

## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
South Florida Ecological Services Office  
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November 22, 2005

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

Service Log No: 4-1-05-TR-9179  
Dated: May 27, 2005  
Project: Indian River County Sector 7 Beach Nourishment  
Applicant: Indian River County Board of County  
Commissioners  
County: Indian River County

Dear Colonel Carpenter:

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed renourishment of the Indian River County Shoreline Protection Project, Sector 7 located in Indian River County in Indian River County, Florida and its effects on the threatened loggerhead sea turtle (*Caretta caretta*), the endangered leatherback sea turtle (*Dermochelys coriacea*), the endangered green sea turtle (*Chelonia mydas*), the endangered hawksbill sea turtle (*Eretmochelys imbricata*), endangered Kemp's ridley (*Lepidochelys kempii*), endangered West Indian manatee (*Trichechus manatus*), threatened southeastern beach mouse (*Peromyscus polionotus niveiventris*), and the threatened piping plover (*Charadrius melodus*). This biological opinion is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your May 27, 2005, request for formal consultation was received on May 31, 2005.

We concur with your May 27, 2005, determination that the proposed action "may affect, but is not likely to adversely affect", the West Indian manatee because the *Standard Manatee Construction Conditions* will be implemented. The presence of manatees will be monitored daily and every precaution (including shut-down of operations if appropriate) will be taken to avoid any adverse effects on the species.

We concur with your May 27, 2005, determination that the proposed action "may affect, but is not likely to adversely affect", the southeastern beach mouse and piping plover. The southeastern beach mouse has not been identified in the project area for many years. The last observations of the southeastern beach mouse within Indian River County occurred in Pelican Island Refuge during April 1998 (P. Tritaik, Service, personal communication 2005). Piping plover sightings are highly infrequent in or near the project area. Critical habitat has not been designated for the southeastern beach mouse or piping plover in the project area; therefore, the proposed action would not result in an adverse modification.



We concur with your May 27, 2005, determination that the proposed action is likely to adversely affect the loggerhead, green, leatherback, and hawksbill sea turtles. Given the Kemp's ridley sea turtle occurs offshore from the project area, and could potentially nest within the project area, we will also address this species in our biological opinion.

This biological opinion is based on information provided in the U.S. Army Corps of Engineers' (Corps) letter dated May 27, 2005; the Corps' draft Public Notice received May 31, 2005; the applicant's agents, Dial Cordy and Associates Inc. (DCA), Applied Technology and Management Inc. (ATM) and Ecological Associates Inc. (EAI); 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, Indian River County, DCA, ATM and EAI 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.

## **CONSULTATION HISTORY**

On June 19, 2003, the Service received a Joint Coastal Permit Application for the Sector 7 Project from Indian River County.

On May 31, 2005, the Service received the Corps' request for initiation of consultation under section 7 of the ESA concerning possible adverse effects of the project on listed species. This submittal included copies of a draft EA and draft Biological Assessment.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

#### **Proposed Action**

Indian River County proposes to nourish 2.2 miles (11,730 feet) of shoreline, in the South County Beach area of southern Indian River County, through the placement of approximately 363,600 cubic yards (cy) of beach compatible material between DEP monuments R-97 and R-108 (Figure 1).

The average post-construction berm width is estimated to be 106 feet, including a uniform elevation of 9 feet NGVD (National Geodetic Vertical Datum) with a berm slope of 1:10. The average profile would receive 24.6 cy per foot of fill sand including 3.0 cy per foot for dune enhancement. The design would advance the shoreline an average of approximately 30 feet after equilibrium and the dune would have a footprint of an average of 32 feet.

The proposed No-Impact design elevation of +9 feet NGVD was determined based on the existing berm elevations, and guidance from other successful beach nourishment projects along the east coast of Florida. The proposed beach design includes a beach face slope of 1 vertical to 10 horizontal between the +9 feet NGVD berm crest and 0 feet NGVD. This slope was chosen to mimic the natural slope of the beach in the project area, and because the borrow area sand

characteristics indicate the material can reasonably be configured to this geometry. The design also features tapered sections at the northern and southern limits of the project between R-97 and R-98 and between and R-107 and R-108 to smooth the transition between the beachfill project and existing beach.

Within the critical hardbottom area (and critically eroded area) between R-102 and R-105 approximately 57,000 cy of material could be placed to avoid hardbottom impacts. This equates to a fill volume density of 15.9 cy per foot within this region and an average increase in the shoreline from its current location to the estimated equilibrium shoreline of 15 feet. While this volume is insufficient to provide the desired level of storm protection, it is the maximum amount that can be placed without impacts to the nearshore hardbottom.

