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April 8, 1998

Colonel Joe R. Miller
Regulatory Division
North Permits Branch
Panama City Regulatory Office
475 Harrison Avenue, Suite 202
Panama City, Florida 32401

Attn: Don Hambrick

Re: FWS Log No. 4-P-97-108
Bay County Tourist Development

Council

Panama City Beach Nourishment
Bay County, Florida

Dear Colonel Miller:

The U.S. Fish and Wildlife Service (Service) has reviewed the permit application 199701891 (LP-DH) for the offshore dredging and beach nourishment along the Gulf of Mexico from approximately 1.25 miles east of Phillips Inlet to 0.82 miles west of St. Andrew Inlet in Bay County, Florida. Your August 18, 1997, request for formal consultation was received on August 21, 1997. This document represents the Service's revised biological opinion on the effects of that action on loggerhead, green, and leatherback sea turtles in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.). This revision is because of additional information provided by the applicant regarding the method of project implementation.

This biological opinion is based on information provided in the public notice for the permit application, additional information provided by the applicant's engineering consultant, Coastal Planning and Engineering, and various meetings and discussions with the Florida Department of Environmental Protection (FDEP); Coastal Planning and Engineering, the U.S. Army Corps of Engineers (Corps), Kennard Watson, sea turtle survey permit holder #038, and National Marine Fisheries Service and field investigations and other sources of information. A complete administrative record of this consultation is on file in this office.

CONSULTATION HISTORY

- August 4, 1994 Service submits a Fish and Wildlife Planning Aid Letter for the Panama City Beaches Beach Erosion Control and Storm Damage Reduction Project, Bay County, Florida, to the Corps, Mobile District
- April 20, 1995 Service submits a Fish and Wildlife Coordination Act Report (FWCA) for the Panama City Beaches Beach Erosion Control and Storm Damage Reduction Project, Bay County, Florida, to the Corps, Mobile District
- June 8, 1995 Service submits a letter to the Corps, Mobile District, reiterating recommended fish and wildlife (including sea turtles) conservation measures identified in the 1995 FWCA report for the Panama City Beaches Erosion Control and Storm Damage Protection, Public Notice FP95-PCB01-2, dated May 11, 1995
- July 26, 1995 Service responds to Corps letter of May 16, 1995, requesting clarification about Service recommendations for conservation of federally listed species and other significant fish and wildlife resources in the subject project
- March 26, 1997 Service receives a notification and request for comments from the FDEP concerning a joint permit application, Bay County Tourist Development Council, file number 033028989
- April 25, 1997 Service receives a copy of a request to the Corps to keep permit application number 199701891 (LP-DH) [*sic* 198990407 (IP-DH)] - Panama City Beach, Florida, Beach Nourishment Project active from the applicant's engineering consultant (Richard Spadoni, Coastal Planning and Engineering, Inc.)
- April 30, 1997 Service receives a copy of additional information (borrow area grain size and volumetric distribution and project consistency statement) sent to the Corps about permit application number 199701891 (LP-DH) [*sic* 198990407 (IP-DH)] - Panama City Beach, Florida, Beach Nourishment Project from the applicant's engineering consultant (Richard Spadoni, Coastal Planning and Engineering, Inc.)
- May 15, 1997 Service receives a telephone call from applicant's engineering consultant (Craig Kruempel, Coastal Planning and Engineering, Inc.) to discuss listed species, the endangered species consultation process, and the difference between a federal project and the Corps permit process related to the consultation process
- May 19, 1997 Service receives a fax confirming the May 15, 1997, telephone call with applicant's engineering consultant (Craig Kruempel, Coastal Planning and Engineering, Inc.)

May 19, 1997 Service receives a telephone request from the applicant's engineering consultant (Sherril Miller, Coastal Planning and Engineering, Inc.) and sends a fax in response entitled, "Threatened, Endangered, and Other Special-Status Species Likely to Occur in Bay County, Florida"

June 2, 1997 Service receives the Panama City Beach, Florida, Beach Nourishment Project Amended Environmental Assessment (EA), dated May 28, 1997, from the applicant's consultant (Richard Spadoni, Coastal Planning and Engineering, Inc.)

July 9, 1997 Service receives copy of response to FDEP's request of April 21, 1997, for additional information about the Panama City Beach, Florida, Beach Restoration Project; Joint Coastal Permit Number: 033028989 from the applicant's consultant (Richard Spadoni, Coastal Planning and Engineering, Inc.)

August 21, 1997 Service receives public notice 199701891 (LP-DH) dated, August 18, 1997, for the subject project. In the notice, the Corps requests formal consultation under the Endangered Species Act for sea turtles

August 28, 1997 Service submits a letter to the Corps acknowledging receipt of the public notice and request for formal consultation. The Service concurred with the request for consultation

September 17, 1997 Service attends a meeting to discuss sea turtle issues and the subject project with the Corps, FDEP, sea turtle permit holder, and the applicant's engineering consultant

October 2, 1997 Service attends a meeting to discuss the sea turtle nest relocation issue concerning the subject project with FDEP, NMFS, and the Corps

October 13, 1997 Service attends a meeting to discuss the sea turtle protection and nest relocation issue concerning the subject project with FDEP

December 16, 1997 Service submits the draft biological opinion to the State of Florida and U.S. Bureau of Land Management (BLM) for review. A copy is also provided to the Corps and Mr. Watson, the sea turtle nesting survey permit holder for Panama City Beach

December 16, 1997 Service provides a copy of the draft Incidental Take Statement from the draft biological opinion to the applicant's consultants (Coastal Planning and Engineering, Inc.)

