UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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St. Petersburg, Florida 33701-5505
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MAY 16 2016 F/SER31: KL

Dr. Jennifer Culbertson
Division of Environmental Assessment
Bureau of Ocean Energy Management Headquarters
Department of the Interior
45600 Woodland Road
Sterling, Virginia 20166

Dear Dr. Culbertson:

Enclosed is the National Marine Fisheries Service's (NMFS) Biological Opinion ("Opinion") on the proposed leasing of offshore borrow areas by the Bureau of Ocean Energy Management (BOEM) to the towns of Duck, Kitty Hawk and Kill Devil Hills ("Towns") for use in 3 proposed beach renourishment projects.

Action Agency	NMFS Identifier Number	City and County
BOEM	SER-2015-15988	Duck, Kitty Hawk, and Kill Devil Hills, Dare County, North Carolina

This Opinion analyzes project effects on sea turtles (loggerhead, leatherback, Kemp's ridley, and green), whales (humpback and North Atlantic right whales), Atlantic sturgeon, and shortnose sturgeon, and designated critical habitat for loggerhead sea turtles, in accordance with Section 7 of the Endangered Species Act. This analysis is based on project-specific information provided by BOEM and NMFS's review of published literature. We conclude that these projects are likely to adversely affect, but are not likely to jeopardize the continued existence of loggerhead and Kemp's ridley sea turtles.

We look forward to further cooperation with you on other BOEM projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Kelly Logan, Consultation Biologist, at (727) 460-9258, or by email at Kel.Logan@noaa.gov.

Sincerely,

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enc.: Biological Opinion
File: 1514-22.F.4

Endangered Species Act - Section 7 Consultation
Biological Opinion

Agency:	Bureau of Ocean Energy Management (BOEM)
Applicant:	The towns of Duck, Kitty Hawk, and Kill Devil Hills ("Towns")
Activity:	Lease of Offshore Borrow Areas A and C to the Towns for Beach Restoration Projects
Consulting Agency:	National Marine Fisheries Service (NMFS) Southeast Regional Office Protected Resources Division NMFS Consultation No. SER-2015-15988
Date Issued:	5/16/2016
Approved By:	For Roy E. Crabtree, Ph.D. Regional Administrator

List of Figures

Glossary of Commonly Used Acronyms

BMP	Best Management Practice
BOEM	Bureau of Ocean Energy Management
CCL	Curved Carapace Length
CFMC	Caribbean Fisheries Management Council
DNER	Department of Environmental and Natural Resources
DPS	Distinct Population Segment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FMP	Fisheries Management Plan
FWCC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Wildlife Research Institute
ITS	Incidental Take Statement
HMS	Highly Migratory Species
NAD83	North American Datum 1983
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NOS	National Ocean Service
RPMs	Reasonable and Prudent Measures
SEFSC	Southeast Fisheries Science Center
SST	Sea Surface Temperature
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service

Units of Measurement

Temperature

°C	degrees Celsius

Length and Area

ac	acre(s)
in	inch(es)
ft	foot/feet
lin ft	linear foot/feet
km	kilometer(s)
yd	yard(s)
ft^2	square foot/feet
yd^3	cubic yards

Weight

lb	pounds

Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. When the action of a federal agency may affect a protected species or its critical habitat, that agency is required to consult with either National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the protected species that may be affected.

Consultations on most listed marine species and their designated critical habitat are conducted between the action agency and NMFS. Consultations are concluded after NMFS determines the action is not likely to adversely affect listed species or critical habitat or issues a Biological Opinion ("Opinion") that determines whether a proposed action is likely to jeopardize the continued existence of a federally listed species, or destroy or adversely modify federally designated critical habitat. The Opinion also states the amount or extent of listed species incidental take that may occur and develops nondiscretionary measures that the action agency must take to reduce the effects of said anticipated/authorized take. The Opinion may also recommend discretionary conservation measures. No incidental destruction or adverse modification of critical habitat may be authorized. The issuance of an Opinion detailing NMFS's findings concludes ESA Section 7 consultation.

This document represents NMFS's Biological Opinion ("Opinion") based on our review of the effects of beach renourishment off the Towns located in Dare County, North Carolina, on green sea turtles *(Chelonia mydas*), leatherback sea turtles (*Dermochelys coriacea*), loggerhead sea turtles (*Caretta caretta*), Kemp's ridley sea turtles *(Lepidochelys kempii*), North Atlantic right whales (*Balaenoptera glacialis*), humpback whales (*Megaptera novaeangliae*), Atlantic sturgeon (*Acipenser oxyrinchus)*, shortnose sturgeon (*Acipenser brevirostrum)*, and designated critical habitat for loggerhead sea turtles, in accordance with Section 7 of the ESA. NMFS has analyzed the information provided in the biological assessment and the effects on listed species under our purview in accordance with Section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.). NMFS bases this Opinion on project information provided by BOEM as well as published literature and the best available scientific and commercial information. It is NMFS's Biological Opinion that the action, as proposed, is not likely to jeopardize the continued existence of sea turtles, whales, or sturgeon, and is not likely to destroy or adversely modify the designated critical habitat of any of these species.

1 Consultation History

On December 18, 2014, we received a request for consultation pursuant to Section 7 of the ESA from BOEM regarding 3 beach restoration projects in Dare County, North Carolina to be implemented by the towns of Duck, Kitty Hawk, and Kill Devil Hills. BOEM proposes to issue the Towns authorization to mine and use sand from borrow areas A and C on the outer continental shelf (federal waters) for their restoration projects. BOEM determined that the beach renourishment projects may affect, but are not likely to adversely affect, North Atlantic right whales, sperm whales, shortnose sturgeon, and leatherback sea turtles, and will not adversely modify the designated critical habitat for any of these species. BOEM also determined that the proposed projects may adversely affect Atlantic sturgeon and 4 species of sea turtles (leatherback, green, loggerhead, and Kemp's ridley).

Consultation was initiated on December 18, 2014, however due to workload and internal reassignment of this project, we were unable to draft or complete the consultation at that time. This Opinion evaluates the direct and indirect effects of BOEM's Outer Continental Shelf Lands Act authorization to the Towns to mine and use sand resources from federal waters. It will also examine the effects of interdependent and interrelated activities of the same broader project, that will be permitted by the U.S. Army Corps of Engineers (USACE) to be conducted in state waters (i.e., placement of the sand mined from federal waters).

2 Description of the Proposed Action

Proposed Actions Occurring in Federal Waters

BOEM is proposing to issue a lease to the Towns for the use (mining) of sand resources from borrow areas A and C located on the Outer Continental Shelf (OCS) in federal waters off the coast of Dare County, North Carolina for beach renourishment purposes. The Towns will apply for a permit by the USACE for the fill aspects of the project that will occur in state waters, i.e., placing mined sand in state nearshore waters.

Construction methodology includes using cutter suction and/or hopper dredge(s) to obtain a total of approximately 4.825 million cubic yards (yd^3) of beach compatible sand from the 2 offshore borrow areas for placement along 8 miles of nearshore habitat. The dredged material will be pumped by the dredge via pipeline to the beach. Once the ship's hull (or hopper) is full, the dredge will transit toward a pump-out station located offshore of the project area. At this location, the dredge will moor to a buoy and pump the material out from the hull to a submerged pipeline that runs onto the beach. These pump-out locations will be located in approximately 25 to 30 ft. of water. Pump-out locations may vary, but will generally be spaced approximately 6,000 ft. apart along the project placement area.

The lessee has agreed to comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Appendix A), including the use and monitoring of siltation barriers. Construction of the Duck project will likely require approximately 3 months, the Kitty Hawk project will require approximately 3.5 months, and the Kill Devil Hills project will require approximately 2.5 months. Construction of the 3 projects could be independent or concurrent. The maximum time anticipated for completion of the 3 projects is 9 months; however, the contractor could utilize multiple pieces of equipment and construct the projects concurrently which would shorten the minimum construction time to 3.5 months. Although the contract will allow for a year-round construction schedule, dredging is anticipated to occur during the summer months due to unsafe offshore weather conditions during the winter.

The effects of activities occurring in state waters and planned in conjunction with these projects, including sand placement activities conducted within state waters, have been previously analyzed in consultations with the USACE (i.e., NMFS's September 25,1997, South Atlantic Regional Biological Opinion ["SARBO"] issued to the USACE's South Atlantic Division on their routinely recurring hopper dredging activities along the southeastern coast of the United States from North Carolina through Key West, Florida; and NMFS's September 4, 2008, Brevard Mid-Reach beach nourishment Opinion for USACE permit SAJ-2005-8688 [Consultation Number F/SERI2005/06003]).

The proposed sand placement in state waters is considered by NMFS to be interrelated and interdependent to the BOEM proposed action, and thus the effects of the placement must be considered in the present Opinion (see 50 CFR § 402.02, definition of "effects of the action"). Therefore, the present Opinion to BOEM considers *all* potential effects of the projects, including beach placement of sand in state waters. It then estimates and authorizes interactions that will occur solely in federal waters. The USACE will issue permits to the Towns to authorize renourishment activities within *state* waters when conducted in compliance with the reasonable and prudent measures (and implementing terms and conditions) of the SARBO. The USACE permit numbers are as follows: Duck (SAW-2014-02202), Kill Devil Hills (SAW-2014-02203), and Kitty Hawk (SAW-2014-02204).

Due to the possibility of encountering munitions and explosives of concern (MEC, or unexploded ordinance (UXO) within the offshore borrow areas, BOEM may require the contractor to use UXO screening. The purpose of the screening is to prevent ordnance from being placed on the beach. This is accomplished through the use of (1) a screening device placed on the dredge intake or in a pipeline section prior to reaching the dredge pump, and (2) a screen at the discharge end of the pipeline on the beach. The screening device on the dredge intake prevents the passage of any material greater than 1.25-in-diameter. The openings on the screening device may have one dimension greater than the other. The maximum allowable opening size is 1.25 in by 6 in. The screening device on the discharge end (on the beach) is designed to retain all items 0.75-in-diameter and larger. The openings on the screening device are of uniform dimension; slotted openings are not permitted. Visual inspection of the screens and sand placement are performed at all times. Intake or pipeline screening is inspected at a minimum of once every 8 hours.

The Effects of the Action Section and Jeopardy Analysis Section of the present Opinion account for and analyze interactions that may result from the entire scope of the proposed action in both state and federal waters, according to the reasonable and prudent measures (and implementing terms and conditions) of this Opinion (Section 8.0), and authorize the interactions with listed species that may occur from activities in federal waters. As noted above, all protected species interactions resulting from any aspect of the proposed action that occur in state waters are under the sole jurisdiction and permitting authority of the USACE, and are already discussed, analyzed, and accounted for in previous biological opinions issued to the USACE.

Harm Avoidance and Minimization Measures that will be Required by BOEM for Activities in Federal Waters: Relocation Trawling, Protected Species Observers Aboard Dredges, and Right Whale Monitoring

During all dredging activities, BOEM will require the contractor to comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*. As part of these conditions, if a sea turtle is observed within 100 yards (yd) of construction operations, all appropriate precautions shall be implemented to ensure protection of the species, including cessation of operation if an animal moves within 50 feet (ft) of any moving equipment. Additionally, the conditions require avoiding collisions with swimming sea turtles, monitoring of siltation barriers for entanglement, operation at "no wake/idle" speeds in the construction area, and reporting any collision with and/or injury to a sea turtle to NMFS's Protected Resources Division and the local sea turtle stranding/rescue organization.

BOEM will require the contractor to adhere to the following measures to protect North Atlantic Right whales. Between November 1 and April 30 all dredge and attendant vessels greater than 65ft will slow to 10 knots (or minimum safe speed) when a right whale is spotted within 15 nautical miles of the activity or transportation route within 24 hours, and one of the following conditions is present:

a. Poor visibility (e.g. fog, precipitation), or

b. Sea state > 3, or

c. Night

By law, vessels shall maintain a 500-yd buffer between the vessel and any North Atlantic right whale (as required by Federal Regulation 50 CFR 224.103 (c)).

BOEM has proposed to implement the following actions designed to avoid or minimize harm to listed species from hopper dredging in federal waters.

The occurrence and distribution of sea turtles along the Atlantic coast is tied to sea surface temperature (SST) ((Braun-McNeill and Griffith 2008; Coles and Musick 2000)). Throughout the region, water temperatures increase rapidly in March and April and decrease rapidly in October and November; these temperature changes are quicker in nearshore waters. An analysis of historical tracking and sightings data conducted by the Turtle Expert Working Group (TEWG) indicates that the shelf waters (out to the 200-meter [m] isobaths) off North Carolina are seasonally "high-use areas" for certain life stages of loggerhead sea turtles (TEWG 2009a). Braun-McNeill et al. (2008) show that loggerhead turtle presence off Cape Hatteras (based on sightings, strandings, and incidental capture records) occurred when 25% or more of the area exceeded SST of 11°C.

