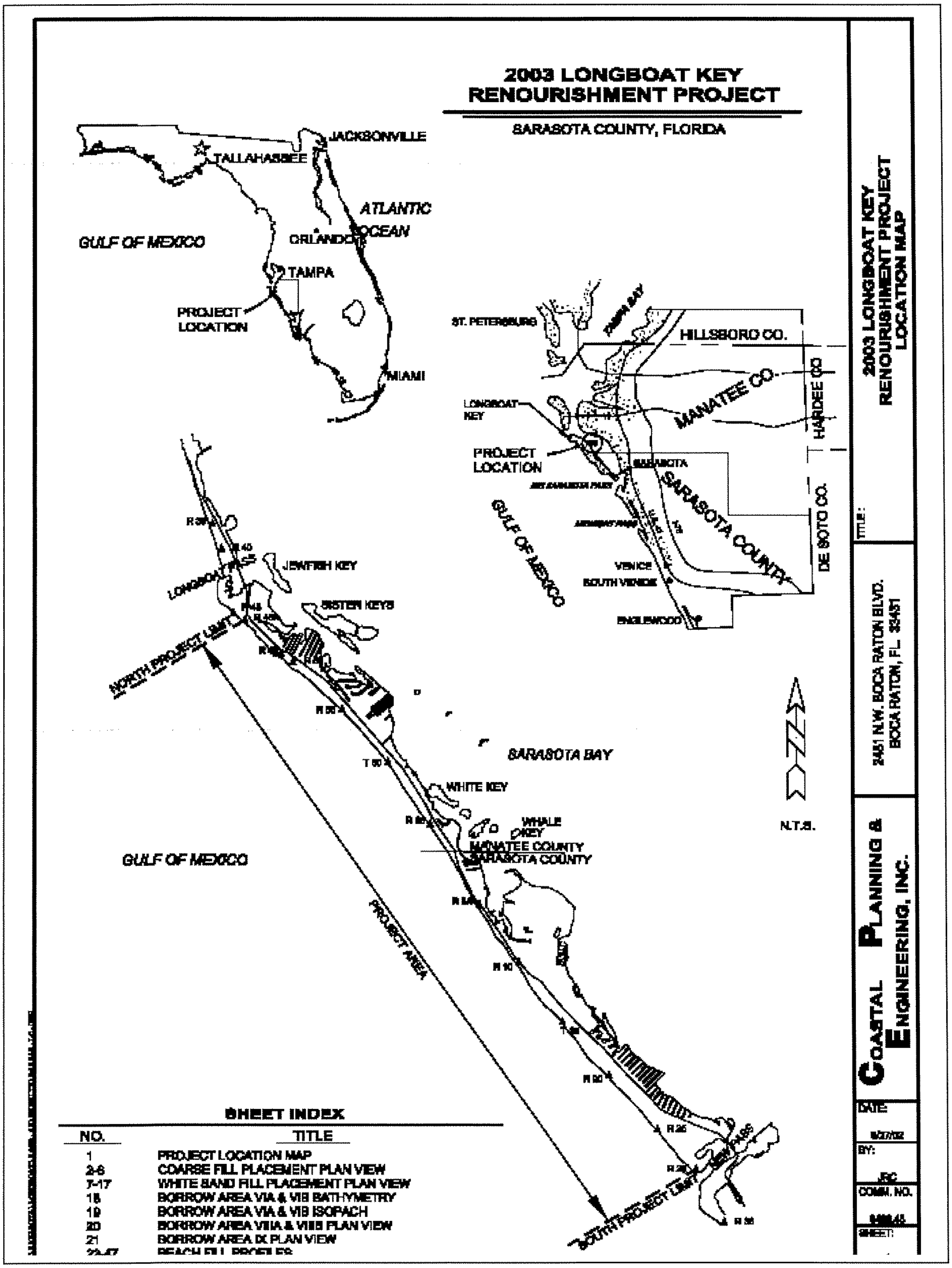

Figure 1. Project Area (CPE 2003).

Table 1. Summary of Historical and Proposed Borrow Areas for Longboat Key Adapted from CPE's March 22, 2004, letter to DEP.

Sediment	Mean Grain Size (mm)	Sorting (phi)	Silt Content (%)	Calcium Carbonate Content (%)	Color	Description
Native Beach Recalculated [1]	0.28	1.62	2.66	-	-	-
Native Beach Presented by ATM [2]	0.22	1.38	Not Presented	-	-	-
Longboat Pass (1993) [2]	0.26	1.09	Not Presented	-	White	Fine quartz sand with occasional thin layers of shell hash
New Pass(1993) [2]	0.19	1.01	Not Presented	-	White	Fine quartz sand with occasional thin layers of shell hash
5A (1996/1997) [3]	0.43	1.18	3.3	-	5Y-7/1-5Y-4/1	Fine to medium sand with shell fragments and shell hash
5A (2001) [3]	0.43	1.18	3.3	-	5Y-7/1-5Y-4/1	Fine to medium sand with shell fragments and shell hash
VIA [4]	0.47	1.67	2.28	52.5	5Y-5/1	Medium to coarse shell fragments and shell hash with fine to medium grained quartz sand
VIB [5]	0.49	1.31	1.53	86.4	5Y-5/1	Medium to coarse shell fragments and shell hash with fine to medium grained quartz sand
VIII [4]	0.44	1.7	2.53	63.6	5Y-5/1	Medium to coarse grained sand with varying amounts of shell hash and shell fragments
IX [4]	0.20	1.09	1.86	4.6	5Y-8/1	Clean fine grained sand with silt percent increasing with depth

[1] Sediment characteristics recalculated by CPE from the native beach data presented by ATM[2].

