



United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960



August 27, 2007

Colonel Paul L. Grosskruger
District Commander
U.S. Army Corps of Engineers
701 San Marcos Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Federal Activity Code: 41420-2007-FA-1023
Corps Application No.: SAJ-2006-1716 (IP-MFN)
Date Received: May 4, 2007
Formal Consultation Initiation Date: July 26, 2007
Project: North Captiva Island Beach
Nourishment
Applicant: South Bank Properties, LLC
County: Lee

Dear Colonel Grosskruger:

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed beach nourishment project along North Captiva Island, Lee County, Florida. The U.S. Army Corps of Engineers (Corps) determined on May 3, 2007, the proposed project "may affect" 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*), and the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*), and we concur with your determination. This biological opinion is provided in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*).

In the May 3, 2007 letter, the Corps also determined the proposed action "may affect, but is not likely to adversely affect," the endangered West Indian manatee (*Trichechus manatus*). In order to protect this species, the Corps will ensure specific construction safety precautions are implemented as outlined in the *Standard Manatee Conditions for In-Water Work* (Florida Fish and Wildlife Conservation Commission (FWC) 2005). Based upon implementation of the above stated conditions, the Service concurs with the determination in regard to the West Indian manatee.

This biological opinion is based on information provided in the Corps' letter dated May 3, 2007, the Public Notice, and email correspondence with the Corps, FWC, and Humiston and Moore



Engineers. A complete administrative record of this consultation is on file at the South Florida Ecological Services Office, Vero Beach, Florida.

FISH AND WILDLIFE RESOURCES

In addition to sea turtles, the shoreline of Lee County supports the following shorebird species and habitats:

Piping Plovers

Piping plovers (*Charadrius melodus*) are small, migratory shorebirds that breed in only three geographic regions of North America: on sandy beaches along the Atlantic Ocean, along sandy shorelines throughout the Great Lakes region, and on the river-bank systems and prairie wetlands of the Northern Great Plains (Haig 1992). The Great Lakes population is listed as endangered, whereas the Atlantic Coast and Great Plains populations are protected under the Migratory Bird Treaty Act (MBTA) of 1918 and listed as threatened under the Act. Though this species does not breed in Florida, individuals from all three breeding populations over-winter in Florida.

In the project area, there is no federally designated piping plover critical habitat, and no breeding piping plovers have been observed. In view of the absence of this species and the scope of the proposed project, the Service believes the effects to the piping plover will be insignificant and discountable. Therefore, this species will not be discussed further in this document.

Snowy Plover

Snowy plovers (*Charadrius alexandrinus*) are small shorebirds that inhabit coastal sand beaches and lagoons. In North America and the Caribbean, the snowy plover is represented by two subspecies: the western snowy plover (*Charadrius alexandrinus nivosus*) distributed along the west coast and western Gulf of Mexico, and the Cuban snowy plover (*Charadrius alexandrinus tenuirostris*) found in the Gulf of Mexico east of Louisiana, northern Yucatan, and West Indies (Lamonte et al. 2006). The snowy plover is listed as threatened by the state of Florida, considered endangered by the Florida Committee on Rare and Endangered Plants and Animals, protected under the MBTA, and the Service has received a petition to list the Cuban snowy plover under the Act (Lamonte et al. 2006). Snowy plover nesting was recorded on North Captiva Island in 2006 and 2007 (Nancy Douglass, FWC, personal communication, 2007). The proposed beach nourishment project could possibly provide additional nesting habitat for this species.

Wilson's Plover

Wilson's plovers (*Charadrius wilsonia*) are small shorebirds that inhabit coastal areas including sandy beaches, tidal flats, and lagoons. During the breeding season, the Wilson's plover occurs in eastern and southern coastal areas of the United States. It winters from southern coastal Florida south to northern South America, usually along the Atlantic and Gulf coasts. Although

not federally or state listed, it is protected under the MBTA. The Wilson's plover has been reported to have attempted to nest along Charley's Cut (Florida Department of Environmental Protection (DEP) monument R-78.5) along the east coast of North Captiva Island (Christina Olson, DEP, personal communication, 2007). The proposed beach nourishment project could possibly provide additional nesting habitat for this species.

Least Tern

Least terns (*Sterna antillarum*) are small, black-capped shorebirds that select nesting sites with a substrate composed of sand or gravel with fragments of shell. Least terns are listed as threatened by the state of Florida and are protected under the MBTA. Least terns nest primarily along the coast in Florida, where beaches and gravel roofs provide nest sites, and where nearby estuarine and marine waters supply small fish as prey. Least terns have attempted to nest on North Captiva Island in the past (Nancy Douglass, FWC, personal communication, 2007). The proposed beach nourishment project could possibly provide additional nesting habitat for this species.