January 5, 1998 Service discusses the draft Incidental Take Statement with the applicant's consultants (Coastal Planning and Engineering, Inc.) concerning the color of the borrow material and the existing beach sand, and the need to conduct pre-project sand compaction data collection

<u>January 6, 1998</u>	Service receives supplemental information from the applicant's consultant (Coastal Planning and Engineering, Inc.) on existing beach and borrow material color
<u>January 10, 1998</u>	Service discusses the supplemental information with the applicant's consultants (Coastal Planning and Engineering, Inc.)
<u>January 15, 1998</u>	By telephone, the BLM and Walton County give their approval for the use of the BLM Inlet Beach tract in Walton County for relocation of sea turtle nests from Panama City Beach during the 1998 nesting season
<u>January 20, 1998</u>	Service submits a draft of the final biological opinion to the Corps, Jacksonville District, for the Panama City Beaches nourishment project
<u>January 21, 1998</u>	Service receives comments and concurrence from the State of Florida in a letter dated January 20, 1998, on the draft biological opinion for the Panama City Beaches nourishment project
<u>January 23, 1998</u>	By telephone, the Corps, Jacksonville District, concurs with the Service's determination and Terms and Conditions (with minor changes) provided in the January 20, 1998, draft of the final biological opinion
<u>March 13, 1998</u>	Service receives a copy of a request for modification of the Service's biological opinion from the applicant's consultant (Coastal Planning and Engineering, Inc.) to the Corps. The request is dated March 10, 1998
<u>March 17, 1998</u>	Service discusses the request for project modification with the applicant's consultants (Coastal Planning and Engineering, Inc.)
<u>March 30, 1998</u>	Service receives a copy of a request regarding the method of project implementation (use two dredges concurrently) from the applicant's consultant (Coastal Planning and Engineering, Inc.) to the Corps. The request is dated March 26, 1998

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed project is to nourish along approximately 16.8 miles(mi) [27 kilometers (km)] of Panama City Beach beachfront to provide storm protection and erosion control. The project will be located on the beach between DNR monuments R4.4 and R93.2. The project will be accomplished by dredging from nine offshore borrow areas and placing the dredged material along the existing beach. The offshore borrow sites are located between the 25 and 65 foot (ft) [7.6 to 19.8 meters (m)] (NGVD) depth contours. Approximately 8.2 million cubic yards will be placed along the beach. The project design consists of a 7-foot (2.1 m) NGVD beach berm with dune construction to an elevation of 12 ft (3.7 m) NGVD. The adjusted beach berm widths transition from a 50-foot (15.2 m) wide template from DNR monument R17.1 east to R93.2 with

tapers. From R4.4 to R17.1, the beach berm will be 30 ft (9.1 m) in width. Reconstructed dunes will average 25 ft (7.6 m) in width.

The dredging will be accomplished by hydraulic dredging possibly using two dredges concurrently. The dredge area(s) configurations will be marked by buoys and continuous monitoring using a global positioning system (GPS). The material will be transported to the beach by pipeline(s). The pipeline(s) will be placed perpendicular to the beach and the material spread to both sides. Personnel will be on the beach to visually inspect the discharged material.

The areas of acceptable material to be dredged have been predefined by geotechnical investigations. Geotechnical work was accomplished from 1984 to 1994 and in 1997 using a total of 385 vibracores. The volume of each of the offshore borrow areas range from approximately 460,000 to 2.3 million cubic yards of suitable beach nourishment material. Total suitable material is approximately 13.5 million cubic yards of which 8.2 million will be used for the project (6.8 million cubic yards will be placed seaward of the existing mean high water line). The material to be dredged is moderately sorted, fine to medium grained sand. Where shell hash and fragments exist, the grain size increases while sorting values decrease. The mean grain size of the natural beach in the project area is 0.009 inches (in) [0.24 millimeters (mm)]. The mean grain size of the borrow area material is 0.01 in (0.26 mm) (range 0.009 to 0.01 in/0.24 to 0.28 mm). The color of the sand ranges from white (10YR or 5Y 8/1) to very dark brown (10YR 3/1) or very dark gray (5Y 3/1). It is thought that the coloration of the sediments is either due to presence of organic material (browns) or elevated silt content (grays). Cleaner and lighter colored sand is more available in the eastern borrow areas. The color of the native beach sand is 10YR 8/1.

Work will be conducted 24 hours a day and is projected to take approximately 270 days (9 months) to complete. Project progress is expected to be approximately 3 mi (4.8 km) per month during the summer months and 1 to 1.5 mi (1.6 to 2.4 km) per month during the winter months. Thus, the beach nourishment will take place during sea turtle nesting and hatching season (May 1 through October 31). Since the work will be conducted year-round, excessive turbidity may be a problem during the dredging and placement of material on the beach. A mixing zone variance has been requested beyond the allowable mixing zone. One alternative proposed to control turbidity is the construction of 500-foot (152.4 m) dikes parallel to the shoreline that would allow suspension fallout before it reaches the beach.