[2] Applied Technology and Management, Incorporated, 1989. "Geotechnical and Sand Search Investigation, Longboat Key", ATM, Gainesville, Florida. Pages 38-43, Appendix C.

[3] Coastal Planning and Engineering, Incorporated, 1999. Town of Longboat Key Phase I Offshore Borrow Area Investigation to Locate "White Sand" Sources for Beach Renourishment of Longboat Key, Boca Raton, Florida. Page 8.

[4] Coastal Planning and Engineering, Incorporated, 2004. Offshore Borrow Area Delineation of "White Sand" Sources for Beach Renourishment of Longboat Key, Boca Raton, Florida. Page 10.

[5] Revised values based on updated cuts.

The proposed renourishment project includes the experimental placement of two distinct types of borrow material on the beach, as follows: (1) a base layer of coarser fill material obtained from Borrow Areas VIA, VIB, or VIII will to be placed in areas where erosion has been historically higher than the other portions of the project area, and (2) a cap layer of significantly finer and lighter fill material will be placed over the coarse base, as well as placed as a single fill layer in the remaining portion of the project area. The advance nourishment of the course base layer of sediment is proposed for placement between DEP monuments R-47 and R-50, near the Beachwalk property in Manatee County; DEP monuments R-2 to R-6; and R-10 to R-14 near the Bayport and Islander properties in Sarasota County, respectively. In these areas, an average of 65 percent of the total fill volume will be comprised of the course fill material. The purpose of the layered design is to increase the material's stability within the high erosion areas through the placement of courser sediments while the sand cap layer is intended to improve the function and match the native "white quartz sand" beaches of Longboat Key. The project time-frame is expected to be 90 days.

To avoid mixing the cap layer with the course sand layer beneath, the cap layer will be 30 inches in depth throughout the project area, except in the northern portion of the project (R-51) where a 24 inch depth will be maintained to minimize the impacts to nearshore hardbottom habitat. To reduce the migration of the cap material from the beach to offshore areas, the cap material is designed for placement above 0 feet NGVD.

Approximately 1.5 acres of nearshore hardbottom habitat located between DEP monuments R-47and R-50 is expected to be buried as a result of the equilibrium toe of fill. The applicant has proposed to construct a low-relief nearshore artificial reef at a 1:1 mitigation ratio. The applicant has agreed to provide additional mitigation if the post-construction monitoring indicates additional hardbottom burial or degradation. As compensation for unmitigated impacts from the previous project, a scientific monitoring and management program will be implemented to promote colonization by desired epibenthic species and to reduce the temporal lag in habitat function.

Action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The Service has determined that the action area for this project includes the 9.4 miles of Sarasota County and Manatee County shoreline between DEP monuments R-46A and R-29.5.

STATUS OF THE SPECIES AND CRITICAL HABITAT RANGEWIDE

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle, listed as a threatened species on July 28, 1978 (43 FR 32800), inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and

Indian Oceans. Loggerhead sea turtles nest within the continental United States (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.

Green Sea Turtle

The green sea turtle was federally listed as a protected species on July 28, 1978 (43 FR 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered; all other populations are listed as threatened. The green turtle has a worldwide distribution in tropical and subtropical waters. Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (National Marine Fisheries Service [NOAA Fisheries] and Service 1991a). Nesting also has been documented along the Gulf Coast of Florida on Santa Rosa Island (Okaloosa and Escambia Counties) and from Pinellas County through Collier County (Florida FWC statewide nesting database). Green turtles have been known to nest in Georgia, but only on rare occasions (Georgia Department of Natural Resources statewide nesting database). The green turtle also nests sporadically in North Carolina and South Carolina (North Carolina Wildlife Resources Commission statewide nesting database; South Carolina Department of Natural Resources statewide nesting database). Unconfirmed nesting of green turtles in Alabama has also been reported (Bon Secour National Wildlife Refuge nesting reports).

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

Leatherback Sea Turtle

The leatherback sea turtle, listed as an endangered species on June 2, 1970 (35 FR 8491), nests on shores of the Atlantic, Pacific and Indian Oceans. Non-breeding animals have been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard 1992). Nesting grounds are distributed worldwide, with the Pacific Coast of Mexico supporting the world's largest known concentration of nesting leatherbacks. The largest nesting colony in the wider Caribbean region is found in French Guiana, but nesting occurs frequently, although in lesser numbers, from Costa Rica to Columbia and in Guyana, Surinam, and Trinidad (NOAA Fisheries and Service 1992, National Research Council 1990).

The leatherback regularly nests in the U.S. in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (NOAA Fisheries and Service 1992). Leatherback turtles have been known to nest in Georgia, South Carolina, and North Carolina, but only on rare occasions (North Carolina Wildlife Resources Commission, South Carolina Department of Natural Resources, and Georgia Department of Natural Resources statewide nesting databases). Leatherback nesting also has been reported on the northwest coast of Florida (LeBuff 1990; FWC statewide nesting database); 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 Saint 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, among others); the mean is approximately 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 U.S. coast (NOAA Fisheries and Service 1991b). Nesting migration intervals of 2 to 3 years are most common in loggerheads, but the number can vary from 1 to 7 years (Dodd 1988). Age at sexual maturity is believed to be about 20 to 30 years (Turtle Expert Working Group 1998).