If hopper dredging is used once SST are above 10°C (50°F) in the area, then sea turtle abundance trawling will be used. Abundance trawling will be employed 5 days prior to the commencement of hopper dredging to determine relative abundance of sea turtles in the area. If a minimum of 1 turtle is captured during preliminary abundance trawling, then relocation trawling will be employed during the remainder of the dredging operation. If no turtles are captured during abundance trawling, relocation trawling shall not be required and dredging may proceed. The taking of 1 sea turtle of any species during hopper dredging will trigger the need for relocation trawling to be enacted for the remainder of the dredge operation. The dredge will shut down until relocation trawling can commence. If during subsequent months of relocation trawling no turtles are relocated, the County may ask BOEM to confer with NMFS for a cessation of relocation trawling.

Essentially, this method employs a capture-relocation technique, and is targeted at the active dredging site within the borrow area. If relocation trawling is used, it will begin no later than 24 hours in advance of any hopper dredging at the borrow site(s). Once dredging begins, relocation trawling will continue simultaneous with dredging operations. Relocation trawling will occur ahead of the dredge(s) throughout the duration of dredging. Any turtles captured during relocation trawling will be photographed, measured, biopsied for genetics, tagged, and relocated at least 3 nautical miles (nmi) away. During relocation trawling, 1 trawling vessel per dredge will operate 24 hours/day, 7 days/week. Tow times (i.e., the duration that the trawl net will be in the water and capable of trapping sea turtles) during relocation trawling will be strictly limited to less than 42 minutes total time.

Protected species observers will live aboard the dredges, monitoring dredge loads 24 hours a day for evidence of impacts to endangered and threatened species, as well as recording water temperatures, bycatch information, and any sightings of species in the area (see RPM Nos. 1-4). Screening will be placed on all points of dredged material inflow into the hopper prior to work beginning, and protected species observers will monitor the screens for evidence of protected species interactions.

Hopper dredges will be required to have rigid turtle deflectors installed on all dragheads (see RPM No. 4). The rigid deflector was developed under controlled conditions by the USACE's Waterways Experimental Station (WES), now known as the Engineering Research and Development Center (ERDC). V-shaped, sea turtle deflector dragheads prevent an unquantifiable yet significant number of sea turtles from being entrained and killed in hopper dredges each year. Without them, turtle takes during hopper dredging operations would unquestionably be higher. Draghead tests conducted in May-June 1993 by the USACE's WES in clear water conditions on the sea floor off Fort Pierce, Florida, with 300 mock turtles placed in rows, showed convincingly that the newly developed WES deflector draghead performed exceedingly well at deflecting the mock turtles. Thirty-seven of 39 mock turtles encountered were deflected, 2 turtles were not deflected, and none were damaged. The V-shape reduced forces encountered by the draghead, and resulted in smoother operation (USACE 1993). V-shaped deflecting dragheads are now a widely accepted conservation tool, the dredging industry is familiar with them and their operation, and they are used by all USACE Districts that conduct hopper dredge operations where turtles may be present. To prevent impingement of sea turtles within the water column, every effort will be made to keep the dredge pumps disengaged when the hopper dredge dragheads are not firmly on the bottom. Also, the rotating cutterhead will not be lifted from the sediment surface during operations.

3 Action Area

The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). There are 2 borrow areas (A and C) being evaluated for use as sand sources in the proposed projects. Borrow Area A is located at 30.03977°N, 75.553752°W, North American Datum 1983 (NAD 1983), between 5.0 and 6.5 miles offshore within federal waters. Borrow Area C is located at 36.192763°N, 75.677568°W, NAD 1983, 4.1 to 5.2 miles offshore and also entirely within federal waters. The borrow areas are approximately 55-75 miles from the mouth of the Chesapeake Bay, 8-28 miles from Oregon Inlet, and are located in depths ranging from 40-70 ft of water (Figure 1). The action area for this activity includes 8 miles of shoreline adjacent to the 3 project towns in Dare County, North Carolina (Duck-36.198721°N, 75.757403°W, NAD 1983; Kitty Hawk-36.079728°N, 75.697664°W, NAD 1983; and Kill Devil Hills-36.039905°N, 75.672089°W, NAD 1983) as well as the waters between the shoreline and the 2 offshore federal borrow areas (Figure 1).

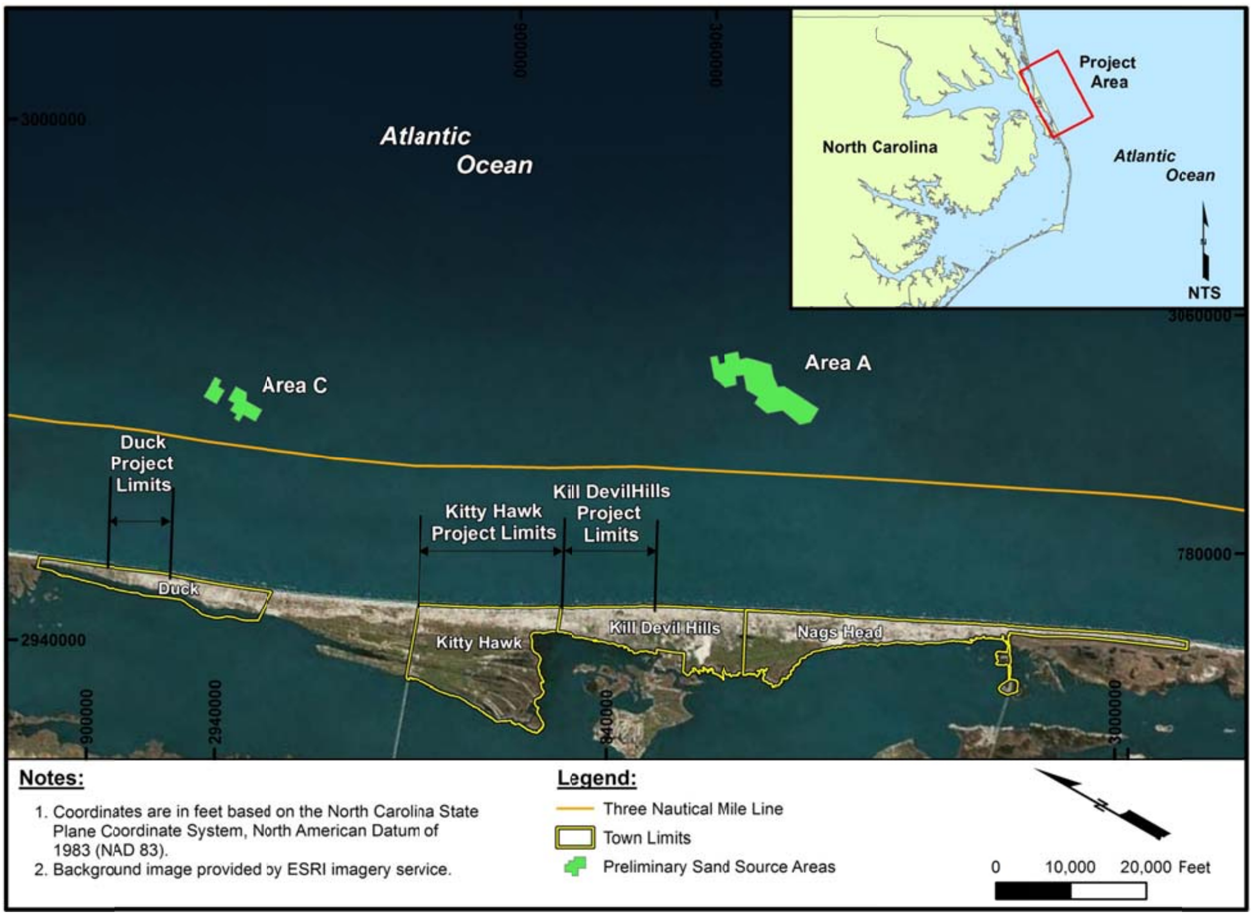

Figure 1. Project and borrow area locations (Figure From "Batched Biological Assessment for the Duck, Kitty Hawk and Kill Devil Hills Shoreline Protection Projects Dare County, North Carolina," Coastal Planning and Engineering. Image is Figure 1 "Map showing general site location (inset), and project locations, including project and town limits for each town, and locations of borrow areas")

4 Status of Listed Species and Critical Habitat

The following endangered (E), threatened (T), and proposed species (P), and designated critical habitat under the jurisdiction of NMFS may occur in or near the action area**.**

Common Name	Scientific Name	Status
Sea Turtles		
Green sea turtle	*Chelonia mydas*[1]	E/T
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Leatherback sea turtle	*Dermochelys coriacea*	E
Loggerhead sea turtle	*Caretta caretta*[2]	T
Fish		
Shortnose Sturgeon	*Acipenser brevirostrum*	E
Atlantic Sturgeon	*Acipenser oxyrinchus*	E[3]
Marine Mammals		
North Atlantic right whale	*Eubalaena glacialis*	E
Humpback whale	*Megaptera novaeangliae*	E
Critical Habitat		
Loggerhead Unit LOGG-N-1		

4.1 Species and Critical Habitat Not Likely to be Adversely Affected

NMFS has analyzed the routes of potential project effects in the marine environment on 4 species of sea turtles (loggerhead, Kemp's ridley, leatherback, and green), Atlantic and shortnose sturgeon, and 2 whale species (North Atlantic right and humpback), as well as designated critical habitat for loggerhead sea turtles. We have determined the potential routes of adverse effects are: (1) injury or death to sea turtles and whales from potential interactions with and operation of hopper dredges, and injuries incurred by sea turtles during relocation trawling capture and handling; and (2) avoidance of the area during construction operations due to disturbance caused by dredging, lighting, and disposal of sediment at the staging area or on the shoreline.

<u>Whales</u>

We believe that the proposed action is not likely to adversely affect humpback or North Atlantic right whales. NMFS has analyzed the routes of potential effects on whales from the proposed action and, based on our analysis, determined that potential effects are limited to the following: injury from potential interactions with construction equipment (e.g., a dredge vessel striking a whale) and temporary avoidance of the area during offshore dredging operations. The dredge crew and contractors will be required to abide by NMFS's *Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners* and all dredges will be required to have

[1] The green sea turtle was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered. On April 6, 2016, NMFS and FWS published a final rule (81 FR 20058), which becomes effective May 6, 2016. , The rule lists 11 distinct population segments (DPSs) of green sea turtle. This includes the North Atlantic DPS which is the only DPS that occurs within the action area.. The North Atlantic DPS is listed as threatened.
[2] Northwest Atlantic Ocean DPS
[3] Carolina DPS

NMFS-approved endangered species observers aboard. Given the vessels' slow speed (10-12 kt maximum) and additional conservation measures (previously discussed in Section 2), NMFS believes that the likelihood of a dredge vessel striking a whale is discountable. The dredge will make a maximum of 4 round trips per day to the borrow area(s) over a 3.5- to 9-month period. This is a reasonable, worst-case assumption; weather events, equipment maintenance, and other operational procedures will likely mean fewer than 4 trips per day. Whales may avoid the area surrounding the borrow areas due to noise and the presence of construction equipment. However, increases in vessel traffic in the area due to construction activities will be minimal and temporary; further, there will be hours and sometimes days in between dredge trips to and from the area. While the project activities could occur year-round, the weather conditions during winter when the whales will be present is unfavorable for dredging. Although humpback whales and right whales may be present in coastal waters off North Carolina, they are most often found during the fall and winter and sometimes early spring. During the summer time, the whales are generally found on, or migrating to, their northern feeding grounds. Further, only 1 right whale has been spotted in or around the project area over the past 5 years. Therefore, North Atlantic right whales and humpback whales are not anticipated in the vicinity of the project area during most of the project's construction schedule, making interactions extremely unlikely to occur and, therefore, discountable. As noted above, we do not expect whales to be in the area during dredging, but to the extent they are present we expect them to avoid the dredging activities, by leaving the action area. The action is occurring in the open ocean environment, similar habitat, which would support the same activities by whales, surrounds the project area. Thus, any animals disrupted by the dredging activities would be expected to continue to conduct the same activities in the surrounding areas that are not being disrupted by dredging. NMFS believes that avoidance effects will be temporary and insignificant. Based on the above information, we believe that all the effects to humpback and North Atlantic Right whales will be discountable or insignificant.

Leatherback sea turtles

NMFS believes the potential use of a hopper dredge may affect, but is not likely to adversely affect, leatherback sea turtles, either by the dredge itself or by the potential relocation trawling associated with the dredging. There has never been a reported take of a leatherback by a hopper dredge. The typical leatherback would be as large as or larger than the large, industry-standard California-type hopper dredge trailing-suction draghead, making leatherbacks unlikely to be entrained. Additionally, the California-type draghead design and level position during dredging (as opposed to more upright positioning of other dredge types), makes it less likely to entrain larger sea turtles (Studt 1987). NMFS determined in the 1997 SARBO that leatherback sea turtles are unlikely to be adversely affected by hopper dredging, and we have not received any new information that would change the basis of this determination.

The action area does not contain seagrass or hard bottom areas that would serve as sea turtle foraging habitat. Therefore, it is most likely any sea turtles present will be swimming in the water column or on the surface to breathe rather than on the bottom foraging. This will further reduce the potential for entrainment. If hopper dredges are used at SST above 10°C, BOEM will also require sea turtle abundance trawling several days before dredging begins. If any sea turtles are encountered during abundance trawling, then BOEM will implement relocation trawling.

According to data provided by BOEM (Table 3), no leatherback sea turtles have been encountered during trawling associated with any dredging projects in or around the action area over the past 16 years.