It is projected that the beach will need to be renourished on a 10-year cycle based on historical erosion rates and storm frequencies. Approximately 45 percent of the sand will be replaced. The work should require one-half the time (4 to 5 months) to complete. Thus, all subsequent beach renourishment work is proposed to be conducted outside the sea turtle nesting season.

The stormwater drainage of the Gulf outlets will be redesigned or extended because of the increase in beach width resulting from the nourishment. There are 142 public and private stormwater drainage outfalls in the project area. The outfalls vary in size from 4 to 7 ft (1.2 to 2.1 m) in diameter. Approximately 25 outfalls have diameters greater than 24 in (61 cm). The plan will not alter any aspect of the existing drainage, other than to extend the drainage structures through the restored beach to avoid back-up of water and flooding problems. It will not change the amount or nature of the stormwater drainage that presently exists.

A dune enhancement and restoration project is also proposed as part of the project action. Project design calls for enhancement along the entire project shoreline to replace the losses from Hurricane Opal between the 7 and 12 ft (2.1 to 3.7 m) (NGVD) contours. The sand used for the dune restoration will be placed on the landward sections of the design berm. The dunes will be designed with a top elevation of 12 ft (3.7 m) (NGVD) and average width of 30 ft (9.1 m). A 1:5 slope will be used as a transition from the top of the dune to the seaward berm; and where necessary a 1:4 slope will be used to transition to the landward existing elevations. Dune vegetation and access development has not been finalized.

STATUS OF THE SPECIES

The U.S. Fish and Wildlife Service has responsibility for regulating sea turtles when they come ashore to nest. The National Marine Fisheries Service has jurisdiction over sea turtles in the marine environment. In applying the jeopardy standard under the Endangered Species Act, the Fish and Wildlife Service has determined that sea turtle species occurring in the U.S. represent populations that qualify for separate consideration under section 7. Even though sea turtles are wide ranging and have distributions outside the U.S., a jeopardy finding could be made when a proposed action, along with cumulative effects, is likely to jeopardize a sea turtle species' U.S. population.

For at least 2 decades, several factors appear to have contributed increasingly to the decline of sea turtle populations along the Atlantic coast and in the Gulf of Mexico (National Research Council 1990a). These factors include commercial over-utilization of eggs and turtles, incidental catches in commercial fishing operations, increased natural predation on eggs and hatchlings, degradation of nesting habitat by coastal development, and marine pollution and debris.

The reproductive strategy of sea turtles involves producing large numbers of offspring to compensate for the high natural mortality through their first several years of life. However, increased unnatural mortality is now occurring due to increased human-caused pressures on sea turtle populations. Therefore, activities that affect the behavior and/or survivability of turtles on their remaining nesting beaches, particularly the few remaining high density nesting beaches, could seriously reduce our ability to conserve sea turtles.

Three species of sea turtles, loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and leatherback sea turtle (*Dermochelys coriacea*) are considered in this biological opinion; although only the loggerhead turtle has been documented to nest in the vicinity of the project area. Nesting by green and leatherback turtles occurs on other beaches in the Florida panhandle. Thus, the possibility exists that nesting by these three species could occur in the project area. The Kemp's Ridley turtle (*Lepidochelys kempi*) occurs in nearshore Gulf waters but no nests have been documented in the Florida panhandle.

Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*) was listed as a federally threatened species on July 28, 1978 (43 FR 32800). This species 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). Total estimated nesting in the Southeast is approximately 50,000 to 70,000 nests per year (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b).

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, National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b). The status of the Oman colony has not been evaluated recently, but its location in a part of the world that is vulnerable to disruptive events (e.g., political upheavals, wars, catastrophic oil spills) is cause for considerable concern (Meylan *et al.* 1995). The loggerhead nesting aggregations in Oman, the southeastern U.S., and Australia account for about 88 percent of nesting worldwide (National Marine Fisheries Service and U.S. Fish and Wildlife 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) (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b).

Recent genetic analyses using restriction fragment analysis and direct sequencing of mitochondrial DNA (mtDNA) have been employed to resolve management units among loggerhead nesting cohorts of the southeastern U.S. (Bowen *et al.* 1993; B.W. Bowen, University of Florida, Gainesville, in litt., November 17, 1994, and October 26, 1995). Assays of nest samples from North Carolina to the Florida Panhandle have identified three genetically distinct nesting sub-populations: (1) northern nesting sub-population - Hatteras, North Carolina, to Cape Canaveral, Florida; (2) South Florida nesting sub-population - Cape Canaveral to Naples, Florida; and (3) Florida Panhandle nesting sub-population - Eglin Air Force Base and the beaches around Panama City, Florida. These data indicate that gene flow between the three 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 sub-population (Bowen *et al.* 1993, B.W. Bowen, University of Florida, Gainesville, in litt., October 26, 1995).

Green Sea Turtle

The green sea turtle (*Chelonia mydas*) was federally listed on July 28, 1978 (43 FR 32808). 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 is a circumglobal species in tropical and subtropical waters. Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam.

Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991a). Nesting also has been documented along the northwest Gulf coast of Florida and from Pinellas County through Collier County on the southwest Gulf coast (Meylan *et al.* 1995). Green turtles have been known to nest in Georgia, but only on rare occasions (Brad Winn, Georgia Department of Natural Resources, pers. comm., 1996). The green turtle also nests sporadically in North Carolina (North Carolina Wildlife Resources Commission, unpubl. data.). Only two green turtle nests, both laid in 1996, have been

documented in South Carolina (S. Murphy, South Carolina Department of Natural Resources, pers. comm., 1996). Unconfirmed nesting of green turtles in Alabama has also been reported (R. Dailey, Bon Secour National Wildlife Refuge, pers. comm., 1995).

Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*), listed as a federally endangered species on June 2, 1970 (35 FR 8495), nests onshore 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 circumglobally, 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 also occurs frequently, from Costa Rica to Columbia and in Guyana, Surinam, and Trinidad (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1992, National Research Council 1990a).

The leatherback regularly nests in the U.S. in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1992). Leatherback nesting also has been reported on the northwest coast of Florida (LeBuff 1976, Florida Department of Environmental Protection, unpubl. data, Longieliere et al. 1997); a false crawl (non-nesting emergence) has been observed on Sanibel Island (LeBuff 1990). Leatherback turtles have been known to nest in Georgia and South Carolina, but only on rare occasions (Georgia and South Carolina Departments of Natural Resources, unpubl. data).

ENVIRONMENTAL BASELINE

Panama City Beach is a popular tourist destination, attracting more than 2 million visitors annually. The east and west ends are mostly residential, with single-family dwellings, multi-family complexes, and small two-story motels. The heavily developed central portion is characterized by night clubs, restaurants, multi-story hotels, and condominiums. Only four undeveloped stretches of beach remain ranging in length from 0.16 to 0.47 mi (0.25 to 0.75 km). They are located at Bid-a-Wee Beach, Laguna Beach, Sunnyside Beach, and Inlet Beach (Watson 1996). State of Florida permitted sea turtle monitoring on the 18 mi (29 km) of developed beachfront was initiated by St. Andrew Bay Resource Management Association (RMA) in 1991 (Mr. Kennard Watson, project coordinator, permit no. 038). The developed beach is bordered by the St. Andrew State Recreation Area (SRA) on the east and Camp Helen State "Park" on the west. The State conducts turtle nesting surveys on St. Andrew SRA and Camp Helen (John Bente, FDEP, Recreation and Parks, District 1, pers. comm., 1997).

Impacts to sea turtles along the developed part of the beach are currently caused by three main factors. The most adverse impact occurs from the loss of nesting habitat from the beachfront development eliminating much of the high beach and dune system. The loss of habitat has been exacerbated by tropical storms. Disorientation of hatchling sea turtles by artificial lighting associated with the developments has been documented (Kennard Watson, 1991, 1992, 1994, 1996, 1997).

Hurricanes Erin and Opal devastated the Florida panhandle coast in 1995. Hurricane Opal caused more structural damage along the Florida coast than all hurricanes and tropical storms combined since 1975 (Leadon 1996). Severe damage extended across the entire Florida Panhandle region from Escambia through Franklin counties. The storm surge was estimated to be between 12 to 14 ft (3.7 to 4.3 m) above mean sea level. The storm surge and breaking waves severely eroded the beach and dune system throughout the panhandle coast. Generally the beach and dunes were lowered and recessed. Areas of high continuous dunes experienced substantial recession; lower dunes experienced tremendous overwash, and blowouts were common.

The State of Florida is funding hurricane recovery efforts in the form of dune restoration and beach access reconstruction. Bay County received funds to build a beach berm using material from an upland source. The State of Florida has conditioned all funded hurricane recovery work on panhandle beaches to be designed as sea turtle compatible. In addition, if any work is to be conducted on the beaches during the sea turtle nesting season (May 1 through October 31), sea turtle surveys must be conducted by permitted individuals daily before work may begin. Additional dune restoration and planting is being proposed for this project.

The State of Florida has a permit program for all work conducted on the beaches of Florida at or below the Coastal Construction Control Line (CCCL). The CCCL along the Panama City Beach shoreline was revised and moved landward after Hurricane Opal. In accordance with Section 6 of the Endangered Species Act, Florida requires sea turtle conservation measures be incorporated as permit conditions as appropriate. The Service and the State of Florida have a cooperative history in identifying and addressing sea turtle issues.

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for the Florida panhandle beaches extends from May 1 through October 31. Nesting has been documented in all panhandle counties from Franklin County through Escambia County. Nest incubation ranges from about 60 to 95 days. Average sea turtle nest density in the panhandle for the 1995 and 1996 nesting seasons, ranged from a high of 5.5 nests per mile (8.8 nests per km) in Gulf County to a low of 0.87 nests per mile (1.4 nests per km) in Escambia County (Florida Marine Research Institute 1996, 1997). Documented average number of nests for the 1995 and 1996 nesting seasons, ranged from a high of 374 nests in Franklin County to a low of 8 nests in Santa Rosa County (Florida Marine Research Institute 1996, 1997).

Green Sea Turtle

The green sea turtle nesting and hatching season for the Florida panhandle beaches extends from May 1 through October 31. Green turtle nesting has been documented on all beaches in the Florida panhandle except in Franklin and Bay counties. Nest incubation ranges from about 60 to 75 days. Average green sea turtle nest density in the panhandle for the 1996 nesting season, ranged from a high of 0.36 nests per mile (0.58 nests per km) in Okaloosa County to a low of 0.07 nests per mile (0.11 nests per km) in Escambia County (Florida Marine Research Institute 1996, 1997). Documented number of nests for the 1995 and 1996 nesting seasons, ranged from a high of 14 nests in Okaloosa County to a low of 1 nest in Santa Rosa County (Florida Marine Research Institute 1996, 1997).