Green Sea Turtle

Green turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3. The interval between nesting events within a season varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Average clutch size reported for Florida was 136 eggs in 130 clutches (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually 2, 3, 4, or more years intervene between breeding seasons (NOAA Fisheries and Service 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Leatherback Sea Turtle

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

Population Dynamics

Loggerhead Sea Turtle

Total estimated nesting in the southeast are approximately 68,000 to 90,000 nests per year, according to the FWC statewide nesting database 2002, Georgia Department of Natural Resources statewide nesting database 2002, South Carolina Department of Natural Resources statewide nesting database 2002, and the 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, NOAA Fisheries 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 (NOAA Fisheries and Service 1991b). About 80 percent of loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties) (NOAA Fisheries and Service 1991b).

Green Sea Turtle

About 150 to 2,750 females are estimated to nest on beaches in the continental U.S. annually (FWC 2003). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NOAA Fisheries and Service 1998). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine Island, Australia, where thousands of females nest nightly in an average nesting season (Limpus et al. 1993). In the Indian Ocean, major nesting beaches occur in Oman where 30,000 females are reported to nest annually (Ross and Barwani 1995).

Leatherback Sea Turtle

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 (100 females/year) (FWC 2003), Sandy Point, U.S. Virgin Islands (50 to 190 females/year) (Alexander et al. 2002) and Puerto Rico (30 to 90 females/year).

Status and Distribution

Loggerhead Sea 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° North.); (2) South Florida Subpopulation occurring from about 29° North on Florida's east coast to Sarasota on Florida's west coast; (3) Dry Tortugas, Florida Subpopulation; (4) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and (5) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen 1994, 1995; Bowen et al. 1993; Encalada et al. 1998; Pearce 2001). These data indicate that gene flow between these five regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation. The Northern Subpopulation has declined substantially since the early 1970s, but most of that decline occurred prior to 1979. No significant trend has been detected in recent years (Turtle Expert Working Group 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 and 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.

Green Sea Turtle

Total population estimates for the green turtle are unavailable, and trends based on nesting data are difficult to assess because of large annual fluctuations in numbers of nesting females. For instance, in Florida, where the majority of green turtle nesting in the southeastern U.S. occurs, estimates range from 150 to 2,750 females nesting annually (FWC 2003). Populations in Surinam and Tortuguero, Costa Rica, may be stable, but there is insufficient data for other areas to confirm a trend.

A major factor contributing to the green turtle's decline worldwide is commercial harvest for eggs and food. Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. The tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens may die. Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from channel dredging and commercial fishing operations.

Leatherback Sea 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 percent of worldwide population), is now less than 1 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

The proposed action has the potential to adversely affect nesting females, nests, and hatchlings within the proposed project area. The effects of the proposed action on sea turtles will be considered further in the remaining sections of this biological opinion. Potential effects include destruction of nests deposited within the boundaries of the proposed project, harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities, and 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 U.S.; therefore, the proposed action would not result in an adverse modification.

ENVIRONMENTAL BASELINE

The distribution of sea turtle nesting activity on Florida's Gulf Coast (Manatee, Sarasota, Charlotte, Lee, and Collier Counties) is understood less than that of the east coast epicenter of sea turtle nesting between Brevard and Palm Beach Counties (Addison et al. 2000). Ten to twelve percent of the total nesting activity on Florida's beaches occurs on Florida's Gulf Coast (Addison et al. 2000). Though the green sea turtle, Kemp's ridley sea turtle (*Lepidochelys kempii*), and the leatherback sea turtle have been documented as nesting on Florida's Gulf Coast beaches, the loggerhead sea turtle is dominant. In 1999 and 2001, marked the first time that the Kemp's ridley and leatherback sea turtles were documented as nesting in Sarasota County. The 2001 leatherback event was the first ever documented nest by the species on the central coast of west Florida (Table 2).

Table 2. Sea turtle nesting activity within Sarasota and Manatee Counties, 2000-2003 (FWC 2003).

Year	Loggerhead Nests		Loggerhead False Crawls		Green Nests		Green False Crawls		Leatherback Nests	
	Sarasota County	Manatee County	Sarasota County	Manatee County	Sarasota County	Manatee County	Sarasota County	Manatee County	Sarasota County	Manatee County
2000	3,562	357	2,621	325	9	0	2	0	0	0
2001	3,211	306	3,531	300	0	0	0	0	1	0
2002	2,584	180	2,266	243	11	0	4	0	0	0
2003	2,814	298	2,553	398	1	1	0	0	0	0

According to data provided by the FWC, Florida Marine Research Institute, the beaches of Sarasota County support the highest density of loggerhead sea turtle nests on the west coast of Florida (FWC 2003). Between 1988 and 2003 the mean number of nests recorded annually in Sarasota County is 2,616, which accounts for approximately 52 percent of loggerhead sea turtle nests in southwest Florida (FWC 2003). Conversely, Manatee County accounts for only approximately 5 percent. The beaches of the remaining counties, Charlotte, Lee, and Collier, support approximately 14, 12, and 17 percent of southwest Florida's loggerhead sea turtle nests in the same 16-year time frame, respectively.

Statewide, the FWC reported that the number of loggerhead turtle nests documented on Florida Index Nesting Beaches reached a 14-year low in 2002.

Status of the Species Within the Action Area

According to data collected during the 2003 nesting season, the results indicate an increase in total sea turtle emergences along Longboat Key when compared to the 2002 data (Mote Marine Laboratory 2004) (Table 3).

Table 3. Sea turtle nesting activity on Longboat Key 1991 through 2003 (Mote Marine Laboratory 2004).

Year	Nests	False Crawls (non-nesting emergence)	Total Emergences
2003	294	344	638
2002	213	217	430
2001	263	250	513
2000	319	321	640
1999	354	303	657
1998	324	299	623
1997	287	320	607
1996	288	391	679
1995	236	432	668
1994	193	201	394
1993	132	544	676
1992	168	195	363
1991	157	195	352

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for southern Gulf of Mexico beaches (includes Pinellas through Monroe Counties in Florida) extends from April 1 through November 30. Incubation ranges from about 45 to 95 days (Table 4).