As proposed, the fill will be obtained from the Indian River Shoal complex (which comprises the South borrow area) which is the primary candidate borrow site for the initial fill project. The Indian River Shoal complex extends offshore of Riomar south to the waters offshore of St. Lucie County (Figure 2). The borrow area is approximately 10,000 feet offshore positioned between R-105 and R-119 at the Indian River and St. Lucie County border. The borrow site material is comprised of sand containing one percent silt content with a median grain size of 0.44 millimeters (mm) (0.02 inches). The total area to be excavated will be approximately 103.3 acres. Due to the distance between the borrow site and Sector 7 a hopper dredge will be required to transport the sand. The fill will be excavated by a hydraulic dredge and pumped onto the beach by a pipeline laid on the ocean floor. A pipeline corridor has been identified that runs through a large hardbottom free area at the north end of the project area around R-98 (the offshore area between R-90 and R-99 is a large embayment that is virtually the only area of the county not fronted by reef). This corridor is also relatively deep therefore the dredge will likely be able to get relatively close to the project area without grounding concerns.

Construction is anticipated to begin in November 2005, outside of the sea turtle nesting season. A 6-year renourishment interval for the project is planned. The project is proposed to be rebuilt when the beach fill has eroded back to pre construction conditions. Unlike the other beach renourishments projects, no attempt will be made to maintain an increased beach width over the 30-year planning period.

Indian River County anticipates the project will not directly affect nearshore hardbottom habitat. The project will directly affect 2.2 miles of sea turtle nesting habitat, 142.2 acres of open water habitat, 23.6 acres of unconsolidated subtidal (sand) bottom within the project footprint, and 103 acres of unconsolidated subtidal habitat within the borrow site. There may be indirect impacts on reef habitat outside the direct impact area from turbid water resulting from project construction. Construction plans will include a fill containment dike and dewatering system to minimize the extent of this impact.

### **Action Area**

The Service identifies the action area to include shoreline in the South County Beach area of southern Indian River County between DEP monuments R-97 and R-108 (2.2 miles).

## 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 sea turtle has a worldwide distribution in tropical and subtropical waters. Major green sea turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Within the U.S., green sea 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 [NMFS] and Service 1991a). Nesting has also been documented along the Gulf coast of Florida on Santa Rosa Island (Okaloosa and Escambia Counties) and from Pinellas County through Collier County (FWC 2004). Green sea turtles also nest sporadically in Georgia, North Carolina, and South Carolina. Unconfirmed nesting of green sea turtles in Alabama has also been reported according to unpublished 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 was listed as an endangered species on June 2, 1970, (35 FR 8491) and 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 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 (NMFS and Service 1992). Leatherback turtles occasionally nest in Georgia, South Carolina, and North Carolina. Leatherback nesting has also been reported on the northwest coast of Florida (LeBuff 1990; FWC 2004); 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.

#### Hawksbill Sea Turtle

The hawksbill sea turtle was listed as an endangered species on June 2, 1970, (35 FR 8491). The hawksbill is found in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean. Within the continental U.S., hawksbill sea turtle nesting is rare and is restricted to the southeastern coast of Florida (Volusia through Miami-Dade Counties) and the Florida Keys (Monroe County) (Meylan et al. 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely under estimate actual hawksbill nesting numbers (Meylan et al. 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NMFS and Service 1993).

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

#### Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970, (35 FR 18320). It has one of the most restricted distributions of any sea turtle and is found mainly in coastal Gulf of Mexico and the northwest Atlantic (Service 1999). Occasionally, individuals will be found in the western Atlantic. Nesting occurs almost entirely on one stretch of beach in northeast Mexico. Nesting in Florida is rare and has only been noted 17 times between 1979 and 2004 (FWC 2005a).

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

### **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 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 (NMFS 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 1 to 9 clutches within a nesting season, but the 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 from 130 clutches in Florida was 136 eggs (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually 2, 3, 4, or more years intervene between breeding seasons (NMFS and Service 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

#### Leatherback Sea Turtle

Leatherbacks nest an average of 5 to 7 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 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).

#### Hawksbill Sea Turtle

Hawksbills nest on average about 4.5 times per season at intervals of approximately 14 days (Corliss et al. 1989). In Florida and the U.S. Caribbean, clutch size is approximately 140 eggs, although several records exist of over 200 eggs per nest (NMFS and Service 1993). On the basis of limited information, nesting migration intervals of 2 to 3 years appear to predominate. Hawksbills are recruited into the reef environment at about 14 inches in length and are believed to begin breeding about 30 years later. However, the time required to reach 14 inches in length is unknown and growth rates vary geographically. As a result, actual age at sexual maturity is not known.

#### Kemp's Ridley Sea Turtle

Nesting occurs from April into July during which time the turtles appear off the Tamaulipas and Vera Cruz coasts of Mexico. Precipitated by strong winds, the females swarm to mass nesting emergences, known as arribadas or arribazones, to nest during daylight hours. Clutch size averages 100 eggs (Service and NMFS 1992). Some females breed annually and nest an average of 1 to 4 times in a season at intervals of 10 to 28 days. Age at sexual maturity is believed to be between 7 to 15 years (Turtle Expert Working Group 1998).