Leatherback Sea Turtle

The leatherback sea turtle nesting and hatching season for the Florida panhandle extends from May 1 through September 30. Nest incubation ranges from about 60 to 75 days. A leatherback nest was reported on St. Vincent National Wildlife Refuge in 1974 (LeBuff 1976); another nest and false crawl were documented at St. Joseph Peninsula State Park in Gulf County in 1993 (Florida Department of Environmental Protection unpubl. data); and three nests were documented on St. George Island in Franklin County during the 1995 nesting season (Longioliere et al. 1997).

Status of the Species in the Project Area

The RMA Turtle Watch program identified 145 loggerhead nests from 1991 through the 1997 sea turtle nesting season. Loggerhead nesting density varies along the 18 mi (29 km) of beachfront ranging from 0.19 to 0.52 per mile (0.31 to 0.83 per km). Highest nest densities occurred on the western 5.0 miles (8.0 km) and accounted for approximately 44 percent of the total 145 nests. This section of beach is unincorporated and development is sparse (Kennard Watson, RMA, pers. comm.). The mean nest incubation period was 73 days with a range of 64 to 83 days (Watson 1996 and pers. comm.). Depredation of eggs and hatchlings (before they reach the water) from natural predators is estimated to be less than a 5 percent loss. Lighting disorientation had the greatest impact on turtles that do nest on Panama City Beach either by causing female turtles to avoid areas that are highly lighted or by causing disorientation of hatchling turtles as they emerge from the nest and crawl to the Gulf of Mexico. For most years, lighting disorientation on Panama City Beach was close to 100 percent. A slight decrease in

lighting disorientation was observed in the 1996 and 1997 turtle seasons because of the loss of structures on the beachfront resulting from Hurricane Opal or reconstruction that required sea turtle friendly lighting. Because of the high tourism associated with the beaches during nesting season, human-associated activities have added to the problem. Areas that have significant activity on the beach during nighttime hours (i.e., nightclubs) also have a corresponding absence of turtle nesting (Kennard Watson, RMA, pers. comm.). No green or leatherback turtle nests have been documented on Panama City Beach from 1991 through 1997.

Effects of the Action

Direct Effects

Placement of sand on an eroded section of beach or an existing 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 construction. Nourishment during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of offspring from human-caused mortality and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these impacts, nests may be inadvertently missed 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 missed by experienced sea turtle nest surveyors (Schroeder 1994).

Besides the potential for missing nests during a nest relocation program, there is a potential for eggs to be damaged by their movement or for unknown biological mechanisms to be affected. 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 and overall fitness of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard *et al.* 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard *et al.* 1985), hatchling size (Packard *et al.* 1981, McGehee 1990), energy reserves in the yolk at hatching (Packard *et al.* 1988), and locomotory ability of hatchlings (Miller *et al.* 1987).

Comparisons of hatching success between relocated and *in situ* nests have noted significant variation ranging from a 21 percent decrease to a 9 percent increase for relocated nests (Florida Department of Environmental Protection, unpubl. data). Comparisons of emergence success between relocated and *in situ* nests have also noted significant variation ranging from a 23 percent decrease to a 5 percent increase for relocated nests (Florida Department of Environmental Protection, unpubl. data). A 1994 Florida Department of Environmental Protection study of hatching and emergence success of *in situ* and relocated nests at seven sites in Florida found that hatching success was lower for relocated nests in five of seven cases

with an average decrease for all seven sites of 5.01 percent (range = 7.19 percent increase to 16.31 percent decrease). Emergence success was lower for relocated nests in all seven cases by an average of 11.67 percent (range = 3.6 to 23.36 percent) (A. Meylan, Florida Department of Environmental Protection, in litt., April 5, 1995).

A final concern about nest relocation is that it may concentrate eggs in an area resulting in a greater susceptibility to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater depredation rates from both land and marine predators because the predators learn where to concentrate their efforts.

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.

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. Sand compaction on nourished beaches can be caused by 1) increased silt/clay content, 2) change in sand grain size, 3) increase in different-sized sand grains, 4) change in sand grain shape, 5) altered natural grain layering, 6) weight of hydraulically pumped material, and/or 7) the use of heavy machinery (Crain, et al., in review, 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 the beach after nourishment if the sand becomes compacted. 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 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 may only 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 root rake with tines at least 42 in (107 cm) long and less than 36 in (91 cm) apart pulled through the sand is recommended for compacted beaches. Service policy calls for beaches to be tilled if compaction levels exceed 500 psi (35 kg/cm²).

The 500 psi (35 kg/cm²) level is based on sand compaction surveys conducted on Atlantic beaches in Florida. Limited sand compaction surveys have been accomplished on Gulf beaches in Florida. The surveys occurred along beaches of southwest Florida (Coastal Engineering Consultants Inc. 1992, Hodgins et al., 1993, Truitt and Foote 1993, Foote and Sprinkel 1994). On ten natural Atlantic beaches, Nelson and Dickerson (1988b) found at sediment depths of 6 to 12 in (15.24 to 30.48 cm) a mean cone index value of 355 (range: 142 to 795). Foote and Sprinkel (1994) found at three natural beaches in southwest Florida at the same sediment depths, a mean cone index value of 670 (range: 542 to 757). Natural beaches in the Florida panhandle may have higher compaction values because they are 99 percent quartz sand. Other beaches along Atlantic coast or southwest Florida consist of quartz sand with varying percentages (10 to 40 percent) of calcium carbonate except in the Florida Keys, Cape Sable, and the Ten Thousand Islands where the sands are mostly calcium carbonate (Johnson and Barbour 1991). Additional compaction data is needed from Florida panhandle beaches to adequately characterize the sand in relation to sea turtle nesting.