Table 4. Loggerhead sea turtle nesting activity on Longboat Key (FWC 2003).

Year	Loggerhead Nests		Loggerhead False Crawls	
	North Longboat (Manatee County)	South Longboat (Sarasota County)	North Longboat (Manatee County)	South Longboat (Sarasota County)
2000	921	941	1,356	1,191
2001	132	125	122	133
2002	86	127	138	79
2003	119	173	210	127

Green Sea Turtle

The green sea turtle nesting and hatching season for southern Gulf of Mexico beaches (includes Pinellas through Monroe Counties in Florida) extends from May 15 through October 31. Incubation ranges from about 45 to 75 days (Table 5).

Table 5. Green sea turtle nesting activity on Longboat Key (FWC 2003).

Year	Green Nests		Green False Crawls	
	North Longboat (Manatee County)	South Longboat (Sarasota County)	North Longboat (Manatee County)	South Longboat (Sarasota County)
2000	0	0	0	0
2001	0	0	0	0
2002	0	0	0	0
2003	0	1	0	0

Leatherback Sea Turtle

Longboat Key in Sarasota County was the first documented leatherback nesting event along the central west coast shoreline of Florida. The nest was deposited on May 31, 2001. Incubation ranges from about 55 to 75 days (Table 6).

Table 6. Leatherback sea turtle nesting activity on Longboat Key (FWC 2003).

Year	Leatherback Nests		Leatherback False Crawls	
	North Longboat (Manatee County)	South Longboat (Sarasota County	North Longboat (Manatee County)	South Longboat (Sarasota County)
2000	0	0	0	0
2001	0	1	0	0
2002	0	0	0	0
2003	0	0	0	0

Factors Affecting the Species Habitat Within the Action Area

Longboat Key is a barrier island that is approximately 10 miles long and 1 mile across at its widest point, which lies approximately 3 miles from the mainland. The area is characterized by high-density residential and commercial development. Longboat Pass separates the Town of Longboat Key from Anna Maria Island to the north, and New Pass separates the island from Lido Key to the south. The State of Florida has designated the entire Gulf of Mexico shoreline of Longboat Key as a critically eroded shoreline.

Historic data collected between 1974 and 1987 shows that the erosion rate between Gulfside Road (R-51, Manatee County) and New Pass (R-29, Sarasota County) was 52,800 cy per year (DEP 2004). Subsequently, a large number of seawalls and groins were constructed along Longboat Key in an attempt to maintain the shoreline. The structures further disrupted the littoral movement of sand to downdrift or adjacent beaches, which caused the shoreline to become misaligned.

To provide an erosion control program for the island, the Town of Longboat Key initiated its first major beach nourishment project in 1993 and adopted the Longboat Key Comprehensive Beach Management Plan in 1995. As shown in the table below, between 1993 and 2004, two major beach renourishment projects were constructed along with the placement of dredged material obtained from three pass maintenance dredging projects and one small fill project near the Islander Condominium Sarasota County between R-13 and R-14.

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2000	0	0	0	0
2001	0	1	0	0
2002	0	0	0	0
2003	0	0	0	0

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Table 7. Longboat Key Sand placement projects 1993 to present (CPE 2003).

Project Name	Construction Date	Length	Range (DEP monuments)	Fill volume (cubic yards)
1993 Longboat Key Beach Restoration	February 28 through August 12,1993	9.3 miles (49,000 feet)	R-47 to R-29	3,336,000
Town of Longboat Key, Mid Key Interim Renourishment	October 21, 1996 through February 3,1997	3.1 miles (17,000 feet)	R-65 to R-14	891,000
Longboat Pass Maintenance Dredging	July 1997	1.0 mile (5,500 feet)	R-45 and R-48 through R-51	109,000
New Pass Maintenance Dredging	August-September 1997	0.8 mile (4,300 feet)	R-25 to R-29	171,000
Beer Can Island Channel Dredging	Early 1998	N/A	R-45 vicinity	2,000
April 2001 Beach Renourishment	April 24, 2001 through May 2, 2001	0.7 mile (3,500 feet)	R-10.5 to R-14	105,280
			Total Fill Placed:	**4,614,280**

The 1993 Longboat Key Beach Restoration Project was constructed between February 28, 1993, and August 12, 1993, nourishing 9.3 miles of shoreline with 3,336,000 cy of fill dredged from the ebb shoals of Longboat Pass and New Pass. Approximately 5,751 tons of derelict shoreline protection structures were removed during the project. During and after construction of the 1993 project, much of the dry beach width was lost during the March 1993 "Storm of the Century" and the subsequent adjustment of the beach profile, which was larger than anticipated. Rough seas generated by the 1995 hurricane season caused additional beach material to be eroded. The 1997 Mid-Key Interim Beach Project was constructed from October 21, 1996, to February 3, 1997, to rebuild and maintain the dry beach, placing 891,000 cy between Manatee County DEP monument R-62A and Sarasota County monument R-14 (DEP 2004).

Four additional beach renourishment projects have taken place since February 1997. The most recent project was constructed between April 24, 2001, and May 2, 2001, to address sand losses from Hurricane Gordon, with a fill volume of 105,280 cy between Sarasota County monuments R-10.5 and R-14. Despite these sand placement projects, almost half of the shoreline (49 percent) nourished in 1993 has not received any additional sand since the initial 1993 restoration project (DEP 2004).