Red Knots

Red knots (*Calidris canutus rufa*) are small, dusky gray and white (non-breeding plumage) shorebirds which are principally found in marine and estuarine habitats. Currently listed as a Federal Candidate Species, red knots are protected under the MBTA. Red knots make one of the longest migrations from their wintering grounds in southern South America to breeding areas within the Canadian Arctic. During the spring migration, red knots stopover briefly along the Atlantic coast of the United States to rebuild energy reserves necessary to complete their journey. Historically, the Delaware Bay region of Delaware and New Jersey has supported the largest known migratory stopover area for red knots (Harrington 1996). In addition to the large flocks of red knots found in the Delaware Bay, red knots are also found in lesser numbers elsewhere along the Atlantic coast. In 2006, an international team of researchers investigating red knots in Florida identified a washout site on North Captiva Island as one of the most important wintering sites for this species (Nancy Douglass, FWC, personal communication, 2007). In addition, flocks as large as 500 individuals have been reported using Charley's Cut (DEP monument R-78.5) along the east coast of North Captiva Island as a resting and feeding area (Christina Olson, DEP, personal communication, 2007).

Although Lee County has not developed a Shorebird Management Plan that establishes avoidance and minimization measures with regard to nesting or roosting shorebirds, the DEP permit will include specific conditions for the protection of nesting shorebird species during project construction.

If the proposed project takes place during shorebird nesting season (February through August), the Applicant will be required to conduct daily surveys for shorebirds prior to mobilizing equipment and commencing construction activities. Shorebird nesting surveys shall begin on February 1 or 45 days prior to construction commencement, whichever is later, and be conducted daily throughout the construction period or through September if no shorebird nesting activity is observed. In addition, the Applicant will establish 300 foot buffer zones where possible in

locations where shorebirds have been observed engaged in courtship or nesting behavior, or around areas where shorebird nesting occurs. If shorebird nesting occurs within the project area, a bulletin board will be placed and maintained in the construction area with the location map of the construction site showing the bird nesting areas and a warning, clearly visible, stating that "BIRD NESTING AREAS ARE PROTECTED BY THE FLORIDA THREATENED AND ENDANGERED SPECIES ACT AND THE FEDERAL MIGRATORY BIRD ACT."

All tilling and scarp removal will be conducted in a manner that avoids or minimizes disturbance to nesting shorebirds. If it will be necessary to extend construction pipes past a known shorebird nesting site or over-wintering area for piping plovers, then whenever possible, pipes will be placed landward of the site before birds are active in that area. No sand will be placed seaward of a known shorebird nesting site during the shorebird nesting season. No scarp removal shall occur within or adjacent to areas being utilized for nesting by shorebirds. Therefore, the Service believes the effects to shorebird species will be insignificant and discountable, and they will not be discussed further in this biological opinion.

Hardbottom Reef Habitat and Seagrasses

Aerial images dating from 1956 to the present show no hardbottom features or seagrasses within the proposed project area. A survey completed in 2003 for the Kohler property located south of the proposed project included a nearshore survey along the inlet shoreline and part of the contiguous bay shoreline. Results of this survey revealed no seagrasses or hardbottom habitat which served as ground truth to the past aerial images.

CONSULTATION HISTORY

On May 4, 2007, the Service received the Corps' request for formal consultation and a copy of the Public Notice concerning the proposed beach nourishment of approximately 1,200 linear feet of shoreline along the west side of North Captiva Island.

On May 31, 2007, the Service requested additional information from the Corps.

On June 1, 2007, the Service received the requested information from the Corps.

On June 26 and 28, 2007, the Service requested additional information from Humiston and Moore Engineers concerning bald eagle nest LE048, the County's Shorebird Monitoring Plan and Sea Turtle Protection Ordinance, barge access, and removal of Australian pines.

On July 2, 2007, the Service received the requested information from the Humiston and Moore Engineers.

On July 11, 2007, the Service requested additional information from the Corps with regard to the proposed Shorebird Monitoring Plan.

On July 26, 2007, the Corps provided the requested information and the Service initiated formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Applicant proposes to nourish approximately 0.23 mile (1,200 feet) of shoreline along the southwest region of North Captiva Island, Lee County, Florida (Figure 1). Approximately 41,000 cubic yards (cy) of beach compatible material will be placed between DEP monuments R-81 and 208 feet south of R-81A. It has been estimated that between 1989 and 2005, approximately 126,000 cy of material has been lost between DEP monument R-81 and R-81A. No past nourishment projects have taken place within the proposed project area.