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 should 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 time frame for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season. The color of the native sands on the beach in the project area can be generally characterized as 10YR 8/1 and 10YR 7/1 according to the Munsell color chart.

On nourished beaches, steep escarpments may develop along the water line interface as the beaches 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 adult female turtles access to nesting sites. 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.

Another impact to sea turtles is disorientation (loss of bearings) and misorientation (incorrect orientation) of hatchlings from artificial lighting. Visual cues are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). Artificial beachfront lighting is a well documented cause of hatchling disorientation and misorientation on nesting beaches (Philbosian 1976; Mann 1977; Florida Department of Environmental Protection, unpubl. data). In addition, research has also documented significant reduction in sea turtle nesting activity 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, disorient females trying to return to the surf after a nesting event, and disorient and misorient 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

Future erosion of nesting beaches is a potential indirect effect of nourishment projects on sea turtles. Dredging of sand offshore from a project area has the potential to cause erosion of the newly created beach or other areas on the same or adjacent beaches by creating a sand sink. The remainder of the system responds to this sand sink by providing sand from the beach to attempt to reestablish equilibrium (National Research Council 1990b).

Cumulative effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Residential and commercial beachfront development is expected to continue along Panama City Beach although it appears to be approximately 90 percent built-out. The developments may range from one-level single-family homes and businesses to high rise hotels or condominiums. The majority of development would probably be tourism related. Most of the development would be new construction; however, some may be reconstruction after Hurricane Opal. Associated with beachfront development is the construction of beach access points and walkovers, increased beachfront artificial lighting, and increased human presence. The largest influx of tourists to Panama City Beach occurs from Memorial Day through Labor Day which is also the sea turtle nesting season (May 1 through October 31). The Service is not aware of any additional cumulative effects in the project area.

Conclusion

After reviewing the current status of the loggerhead, green, and leatherback sea turtle species, 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 the loggerhead, green, and leatherback sea turtles and is not likely to destroy or adversely modify designated critical habitat.

No critical habitat has been designated for the loggerhead and green sea turtles; therefore, none will be affected. Marine and terrestrial critical habitat for the leatherback sea turtle has been designated for St. Croix, U.S. Virgin Islands; however, no destruction or adverse modification of that critical habitat is anticipated.

INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant

habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as 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 any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. 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 a prohibited taking 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 agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Jacksonville District Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Jacksonville District Corps (1) 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, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or extent of incidental take

The Service has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated for: 1) all sea turtle nests that may be laid and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; 2) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches; 3) disorientation of hatchling turtles on adjacent beaches to the construction area as they emerge from the nest and crawl to the water; and 4) for all sea turtle 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.

Effect of the take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and prudent measures

The following reasonable and prudent measures are necessary and appropriate to minimize take of sea turtles in the project area.

The Panama City Beach nourishment project will be allowed during the sea turtle nesting season (May 1 through October 31), provided the following reasonable and prudent measures are incorporated as conditions of the Corps permit.

1. Only beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence shall be used for the beach nourishment.

2. Surveys for nesting sea turtles shall be conducted. All sea turtle nests laid prior to July 15, 1998, and located between R-4.4 and R-25.75 shall be left *in situ*. All other turtle nests that are laid in the area of active beach nourishment or within 90 days of beach nourishment shall be relocated.
3. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, beach compaction shall be monitored and tilling shall 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 shall be conducted to determine if escarpments are present, and if present, shall be leveled as required to reduce the likelihood of impacting sea turtle nesting activities.
5. The applicant shall ensure that the sea turtle conservation measures are accomplished and completed as detailed in this incidental take statement.
6. The applicant shall ensure that the contractors conducting the beach nourishment work fully understand the sea turtle protection measures detailed in this incidental take statement.
7. During the sea turtle nesting season, construction equipment and pipes shall be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.
8. During the sea turtle nesting season, lighting associated with the project shall be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles.
9. All dune restoration and planting shall be designed and conducted to minimize impacts to sea turtles.

Terms and conditions

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

1. The western portion of the project area between R-4.4 and R-25.75 shall be constructed either outside the sea turtle nesting season or after emergence of hatchlings from any nest laid prior to July 15, 1998. This would protect the highest density of turtle nesting in the project area during the peak nesting period by allowing natural development of the sea turtle nests.

2. Borrow site no. 1 shall be fully utilized as feasible, without using hopper dredges, as the site contains the highest quality of beach nourishment material. All nourishment material shall be sand that is similar in both coloration and grain size distribution to that existing at the beach site. All such material shall be free of construction debris, rocks, or other foreign matter and shall not contain, on average, greater than 10 percent fines (i.e., silt and clay) (passing the #200 sieve) and shall not contain, on average, greater than 5 percent coarse gravel or cobbles, exclusive of shell material (retained by the #4 sieve).