## **Population Dynamics**

### **Loggerhead Sea Turtle**

Total estimated nesting in the Southeast is approximately 68,000 to 90,000 nests per year (FWC statewide nesting database 2002, unpublished data; Georgia Department of Natural Resources statewide nesting database 2002, unpublished data; South Carolina Department of Natural Resources statewide nesting database 2002, unpublished data; North Carolina Wildlife Resources Commission unpublished statewide nesting database 2002, unpublished data). 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 (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 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) (NMFS and Service 1991b).

### **Green Sea Turtle**

The number of green sea turtles nesting each year fluctuates widely, and population trends are difficult to assess. However, it is estimated that 200 to 1,100 females nest on U.S. beaches each year (NMFS 2005). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NMFS and Service 1998a). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine Island, Australia, where thousands of females nest nightly in an average nesting season (Limpus et al. 1993). In the Indian Ocean, major nesting beaches occur in Oman where 30,000 females are reported to nest annually (Ross and Barwani 1995).

### **Leatherback Sea Turtle**

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 per year) and Colombia (an estimated several thousand nests annually), and in the western Pacific in West Papua (formerly Irian Jaya) and Indonesia (about 600 to 650 females nesting per year). In the U.S., small nesting populations occur on the Florida east coast (100 females per year) (FWC 2005b), Sandy Point, U.S. Virgin Islands (50 to 190 females per year) (Alexander et al. 2002), and Puerto Rico (30 to 90 females per year).

## Hawksbill Sea Turtle

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

## Kemp's Ridley Sea Turtle

The 40,000 nesting females estimated from a single mass nesting emergence in 1947 reflected a larger total number of nesting turtles in that year than exists today (Carr 1963; Hildebrand 1963). However, nesting in Mexico has steadily increased from 702 nests in 1985 to over 6,000 nests in 2000 (Service 2001). Despite protection for the nests, turtles have been and continue to be lost to incidental catch by shrimp trawls (Service and NMFS 1992).

## 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, 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 267 to 6,981 nests annually between 1989 and 2004 at core index beaches, where approximately 54 percent of the state's green sea turtle nesting occurs (FWC 2005c). 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 the worldwide population), is now less than 1 percent of its estimated size in 1980. Spotila et al. (1996) estimated the number of leatherback sea turtles nesting on 28 beaches throughout the world from the literature and from communications with investigators studying those beaches. The estimated worldwide population of leatherbacks in 1995 was about 34,500 females on these beaches with a lower limit of about 26,200 and an upper limit of about 42,900. This is less than one third the 1980 estimate of 115,000. Leatherbacks are rare in the Indian Ocean and in very low numbers in the western Pacific Ocean. The largest population is in the western Atlantic. Using an age-based demographic model, Spotila et al. (1996) determined that leatherback populations in the Indian Ocean and western Pacific Ocean cannot withstand even moderate levels of adult mortality and that even the Atlantic populations are being exploited at a rate that cannot be sustained. They concluded that leatherbacks are on the road to extinction and further population declines can be expected unless 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.

#### Hawksbill Sea Turtle

The hawksbill sea turtle has experienced global population declines of 80 percent or more during the past century and continued declines are projected (Meylan and Donnelly 1999). Most populations are declining, depleted, or remnants of larger aggregations. Hawksbills were previously abundant, as evidenced by high-density nesting at a few remaining sites and by trade statistics. The decline of this species is primarily due to human exploitation for tortoiseshell. While the legal hawksbill shell trade ended when Japan agreed to stop importing shells in 1993, a significant illegal trade continues. It is believed that individual hawksbill populations around the world will continue to disappear under the current regime of exploitation for eggs, meat, and tortoiseshell, loss of nesting and foraging habitat, incidental capture in fishing gear, ingestion of and entanglement in marine debris, oil pollution, and boat collisions. Hawksbills are closely associated with coral reefs, one of the most endangered of all marine ecosystem types.

#### Kemp's Ridley Sea Turtle

The decline of this species was primarily due to human activities, including the direct harvest of adults and eggs and incidental capture in commercial fishing operations. Today, under strict protection, the population appears to be in the early stages of recovery. The recent nesting increase can be attributed to full protection of nesting females and their nests in Mexico resulting from a bi-national effort between Mexico and the U.S. to prevent the extinction of the Kemp's ridley, and the requirement to use turtle excluder devices in shrimp trawls both in the United States and Mexico.

The Mexican government also prohibits harvesting and is working to increase the population through more intensive law enforcement, by fencing nest areas to diminish natural predation, and by relocating all nests into corrals to prevent poaching and predation. While relocation of nests into corrals is currently a necessary management measure, this relocation and concentration of eggs into a "safe" area is of concern since it makes the eggs more susceptible to reduced viability due to movement-induced mortality, disease vectors, catastrophic events like hurricanes, and marine predators once the predators learn where to concentrate their efforts.