In addition to shoreline erosion and subsequent actions to combat erosion, adult nesting sea turtles face several potential land-based obstacles along the beach berm that may deter nesting. Beach furniture (*e.g.*, beach chairs, tables, umbrellas, etc.) was frequently left on the beach overnight and was documented as a frequent obstacle to nesting sea turtles during the 2003 sea turtle nesting season (Mote Marine Laboratory 2004). In addition, adult and hatchling sea turtles may become entangled in the furniture which may result in an increase threat of injury, mortality, and predation.

Another threat to sea turtles on Longboat Key includes the potential of sea turtle hatchling disorientation as a result of artificial lighting along the beach. Typically, sea turtle hatchlings will emerge from the nest then move away from shadows caused by dune vegetation. They orient themselves towards the lighter, open horizon of the ocean (Salmon et al. 1992). If artificial lights are visible from the beach, sea turtle hatchlings tend to travel great distances towards the artificial lights instead of heading towards the ocean. Disorientation events often result in hatchling mortality as a result of dehydration, predation, and in some cases, motor vehicle strikes. In 2003, 53 hatchling disorientation events were documented on Longboat Key, of which 56.8 percent were attributed to lights associated with condominiums (Mote Marine Laboratory 2004).

According to Mote Marine Laboratory, 35 percent of the total sea turtle nests deposited along the Longboat Key shoreline experienced some level of damage in the 2003 nesting season. The damage was attributed to: (1) nest inundation during storm events; (2) fox, ghost crab, and fire ant predation; and (3) encroachment of the nest cavity by vegetation roots.

EFFECTS OF THE ACTION

Factors to be Considered

The proposed sand placement activities are expected to occur along 9.4 miles of suitable sea turtle nesting habitat and construction will likely take place during the sea turtle nesting season. As mentioned previously, the project includes the experimental placement of two distinct types of borrow material on the beach, as follows: (1) a base layer of coarser fill material obtained from three borrow areas will to be placed in areas where erosion has been historically higher than the other portions of the project area, and (2) a cap layer of significantly finer and lighter fill material will be placed over the coarse base, as well as placed as a single fill layer in the remaining portion of the project area. The proposed base layer is not considered beach compatible under Chapter 62B-41 of the Florida Administrative Code (FAC) since it is does not match the composition or color of the native beach sediments. Since the proposed design is expected to increase the renourishment interval and minimize impacts to adjacent hardbottom reef habitat, the DEP authorized the placement of the non-beach compatible material on the beach as designed. However, the DEP and Corps permits will require that the cap layer be greater or equal to 24 inches, the maximum depth at which loggerhead sea turtles typically excavate a nest and extensive physical and biological monitoring will be required.

Analyses for Effects of the Action

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

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 during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, and/or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about 7 percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder 1994).

1. Nest relocation

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).

In a 1994 Florida study comparing loggerhead hatching and emergence success of relocated nests with *in situ* nests, Moody (1998) found that hatching success was lower in relocated nests at 9 of 12 beaches evaluated and emergence success was lower in relocated nests at 10 of 12 beaches surveyed in 1993 and 1994.

2. Equipment

The placement of pipelines and the use of heavy machinery 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.

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

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, and future sand migration.

1. Increased susceptibility to catastrophic events

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

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 (National Research Council 1995). Increased building density immediately adjacent to the beach often resulted as older buildings were replaced by much larger ones that accommodated more beach users. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures. Increased shoreline development may adversely affect sea turtle nesting success. Greater development may support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas (National Research Council 1990), and can also result in greater adverse effects due to artificial lighting, as discussed above.

3. Changes in the physical environment

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

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 10 years or more.

These impacts can be minimized by using suitable sand and by tilling compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain uncompacted for up to 1 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 and Nelson et al. 1987). These escarpments can hamper or prevent access to nesting sites (Nelson and Blihovde 1998). Researchers have shown that female turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (*e.g.*, in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

5. Experimental sediment layering design

Typically, these potential adverse affects listed are further minimized by authorizing only the placement of material that most closely matches the natural beach sediment composition within the project area in terms of composition, grain size distribution, silt content, and quartz to carbonate ratio, as required under Chapter 62B-41 of the FAC. The project includes the experimental placement of two distinctly different sediment layers, the cap layer which is considered beach compatible while the base layer is not considered beach compatible. The layered design has the potential to alter the nesting environment since the differences in the composition of the layered sediments may: (1) increase water retention;(2) alter water table levels; (3) reduce gas exchange through the sediment layers; (4) alter sediment temperature; and (5) increase the likelihood of sediment compaction.

Species Response to a Proposed Action

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 nourishment project. A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on control or prenourished 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 nourishment project (*e.g.,* beach profile, sediment grain size, beach compaction, frequency, and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on 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 nourishment on sea turtle reproduction was a reduction in nesting success during the first year following project construction, as with other beach nourishment projects. 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 ESA. The Service is not aware of any cumulative effects in the project area.

CONCLUSION

After reviewing the current status of the federally threatened loggerhead sea turtle, endangered green sea turtle, and endangered leatherback sea turtle, the environmental baseline for the action area, the effects of the proposed 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 of the federally threatened loggerhead sea turtle, endangered green sea turtle, and endangered leatherback sea turtle, and is not likely to destroy or adversely modify designated critical habitat. No critical habitat has been designated for the federally threatened loggerhead sea turtle, endangered green sea turtle, and endangered leatherback sea turtle in the continental U.S.; therefore, none will be affected.