3. From May 1 through October 31, staging areas for construction equipment shall be located off the beach to the maximum extent practicable. Night-time storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes shall be off the beach to the maximum extent possible. Temporary storage of pipes on the beach shall be in such a manner so as to impact the least amount of nesting habitat and shall likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

4. Daily early morning surveys shall be required if any portion of the beach nourishment project occurs during the period from May 1 through October 31. Nesting surveys shall be initiated 90 days prior to nourishment activities or by May 1, whichever is later. Nesting surveys shall continue through the end of the project or through September 15, whichever is earlier. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys. If nests (other than nests located between R4.4 and R25.75) are laid in areas where they may be affected by nourishment activities, eggs shall be relocated per the following requirements.

a. Nest surveys and egg relocations shall only be conducted by personnel with prior experience and training in nest survey and egg relocation procedures. Surveyors shall have a valid Florida Department of Environmental Protection permit. Nest surveys shall be conducted daily between sunrise and 9 a.m. Surveys shall be performed in such a manner so as to ensure that construction activity does not move on to a "new" location prior to completion of the necessary sea turtle protection measures.

b. Nests deposited within areas where nourishment activities have ceased or will not occur for 90 days shall be marked and left *in situ* unless other factors threaten the success of the nest. The turtle permit holder shall 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 shall be installed to establish an area of 10 feet radius surrounding the nest. No activity shall occur within this area nor shall any activity occur which could result in impacts to the nest. Nest sites shall be inspected daily to assure

nest markers remain in place and the nest has not been disturbed by the nourishment activity.

c. Only those nests that may be affected by construction activities within the 90-day window shall be relocated. Nests requiring relocation shall 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. All relocated nests shall be moved to the U.S. Department of Interior, Bureau of Land Management, Inlet Beach tract in Walton County, Florida. Any other relocation sites shall be approved by the Fish and Wildlife Service prior to usage. Nest relocations in association with construction activities shall cease when construction activities no longer threaten nests.

5. Immediately after completion of the beach nourishment project and prior to March 15, for 3 subsequent years, sand compaction shall be monitored in the area of beach nourishment in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant. At a minimum, the protocol provided under a. and b. below shall be followed. If required, the area shall be tilled to a depth of 36 in (91 cm). All tilling activity must be completed prior to April 15. A report on the results of compaction monitoring shall be submitted to the Service prior to any tilling actions being taken. An annual summary of compaction surveys and the actions taken shall be submitted to the Service. This condition shall be evaluated annually and may be modified if necessary to address sand compaction problems identified during the previous year.

a. Compaction sampling stations shall be located at 500-foot (152-m) intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area); one station shall be midway between the dune line and the high water line (normal wrack line); and one station shall be located just landward of the high water line.

At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 in (15.2, 30.5, and 45.7 cm) 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 shall 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 shall be averaged to produce final values for each depth at each station. Reports shall include all 27 values for each transect line, and the final 9 averaged compaction values.

b. If the average value for any depth exceeds 500 psi (35 kg/cm²) for any two or more adjacent stations, then that area shall be tilled prior to April 15. If values exceeding 500 psi (35 kg/cm²) 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 shall be required to determine if tilling is required. If a few values exceeding 500 psi (35 kg/cm²) are randomly present within the project area, tilling shall not be required.

6. Visual surveys for escarpments along the project area shall be started immediately upon completion of each section of beach if within the time period May 1 through October 31, and prior to April 1, for 3 subsequent years. Results of the surveys shall be submitted to the Fish and Wildlife Service prior to any action being taken. Escarpments that interfere with sea turtle nesting as determined by the nesting surveyors or that exceed 18 in (45.7 cm) in height for a distance of 100 ft (30.5 m) shall be leveled to the natural beach contour by April 15. 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 Fish and Wildlife Service shall be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting as determined by the nesting surveyors or that exceed 18 in (45.7 cm) in height for a distance of 100 ft (30.5 m) 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 Fish and Wildlife 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 shall be submitted to the Fish and Wildlife Service. To ensure compliance with this condition, turtle nesting surveys must be conducted for 3 years following beach nourishment .

7. The applicant shall arrange a meeting between representatives of the contractor, the Service, the Florida Department of Environmental Protection, Bureau of Protected Species Management, and the permitted person responsible for egg relocation at least 14 days prior to the commencement of work on this project. At least 10 days advance notice shall 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 May 1 through October 31, all on-beach lighting associated with the project shall be limited to the immediate area of active construction only. Shielded low pressure sodium vapor lights are recommended to minimize illumination of the nesting beach and nearshore waters. Lighting on offshore equipment shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded low pressure sodium vapor lights are highly recommended for lights on offshore equipment that cannot be eliminated.

9. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the Project Leader, U.S. Fish and Wildlife Service, 1612 June Avenue, Panama City, Florida, 32405, within 60 days of completion of the terms and conditions for each year. 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 and emerging success of nests.

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

11. Upon locating a dead, injured, or sick endangered or threatened sea turtle specimen, initial notification must be made to the U.S. Fish and Wildlife Service Law Enforcement Office located in Tallahassee, Florida at (850) 942-8331. Care should be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered or threatened species, or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

12. All subsequent beach nourishment maintenance activities shall be conducted outside the sea turtle nesting season (May 1 through October 31).