Using a hopper dredge, the fill material will be removed from Borrow Area VI located 11 miles southwest of the project area and transferred to a pumpout station located approximately 5 miles offshore. From the pumpout station the fill material will be pumped to the project area through a pipeline. The fill material will be discharged from the end of the pipe and distributed and graded using a front end loader and bulldozer. The proposed nourished beach profile will have a 1:10 slope. Prior to fill material placement, all Australian pine (*Casuarina sp.*) (live and snags) will be removed.

Surveys have determined that seagrasses and hardbottom areas are not present within the pipeline corridor, and barge beach access area for loading and unloading equipment. The proposed project will take place concurrently with the Sanibel-Captiva beach nourishment project which is scheduled for October and/or November 2007. The project is expected to take place during both daylight and night-time hours. If the project is delayed and construction takes place between the months of February and August, the Applicant will be required to implement the shorebird minimization and avoidance measures outlined above.

The action area is defined as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action. The Service identifies the action area to include shoreline in Lee County between DEP monuments R-81 and 208 feet south of R-81A (0.23 mile).

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle, listed as a threatened species on July 28, 1978 (43 Federal Register [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 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 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 (NOAA Fisheries 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 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 has also 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 St. 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 Dade Counties) and the Florida Keys (Monroe County) (Meylan 1992, Meylan et al. 1995). However, hawksbill tracks are difficult to differentiate from those of loggerheads and may not be recognized by surveyors. Therefore, surveys in Florida likely underestimate actual hawksbill nesting numbers (Meylan et al. 1995). In the U.S. Caribbean, hawksbill nesting occurs on beaches throughout Puerto Rico and the U.S. Virgin Islands (NOAA Fisheries 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). The range of the Kemp's ridley includes the Gulf coasts of Mexico and the U.S., and the Atlantic coast of North America as far north as Nova Scotia and Newfoundland. Most Kemp's ridleys nest on the coastal beaches of the Mexican states of Tamaulipas and Veracruz, although a very small number of Kemp's ridleys nest consistently along the Texas coast (Turtle Expert Working Group 1998). In addition, rare nesting events have been reported in Florida, Alabama, South Carolina, and North Carolina. Hatchlings, after leaving the nesting beach, are believed to become entrained in eddies within the Gulf of Mexico, where they are dispersed within the Gulf and Atlantic by oceanic surface currents until they reach about 8 inches in length, at which size they enter coastal shallow water habitats (Ogren 1989). Outside of nesting, adult Kemp's ridleys are believed to spend most of their time in the Gulf of Mexico, while juveniles and subadults also regularly occur along the eastern seaboard of the U.S. (Service and NOAA Fisheries 1992).

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 eggs along the southeastern United States coast (NOAA Fisheries and Service 1991b). Nesting migration intervals of 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 3.3. The mean interval between nesting events within a season is 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 5 to 7 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 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 Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald and Dutton 1996). Leatherbacks are believed to reach sexual maturity in 6 to 10 years (Zug and Parham 1996).

Hawksbill Sea Turtle

Hawksbills nest on average 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 (NOAA Fisheries 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 Veracruz coasts of Mexico. Precipitated by strong winds, the females swarm to mass nesting emergences, known as *arribadas* or *arribazones*, to nest during daylight hours. Clutch size averages 100 eggs (Service and NOAA Fisheries 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 50,000 to 90,000 nests per year (FWC statewide nesting database 2004, Georgia Department of Natural Resources statewide nesting database 2004, South Carolina Department of Natural Resources statewide nesting database 2004, North Carolina Wildlife Resources Commission statewide nesting database 2004). In 1998, 85,988 nests were documented in Florida alone. However, in 2001, 2002, 2003, and 2004, this number dropped to 69,657, 62,905, 56,852, and 47,173, respectively. An analysis of nesting data from the Florida Index Nesting Beach Survey (INBS) Program from 1989 to 2004, a period encompassing index surveys that are more consistent and more accurate than surveys in previous years, has shown no detectable trend, but more recently (1998 through 2004), has shown evidence of a declining trend (Blair Witherington, FWC, personal communication, 2005). Given inherent annual fluctuations in nesting and the short time period over which the decline has been noted, caution is warranted in interpreting the decrease in terms of nesting trends.

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 loggerhead nesting population, reported to be the largest in the world (Ross 1979), is uncertain because of the lack of long-term standardized nesting or foraging ground surveys and its vulnerability to increasing development pressures near major nesting beaches and threats from fisheries interactions on foraging grounds and migration routes (Earl Possardt, Service, personal communication, 2005). The loggerhead nesting aggregations in Oman, the southeastern U.S., and Australia have been estimated to 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 2006). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NOAA Fisheries and Service 1998a). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting group 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 2006), Sandy Point, U.S. Virgin Islands (50 to 190 females/year) (Alexander et al. 2002), and Puerto Rico (30 to 90 females/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). Mexico is now the most important region for hawksbills in the Caribbean with 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 (NOAA Fisheries and Service 1998b).