#### **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

### **Status of the Species Within the Action Area**

#### **Loggerhead Sea Turtle**

The loggerhead sea turtle nesting and hatching season for southern Florida Atlantic beaches (Brevard through Miami-Dade Counties) extends from March 15 through November 30. Incubation ranges from about 45 to 95 days.

Indian River County's 22.25 miles of beach supports about 4.6 percent of the total loggerhead nesting in the State of Florida (Meylan et al. 1995). On average, about 5,217 loggerhead nests are deposited in the County each season yielding an overall nest density of 235 nests per mile (Table 1). The areas of lowest nest densities occur in the urban area of Vero Beach and southern County beaches, while highest are north of Vero Beach. These areas support some of the greatest loggerhead nesting densities in the State (Meylan et al. 1995). Although historic data on turtle nesting on the South County beaches of Indian River is limited this area has been included in recent surveys, this preliminary data is indicated in Table 2.

#### **Green Sea Turtle**

The green sea turtle nesting and hatching season for southern Florida Atlantic beaches (Brevard through Miami-Dade Counties) extends from May 1 through November 30. Incubation ranges from about 45 to 75 days.

Indian River County Beaches support about 5.4 percent of the State's green turtle nests (Meylan et al. 1995). During an average year, about 300 nests are deposited on County Beaches. This equates to about 13.5 nests per mile for the entire shoreline of Indian River County. As with the loggerhead, green turtle nest densities tend to be higher north of Vero Beach, and lower from Vero Beach south (Tables 1 and 2). The Archie Carr NWR in Brevard and Indian River Counties contains some of the State's highest concentrations of green turtle nests. Additionally, the nearshore reefs that parallel much of the Indian River County coastline serves as an important developmental habitat for juvenile green turtles (Ehrhart 1992).

## Leatherback Sea Turtle

The leatherback sea turtle nesting and hatching season for southern Florida Atlantic beaches (Brevard through Miami-Dade Counties) extends from February 15 through November 15. Incubation ranges from about 55 to 75 days.

The bulk of leatherback nesting in Florida occurs just south of Indian River County within St. Lucie, Martin, and Palm Beach Counties (Meylan et al. 1995). Indian River County only receives about 1.7 percent of the State's leatherback nesting each year. On average there are about 0.5 nest per-mile in the county, totaling about 10 nests per-year. Leatherback nests have been recorded throughout Indian River County beaches (Tables 1 and 2).

## Hawksbill Sea Turtle

The hawksbill sea turtle nesting and hatching season for the southern Florida Atlantic beaches (Brevard through Miami-Dade Counties) extends from June 1 through December 31. Incubation lasts about 60 days. Although hawksbill sea turtles are known to occur offshore from the project area, no nests have been reported for this species within the project area (FWC 2005b).

## Kemp's Ridley Sea Turtle

Kemp's ridley sea turtles rarely nest in the U.S., with no more than 30 nests in any one year (Turtle Expert Working Group 2000; FWC 2005a). No nests have been recorded for Indian River County between 1979 and 2004 (FWC 2005a), though false crawls have been recorded for Palm Beach County (Meylan et al. 1995; FWC 2005a).

## **Factors Affecting the Species Environment Within the Action Area**

The project area includes 2.2 miles of shoreline characterized by single-family homes and private road access ways. Approximately 84 percent of this shorefront is developed and 40 percent of the project shoreline has been characterized by the DEP as critically eroded. The shoreline segment proposed for restoration has experienced recent volumetric erosion rates averaging 2.08 cubic yards per foot per year and shoreline erosion rates averaging 2.4 feet per year at 0 feet NGVD, based on shoreline change analyses conducted between 1986 and 2001. Sector 7 contains the highest erosion rates identified anywhere in Indian River County.

Since 2001, approximately 61,800 cy of sand has been placed within Sector 7 for enhancement of dunes damaged by hurricanes through assistance provided by the Federal Emergency Management Agency (FEMA). These efforts restored dunes within R- 103, 105 and 107 to their pre-storm conditions; however, all sand placed in these restoration efforts has since been lost due largely to hurricanes in 2004.

As a result of ongoing erosion, numerous homeowners have constructed seawalls to protect their property from the encroaching ocean as the beach is narrow and prone to increased erosion. Currently, seawalls and rock revetments, concentrated between R-102 and R-106, armor

approximately 1,100 feet or 14 percent of the project shoreline. Mosier (1998) reported that nesting success was, on average, 69 percent lower at sites with seawalls than at sites without seawalls. The reduction in nesting success attributable to 1,044 shoreline feet of seawalls, results in a displacement of 13 nests every year in Sector 7 (EAI, 2002). It is anticipated that the construction of the Sector 7 project will result in 1,044 fewer feet of armoring being constructed under emergency permitting in Sector 7 over the next 30 years (EAI 2002).