The proposed project will affect 9.4 miles of beach proposed for nourishment of the approximately 1,400 miles of available sea turtle nesting habitat in the southeastern U.S. Research has shown that the principal effect of beach nourishment on sea turtle reproduction is a reduction in nesting success, and this reduction is most often limited to the first year following project construction. Research has also shown that the impacts of a nourishment project on sea turtle nesting habitat are typically short-term because a nourished beach will be reworked by natural processes in subsequent years, and beach compaction and the frequency of escarpment formation will decline. Although a variety of factors, including some that cannot be controlled, can influence how a nourishment project will perform from an engineering perspective, measures can be implemented to minimize impacts to sea turtles.

INCIDENTAL TAKE STATEMENT

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

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

AMOUNT OR EXTENT OF TAKE

The Service anticipates 9.4 miles of nesting beach habitat could be taken as a result of this proposed action. The take is expected to be in the form of: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service.

Incidental take is anticipated for only the 9.4 miles of beach that has been identified for sand placement. The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) the turtles nest primarily at night and all nests are not found because [a] natural factors, such as rainfall, wind, and tides may obscure crawls and [b] human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program; (2) the total number of hatchlings per undiscovered nest is unknown; (3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown; (4) an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area; (5) lights may misdirect an unknown number of hatchlings and cause death; and (6) escarpments may form and cause an unknown number of females from accessing a suitable nesting site. However, the level of take of these species can be anticipated by the disturbance and renourishment of suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) beach renourishment will likely occur during a portion of the nesting season; (3) the renourishment project will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter and/or misdirect nesting females and hatchlings.

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 species. Critical habitat has not been designated in the project area; therefore, the project will not result in destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

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

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

2. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted. If nests are constructed in the area of beach nourishment, the eggs must be relocated.

3. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, beach compaction must be monitored and tilling must be conducted as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

4. Immediately after completion of the beach nourishment 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 ensure that contractors doing the beach nourishment work fully understand the sea turtle protection measures detailed in this incidental take statement.

6. During the sea turtle nesting season, 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.

8. The applicant must implement additional physical and biological monitoring to determine the extent of the effects of the layered sediment design on sea turtles.

TERMS AND CONDITIONS

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

1. All fill material placed must be sand that is similar to a native beach in the vicinity of the site that has not been affected by prior renourishment activities. The fill material must be similar in both coloration and grain size distribution to the native beach. All such fill material must be free of construction debris, rocks, or other foreign matter and must not contain, on average, greater than 10 percent fines (*i.e.*, silt and clay) (passing the #200 sieve) and must not contain, on average, greater than 5 percent coarse gravel or cobbles, exclusive of shell material (retained by the #4 sieve). This is exclusive of the proposed base layer sediment which are to be obtained from the identified borrow areas only.

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

    2a. 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 have a valid FWC permit. Nesting surveys must be conducted daily between sunrise and 9 a.m. Surveys must be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

    2b. Only those nests that may be affected by construction 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 construction activities no longer threaten nests. Nests deposited within areas where construction activities have ceased or will not occur for 65 days must be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zone must be clearly marked, and all mechanical equipment must avoid nests by at least 10 feet.

3. Immediately after completion of the beach nourishment project and prior to April 1 for 3 subsequent years, sand compaction must be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant. At a minimum, the protocol provided under 3a and 3b below must be followed. If required, the area must be tilled to a depth of 24 inches and each pass of the tilling equipment must be overlapped to allow more thorough and even tilling. All tilling activity must be completed prior to April 1. If the project is completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. 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).

    3a. Compaction sampling stations must be located at 500-foot intervals along the project area. One station must be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station must be midway between the dune line and the high water line (normal wrack line).

    At each station, the cone penetrometer will be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. 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 will be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth will be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final 6 averaged compaction values.

    3b. 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 April 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.

4. Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment project and prior to April 1 for 3 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 April 1. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service 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 the nesting and hatching season to determine the appropriate action to be taken.

If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken must be submitted to the Service. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach.)

5. The applicant must arrange a meeting between representatives of the contractor, the Service, the FWC, and the permitted person responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice must be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.

6. From April 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 without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes must be off the beach to the maximum extent possible. Temporary storage of pipes on the beach must be in such a manner so 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 April 1 through 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 U.S. Coast Guard, EM 385-1-1, and Occupational Safety and Health Administration (OSHA) requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (Figure 2).

8. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to the South Florida Ecological Services Office within 60 days of completion of the proposed work for each year when the activity has occurred. This report will include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of self-release beach sites, nest survey and relocation results, and hatching success of nests.

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.