Kemp's Ridley Sea Turtle

The 40,000 nesting females estimated from a single mass nesting emergence in 1947 reflected a much larger total number of nesting turtles in that year than exists today (Carr 1963, Hildebrand 1963). However, nesting in Mexico has been steadily increasing in recent years - from 702 nests in 1985 to over 10,000 nests in 2005 (Service 2005). Despite protection for the nests, turtles have been and continue to be lost to incidental catch by shrimp trawls (Service and NOAA Fisheries 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° N.); (2) South Florida Subpopulation occurring from about 29° N. on Florida's east coast to Sarasota on Florida's west coast; (3) Dry Tortugas, Florida, Subpopulation, (4) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and

(5) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen 1994, 1995, Bowen et al. 1993, Encalada et al. 1998, Pearce 2001). These data indicate gene flow between these five regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation.

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

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

A near census of the Florida Panhandle Subpopulation undertaken from 1989 to 2002, reveals a mean of 1,028 nests per year, which equates to about 251 females nesting per year (FWC 2006). Evaluation of long-term nesting trends for the Florida Panhandle Subpopulation is difficult because of changed and expanded beach coverage. Although there are now 8 years (1997 to 2004) of INBS data for the Florida Panhandle Subpopulation, the time series is too short to detect a trend (Blair Witherington, FWC, personal communication, 2005).

A near census of the Dry Tortugas Subpopulation undertaken from 1995 to 2001, reveals a mean of 213 nests per year, which equates to about 50 females nesting per year (FWC 2006). The trend data for the Dry Tortugas Subpopulation are from beaches that were not part of the State of Florida's INBS program prior to 2004, but have moderately good monitoring consistency. There are 7 continuous years (1995 to 2001) of data for this Subpopulation, but the time series is too short to detect a trend (Blair Witherington, FWC, personal communication, 2005).

Nesting surveys in the 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 150 to 2,750 females nesting annually (FWC 2006). 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 2 decades along the Pacific coasts of Mexico and Costa Rica. The Mexican leatherback nesting population, once considered to be the world's largest leatherback nesting population (historically estimated to be 65 percent of the worldwide population), is now less than 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 leatherback populations in the Indian Ocean and western Pacific Ocean cannot withstand even moderate levels of adult mortality and even the Atlantic populations are being exploited at a rate that cannot be sustained. They concluded 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 shell in 1993, a significant illegal trade continues. It is believed 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 Mexico government also prohibits harvesting and is working to increase the population through more intensive law enforcement, by fencing nest areas to diminish natural predation, and by relocating 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 the 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 hatchling 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 Southwest Gulf Coast (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 12 percent of the total nesting activity on Florida's beaches occurs on Florida's Gulf Coast (Addison et al. 2000). During the 2006 nesting season, Lee County accounted for approximately 12 percent of the overall nesting in the Gulf coast region. From 2000 to 2006, there was an average of 6 green and 623 loggerhead sea turtle nests laid within the County (Table 1). Though leatherback sea turtles nest occasionally on Florida's southwest coast, leatherback nests have not been recorded in Lee County since 1990. The Lee County shoreline supports the third greatest number of nesting turtles in southwest Florida (FWC, unpublished data). Since 1993, an average of 40.9 miles of Lee County shoreline has been surveyed annually for sea turtle nesting activity, with a total of 44.2 miles surveyed in 2006.

Status of the species/critical habitat within the action area

Along the Florida coast between 1988 and 1992, Lee County accounted for 0.6 percent of all sea turtle nesting (Meylan et al. 1995). In Lee County, 12 sea turtle nests were laid per mile in 2005 and 2006 (Table 1). The nesting density within North Captiva State Park was 8 nests per mile in 2006 (Table 2).

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for Lee County extends from April 1 through November 30. Incubation ranges from about 45 to 95 days.

Along the west coast of Florida in 2006, Lee County had the third highest nesting of loggerhead sea turtles with 512 nests or 12 nests per mile (FWC 2007). In 2006, loggerhead sea turtles laid 20 nests along 2.5 miles of shoreline within North Captiva State Park (Table 2).

Loggerhead sea turtles made 494 false crawls in 2006 in Lee County (Table 1). Along North Captiva State Park, loggerhead turtles made 33 false crawls in 2006 (Table 2).