As restored beaches equilibrate to a more natural profile, steep vertical escarpments often form along the seaward edge of the constructed beach berm and this presents a physical barrier to nesting turtles (IRC 2004). Additionally, as beach profiles equilibrate, losses of nests laid in the seaward portions of the renourished beach due to erosion may be high. Steinitz et al. (1998) following long-term studies at Jupiter Inlet indicated that at 2 years post-renourishment, nesting success was considerably higher than pre-renourishment levels and similar to densities found on nearby non-eroded beaches. However, the nesting success declined as the renourished beach eroded and narrowed until the next renourishment event.

### EFFECTS OF THE ACTION

The analysis of the direct and indirect effects of the proposed action on sea turtles and the interrelated and interdependent activities of those effects was based on beneficial and detrimental factors.

#### **Factors to be Considered**

The proposed action has the potential to adversely affect nesting females, nests, and hatchlings within the proposed project area through the placement of dredged material on the South County Beach area of Indian River County.

#### **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 363,600 cy of along 2.2 miles of 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 example, 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. Missed nests

Although a nesting survey and nest marking program would reduce the potential for nests to be impacted by construction activities, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, and/or tides) or misidentified as false crawls during daily patrols. 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).

### 3. 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.

#### 4. 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). 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 in the area (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.

Geologically, the proposed South Borrow Area (Indian River Shoal) is a one of several relic ebb shoals known to occur in southern Indian River County and northern St. Lucie County. The borrow material is comprised of fine to medium-grained, tan to brown, shelly sand with shell fragments. The existing beach is also comprised of fine to medium-grained, tan to brown, shelly



sand with shell fragments. On average, the South Borrow Area contains approximately 0 percent coarse gravel, 3.39 percent fine gravel, 4.32 percent coarse sand, 42.22 percent medium sand, 48.88 percent fine sand and, 1.18 percent silt/clay with a median grain size of 0.42 mm (0.02 inches). Dredging will likely occur to a depth of 10 feet with a 2 foot overdredge allowance. However, the core borings of the borrow site revealed a distinct boundary at approximately 12 feet between the suitable (high energy marine deposit) and unsuitable material (low energy estuarine deposit). With the 2 foot overdredge allowance, the unsuitable estuarine layer may be breached resulting in the deposit of the unsuitable material on the beach. This layer can be avoided through a reduction of the overdredge allowance and/or depth of dredging.

#### 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). 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 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 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 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.

As with other beach nourishment projects, Ernest and Martin (1999) found the principal effect of nourishment 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.

### CONCLUSION

After reviewing the current status of the loggerhead, green, leatherback, hawksbill and Kemp's ridley sea turtles, the environmental baseline for the action area, the effects of the proposed beach nourishment, and the cumulative effects, it is the Service's biological opinion that the beach nourishment project, as proposed, is not likely to jeopardize the continued existence of these sea turtles. No critical habitat has been designated for the loggerhead, green, leatherback, and hawksbill sea turtles in the continental United States; therefore, none will be affected.

The proposed project will affect 2.22 miles of the approximately 1,400 miles of available sea turtle nesting habitat in the southeastern United States. 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 Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage

in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

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

#### AMOUNT OR EXTENT OF TAKE

The Service anticipates 2.2 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 from March 1 through April 30 and from September 1 through September 30 and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited from October 1 through February 28 (or 29 as applicable) when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service.

Incidental take is anticipated for only the 2.2 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 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, green, leatherback, hawksbill and Kemp's ridley sea turtles.

1. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence must be used on the project site.
2. Beach nourishment activities must not occur from May 1 through October 31, the period of peak sea turtle egg laying and egg hatching, to reduce the possibility of sea turtle nest burial, crushing of eggs, or nest excavation.
3. If the beach nourishment project will be conducted during the period from March 1 through April 30, surveys for early nesting sea turtles must be conducted. If nests are constructed in the area of beach nourishment, the eggs must be relocated.
4. If the beach nourishment project will be conducted during the period from November 1 through November 30, surveys for late nesting sea turtles must be conducted. If nests are constructed in the area of beach nourishment, the eggs must be relocated.
5. 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 by March 1 to reduce the likelihood of impacting sea turtle nesting and hatching activities. The March 1 deadline is required to reduce impacts to leatherbacks that nest in

greater frequency along the South Atlantic coast of Florida than elsewhere in the continental United States.