13. Planting of dune vegetation may be implemented during the turtle nesting season (May 1 through October 31) and shall incorporate the following conditions:

a. Daily early morning nesting surveys shall be required during the period from May 1 through October 31. Nest surveys shall only be conducted by personnel with prior experience and training in nest surveys. Surveyors shall have a valid Florida Department of Environmental Protection permit. Nest surveys shall be conducted daily between sunrise and 9 a.m. No dune planting activity shall occur until after the daily turtle survey and nest conservation and protection efforts have been completed.

b. Nesting surveys shall be initiated 90 days prior to dune planting activities or by May 1, whichever is later. Nesting surveys shall continue through the end of the project or through September 15, whichever is earlier. Hatching and emerging success monitoring will involve checking nests beyond the completion date of the daily early morning nesting surveys.

c. Any nests deposited in the dune planting area not requiring relocation for conservation purposes shall be left *in situ*. The turtle permit holder shall 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 shall be installed to establish an area of 3 ft (0.91 m) radius surrounding the nest. No planting or other activity shall occur within this area nor shall any activity occur which could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the planting activity.

d. If a nest is disturbed or uncovered during planting activity, the permittee shall cease all work and immediately contact the responsible turtle permit holder. If a nest(s) cannot be safely avoided during planting, all activity within the affected project site shall be delayed until hatching and emergence of the nest is completed.

e. All dune planting activities shall be conducted during daylight hours only.

f. All dune vegetation shall consist of plant species native to the area and be planted in accordance with Florida Department of Environmental Protection guidelines.

g. No use of heavy equipment (trucks) shall occur on the dunes or seaward. A lightweight (ATV type) vehicle, with tire pressures of 10 psi (0.70 kg/cm²) or less may be operated on the beach.

h. All irrigation, if proposed, shall be installed by hand labor or tools and entrenched 1 to 3 in (2.54 to 7.62 cm) below grade so as not to pose a barrier to hatchling turtles and to allow for easy removal. The irrigation system shall be designed and maintained so that watering of the adjacent sandy beach does not occur. If a turtle nest is deposited within the newly established planted dune area, the applicant shall modify the irrigation system so that no watering occurs within 10 ft (3.1 m) of the nest. Daily inspection of the irrigation system shall be conducted to assure the irrigation system is properly working and meets the above conditions. The irrigation system shall be completely removed once watering is no longer needed or before May of the next year.

14. Any sand fencing or other dune restoration material placed in the project area shall be installed as follows:

a. A maximum of 10 foot- (3.1 m) long spurs of parallel fence spaced at a minimum of 7 ft (2.1 m) apart shall be installed on a northeast-southwest (diagonal) alignment.

b. All fence material shall be repositioned as necessary to facilitate dune building and shall be removed when the dune has been built up sufficiently.

c. Upon site inspection by the Florida Department of Environmental Protection, if it is determined that the fence adversely impacts nesting or hatchling turtles, the fence shall be removed or repositioned as appropriate.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, the Service believes that incidental take of sea turtles as a result of the proposed project will only include the following: 1) sea turtle nests that may be laid and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; 2) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent project and non-project beaches; 3) disorientation of hatchling turtles on adjacent project and non-project beaches as they emerge from the nest and crawl to the water; and 4) for all sea turtle 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. If during the course of the action, this minimized level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The Federal agency 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 Endangered Species Act (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 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. We encourage the applicant to meet with the Service to discuss conservation of sea turtles and ways that they could help contribute to their recovery.

1. Other future projects, including new beach renourishment, should be planned to take place outside the main part of the sea turtle nesting and hatching season as practicable.
2. Pre-project sand compaction sampling of the existing beach should be conducted according to the protocol as described under No. 5 in the above Terms and Conditions.
3. The beach nourishment material should have a Munsell color value of 7 to 8 once the natural bleaching and weathering process is complete.
4. A sea turtle-friendly lighting ordinance should be adopted and implemented. In the interim, City of Panama Beach and Bay County should: a) replace or retrofit existing controlled lighting to sea turtle friendly lighting, b) assist the FDEP in identifying and encouraging private beachfront property owners to correct lighting or use sea turtle-friendly lighting, and c) work with Gulf Power to retrofit street lights along Front Beach Road.
5. Measures to attenuate and adequately treat all stormwater that empties into the Gulf of Mexico should be incorporated into the project design. Any pipes conveying treated stormwater to the Gulf should be buried a minimum of 4 ft (1.2 m) to prevent interfering with a female sea turtle approaching, constructing, and depositing eggs on the beach or interfering with hatchling sea turtles from emerging from the nest and crawling to the Gulf of Mexico.
6. Dune restoration and protection should be continued as needed.
7. Dune walkovers and parking areas should be constructed where appropriate to protect dune habitats at beach access points.
8. To increase public awareness about sea turtles, informational signs should be placed at beach access points where appropriate. The signs should describe 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

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.

Sincerely,

Hildreth Cooper
Acting Project Leader

cc:

FDEP, Bureau of Protected Species Mgmt., Tallahassee, FL (Trindell)
FWS, Jacksonville, FL (MacPherson)
COE, Jacksonville, FL (Burns)
RMA, Panama City, FL (Watson)
BLM, Jackson, MS (Winters)
FDEP, Recreation and Parks, Dist. 1, Panama City Beach, FL (Bente)

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