Green Sea Turtle

The green sea turtle nesting and hatching season for Lee County extends from May 15 through October 31. Incubation ranges from about 45 to 75 days.

Along the west coast of Florida in 2006, Lee County had the fifth highest nesting of green sea turtles with 2 nests or 0.05 nest per mile (FWC 2007). Green sea turtles laid no nests in 2006 along 2.5 miles of North Captiva State Park (Table 2). In Lee County, green sea turtles made 7 false crawls in 2006 (Table 1). Along North Captiva State Park, green sea turtles did not make any false crawls in 2006 (Table 2).

Leatherback Sea Turtle

Longboat Key in Sarasota County had the first documented leatherback nesting event along the central west coast shoreline of Florida. The nest was deposited on May 31, 2001. No occurrences of leatherback nesting have been documented in the action area or Lee County. Incubation ranges from about 55 to 75 days.

Hawksbill Sea Turtle

Hawksbill sea turtle nesting and hatching season along southern Florida Atlantic beaches (Brevard through Miami-Dade Counties) extends from June 1 through December 31. No occurrences of hawksbill nesting have been documented in the action area or Lee County. Incubation lasts for about 60 days.

Kemp's Ridley Sea Turtle

No nesting has been reported in Lee County for Kemp's ridley turtles. The incubation period for the Kemp's ridley sea turtle ranges from 45 to 70 days.

The majority of nesting surveys conducted in Florida occur during the morning hours and are based on interpretation of the tracks left by the turtles as they ascend and descend the beach; the turtles themselves are rarely observed. Because both hawksbill and Kemp's ridley turtle tracks are difficult to discern from loggerhead tracks, it is likely that nesting by both species is underreported (Meylan et al. 1995).

Factors affecting the species habitat within the action area

The project area includes 0.23 mile of shoreline which has an average beach width of 40 feet. It is estimated that approximately 126,000 cy of material has been lost in the project area between 1989 and 2005. In addition, contiguous stands of Australian pine are common along the beaches of North Captiva Island. The presence of Australian pines or snags on the beach reduce access to nesting areas and reduce the suitability of nesting habitat. During construction of the proposed project, all Australian pine (live and snags) will be removed prior to placement of fill material.

A primary threat to sea turtles along nesting shorelines includes sea turtle hatchling disorientation as a result of artificial lighting along the beach. Typically, sea turtle hatchlings will emerge from the nest and orient themselves towards the brighter, open horizon of the ocean (Salmon et al. 1992). If artificial lights are visible from the beach, sea turtle hatchlings tend to

travel toward the artificial lights instead of the ocean. Disorientation events often result in hatchling mortality as a result of dehydration, predation, and motor vehicle strikes. In addition, regular beach maintenance in the form of tractor tilling may disrupt or impact deposited nests and nesting females. Plastics, styrofoam, and fishing line are pollutants that may negatively impact nesting success and nearshore foraging.

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. 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.

Lighting

North Captiva Island is a barrier island approximately 3.5 miles long and 0.75 mile across at the widest point. The island is located approximately 5 and 8.5 miles from Pine Island and the mainland, respectively. The area is characterized as a low-density residential area with eleven private residences located in the south portion of the Island along the western shoreline. Because the beach-front residences are not fully occupied during much of the nesting season, impacts to nesting sea turtles and hatchlings may be reduced.

Lee County has a Land Development Code that includes measures to reduce impacts of coastal lighting on nesting sea turtles and hatchlings. The proposed project area is subject to this code.

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, nest, and hatchlings within the proposed project area through the placement of dredged material on the beach within Lee County, Florida.

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 (*e.g.*, 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 up to 41,000 cy of sand along 0.23 mile of beach in and of itself may not provide suitable nesting habitat for sea turtles. Although placement of beach compatible material may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Placement of material 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 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.

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 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 may also 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 placement activities 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 placement 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 (*e.g.*, increase in false crawls) have been documented on severely compacted nourished beaches (Fletemeyer 1980, Raymond 1984, Nelson and Dickerson 1987, Nelson et al. 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and also cause increased physiological stress to the animals (Nelson and Dickerson 1988b). Nelson and Dickerson (1988c) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

These impacts can be minimized by using suitable sand and by tilling compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988b) 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 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. Tilling, natural reworking of sediments, and bleaching from exposure to the sun

would help to lighten dark nourishment sediments; however, the timeframe for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

4. Escarpment formation

On nourished beaches, steep escarpments may develop along their water line interface as they adjust from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center 1984, Nelson et al. 1987). 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 area. 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 beach. 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 (1999) indicate 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. The Service has considered potential cumulative effects of this project on sea turtles and, in this instance, there are no cumulative effects.