6. 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; escarpments must be leveled, as required, to reduce the likelihood of impacting sea turtle nesting and hatching activities.
7. The applicant must ensure that contractors doing the beach nourishment work fully understand the sea turtle protection measures detailed in this incidental take statement.
8. During the early and late portions of the nesting season, construction equipment and materials must be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.
9. During the early and late portions of the 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 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).
2. Beach nourishment must be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes will be stored on the beach.
3. If the beach nourishment project will be conducted during the period from March 1 through April 30, daily early morning surveys for sea turtle nests must be conducted from March 1 through April 30 or until completion of the project (whichever is earliest), and eggs must be relocated per the following requirements.
  - 3a. Nesting surveys and egg relocations will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures for sea

turtles. 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.

- 3b. 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.
4. If the beach nourishment project will be conducted during the period from November 1 through November 30, daily early morning sea turtle nesting surveys must be conducted 65 days prior to project initiation and continue through September 30, and eggs must be relocated per the preceding requirements.
5. Immediately after completion of the beach nourishment project and prior to March 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 5a and 5b below must be followed. If required, the area must be tilled to a depth of 36 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 March 1. 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 beach.)
- 5a. 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.

- 5b. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area must be tilled prior to March 1. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Fish and Wildlife Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.
6. Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment project and prior to March 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 March 1. If the project is completed during the early part of the sea turtle nesting and hatching season (March 1 through April 30), escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service 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 dry beach).
7. The applicant must arrange a meeting between representatives from 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.
8. From March 1 through April 30 and November 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).

9. From March 1 through April 30 and November 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 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 (see Figure 3).
10. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to Mark Salvato (772-562-3909 at extension 340) at 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.
11. 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.
12. 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 Commission, Bureau of Marine Enforcement (formerly the Florida Marine Patrol) at 800-342-5367 and South Florida Ecological Services Office at (772) 562-3909. 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.

The Service believes incidental take will be limited to the 2.2 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 Fish and Wildlife 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 2.2 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 Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Appropriate native salt-resistant dune vegetation should be established on the restored dunes. The Florida Department of Environmental Protection, Bureau of Beaches and Wetland Resources, can provide technical assistance on the specifications for design and implementation.
2. 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.
3. 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.

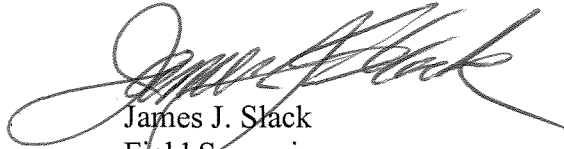
In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

## REINITIATION NOTICE

This concludes formal consultation on the action outlined in the 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.

Should you have additional questions or require clarification, please contact Mark Salvato at (772) 562-3909, extension 340.

Sincerely yours,



James J. Slack  
Field Supervisor  
South Florida Ecological Services Office

cc.