Based on the above information, we believe that effects to leatherback sea turtles from hopper dredge entrainment and/or relocation trawling are extremely unlikely to occur and are, therefore, discountable.

Leatherback sea turtles may be temporarily unable to use the project site described above for forage and shelter habitat due to avoidance of construction activities, related noise, and physical exclusion from areas blocked by turbidity curtains. The proposed beach placement area does not contain resources (coral or seagrasses) typically used by this species as foraging habitat. The action is occurring in the open ocean environment, and is surrounded by similar habitat, which would support the same activities by sea turtles. Thus, any animals disrupted by the dredging activities would be expected to continue to conduct the same activities in the surrounding areas, which are not being disrupted by dredging. NMFS believes that those avoidance effects will be temporary and insignificant. Therefore, we expect that any effects to foraging habitat from beach placement will be insignificant.

Green sea turtles

While green sea turtles have been sighted, primarily from spring through fall, along the entire North Carolina coastline, nesting activities have only been observed in Onslow, Brunswick, Hyde, Dare, and Currituck Counties. Nesting survey data provided by the NCWRC indicates 48 green sea turtle nests have been recorded within North Carolina from 2009 to 2013. The earliest nest was laid on June 7, 2011, along the Cape Hatteras National Seashore, and the latest nest was laid October 3, 2013, on Topsail Island. Of the 48 nests documented, only a single nest was laid north of Oregon Inlet; this nest was deposited in Duck on July 17, 2013 (**Error! Reference source not found.**). Based on data provided by BOEM (Table 3), there has never been a take of a green sea turtle in or around the action area during hopper dredging, nor have any been encountered during relocation trawling activities. Given the low abundance of green sea turtles in the area, we believe that effects from hopper dredging and/or relocation trawling and effects to foraging habitat from beach placement are extremely unlikely to occur, and are, therefore, discountable.

Shortnose Sturgeon

We believe that the proposed action is not likely to adversely affect shortnose sturgeon. Shortnose sturgeon primarily utilize riverine and estuarine habitats, neither of which is located in the proposed project area. Spawning occurs in upper, freshwater areas, typically in January and February while feeding and overwintering activities may occur in both fresh and saline habitats. Aside from seasonal migrations to estuarine waters, this species rarely occurs in the marine environment (NMFS 1998b; Keiffer and Kynard 1993). Shortnose sturgeons appear to feed either in freshwater riverine habitats or near the freshwater/saltwater interface (NMFS 1998b). Although shortnose sturgeons are capable of entering open ocean water, it has been suggested that the species appears hesitant to enter open ocean water (Gilbert 1989). This factor may limit extensive coastal migrations of this species. Dredging will not occur within the typical spawning or foraging grounds for the shortnose sturgeon. We believe that shortnose sturgeon are likely to avoid the area during construction operations. Based on the preceding, we believe that shortnose sturgeon being adversely affected by the proposed action is extremely unlikely to occur; therefore, the risk is discountable.

Atlantic sturgeon

While Atlantic sturgeon may be found in or around the project area, NMFS does not believe they are likely to be adversely affected by the proposed project. According to data provided by BOEM, there have been no Atlantic sturgeon taken in the past 16 years of hopper dredging events near the project area. Additionally, Laney et al. (2007) indicates that sturgeon distribution was found to be concentrated within a narrow depth range offshore North Carolina, suggesting the fish are aggregating with bottom features that support prey. The borrow areas are located in unconfined open ocean environment outside of any known congregating or spawning areas. We believe that Atlantic sturgeon are likely to avoid the area during construction operations. Based on the preceding, we believe that Atlantic sturgeon being adversely affected by the proposed action is extremely unlikely to occur; therefore, the risk is discountable.

Designated Critical Habitat for Loggerhead Sea Turtles

On July 10, 2014, NMFS designated marine critical habitat for the loggerhead sea turtle Northwest Atlantic (NWA) DPS within the Atlantic Ocean and the Gulf of Mexico. Open water critical habitat is designated for nearshore reproductive habitat, breeding habitat, migratory habitat, and winter habitat and is located along the U.S. Atlantic coast from North Carolina south to Florida and into the Gulf of Mexico. Critical habitat is designated offshore of the U.S. Atlantic coast coincident with the Gulf Stream to the edge of the U.S. Exclusive Economic Zone (EEZ) stretching from approximately 38°N latitude, 71°W longitude south to the Gulf of Mexico-Atlantic border. This includes the majority of the mid- and south Atlantic and Straits of Florida Planning Areas. Detailed descriptions and maps may be found in the NMFS Final Rule for critical habitat designation (79 FR 39856). Unit LOGG-N-01 is the northernmost unit within North Carolina and the closest to Dare County. This unit is defined in the Federal Register as 79 FR 39856:

> *LOGG-N-1—North Carolina Constricted Migratory Corridor and Northern Portion of the North Carolina Winter Concentration Area:* This unit contains constricted migratory and winter habitat. The unit includes the North Carolina constricted migratory corridor and the overlapping northern half of the North Carolina winter concentration area. NMFS defined the constricted migratory corridor off North Carolina as the waters between 36°N lat. and Cape Lookout (approximately 34.58°N) and from the shoreline (MHW) of the Outer Banks, North Carolina, barrier islands to the 200-m depth contour (continental shelf).
>
> The constricted migratory corridor overlaps with the northern portion of winter concentration area off North Carolina. The western and eastern boundaries of winter habitat are the 20-m and 100-m contours, respectively. The northern boundary of winter habitat starts at Cape Hatteras (35°16′N) in a straight latitudinal line between the 20-m and 100-m depth contours and ends at Cape Lookout (approximately 34.58°N) (**Error! Reference source not found.**).

According to the above description, there is no designated critical habitat that falls within the municipal boundaries of Duck or Kitty Hawk. However, the southernmost limit of the town of Kill Devil Hills is at 35.9949°N, therefore unit LOGG-N-1 barely extends into the waters off the southernmost portion of Kill Devil Hills. One of the proposed borrow areas - Borrow Area A - is located within Unit LOGG-N-1, which includes constricted migratory habitat.

Although the majority of loggerheads pass through this corridor from April to June and September to November, loggerheads are present in the area from April through November. Time periods in which loggerheads are present in these areas vary with water temperatures and individual migration patterns.

In the Final Rule designating critical habitat for the loggerhead sea turtle, NMFS highlights special management considerations for the physical or biological features of constricted migratory habitat., and states that the "…primary impact to the functionality of the migratory routes…would be a loss of passage conditions that allow for free and efficient migration along the corridor (79 FR 39856)." Of major concern are large-scale or multiple construction activities that alter the habitat to such a degree that large scale deviations of migration patterns result. NMFS also highlights activities that may, but will not likely, impact important characteristics of the habitat, including the "Dredging and disposal of sediments that results in altered habitat conditions needed for efficient passage" (79 FR 39856).

The proposed activities may result in elevated turbidity levels in the immediate vicinity of the dredge, and this impact will be greater for hopper dredges than cutterhead dredges. However, the turbidity plumes will be temporary and localized to the dredging site and should not result in significant deviation from migration patterns. Submerged pipelines have a very small footprint, are secured near the bottom, and will be removed upon project completion. Therefore, we believe submerged pipelines will not pose any hindrance to sea turtle migration. Similarly, vessels moving between the borrow sites and the pipeline are not expected to have any effect on migration patterns. The vessels will only make 4 round trips per day at slow speeds, thereby creating minimal disruptions easily avoided by mobile sea turtles migrating through the area. Additionally, the proposed borrow areas encompass a very small area (2.5 square miles or 1600 acres) relative to the much larger area encompassed by the entire LOGG-N-01 unit. Thus, any turtles in the area will have ample unaffected surrounding habitat through which to migrate. Therefore, we believe that impacts to Unit LOGG-N-01 of designated critical habitat for sea turtles will be temporary and insignificant.

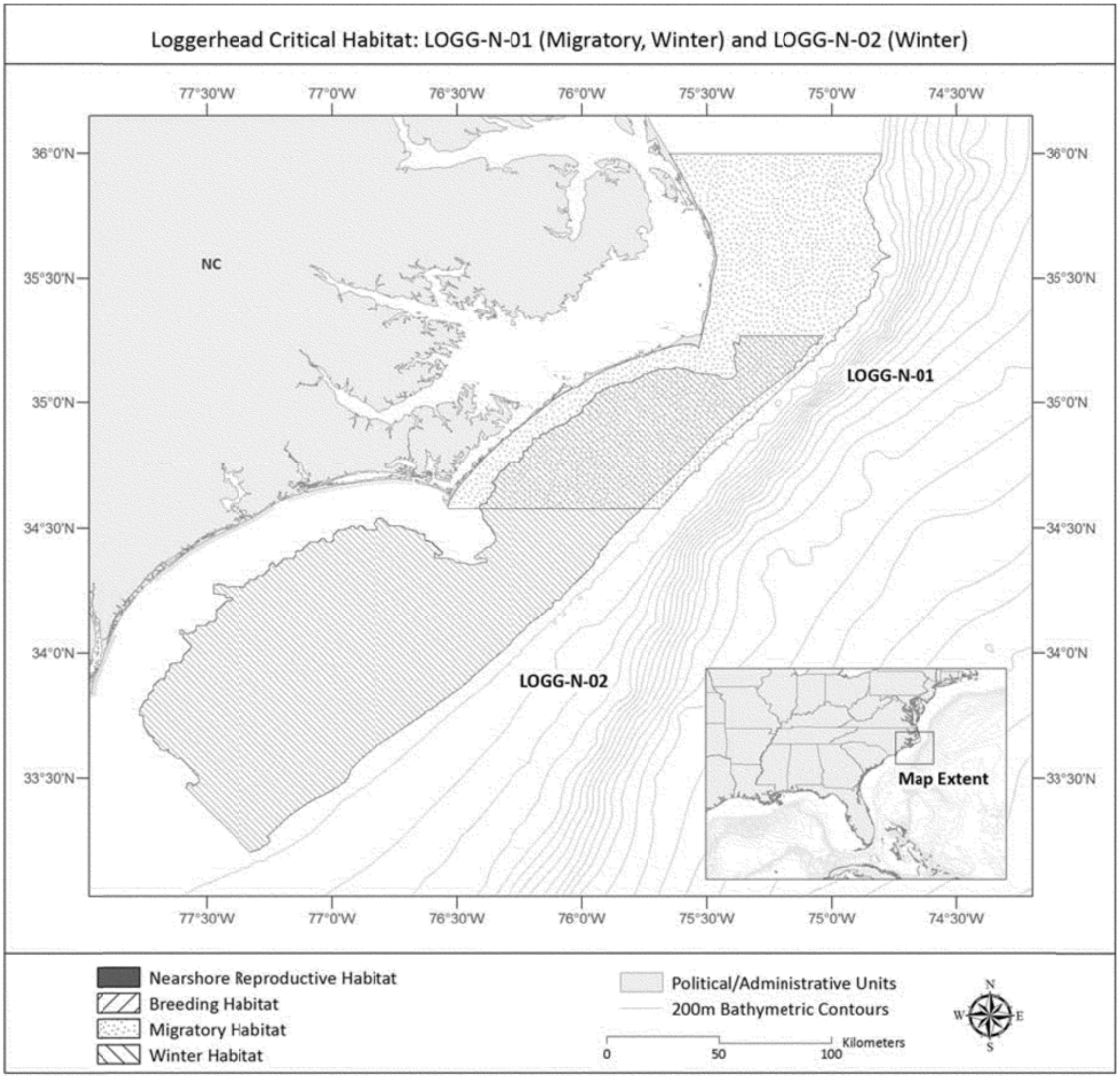

Figure 2. Location of the NMFS designated loggerhead sea turtle critical habitat in proximity to the Towns. (79 FR 39855, July 10, 2014).

4.2 Species Likely to be Adversely Affected

NMFS believes that the proposed project may affect Kemp's ridley and loggerhead sea turtles.

4.2.1 Sea Turtles

We have analyzed the routes of potential effects on loggerhead and Kemp's ridley sea turtles from the proposed action. Responsibility for ESA consultation on the effects related to failure to nest (i.e., "false crawls") and/or loss of nests and nesting habitat are the purview of the U.S. Fish and Wildlife Service (USFWS) and will not be discussed in this Biological Opinion.

The following subsections are synopses of the best available information on the status of the sea turtle species that are likely to be adversely affected by one or more components of the proposed action, including information on the distribution, population structure, life history, abundance, and population trends of each species and threats to each species. The biology and ecology of these species as well as their status and trends inform the effects analysis for this Opinion. Additional background information on the status of sea turtle species can be found in a number of published documents, including: recovery plans for the Atlantic green sea turtle (NMFS and USFWS 1991), Kemp's ridley sea turtle (NMFS and USFWS 2011), loggerhead sea turtle (NMFS and USFWS 2008); Pacific sea turtle recovery plans (NMFS and USFWS 1998a; NMFS and USFWS 1998b; NMFS and USFWS 1998c; NMFS and USFWS 1998b); and sea turtle status reviews, stock assessments, and biological reports (Conant et al. 2009b; NMFS-SEFSC 2001; NMFS-SEFSC 2009; NMFS and USFWS 1995; NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e; TEWG 1998; TEWG 2000a; TEWG 2007; TEWG 2009b).