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 dredging and 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, Kemp's Ridley, and hawksbill sea turtles in the continental United States; therefore, none will be affected.

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 they become binding conditions of any grant or permit issued to the Applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or, (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps 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 0.23 mile of nesting beach habitat could be taken as a result of the proposed action; however, incidental take of sea turtles will be difficult to detect for the following reasons:

- 1) turtles nest primarily at night and all nests are not located because
 - a. natural factors, such as rainfall, wind, and tides may obscure crawls; and
 - b. human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program;
- 2) the total number of hatchling 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 nourishment of suitable turtle nesting beach habitat because: (1) turtles nest within the project area; (2) beach nourishment will likely occur during a portion of the nesting season; (3) the nourishment project will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter and/or misdirect nesting females and hatchlings.

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.

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. Incidental take of nesting and hatchling sea turtles is anticipated to occur during project construction and during the life of the project. Take will occur on nesting habitat consisting of the length of the beach where the restoration material will be placed.

REASONABLE AND PRUDENT MEASURES

1. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence must be used for the beach nourishment project;
2. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted daily before work is conducted. If nests are constructed in the area of beach nourishment, the eggs must be relocated to minimize sea turtle nest burial, crushing eggs, or nest excavation;
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 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 disorienting nesting and/or hatchling sea turtles;
8. All dune restoration and planting must be designed and conducted to minimize impacts to sea turtles; and
9. The Applicant shall complete a survey of all lighting visible from the nourished beach and submit a report to the Service.

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.

In accordance with the 2001 rule change under subsection 62B-41.007, Florida Administrative Code, all fill material placed on the beach must be analogous to that which naturally occurs within the project location or vicinity in quartz to carbonate ratio, color, median grain size, and median sorting. Specifically, such material shall be predominately of carbonate, quartz, or similar material with a particle size distribution ranging between 0.62 mm and 4.76 mm (classified as sand by either the Unified Soil Classification System or the Wentworth classification). The material shall be similar in color, grain size distribution (sand grain frequency, mean and median grain size, and sorting coefficient) to the material in the existing coastal system at the nourishment site and shall not contain:

- 1a. Greater than 5 percent, by weight, silt, clay, or colloids passing the #230 sieve;
- 1b. Greater than 5 percent, by weight, fine gravel retained on the #4 sieve;
- 1c. Coarse gravel, cobbles, or material retained on the ¾-in sieve in a percentage or size greater than found on the native beach; and
- 1d. Construction debris, toxic material, or other foreign matter; and not result in cementation of the beach.

These standards must not be exceeded in any 10,000 square foot section, extending through the depth of the nourished beach. If the natural beach exceeds any of the limiting parameters listed above, then the fill material must not exceed the naturally occurring level for that parameter.

Protection of sea turtles

1. 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.

- 1a. 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. The contractor must not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys must be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.
 - 1b. 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.
 - 1c. Nests deposited within areas where construction activities have ceased or will not occur for 65 days must be marked and left *in situ* unless other factors threaten the success of the nest. The turtle permit holder must install an on-beach marker at the nest site and a secondary marker at a point landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and highly visible survey ribbon or string must be installed to establish a 10 foot radius around the nest. No activity will occur within this area nor will any activity occur which could result in impacts to the nest. Nest sites must be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the restoration activity.
2. 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 2a and 2b below must be followed. If required, the area must be tilled to a depth of 36 inches. All tilling must be completed prior to April 1. Each pass of the tilling equipment must be overlapped to allow more thorough and even tilling. 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. (NOTE: The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.)
 - 2a. 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.

- 2b. 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.
3. Visual surveys for escarpments along the project area must be made immediately after completion of the 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 escarpments 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.)
4. 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.
5. 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).

6. 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 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).

Reporting

1. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to the FWC, Imperiled Species Management Section, Tequesta office and the Tallahassee office as well as the South Florida Ecological Services Office, Vero Beach, Florida 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.
2. In the event a sea turtle 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.
3. 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 1-888-404-3922, and the South Florida Ecological Services Office biologist listed at the end of this biological opinion. 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 0.23 mile of beach that has 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 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 0.23 mile of beach that has 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. 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, Bureau of Beaches and Coastal Systems, 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. To increase public awareness about sea turtles, informational signs should be placed at beach access points where appropriate. The signs should explain the importance of the beach to sea turtles and/or the life history of sea turtle species that nest in the area.