Service, Atlanta, Georgia (Noreen Walsh) (electronic copy only)  
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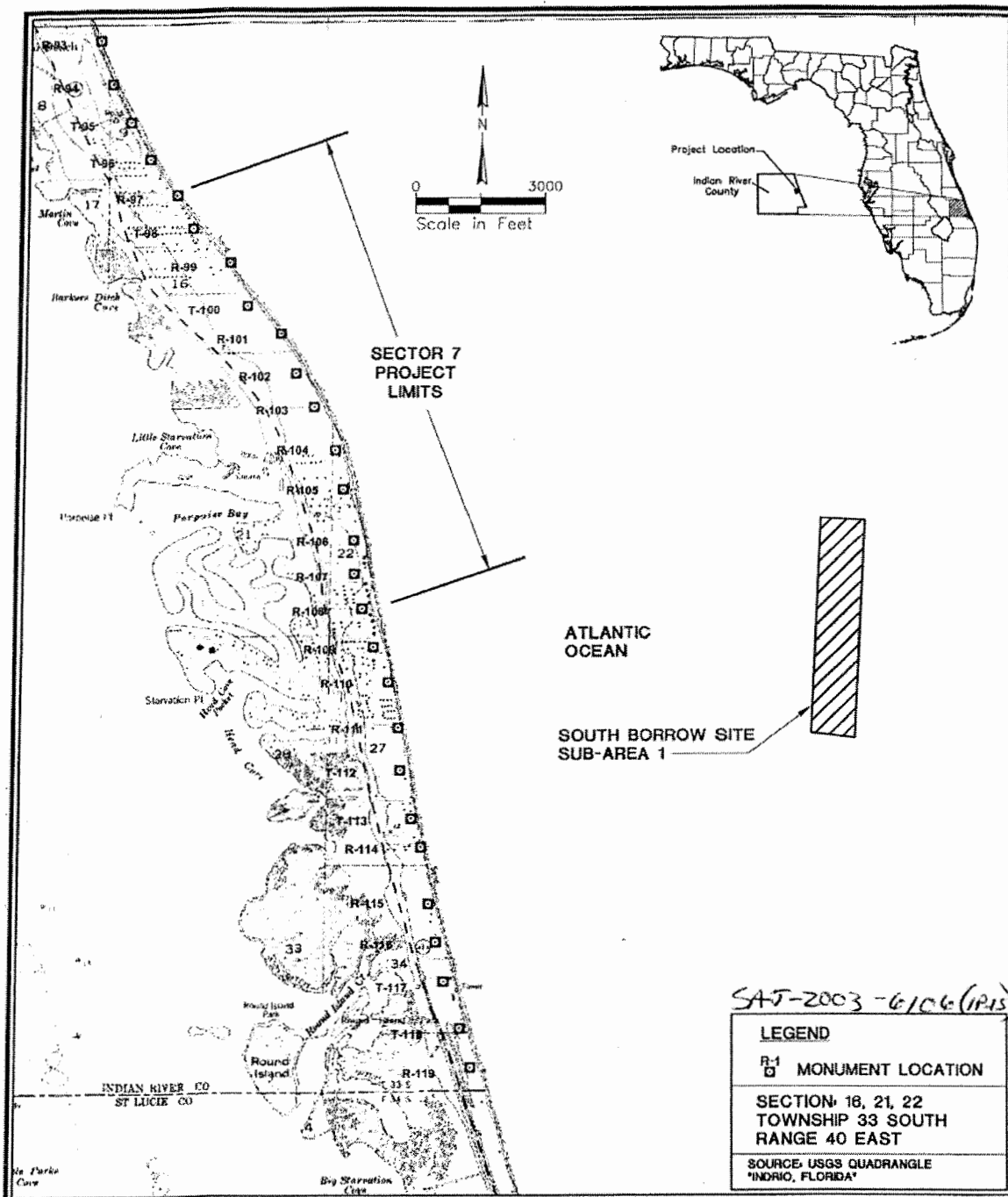
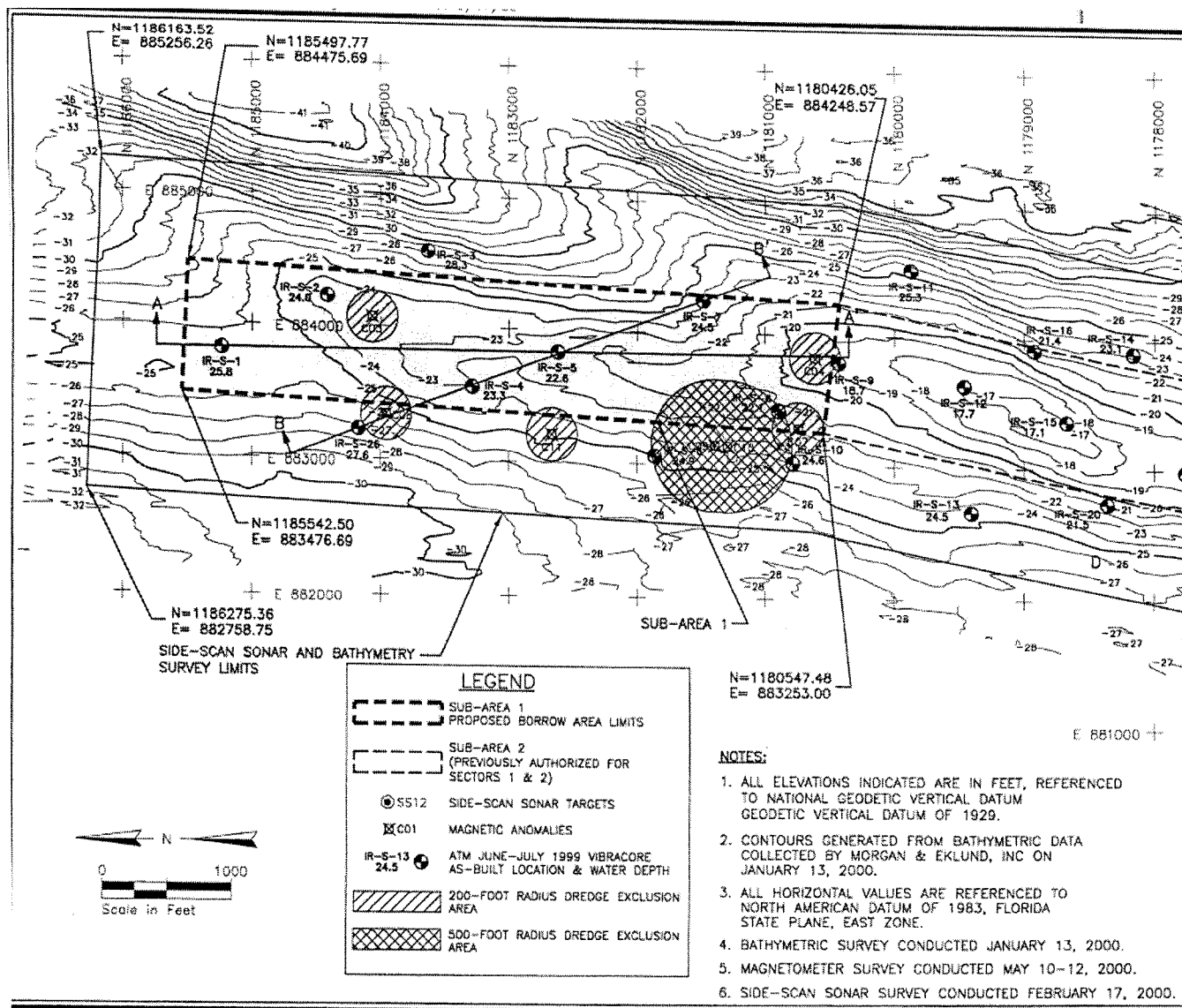