4.2.1.1 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and anthropogenic threats that shape their status and affect their ability to recover. As many of the threats are the same or similar in nature for all listed sea turtle species, those identified in this section are discussed in a general sense for all listed sea turtles. Threat information specific to a particular species is then discussed in the corresponding status section where appropriate.

Fisheries

Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and threat to future recovery, for all of the sea turtle species (NMFS and USFWS 1991, 1992, 1993, 2008, 2011). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. The Southeast shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of sea turtles each year. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters. These fishing methods include trawls, gillnets, purse seines, hook-and-line gear (including bottom longlines and vertical lines [e.g., bandit gear, handlines, and rod-and-reel]), pound nets, and trap fisheries. (Refer to the Environmental Baseline section of this Opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area).

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom longline and gillnet fishing are known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also operating off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Non-Fishery In-Water Activities
There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, in-water construction activities, and scientific research activities.

Coastal Development and Erosion Control
Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may decrease the amount of nesting area available to females and change the natural behaviors of both adults and hatchlings, directly or indirectly, through loss of beach habitat or changing thermal profiles and increasing erosion, respectively. (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, coastal development is usually accompanied by artificial lighting which can alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991). In-water erosion control structures such as breakwaters, groins, and jetties can impact nesting females and hatchlings as they approach and leave the surf zone or head out to sea by creating physical blockage, concentrating predators, creating longshore currents, and disrupting of wave patterns.

Environmental Contamination
Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., DDT, PCBs, and PFCs), and others that may cause adverse health effects to sea turtles (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area. In 2010, there was a massive oil spill (the *Deepwater Horizon* incident) in the Gulf of Mexico at BP's Macondo well (MC252). Official estimates are that millions of barrels of oil were released into the Gulf of Mexico. Additionally, approximately 1.8 million gallons of chemical dispersant were applied on the seawater surface

and at the wellhead to attempt to break down the oil. At this time, the assessment of total direct impact to sea turtles has not been determined. Additionally, we do not know the long-term impacts to sea turtles because of habitat impacts, prey loss, and subsurface oil particles and oil components broken down through physical, chemical, and biological processes.

Marine debris is a continuing problem for sea turtles. Sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons, and ghost fishing gear) as they feed along oceanographic fronts[4] where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles).

Climate Change

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and USFWS 2007c). In sea turtles, sex is determined by the ambient sand temperature (during the middle third of incubation) with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c).

The effects from increased temperatures may be intensified on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990a). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of the erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007c). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

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[4] In oceanography, a front is a boundary between 2 distinct water masses. The water masses are defined by moving in different directions, i.e. on one side of the front the water is generally moving in one way, and on the other side of the front, the water is moving in another.

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish) which could ultimately affect the primary foraging areas of sea turtles.

Other Threats
Predation by various land predators is a threat to developing nests and emerging hatchlings. The major natural predators of sea turtle nests are mammals, including raccoons, dogs, pigs, skunks, and badgers. Emergent hatchlings in the United States are preyed upon by these mammals as well as ghost crabs, laughing gulls, and the exotic South American fire ant (*Solenopsis invicta*). In addition to natural predation, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges (NMFS and USFWS 2008).

Diseases, toxic blooms from algae and other microorganisms, and cold stunning events are additional sources of mortality that can range from local and limited to wide-scale and impact hundreds or thousands of animals.

Actions Taken to Reduce Threats
Actions have been taken to reduce anthropogenic impacts to sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes from various fisheries and other marine activities. Some actions have resulted in significant steps towards reducing the recurring sources of mortality of sea turtles in the environmental baseline and improving the status of all sea turtle populations in the Atlantic and Gulf of Mexico. For example, the TED regulation published on February 21, 2003 (68 FR 8456), represent a significant improvement in the baseline effects of trawl fisheries on sea turtles, though shrimp trawling is still considered to be one of the largest source of anthropogenic mortality for most of our sea turtle species (NMFS-SEFSC 2009).

4.2.1.2 Loggerhead Sea Turtle – Northwest Atlantic DPS
The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a final rule designating 9 DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, and effective October 24, 2011). This rule listed the following DPSs: (1) Northwest Atlantic Ocean (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic (NWA) DPS is the only one that occurs within the action area and therefore is the only one considered in this Opinion.

Species Description and Distribution

Loggerheads are large sea turtles. Adults in the southeast United States average about 3 ft (92 centimeters (cm)) long, measured as a straight carapace length (SCL), and weigh approximately 255 lb (116 kg) (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along seam lines. They typically have 11 or 12 pairs of marginal scutes, 5 pairs of costals, 5 vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 1988).

The loggerhead sea turtle inhabits continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans (Dodd 1988). Habitat uses within these areas vary by life stage. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Subadult and adult loggerheads are primarily found in coastal waters and eat benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990b). For the NWA DPS, most nesting occurs along the coast of the United States, from southern Virginia to Alabama. Additional nesting beaches for this DPS are found along the northern and western Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

Non-nesting, adult female loggerheads are reported throughout the U.S. Atlantic, Gulf of Mexico, and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches. Aerial surveys suggest that loggerheads as a whole are distributed in U.S. waters as follows: 54% off the southeast U.S. coast, 29% off the northeast U.S. coast, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Within the NWA DPS, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf Coast of Florida. Previous Section 7 analyses have recognized at least 5 western Atlantic subpopulations, divided geographically as follows: (1) a Northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29ºN; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast of the state to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez M 1990; TEWG 2000b); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS-SEFSC 2001).

The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA DPS.

Life History Information

The Northwest Atlantic Loggerhead Recovery Team defined the following 8 life stages for the loggerhead life cycle, which include the ecosystems those stages generally use: (1) egg (terrestrial zone), (2) hatchling stage (terrestrial zone), (3) hatchling swim frenzy and transitional stage (neritic zone[5]), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985; NMFS 2001). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008). Loggerhead hatchlings are 1.5-2 inches long and weigh about 0.7 ounces (20 grams).

As post-hatchlings, loggerheads hatched on U.S. beaches enter the “oceanic juvenile” life stage, migrating offshore and becoming associated with *Sargassum* habitats, driftlines, and other convergence zones (Carr 1986; Conant et al. 2009a; Witherington 2002). Oceanic juveniles grow at rates of 1-2 inches (2.9-5.4 cm) per year (Bjorndal et al. 2003; Snover 2002) over a period as long as 7-12 years (Bolten et al. 1998) before moving to more coastal habitats. Studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the oceanic habitat in the North Atlantic longer than hypothesized, or they move back and forth between oceanic and coastal habitats interchangeably (Witzell 2002). Stranding records indicate that when immature loggerheads reach 15-24 inches (40-60 cm) SCL, they begin to reside in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell 2002).

[5] Neritic refers to the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters.

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Estuarine waters of the United States, including areas such as Long Island Sound, Chesapeake Bay, Pamlico and Core Sounds, Mosquito and Indian River Lagoons, Biscayne Bay, Florida Bay, and numerous embayments fringing the Gulf of Mexico, comprise important inshore habitat. Along the Atlantic and Gulf of Mexico shoreline, essentially all shelf waters are inhabited by loggerheads (Conant et al. 2009a).

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads do not use the relatively enclosed shallow-water estuarine habitats with limited ocean access as frequently as juveniles. Areas such as Pamlico Sound, North Carolina, and the Indian River Lagoon, Florida, are regularly used by juveniles but not by adult loggerheads. Adult loggerheads do tend to use estuarine areas with more open ocean access, such as the Chesapeake Bay in the U.S. mid-Atlantic. Shallow-water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads (Conant et al. 2009a).

Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Seasonal use of mid-Atlantic shelf waters, especially offshore New Jersey, Delaware, and Virginia during summer months, and offshore shelf waters, such as Onslow Bay (off the North Carolina coast), during winter months has also been documented (Hawkes et al. 2007; Georgia Department of Natural Resources, unpublished data; South Carolina Department of Natural Resources, unpublished data). Satellite telemetry has identified the shelf waters along the west Florida coast, The Bahamas, Cuba, and the Yucatán Peninsula as important resident areas for adult female loggerheads that nest in Florida (Foley et al. 2008; Girard et al. 2009; Hart et al. 2012). The southern edge of the Grand Bahama Bank is important habitat for loggerheads nesting on the Cay Sal Bank in The Bahamas, but nesting females are also resident in the bights of Eleuthera, Long Island, and Ragged Islands. They also reside in Florida Bay in the United States, and along the north coast of Cuba (A. Bolten and K. Bjorndal, University of Florida, unpublished data). Moncada et al. (2010) report the recapture in Cuban waters of 5 adult female loggerheads originally flipper-tagged in Quintana Roo, Mexico, indicating that Cuban shelf waters likely also provide foraging habitat for adult females that nest in Mexico.

Status and Population Dynamics
A number of stock assessments and similar reviews (Conant et al. 2009a; Heppell et al. 2003; NMFS-SEFSC 2001; NMFS-SEFSC 2009; NMFS and USFWS 2008; TEWG 1998; TEWG 2000b; TEWG 2009b) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. Nesting beach surveys, though, can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of female loggerhead sea turtles, as long as such studies are sufficiently long and survey effort and methods are standardized (e.g., (NMFS and USFWS 2008). NMFS and USFWS (2008) concluded that the lack of change in 2 important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population.

Peninsular Florida Recovery Unit

The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989-2007 showed an average of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008). The statewide estimated total for 2013 was 77,975 nests (FWRI nesting database).

In addition to the total nest count estimates, the Florida Fish and Wildlife Research Institute (FWRI) uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. This provides a better tool for understanding the nesting trends (Figure 3). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2015) (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Over that time period, 3 distinct trends were identified. From 1989-1998 there was a 24% increase that was then followed by a sharp decline over the subsequent 9 years. A large increase in loggerhead nesting has occurred since, as indicated by the 74% increase in nesting between 2008 and 2015. FWRI examined the trend from the 1998 nesting high through 2015 and found that the decade-long post-1998 decline was replaced with a slight but nonsignificant increasing trend. Looking at the data from 1989 through 2015 (an increase of over 38%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

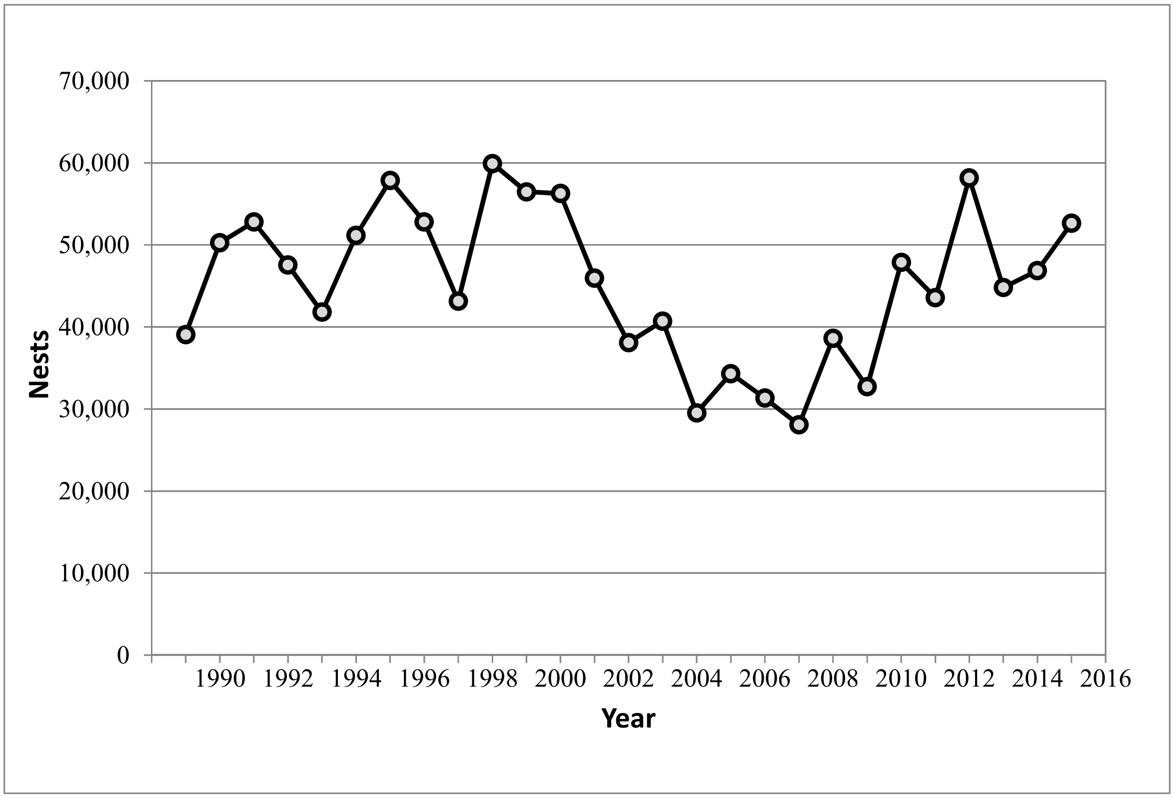

Figure 3. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (Georgia Department of Natural Resources [GADNR] unpublished data, North Carolina Wildlife Resources Commission [NCWRC] unpublished data, South Carolina Department of Natural Resources [SCDNR] unpublished data), and represent approximately 1,272 nesting females per year, assuming 4.1 nests per female (Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3% annually from 1989-2008. Nest totals from aerial surveys conducted by SCDNR showed a 1.9% annual decline in nesting in South Carolina from 1980-2008. Overall, there are strong statistical data to suggest the NRU had experienced a long-term decline over that period of time.