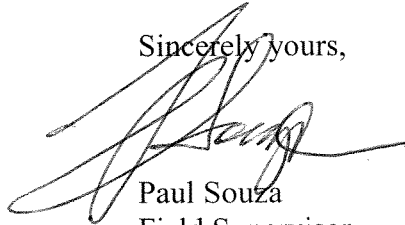
In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

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 Jeff Howe at 772-562-3909, extension 283.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Paul Souza', is written over the typed name.

Paul Souza
Field Supervisor
South Florida Ecological Services Office

cc:

Corps, Jacksonville, Florida (Mike Nowicki)
DEP, Tallahassee, Florida (Stephanie Gudeman)
EPA, West Palm Beach, Florida
FWC, Tallahassee, Florida (Robbin Trindell)
NOAA Fisheries, St. Petersburg, Florida (Mark Sramek)
Service, Jacksonville, Florida (Sandy MacPherson)
Service, Atlanta, Georgia (Noreen Walsh) electronic copy
USGS, Florida Integrated Science Center, Gainesville, Florida (Susan Walls)

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Table 1. Summary of sea turtle nesting data for Lee County, Florida from 2000 to 2006 (FWC).

Year	Loggerhead Nests	Loggerhead False Crawls	Green Nests	Green False Crawls	Leatherback Nests	Leatherback False Crawls
2000	935	1,026	5	2	0	0
2001	660	730	6	12	0	0
2002	560	596	7	7	0	0
2003	617	675	9	3	0	0
2004	572	805	4	15	0	0
2005	503	650	7	0	0	0
2006	512	494	2	7	0	0
Mean	623	711	6	7	0	0

Table 2. Summary of sea turtle nesting data for North Captiva State Park, Lee County, Florida from 1993 to 2006 (FWC).

Year	Loggerhead Nests	Loggerhead False Crawls	Green Nests	Green False Crawls	Leatherback Nests	Leatherback False Crawls
1993	51	0	0	0	0	0
1994	50	2	0	0	0	0
1995	24	0	2	0	0	0
1996	36	0	0	0	0	0
2000	52	25	0	0	0	0
2002	24	3	0	0	0	0
2003	28	9	1	0	0	0
2006	20	33	0	0	0	0
Mean	36	9	0.4	0	0	0