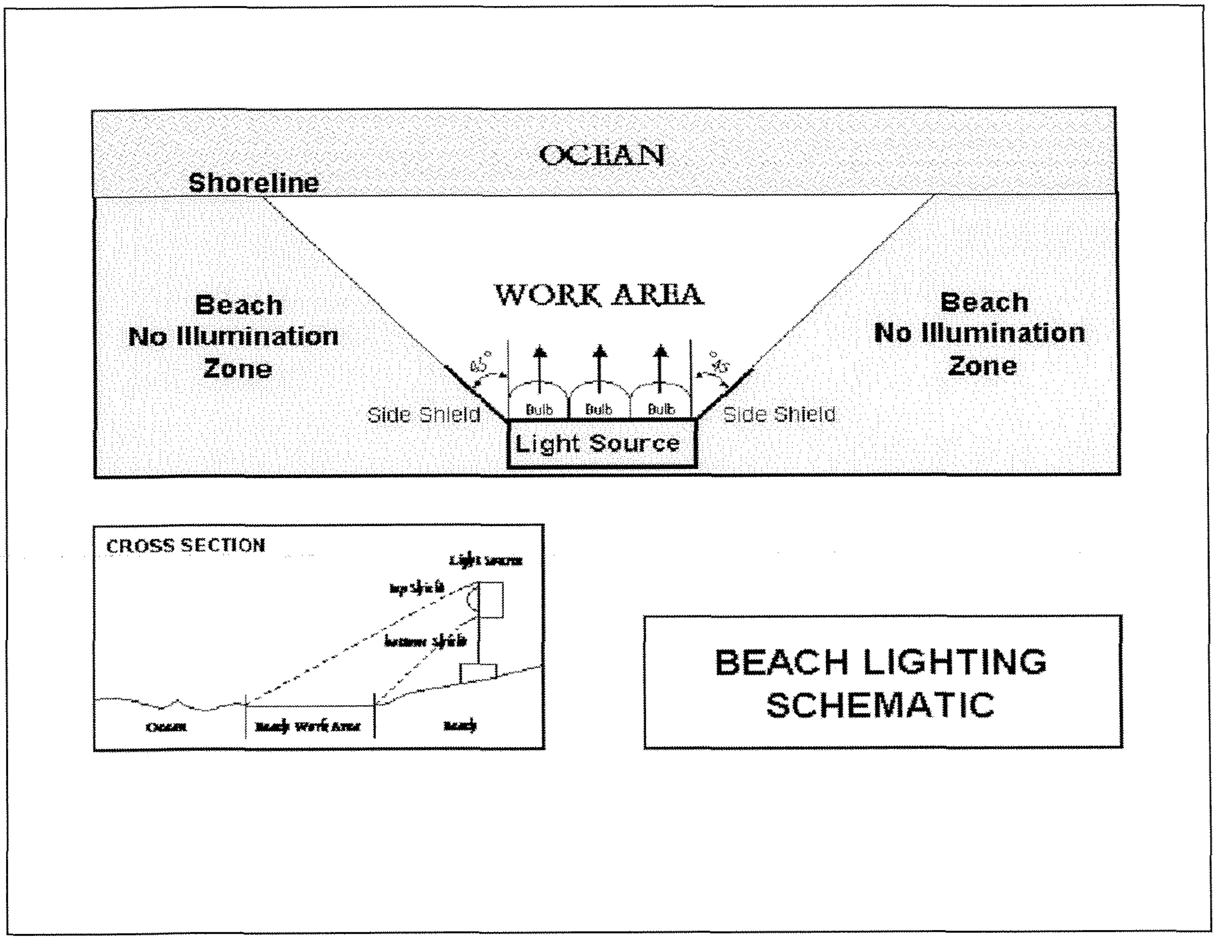

Figure 2. Beach Lighting Schematic.

10. Upon locating a sea turtle adult, hatchling, or egg harmed or destroyed as a direct or indirect result of the project, notification must be made to the FWC at Bureau of Marine Enforcement (formerly the Florida Marine Patrol) at 800-342-5367. Care should be taken in handling injured turtles or eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

11. The applicant must conduct the following physical monitoring in the layered fill areas and on at least two controlled (reference sites) to adequately assess the effects of the layered fill design on sea turtles and sea turtle nesting habitat.

    11a. Experimental monitoring sites must be established at two locations along each of the following survey profile lines: R-47.5, R-48, R-48.5, R-52, R-53, R-54 in Manatee County; and R-3, R-4, R-4.5, R-11, R-11.5, R-12, R-24, R-25, R-26 in Sarasota County. The location of the two monitoring sites must be on the horizontal backshore berm: one site near the landward extent of fill placement and one site immediately landward the beach scarp. Both sites must be located where a minimum 24-inch thick surface layer of finer fill material exists; and for sites within the layered fill areas, a minimum of a 12-inch thick sub-layer of coarse fill material must exist. Sediment grab samples must be collected from 12-inch, 18-inch, and 24-inch depths at each monitoring site in accordance with American Society for Testing and Materials (ASTM) or comparable standards, for the purpose of laboratory analysis of grain size distribution, carbonate content, and moisture content.

11b. Sediment samples must be collected during a minimum of three monitoring events during the first and third marine turtle nesting seasons (Years 1 and 3) after construction of the beach nourishment project. Two of the monitoring events must be conducted between 48 hours and 72 hours following a 24-hour period during which at least 1 inch of rain has fallen in the project area. One monitoring event must be conducted at the end of a 7-day period during which less than 1 inch of rain has fallen in the project area and no rain has fallen during the immediately preceding 24-hour period. If a storm event occurs that results in wave run-up overtopping the horizontal beach berm, an additional fourth monitoring event must be conducted between 48 hours and 72 hours following this storm event. A record of rainfall in the project area and reporting of any storm events with wave run-up that overtops the beach must be maintained during the marine turtle nesting season.

11c. Sediment characteristics will be determined on triplicate sub-samples from the grab samples at each sampling point. Laboratory analysis of grain-size distribution, carbonate content and moisture content must be conducted and reported in accordance with ASTM standards and certified by a licensed soil scientist. In addition, the degree of saturation must be calculated and reported for each sample, and the porosity of the sediment at each sample depth must be calculated. The density of the sediment is determined as the mass of a known volume.

11d. Compaction measurements using an electronic-strain, gauge-type cone penetrometer must be taken at 12-inch, 18-inch, and 24-inch depths at each monitoring site in conjunction with the collection of the sediment samples during each monitoring event. The measurements must be made in accordance with ASTM standards or comparable guidelines. In addition, if the interface between the surface, "white sand fill" cap layer and the darker, base layer is encountered within the 24-inch depth interval, the interface must be in inspected for evidence of cementation. The depths of the different sediment layers must be measured and a digital photograph encompassing the entire sediment column must be submitted. If cementation is encountered, the observer must visually estimate the degree of cementation and obtain sediment samples for additional analyses upon consultation with state and Federal agencies.