Data since that analysis (Table 1) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the declining trend of the past.

Table 1. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets)

Nests Recorded	2008	2009	2010	2011	2012	2013	2014
Georgia	1,649	998	1,760	1,992	2,241	2,289	1,196
South Carolina	4,500	2,182	3,141	4,015	4,615	5,193	2,083
North Carolina	841	302	856	950	1,074	1,260	542
Total	**6,990**	**3,472**	**5,757**	**6,957**	**7,930**	**8,742**	**3,821**

South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009-2012, with 2012 showing the highest index nesting total since the start of the program (Figure 4).

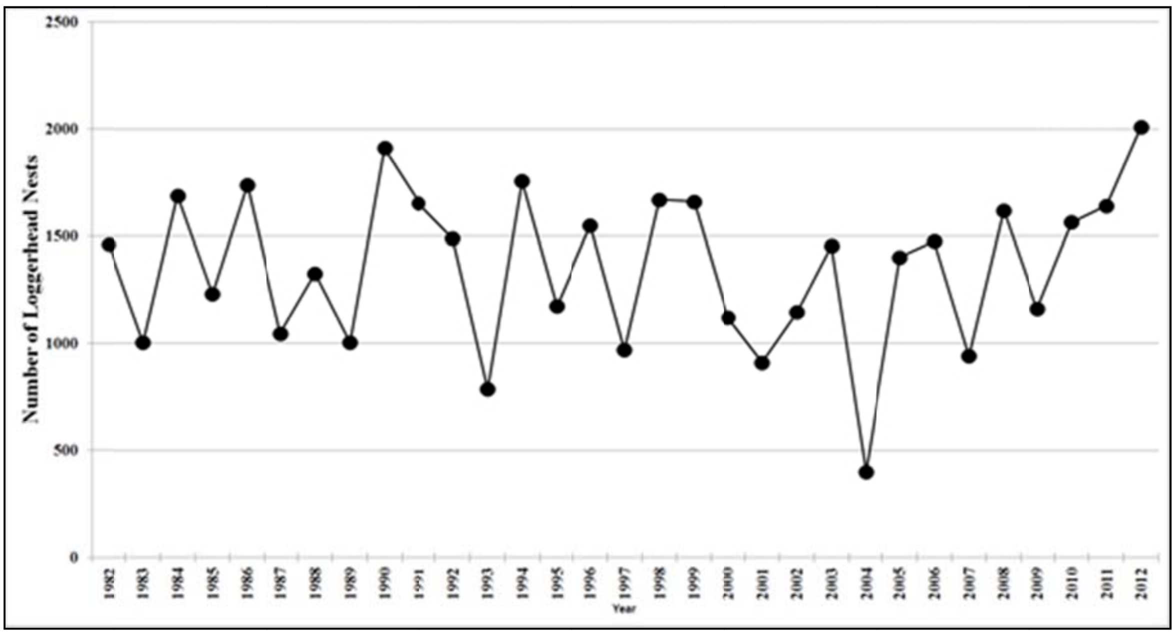

Figure 4. South Carolina index nesting beach counts for loggerhead sea turtles (from the SCDNR website, http://www.dnr.sc.gov/seaturtle/nest.htm)

<u>Other Northwest Atlantic DPS Recovery Units</u>

The remaining 3 recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages, but they are still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004, although the 2002 year was missed. Nest counts ranged from 168-270, with a mean of 246, but there was no detectable trend during this period

(NMFS and USFWS 2008). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997-2008) of index nesting beaches in the area shows a statistically significant declining trend of 4.7% annually. Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches, and no trend can be determined for this subpopulation (NMFS and USFWS 2008). Zurita et al. (2003a) found a statistically significant increase in the number of nests on 7 of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. Nonetheless, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

In-water Trends

Nesting data are the best current indicator of sea turtle population trends, but in-water data also provide some insight. In-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in catch per unit effort (CPUE) (Arendt et al. 2009; Ehrhart et al. 2007; Epperly et al. 2007). Researchers believe that this increase in CPUE is likely linked to an increase in juvenile abundance, although it is unclear whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence. Bjorndal et al. (2005), cited in NMFS and USFWS (2008), caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern United States may be due to increased abundance of the largest oceanic/neritic juveniles (historically referred to as small benthic juveniles), which could indicate a relatively large number of individuals around the same age may mature in the near future (TEWG 2009b). In-water studies throughout the eastern United States, however, indicate a substantial decrease in the abundance of the smallest oceanic/neritic juvenile loggerheads, a pattern corroborated by stranding data (TEWG 2009b).

Population Estimate

The NMFS Southeast Fisheries Science Center developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS-SEFSC 2009). The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Resulting trajectories of model runs for each individual recovery unit, and the western North Atlantic population as a whole, were found to be very similar. The model run estimates from the adult female population size for the western North Atlantic (from the 2004-2008 time frame), suggest the adult female population size is approximately 20,000 to 40,000 individuals, with a low likelihood of being up to 70,000 (NMFS-SEFSC 2009). A less robust estimate for total benthic females in the western North Atlantic was also obtained, yielding approximately 30,000-300,000 individuals, up to less than 1 million (NMFS-SEFSC 2009). A preliminary regional abundance survey of loggerheads within the northwestern Atlantic continental shelf for positively identified loggerhead in all strata estimated about 588,000 loggerheads (interquartile range of 382,000-817,000). When correcting for unidentified turtles in proportion to the ratio of identified turtles, the estimate increased to about 801,000 loggerheads (interquartile range of 521,000-1,111,000) (NMFS-NEFSC 2011).

Threats (Specific to Loggerhead Sea Turtles)
The threats faced by loggerhead sea turtles are well summarized in the general discussion of threats in Section 4.2.1.1. Yet the impact of fishery interactions is a point of further emphasis for this species. The joint NMFS and USFWS Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009a).

Regarding the impacts of pollution, loggerheads may be particularly affected by organochlorine contaminants; they have the highest organochlorine concentrations (Storelli et al. 2008) and metal loads (D'Ilio et al. 2011) in sampled tissues among the sea turtle species. It is thought that dietary preferences were likely to be the main differentiating factor among sea turtle species. Storelli et al. (2008) analyzed tissues from stranded loggerhead sea turtles and found that mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals, and porpoises (Law et al. 1991).

Specific information regarding potential climate change impacts on loggerheads is also available. Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80% female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100% female offspring. Such highly skewed sex ratios could undermine the reproductive capacity of the species. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most nests, leading to egg mortality (Hawkes et al. 2007). Warmer sea surface temperatures have also been correlated with an earlier onset of loggerhead nesting in the spring (Hawkes et al. 2007; Weishampel et al. 2004), short inter-nesting intervals (Hays et al. 2002), and shorter nesting seasons (Pike et al. 2006).

4.2.1.3 Kemp’s Ridley Sea Turtle
The Kemp’s ridley sea turtle was listed as endangered on December 2, 1970, under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Internationally, the Kemp’s ridley is considered the most endangered sea turtle (Groombridge 1982; TEWG 2000b; Zwinenberg 1977).

Species Description and Distribution
The Kemp’s ridley sea turtle is the smallest of all sea turtles. Adults generally weigh less than 100 lb (45 kg) and have a carapace length of around 2.1 ft (65 cm). Adult Kemp’s ridley shells are almost as wide as they are long. Coloration changes significantly during development from the grey-black dorsum and plastron of hatchlings, a grey-black dorsum with a yellowish-white plastron as post-pelagic juveniles, and then to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are 2 pairs of prefrontal scales on the head, 5 vertebral scutes, usually 5 pairs of costal scutes, and generally 12 pairs of marginal scutes on the carapace.

In each bridge adjoining the plastron to the carapace, there are 4 scutes, each of which is perforated by a pore.

Kemp's ridley habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 ft (37 m) deep, although they can also be found in deeper offshore waters. These areas support the primary prey species of the Kemp's ridley sea turtle, which consist of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The primary range of Kemp's ridley sea turtles is within the Gulf of Mexico basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia. Historic records indicate a nesting range from Mustang Island, Texas, in the north to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia. The Kemp's ridley nesting population had been exponentially increasing prior to the recent low nesting years, which may indicate that the population had been experiencing a similar increase. Additional nesting data in the coming years will be required to determine what the recent nesting decline means for the population trajectory.

Life History Information

Kemp's ridley sea turtles share a general life history pattern similar to other sea turtles. Females lay their eggs on coastal beaches where the eggs incubate in sandy nests. After 45-58 days of embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size. Hatchlings generally range from 1.65-1.89 in (42-48 mm) straight carapace length (SCL), 1.26-1.73 in (32-44 mm) in width, and 0.3-0.4 lb (15-20 g) in weight. Their return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from 1-4 years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic coast) as water temperature drops.

The average rates of growth may vary by location, but generally fall within 2.2-2.9 ± 2.4 in per year (5.5-7.5 ± 6.2 cm/year) (Schmid and Barichivich 2006; Schmid and Woodhead 2000). Age to sexual maturity ranges greatly from 5-16 years, though NMFS et al. (2011b) determined the best estimate of age to maturity for Kemp's ridley sea turtles was 12 years. It is unlikely that most adults grow very much after maturity. While some sea turtles nest annually, the weighted mean remigration rate for Kemp's ridley sea turtles is approximately 2 years. Nesting generally occurs from April to July and females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M 1994).

Population Dynamics

Of the 7 species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century (Figure 5), which indicates the species is recovering. It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo 2013). In 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively. A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012 (National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm).

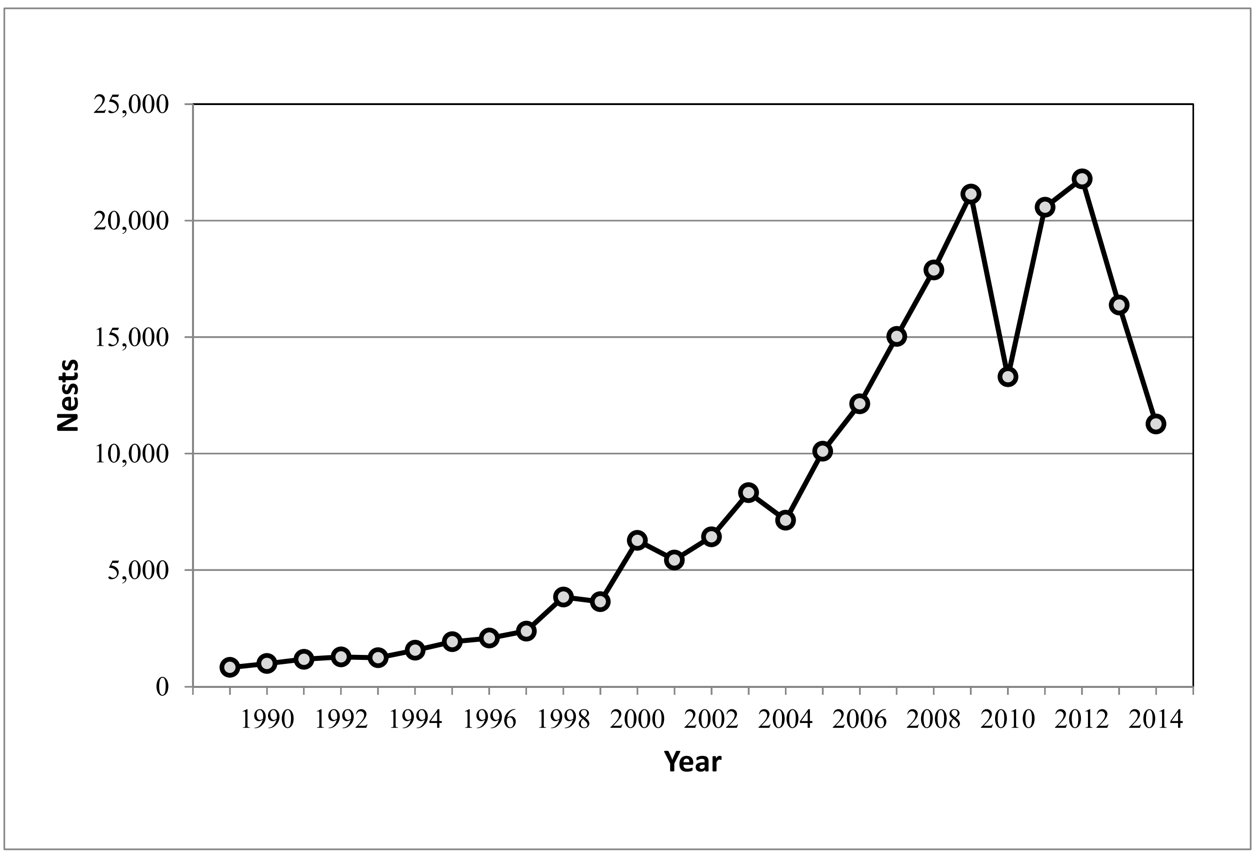

Figure 5. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2014)

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011b) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population had been steadily increasing over the long term. The recent increases in Kemp's ridley sea turtle nesting seen in the last 2 decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of TEDs, reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000b). While these results are encouraging, the species limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty. Additionally, the significant nesting declines observed in 2010 and 2013-2014 potentially indicate a serious population-level impact, and there is cause for concern regarding the ongoing recovery trajectory.