Figure 1. Project location (ATM 2005).

Figure 2. Proposed South Borrow Site location (ATM 2005).



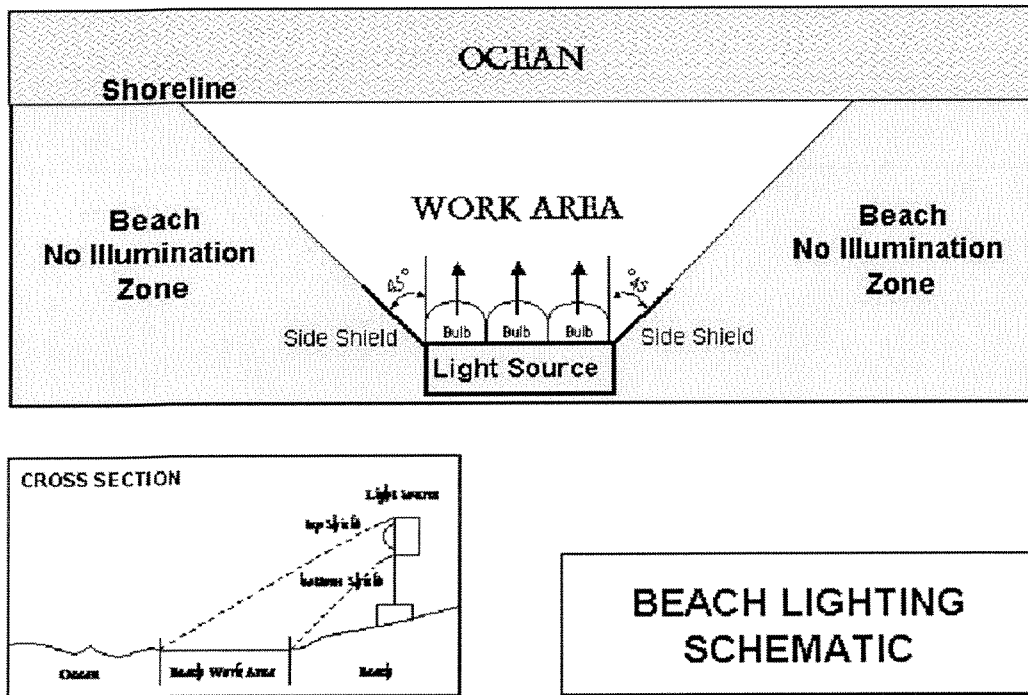


Figure 3. Beach lighting schematic.

Year	Loggerhead nests	Loggerhead False-crawls	Total	Green nests	Green False-crawls	Total	Leatherback nests	Leatherback false-crawls	Total
2004	2,488	2214	4702	273	199	472	18	1	19
2003	3772	2723	6495	182	103	285	53	7	60
2002	3648	3860	7508	589	406	995	16	5	21
2001	3380	3023	6403	48	29	77	41	7	48
2000	5104	4680	9784	633	451	1084	16	1	17
1999	3591	3320	6911	44	28	72	15	3	18
1998	4491	4680	9171	302	257	559	9	6	15
1997	3371	2594	5965	56	35	91	11	3	14
1996	3645	3391	7036	97	105	202	0	0	0
1995	3468	2980	6448	20	7	27	7	1	8
1994	3044	2681	5725	177	128	305	2	0	2
1993	2792	2359	5151	14	11	25	1	0	1
Total	32,885	29,708	62,594	1,391	1,051	2,442	102	21	123

**Table 1.** FWC Index Nesting Beaches from 1993 to 2004 in Indian River County, Florida (FWC 2004).

Month	Loggerhead		Leatherback		Green Turtle		Total	
	Nests	False Crawls	Nests	False Crawls	Nests	False Crawls	Nests	False Crawls
March	0	0	0	0	0	0	0	0
April	0	4	4	2	0	0	4	6
May	126	99	3	2	0	0	129	101
June	315	388	1	0	9	15	325	403
July	291	473	0	0	32	63	323	536
Total	732	960	8	4	41	78	777	1040

**Table 2.** Preliminary sea turtle nesting in South County Beach region of Indian River County for March-July 2005 (EAI 2005).