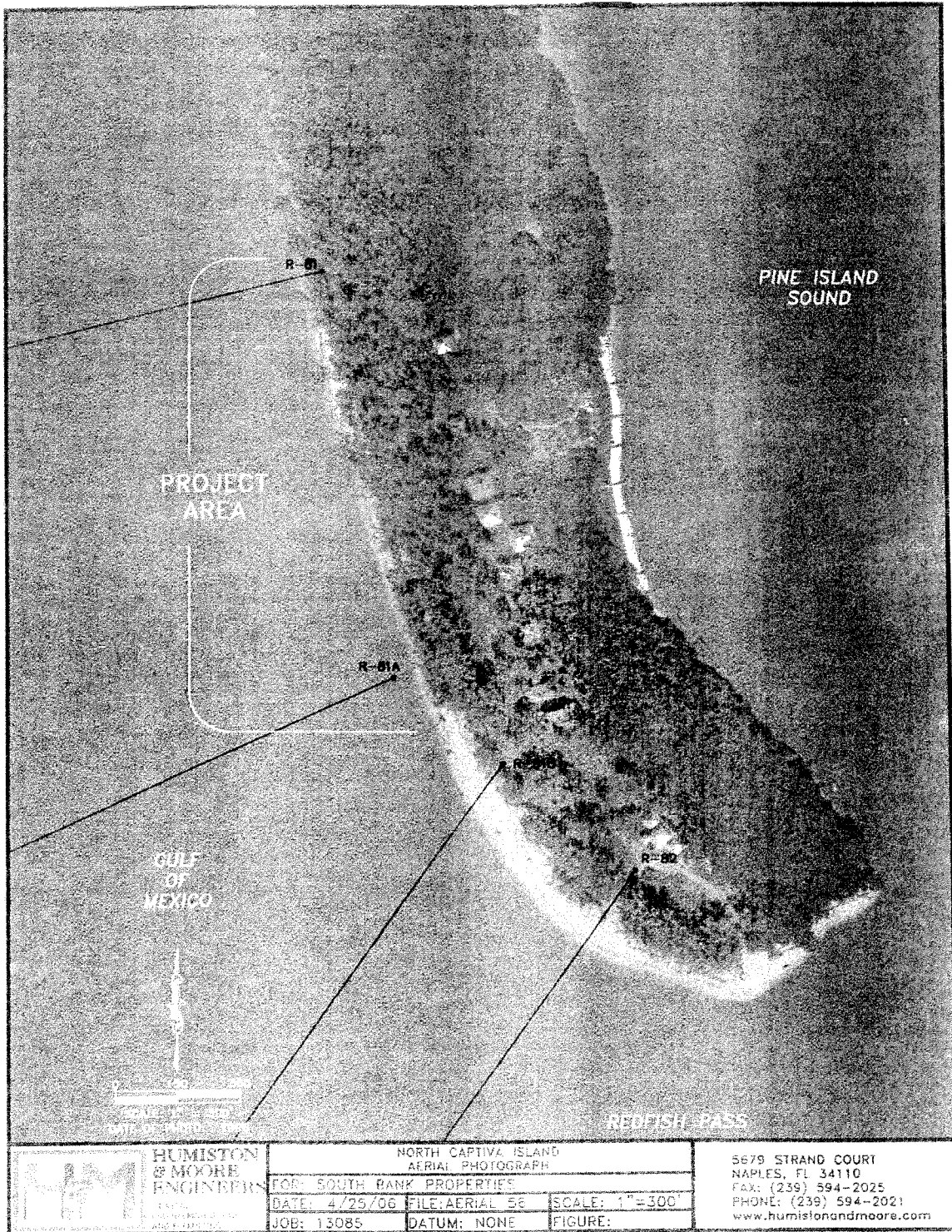


Figure 1. Location of the proposed beach nourishment project along North Captiva Island, Lee County, Florida.

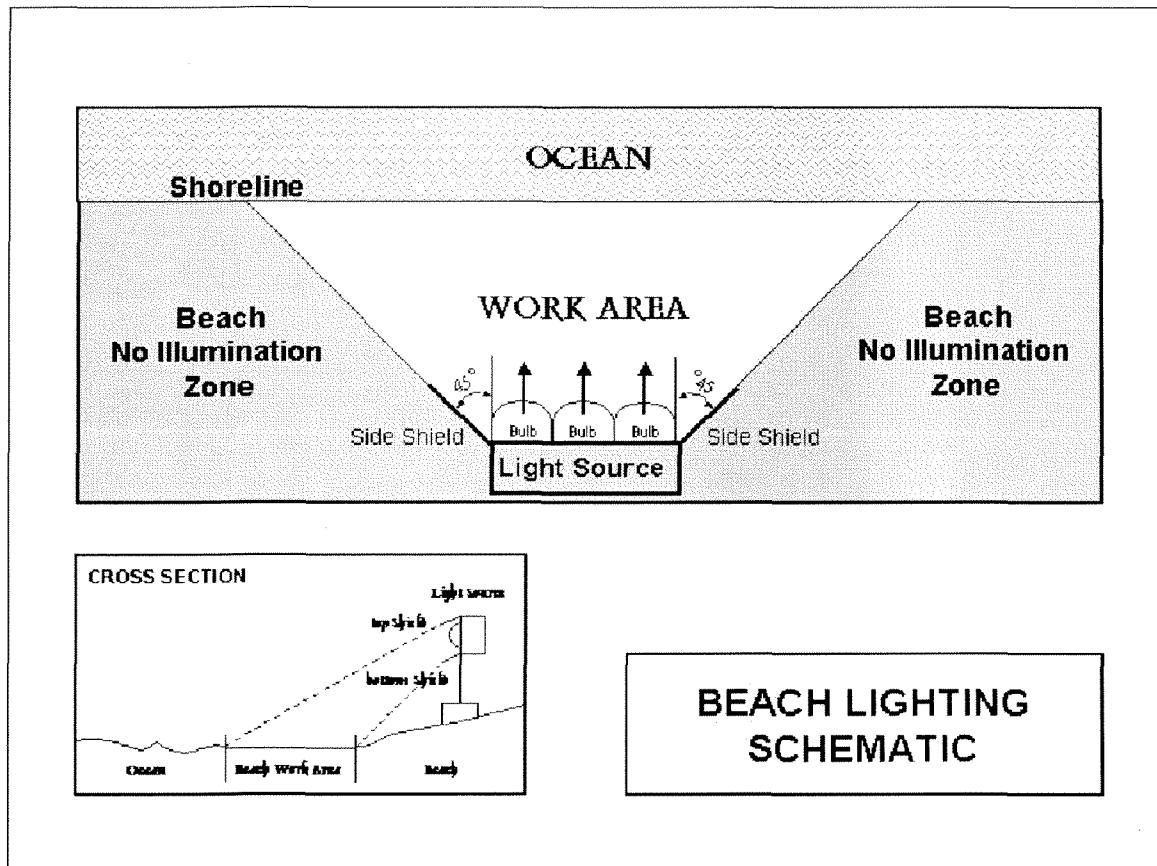


Figure 2. Beach lighting schematic.