Threats

Kemp's ridley sea turtles face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 4.2.1.1; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically impact Kemp's ridley sea turtles.

As Kemp's ridley sea turtles continue to recover and nesting arribadas[6] are increasingly established, bacterial and fungal pathogens in nests are also likely to increase. Bacterial and fungal pathogen impacts have been well documented in the large arribadas of the olive ridley at Nancite in Costa Rica (Mo 1988). In some years, and on some sections of the beach, the hatching success can be as low as 5% (Mo 1988). As the Kemp's ridley nest density at Rancho Nuevo and adjacent beaches continues to increase, appropriate monitoring of emergence success will be necessary to determine if there are any density-dependent effects.

Over the past 3 years, NMFS has documented (via the Sea Turtle Stranding and Salvage Network data, http://www.sefsc.noaa.gov/species/turtles/strandings.htm) elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. In the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the DWH oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley

[6] Arribada is the Spanish word for "arrival" and is the term used for massive synchronized nesting within the genus *Lepidochelys.*

sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 428 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 301 (70%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. It should be noted that stranding coverage has increased considerably due to the DWH oil spill event.

Nonetheless, considering that strandings typically represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, pers. comm. to M. Barnette, NMFS, March 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that in both 2010 and 2011 approximately 85% of all Louisiana, Mississippi, and Alabama stranded sea turtles were Kemp's ridleys is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fishery during the summer of 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fishery, all but one of which were identified as Kemp's ridleys (1 sea turtle was an unidentified hardshell turtle). Encountered sea turtles were all very small, juvenile specimens ranging from 7.6-19.0 in (19.4-48.3 cm) curved carapace length (CCL), and all sea turtles were released alive. The small average size of encountered Kemp's ridleys introduces a potential conservation issue, as over 50% of these reported sea turtles could potentially pass through the maximum 4-in bar spacing of TEDs currently required in the shrimp fishery. Due to this issue, a proposed 2012 rule to require TEDs in the skimmer trawl fishery (77 FR 27411) was not implemented. Based on anecdotal information, these interactions were a relatively new issue for the inshore skimmer trawl fishery. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

5 Environmental Baseline

This section is a description of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline does not include the effects of the action under review in the consultation.

By regulation, environmental baselines for biological opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area. We identify the anticipated impacts of all proposed federal projects in the specific action area of the consultation at issue, that have already undergone formal or early Section 7 consultation as well as the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Focusing on the impacts of the activities in the action area specifically, allows us to assess the prior experience and state (or condition) of the endangered and threatened individuals, and areas of designated critical habitat that occur in an action area, and that will be exposed to effects from the action under consultation. This is important because, in some phenotypic states or life history stages, listed individuals will commonly exhibit, or be more susceptible to, adverse responses to stressors than they would be in other states, stages, or areas within their distributions. The same is true for localized populations of endangered and threatened species: the consequences of changes in the fitness or performance of individuals on a population's status depends on the prior state of the population. Designated critical habitat is not different: under some ecological conditions, the physical and biotic features of critical habitat will exhibit responses that they would not exhibit in other conditions.

5.1 Sea Turtles

5.1.1 Status of Sea Turtles within the Action Area

Kemp's ridley and loggerhead sea turtles occur in the action area and may be adversely affected by the project. Although loggerheads are the most common turtle occurring offshore of North Carolina, the state's marine waters also provide important habitat for Kemp's ridley sea turtles. A review of sightings reports obtained from commercial and recreational fishermen and the public indicate that sea turtles are present offshore North Carolina year-round. There were 2 seasonal peaks: 1 in spring (April to June) off the entire North Carolina coast, and 1 in late fall (October through December) off the northern North Carolina coast (Epperly et al. 1995a; Epperly et al. 1995b). Sightings were generally greatest in offshore water (> 5.6 km from shore), except during the period from May to June, when nearshore (< 5.6 km) sightings were equal to offshore sightings.

Loggerhead

Numerous studies have shown that the Mid-Atlantic and South-Atlantic Bight, particularly the waters from North Carolina to New Jersey, provide important seasonal and migratory habitat for sea turtles, especially juvenile and adult loggerheads. Loggerhead sightings data compiled for the Atlantic Marine Assessment Program for Protected Species show the presence of this species inside the 200-m isobaths off of North Carolina is well-documented during the spring (NOAA 2012) (**Error! Reference source not found.**). As mentioned above, the occurrence and distribution of sea turtles along the Atlantic coast is tied to SST (Coles and Musick 2000); (Braun-McNeill et al. 2008). Throughout the region, water temperatures increase rapidly in March and April and decrease rapidly in October and November; these temperature changes are quicker in nearshore waters. An analysis of historical tracking and sightings data conducted by the Turtle Expert Working Group (TEWG) indicates that the shelf waters (out to the 200-meter isobaths) off North Carolina are seasonally “high-use areas” for certain life stages of loggerhead sea turtles (TEWG 2009a). During the winter months (January through March), very few loggerheads occur coastally north of Cape Hatteras, North Carolina. During the spring (April through June), summer (July through September) and fall (October through December), the nearshore waters from the North Carolina/South Carolina border up to the Chesapeake Bay, Virginia serve as high-use areas for juvenile and adult nesting females. Similarly, male loggerheads frequent the nearshore waters of the mid-Atlantic Bight from the spring through the fall (essentially April through December), with a high-use area in the vicinity of Cape Hatteras. Braun-McNeill et al.(2008) show that loggerhead turtle presence off Cape Hatteras (based on sightings, strandings, and incidental capture records) occurred when 25% or more of the area exceeded SST of 11°C. Satellite tagging studies of juvenile loggerheads performed by Mansfield et al. (2009) also demonstrate that the waters of Virginia and North Carolina serve as important seasonal habitat for juvenile sea turtles from May through November. The Cape Hatteras area creates a “migratory bottleneck” that warrants special management consideration.

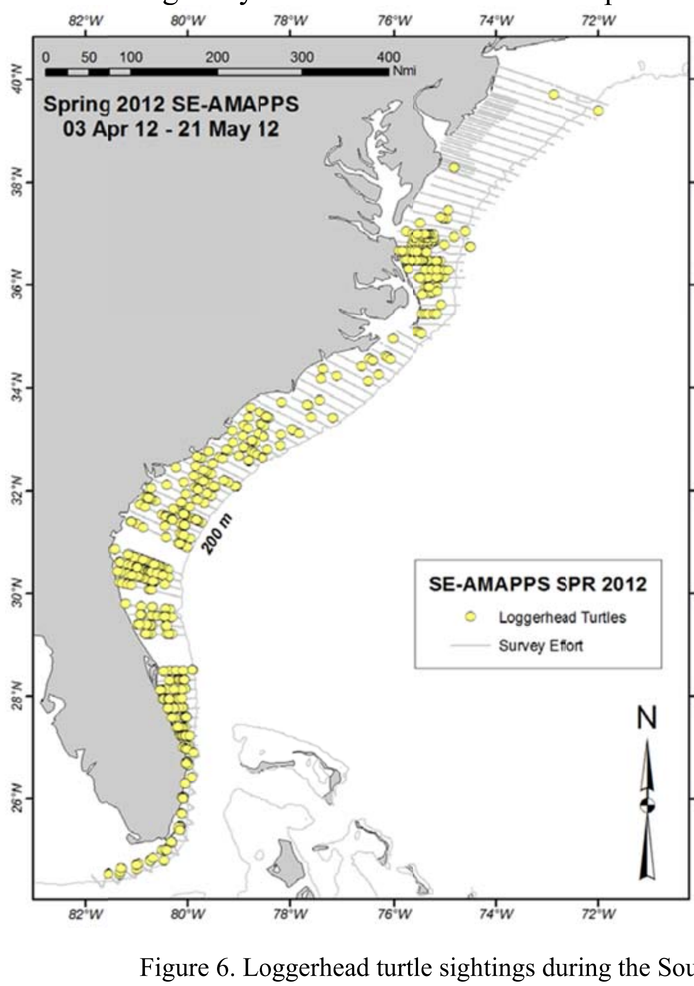

Figure 6. Loggerhead turtle sightings during the Southeast AMAPPS spring 2012 aerial survey (2012 NOAA)

Eighty percent of all loggerhead nesting that occurs in the southeastern U.S. takes place in Florida. Loggerhead sea turtle nesting occurs to a lesser extent on suitable beaches on islands off the Gulf states, Georgia, South Carolina, and along the entire North Carolina coastline, including Dare County where the Project Area is located (NCDENR 2001; USFWS 2014a). The U.S. Fish and Wildlife Service reported that although declines in nesting since the 1970's have been documented, no long-term trend data is available for the Northern subpopulation (USFWS 2012b). Bolten and Witherington (2003) reported that studies on the northern subpopulation from 1989 to 1998 illustrated a stable or declining population trend. The Florida Fish and Wildlife Conservation Commission analyzed trends in loggerhead nesting in Florida and found no demonstrable trend for the period between 1998 to 2013, indicating a reversal in the decline detected prior to 1998. Between 1989 and 2013, there was an almost 30% positive change in nest counts (FWC 2014).

Nesting survey data provided by the NCWRC indicate 1,634 loggerhead sea turtle nests were recorded within North Carolina from 2009 to 2013. The earliest nest recorded was May 11, 2012, and the latest record of the season occurred on October 7, 2009. Of the total nests recorded in North Carolina, 67 (4.1%) occurred along the northern Outer Banks, north of Oregon Inlet. Nests in this region were recorded from May through September, with the majority being recorded during June and July (**Error! Reference source not found.**).

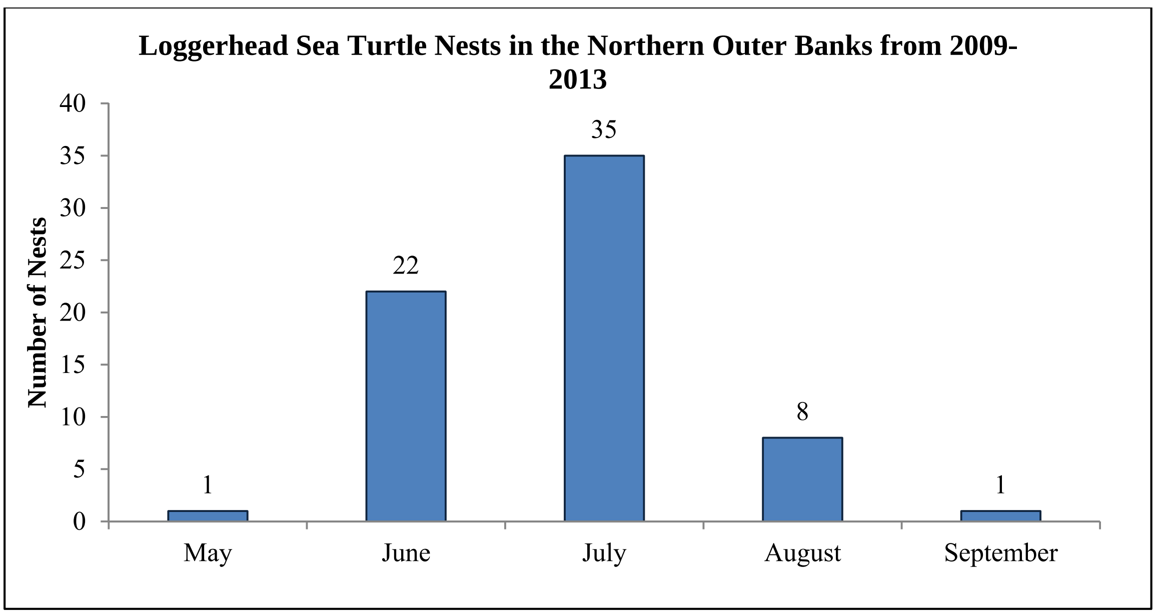

Figure 7. Number of loggerhead sea turtle nests recorded along the northern portion of the Outer Banks, north of Oregon Inlet, from 2009 to 2014 (2014 NCWRC)

Kemp's ridley

Unlike most sea turtle species that are widely distributed, the Kemp's ridley distribution is mostly restricted to the Gulf of Mexico (Miller 1997). The largest nesting populations occur on the coastal beaches of the Mexican states of Tamaulipas and Veracruz (NMFS et al. 2011a). Smaller nesting events occur near Padre Island National Seashore, Texas. According to the USFWS, rare nesting events have also been recorded in Florida, South Carolina and North Carolina (USFWS 2013b). Data from the NCWRC show four Kemp's ridley sea turtle nests have been documented in North Carolina between 2009 and 2013, all of which occurred in the Outer Banks Table). Two of these nests were deposited along Cape Hatteras National Seashore in June and August (Table). The other 2 nestings occurred in Corolla and Duck (**Error! Reference source not found.**8), both during June.