11e. During Year 1, visual surveys for escarpments within the layered fill areas must be recorded separately and any exposure of the coarser, base fill material must be noted with the survey date, height, length, and location. These visual surveys must be performed during Years 2 and 3 post-construction in conjunction with the visual escarpment surveys required under Specific Condition 14c.

11f. Prior to sea turtle nesting season during Year 2 post-construction, compaction monitoring must be performed at the experimental and control sites referenced above. Sediment collection and analyses, as described above, is not required during Year 2 post-construction. Compaction measurements using an electronic-strain, gauge-type cone penetrometer must be taken at 12-inch, 18-inch, and 24-inch depths at each monitoring site, and excavation to each depth interval must be performed after the compaction reading is obtained. If the interface between the "white sand fill" cap layer and the darker, coarser, base layer is encountered within the 24-inch depth interval, the interface must be inspected for evidence of cementation. The depth of different sediment layers must be measured and a digital photograph encompassing the entire sediment column must be submitted. If cementation is encountered, the observer must visually estimate the degree of cementation and obtain samples for additional analyses upon consultation with state and Federal agencies. A summary report, including copies of any photographic documentation, must be submitted to the Service within 30 days of completion of the Year 2 compaction survey in both electronic (PDF format) and hardcopy formats with the raw data submitted in Excel spreadsheet format. The Year 2 report should describe any reductions in the thickness of the "white sand fill" cap layer from the post-construction condition within the layered fill areas, and any evidence of cementation encountered during excavation.

11g. The report of the nesting activity and hatchling success, must include an appendix that provides the monitoring data and sample analyses described above. The Year 1 and Year 3 reports must include appropriate statistical analyses to determine if any significant differences were observed between the behavior of the layered and non-layered fill areas with regard to sediment properties and nesting activity and hatching success. The final report (prepared after Year 3) must also contain a discussion and assessment of the layered fill design upon nesting and hatchling sea turtles based upon the statistical comparison of the data. Two hardcopies and two digital copies in PDF format must be submitted to the Service. The raw data must also be submitted in both hard copy and electronic format (Excel spreadsheet).

12. The applicant must conduct the following biological monitoring in the layered fill areas and on at least two controlled (reference sites) to adequately assess the effects of the layered fill design on sea turtles and sea turtle nesting habitat.

12a. <u>Nesting Success</u>: The number of nests and non-nesting emergences must be surveyed daily and tabulated based on fill type: layered fill or adjacent control.

12b. <u>Emergence Location</u>: The location of each nest and the apex of each false crawl (or non-nesting emergence) must be measured using a Global Positioning System unit with sub-meter accuracy.

12c. <u>Location Along the Profile</u>: The distance of each nest and the apex of the false crawl from the wrack or water line and from the dune or seawall must be measured.

12d. Length of Crawl: The actual length of each emergence, nesting or non-nesting, must be measured from the high tide line and tabulated based on fill type.

12e. Depth and Structure of Nest Cavity: The depth to the top and bottom of the egg chamber and the approximate width of the egg chamber must be measured once the hatchlings have emerged. If the darker, coarse sediment base layer is encountered during excavation, the depth to the base must be measured as well.

12f. Nest Identification: Each nest must be assigned a specific identification and its fate tracked. The nest's position must be reported relative to R-monument and type of beach: layered fill, nourished, not nourished. Within the layered fill beach, it will be noted if the nest was deposited within the "white sand fill" surface cap layer or darker, coarser base layer.

12g. Nest inventory: Nest inventories must be conducted in accordance with FWC guidelines for such activities. In particular, the number of hatchlings that escape the nest, number of live and dead hatchlings in the nest, number of piped live and dead hatchlings, and the number of unhatched eggs must be reported.

12h. Nest Overwash, Erosion, or Inundation: Daily records must be kept for each nest indicating if it was over washed, inundated, or lost to erosion.

12i. Sediment Samples: Approximately 100 grams must be collected from the egg chamber, retained, and appropriately preserved for subsequent analysis. The specific analysis requested will be based on observed responses of marine turtles, their eggs or hatchlings in the nourished sand and through consultation with the FWC Marine Turtle Permit Holder, DEP, FWC, and the Service.

The Service believes that incidental take will be limited to the 9.4 miles of beach that have been identified for sand placement. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than the following types of incidental take will result from the proposed action: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service. The amount or extent of incidental take for sea turtles will be considered exceeded if the project results in more than a **one-time placement** of sand on the 9.4 miles of beach that have been identified for sand placement. If during the course of the action, this level of incidental take is exceeded; such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

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

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

2. Appropriate native salt-resistant dune vegetation should be established on the restored dunes. The DEP can provide technical assistance on the specifications for design and implementation.

3. Surveys for nesting success of sea turtles should be continued for a minimum of 3 years following beach nourishment to determine whether sea turtle nesting success has been adversely impacted.

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

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

REINITIATION NOTICE

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

Thank you for your cooperation and effort in protecting fish and wildlife resources. Should you have any questions regarding the findings and recommendations contained in this document, please contact Trish Adams at 772-562-3909, extension 232.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

cc:
CPE, Boca Raton, Florida (Craig Krumple)
DEP, Bureau of Beaches and Wetland Resources, Tallahassee, Florida (Cheryl Miller)
EPA, West Palm Beach, Florida
FWC, Bureau of Protected Species Management, Tallahassee, Florida (Robbin Trindell)
NOAA Fisheries, St. Petersburg, Florida
Service, Jacksonville, Florida (Sandy MacPherson)

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