Table 2. Kemp's ridley Sea Turtle Nests Documented in North Carolina from 2009 to 2013 (Data provided by the NCWRC)

Location	Date
Northern Outer Banks (Corolla)	07/09/2010
Cape Hatteras National Seashore	06/16/2011
Northern Outer Banks (Duck)	06/14/2012
Cape Hatteras National Seashore	08/14/2013

Hatchlings are dispersed within the Gulf and Atlantic by oceanic surface currents. They have also been sighted in shallow coastal waters along the east coast of the United States. Kemp's ridley sea turtles are commonly observed migrating within North Carolina inshore waters during the spring and fall and occasionally found stranded on the beaches of North Carolina (Mihnovets 2003). These strandings may be attributed to juveniles being caught in the southern Gulf of Mexico Loop Current that eventually moves these turtles east and north along the western Atlantic coast (Musick and Limpus 1997).

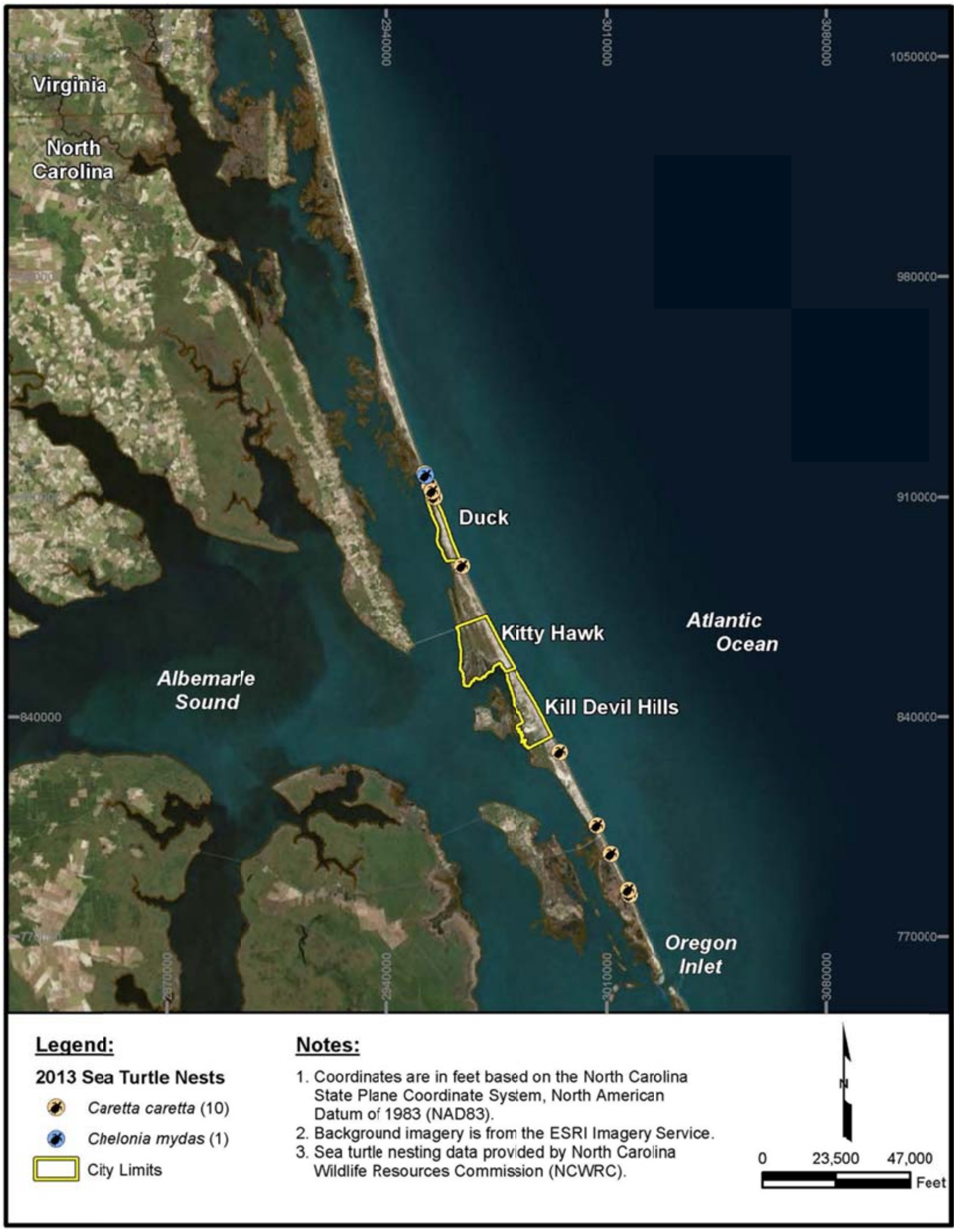

Figure 8. Number and species of sea turtle nests recorded from Oregon Inlet to the North Carolina/Virginia border in 2013 (2013 NCWRC)

5.1.2 Factors Affecting Sea Turtles in the Action Area

NMFS has completed a number of Section 7 consultations to address the effects of federally permitted fisheries and other federal actions on threatened and endangered sea turtle species, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to minimize the adverse impacts of the action on sea turtles. NMFS has undertaken conservation actions under the ESA to address sea turtle takes in the fishing and shipping industries and other activities such as USACE dredging operations. The summary below of federal actions and the effects these actions have had or are having on sea turtles includes only those federal actions in, or with effects within, the action area that have already concluded or are currently undergoing formal Section 7 consultation.

Federal Vessel Activity and Operations
Potential sources of adverse effects from federal vessel activity and operations in the action area include operations of the USN and USCG. NMFS has conducted formal consultations with the USCG and the USN on their vessel activities and operations. Through the Section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. Refer to the Biological Opinions for the USCG (NMFS 1995) and the USN (NMFS 1996; 1997a; 2013) for details on the scope of vessel operations for these agencies and conservation measures implemented as standard operating procedures.

Dredging
The construction and maintenance of federal navigation channels and sand mining sites ("borrow areas") conducted by the USACE has been identified as a source of sea turtle mortality. Hopper dredges have been known to entrain and kill sea turtles as the suction dragheads (generally 2 per dredge) of the advancing dredge overtake the resting or swimming turtle. Entrainment events most likely occur when hopper dredge dragheads approach an animal that is oriented on the bottom and either resting or foraging and moving at minimal speed. In most cases, the entrainment scenario occurs when the operating environment presents challenges for the turtle deflector to operate as designed and the operator is not able to keep the draghead(s) fixed on the bottom. Similarly, entrainment can occur when a turtle burrows into the substrate or is within a hole/trench/depression that the draghead moves over. Entrained sea turtles rarely survive. NMFS completed a regional Biological Opinion on the impacts of USACE's South Atlantic coast hopper-dredging operations in 1997 for dredging in the USACE's South Atlantic Division (NMFS 1997b). The regional Biological Opinion on South Atlantic hopper dredging (SARBO) of navigational channels and borrow areas determined that hopper dredging would not adversely affect leatherback sea turtles in the South Atlantic Division (i.e., coastal states of North Carolina through Key West, Florida). The Opinion did determine hopper dredging in the South Atlantic Division would adversely affect 4 sea turtle species (i.e., green, hawksbill, Kemp's ridley, and loggerheads), but it would not jeopardize their continued existence. An ITS for those species was issued. Reinitiation of consultation on the SARBO has been triggered for a number of reasons, including listing of new species and designation of critical habitat that may be affected by these dredging activities.

ESA Permits
Sea turtles are the focus of research activities authorized by Section 10 permits under the ESA. Regulations developed under the ESA allow for the issuance of permits allowing take of certain ESA-listed species for the purposes of scientific research under Section 10(a)(1)(a) of the ESA. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured sea turtles. The number of authorized takes varies widely depending on

the research and species involved, but may involve the taking of hundreds of sea turtles annually. Most takes authorized under these permits are expected to be (and are) nonlethal, although lethal takes are sometimes authorized. Before any research permit is issued, the proposal must be reviewed under the permit regulations. In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS must also be reviewed for compliance with Section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species or adverse modification of its critical habitat.

Federally Managed Fisheries
Threatened and endangered sea turtles are adversely affected by fishing gears used throughout the continental shelf of the action area. Hook-and-line gear, trawl, and pot fisheries have all been documented as interacting with sea turtles.

For all fisheries for which there is a Fishery Management Plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated under Section 7.

Finfish Fisheries
Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area of the proposed action. Efforts to reduce the adverse effects of federal fisheries are addressed through the ESA Section 7 process. Trawl, hook-and-line, gillnet, and cast net gear fisheries have all been documented as interacting with sea turtles. Several formal consultations have been conducted on the following fisheries that NMFS has determined are likely to adversely affect threatened and endangered species (including sea turtles): the South Atlantic and Gulf of Mexico coastal migratory pelagic fishery, and the Atlantic Highly Migratory Species shark fishery. An Incidental Take Statement (ITS) has been issued for interactions with sea turtles in each of these fisheries.

NMFS completed a Section 7 consultation on the continued authorization of the coastal migratory pelagic fishery in the South Atlantic (NMFS 2007c) where hook-and-line, gillnet, and cast net gears are used. The recreational sector uses hook-and-line gear. The hook-and-line effort is primarily trolling. The Biological Opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by operation of the fishery.

In 2012, NMFS issued a Biological Opinion on the continued authorization of Highly Migratory Species Atlantic shark fisheries (NMFS 2012). This commercial fishery uses bottom longline and gillnet gear. The recreational sector of the fishery uses only hook-and-line gear. To protect declining shark stocks, the proposed action seeks to greatly reduce the fishing effort in the commercial component of the fishery. These reductions are likely to greatly reduce the interactions between the commercial component of the fishery and sea turtles. The Biological Opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by operation of the fishery but that the proposed action was not expected to jeopardize the continued existence of any of these species.

Southeastern Shrimp Trawl Fisheries

Southeastern U.S. shrimp fisheries target primarily brown, white, and pink shrimp in inland waters and estuaries through the state-regulated territorial seas and in federal waters of the EEZ. As sea turtles rest, forage, or swim on or near the bottom, they are captured by shrimp trawls pulled along the bottom. In 1990, the National Research Council (NRC) concluded that the southeastern U.S. shrimp trawl fisheries affected more sea turtles than all other activities combined and was the most significant anthropogenic source of sea turtle mortality in the U.S. waters, in part due to the high reproductive value of turtles taken in this fishery (NRC 1990).

On May 9, 2012, NMFS completed a Biological Opinion that analyzed the continued implementation of the sea turtle conservation regulations and the continued authorization of the Southeast shrimp fisheries in federal waters under the Magnuson-Stevens Act (NMFS 2012). The Opinion also considered a proposed amendment to the sea turtle conservation regulations that would withdraw the alternative tow time restriction at 50 CFR 223.206(d)(2)(ii)(A)(*3*) for skimmer trawls, pusher-head trawls, and wing nets (butterfly trawls) and instead require all of these vessels to use TEDs. The Opinion concluded that the proposed action would not jeopardize the continued existence of any sea turtle species. An ITS was provided that used trawl effort and capture rates as proxies for sea turtle take levels. The Biological Opinion requires NMFS to minimize the impacts of incidental takes through monitoring of shrimp effort and regulatory compliance levels, conducting TED training and outreach, and continuing to research the effects of shrimp trawling on listed species. Subsequent to the completion of this opinion, NMFS withdrew the proposed amendment to require TEDs in skimmer trawls, pusher-head trawls, and wing nets. Consequently, NMFS reinitiated consultation on November 26, 2012. Consultation was completed in April 2014 and determined the continued implementation of the sea turtle conservation regulations and the continued authorization of the southeastern U.S. shrimp fisheries in federal waters under the MSFCMA was not likely jeopardize the continued existence of any sea turtle species. The ITS maintained the use of anticipated trawl effort and fleet TED compliance as surrogates for numerical sea turtle takes.

Beach Nourishment

The USACE issues Clean Water Act permits for disposal of material in navigable waters of the United States, including beach nourishment. The activity of beach nourishment, especially when impacts include the loss of nearshore hard bottom habitat along the east coast of Florida, has been documented to result in injury and death of juvenile green sea turtles. Juvenile green turtles are known to utilize these high-energy, dynamic habitats for foraging and as refuge, and show a preference for this habitat even when abundant deeper-water sites are available. The loss of such limited habitat, especially when considering the cumulative loss as a result of beach nourishment activities occurring along the entire range of the habitat and continually over time, is expected to result in loss of foraging opportunities and protective refuge. The stresses are also expected to contribute to mortality of individuals already in poor condition as a result of disease or other factors (NMFS 2008a). Beach nourishment permitted by the USACE also often involves use of a hopper dredge to collect nourishment material, thus posing another route of adverse effects to sea turtles.

State or Private Actions

Maritime Industry

Private and commercial vessels, including fishing vessels, operating in the action area of this consultation also have the potential to interact with ESA-listed species. The effects of fishing vessels, recreational vessels, or other types of commercial vessels on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Commercial traffic and recreational pursuits can also adversely affect sea turtles through propeller and boat strikes. The Sea Turtle Stranding and Salvage Network (STSSN) includes many records of vessel interaction (propeller injury) with sea turtles where there are high levels of vessel traffic. The extent of the problem is difficult to assess because of not knowing whether the majority of sea turtles are struck pre- or post-mortem. It is important to note that minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so it is more likely to become vulnerable to effects such as entanglements or predation. NMFS and the USCG have completed several formal consultations on individual marine events that may affect sea turtles.

Coastal Development

Beachfront development, lighting, and beach erosion control all are ongoing activities along the Florida coastline. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nighttime human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, more and more coastal counties are adopting stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

State Fisheries

Commercial state fisheries are located in the nearshore habitat areas that comprise the action area. Recreational fishing from private vessels also occurs in the area. Observations of state recreational fisheries have shown that loggerhead sea turtles are known to bite baited hooks and frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial anglers fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

In August of 2007, NMFS issued a regulation (72 FR 43176, August 3, 2007) to require any fishing vessels subject to the jurisdiction of the United States to take observers upon NMFS's request. The purpose of this measure is to learn more about sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary.

Other Potential Sources of Impacts in the Environmental Baseline

Marine Debris and Acoustic Impacts

A number of activities that may affect listed species in the action area of this consultation include anthropogenic marine debris and acoustic impacts. The impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources.

Marine Pollution and Environmental Contamination

Sources of pollutants along the coastal areas include atmospheric loading of pollutants such as polychlorinated biphenyls (PCBs), stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean, and groundwater and other discharges (Carpenter et al. 1986). Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems (Bowen and Valiela 2001; Rabalais 2002; Rabalais et al. 2002). The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

Coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996). The development of marinas and docks in inshore waters can negatively impact nearshore habitats. An increase in the number of docks built increases boat and vessel traffic. Fueling facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive estuarine and coastal habitats. Although these contaminant concentrations do not likely affect the more pelagic waters, the species of turtles analyzed in this Biological Opinion travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

There are studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000). Mckenzie et al. (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in sea turtle tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). Dietary preferences were likely the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. Sakai et al. (1995) found the presence of metal residues occurring in loggerhead turtle organs and eggs. Storelli et al. (1998) analyzed tissues from 12 loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises (Law et al. 1991).

Conservation and Recovery Actions Benefiting Sea Turtles
NMFS has implemented a number of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the action area. These include sea turtle release gear requirements for Atlantic HMS and Gulf of Mexico reef fish fisheries, and TED requirements for the southeastern shrimp fisheries. These regulations have relieved some of the pressure on sea turtle populations.

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. NMFS has agreements with the state of Florida. Prior to issuance of these agreements, the proposal must be reviewed for compliance with Section 7 of the ESA.

Other Actions
A revised recovery plan for the loggerhead sea turtle was completed December 8, 2008 (NMFS and USFWS 2008). Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising other plans based upon the latest and best available information. Five-year status reviews were completed in August 2007, for green and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time. Loggerhead sea turtles also had a full status review in August 2009 and a Recovery Plan update in December 2008. However, further review of species data for the green sea turtles was recommended, and a new rule was proposed on March 23, 2015, to list 11 separate DPSs.

Summary and Synthesis of Environmental Baseline
In summary, several factors adversely affect sea turtles in the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action. Fisheries in the action area likely had the greatest adverse impacts on sea turtles in the mid- to late 80s, when effort in most fisheries was near or at peak levels. With the decline of the health of managed species, effort since that time has generally been declining. Over the past 5 years, the impacts associated with fisheries have also been reduced through the Section 7 consultation process and regulations implementing effective bycatch reduction strategies. However, interactions with commercial and recreational fishing gear are still ongoing and are expected to occur contemporaneously with the proposed action. Other environmental impacts including effects of vessel operations, additional military activities, dredging, oil and gas exploration, permits allowing take under the ESA, private vessel traffic, and marine pollution have also had and continue to have adverse effects on sea turtles in the action area in the past.

6 Effects of the Action

As described below, NMFS believes that the proposed action may adversely affect loggerhead and Kemp's ridley sea turtles. Because the action will result in adverse effects to these species, we must evaluate whether the action is likely to jeopardize the continued existence of these species.

6.1 Cutterhead Dredge Effects

NMFS has previously determined in dredging Opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, non-hopper type dredging methods (e.g., clamshell or bucket dredging, cutterhead dredging, pipeline dredging,) are slower and unlikely to adversely affect them. Sea turtles are highly mobile species and can avoid interactions with these slow moving dredge types. Further, NMFS believes that sea turtles are likely to avoid the areas during construction, due to the noise and associated disturbances. Thus, NMFS believes that injury or death from interactions with clamshell and/or hydraulic dredging equipment is extremely unlikely to occur, and is, therefore, discountable.

Sea turtles may be temporarily unable to use the project site described above for forage and shelter habitat due to avoidance of construction activities, related noise, and physical exclusion from areas blocked by turbidity curtains. The action is occurring in the open ocean environment, where the entire area contains the same type of habitat, which would support the same activities by sea turtles. Thus, any animals disrupted by the dredging activities would be expected to continue to conduct the same activities in the surrounding areas not disrupted by dredging. NMFS believes that those avoidance effects will be temporary and insignificant.

6.2 Hopper Dredge Effects and Estimated Sea Turtle Mortality

Potential routes of adverse effects of the proposed action to loggerhead and Kemp's ridley sea turtles are limited to hopper dredging interactions and relocation trawling.

Hopper Dredge Vessel Collisions

NMFS believes that the possibility that the hopper dredge vessel(s) will collide with and injure or kill sea turtles during dredging and/or sand pump out operations is discountable, given the following reasons: (1) the vessel's slow speed (generally 3-5 kt during active dredging, and 10-12 kt during transits), (2) the ability of these species to move out of the way, and (3) anticipated avoidance behavior by sea turtles at the sea surface or in the water column.

Hopper Dredge Entrainment Effects

Previous NMFS Biological Opinions have determined that hopper dredges may adversely affect loggerhead and Kemp's ridley sea turtles through crushing and/or entrainment by the dredge's suction dragheads. A typical hopper dredge vessel operates with 2 trailing, suction dragheads simultaneously, 1 on each side of the vessel. Sand will be dredged from the borrow areas and transported to the nearshore waters adjacent to the Towns. There it will be dispersed via pump and pipeline from the hopper dredge. It is anticipated that the hopper dredge will make up to 4 round-trips from the borrow area to the pipeline per day, and dredge and discharge approximately 10,000 yd^3 of sand per day for a total of 390 round-trips. Each trip can take up to 4 hours resulting in a conservative total of 1,560 dredge hours (4 hr x 390 trips). More than one hopper dredge may be used. Dredging is expected to last 3.5-9 months.

During dredging operations, protected species observers will live aboard the dredge, monitoring every load, 24 hours a day, for evidence of dredge-related impacts to protected species, particularly sea turtles. Observers will also maintain a bridge watch for protected species and keep a logbook noting the date, time, location, species, number of animals, distance and bearing from dredge, direction of travel, and other information, for all sightings. During all phases of dredging operations, the dredge and crew will be required to adhere to NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*.

We used data from previous hopper dredging projects in and around the action area to determine the effects to sea turtles. From 1998 through 2014, hopper dredging in and around the action area generated approximately 17,461,818 yd^3 of material (Table 3). Thirteen sea turtles were documented/observed as taken in hopper dredges during these dredging events. This equates to a catch per unit effort (CPUE) of 0.0000000744 turtles per cubic yard dredged.

Table 3. Dredged Material Removed and Sea Turtle Takes from Dredging Projects in and around Dare County, NC 1998-2014 (Data provided by BOEM)

Project	Year/ Time of Year	Quantity of Material (yd^3)	Relocation	Loggerhead	Green	Kemp's Ridley	Total Turtles
Nags Head Beach Nourishment Project - Wilmington	8/19/11 - 10/27/11	3,208,552	No				0
Emerald Isle FEMA Beach Nourishment - Wilmington	2/13- 3/13	1,000,000	Yes, no takes (lethal or nonlethal)				0
VA Beach	2001- 2002	~ 3,500,000	Yes 9 Cc 3 Lk	10		2	12
VA Beach	12/26/03 - 3/14/04	844,968	No				0
Wallops	7/2014- 9/2014	800,000	No				0
Wallops	Began 4/2012	3,500,000	No				0
Sandbridge	3/2013- 6/2013	2,000,000	No	1			1
Oregon Inlet	9/1/98 - 10/27/98	304,080	No				0
Oregon Inlet	7/9/99 - 12/15/99	380,951	No				0
Oregon Inlet	7/23/00 - 10/20/00	480,612	No				0
Oregon Inlet	9/02/02 - 9/22/02	198,101	No				0
Oregon Inlet	8/23/03 - 10/23/03	153,108	No				0
Oregon Inlet	7/03/04 - 7/23/04	147,871	No				0
Oregon Inlet	9/20/06 - 11/3/06	172,155	No				0
Carolina Beach/Kure Beach	3/11/04 - 3/22/04	324,453	No				0
Carolina Beach/Kure	3/4/10 – 3/20/10	446,967	**No**				**0**
	Total	**17,461,818**	**12**	**11**		**2**	**13**

Project	Year/ Time of Year	Quantity of Material (yd^3)	Relocation	Loggerhead	Green	Kemp's Ridley	Total Turtles
	CPUE	**0.000000 0**744					

Using this data, we can calculate that the proposed project will result in the observed take of 3.6 (0.0000000744 x 4,825,000,000), rounded up to 4 turtles.

NMFS has previously determined that dredged material screening is only partially effective at detecting entrained turtles, and observed interactions likely provide only partial estimates of total sea turtle mortality. NMFS believes that some turtles killed by hopper dredges go undetected because body parts are forced through the sampling screens by water pressure and are buried in the dredged material, or animals are crushed or killed but their bodies or body parts are not entrained by the suction and so the interactions may go unnoticed. Mortalities are only noticed and documented when body parts float, are large enough to be caught in the screens, and can be identified as sea turtle parts. Body parts that are forced through the suction dragheads' 4-inch (or greater) inflow screens by the suction-pump pressure and that do not float are very unlikely to be observed, since they will sink to the bottom of the hopper and not be detected by the overflow screening. Further, the use of UXO screens greatly reduces the likelihood that the observers will be able to detect any sea turtle parts if they were entrained because any entrained parts would be so small. However, we also suspect that UXO screens may make entrainment (meaning actual uptake of turtle parts into the hopper) less likely.

It is not known how many turtles are killed but unobserved. Therefore, to be conservative, in the November 19, 2003 Regional Biological Opinion on hopper dredging issued to the U.S. Army Corps of Engineers for their Gulf of Mexico District's (i.e., Jacksonville, Mobile, New Orleans, and Galveston) maintenance dredging and beach renourishment operations, NMFS estimated that up to 1 out of 2 impacted turtles may go undetected (i.e., that observed interactions constitute only 50% of total takes). We will apply this longstanding conservative assumption in the present Opinion, since we have no new information that would change the basis of that previous conclusion and estimate. Our Incidental Take Statement (ITS) is based on observed takes, not only because observed mortality gives us an estimate of unobserved mortality, but because observed, documented take numbers serve as triggers for some of the reasonable and prudent measures, and for potential reinitiation of consultation if actual observed takes exceed the anticipated/authorized number of observed takes. Our jeopardy analysis will account for total takes (observed takes plus undetected takes). To be most conservative, in our jeopardy analysis we will assume that all takes will occur to reproductively mature females.

Experience has shown that the vast majority of hopper-dredge impacted turtles are immediately killed by being crushed or through dismemberment from being trapped underneath and rolled under the heavy suction dragheads and/or by the violent forces they are subjected to during entrainment through the dredges' powerful, high-velocity dredge pumps. A very few turtles (over the years, a fraction of a percent) survive entrainment in hopper dredges; these are usually smaller juveniles that are sucked through the pumps without being dismembered or badly injured. Often they will appear uninjured only to die days later of unknown internal injuries while in rehabilitation. Therefore, we are conservatively predicting that all entrainment events by hopper dredges will be lethal.

Based on the previously discussed 50% detection rate of dredge-impacted turtles, NMFS estimates that there will be 8 incidental, lethal interactions (4 observed and 4 unobserved). Although all of these takes may be completely unobserved due to the potential use of UXO screens.

We anticipate that the turtles entrained will be either loggerhead or Kemp's ridley. Data from Table 3 above indicates that approximately 85% of entrainments were loggerhead, and approximately 15% were Kemp's ridleys. Therefore we anticipate that the project will result in the lethal take, due to entrainment, of up to 7 loggerheads (8 total x .85=6.8 rounded to 7) and up to 2 Kemp's ridleys (8 total x .15=1.2 rounded up to 2), but still not to exceed a total expected take of 8 turtles. Therefore, we expect that up to 8 sea turtles will be taken as a result of entrainment, either a combination of 7 loggerheads and 1 Kemp's ridley or 6 loggerheads and 2 Kemp's ridleys.

We estimated above that for this project, hopper dredge entrainment will result in 8 sea turtle mortalities due to entrainment . However, the dredge draghead is actually interacting with a larger (but unknown) number of turtles. We assume that sea turtle deflector dragheads are fairly effective at pushing away turtles unharmed, based on studies conducted by the USACE (Banks and Alexander 1994; Nelson and Shafer 1996). To be conservative, we assume each draghead is only 50% effective (i.e., for every turtle killed, 1 is safely deflected); therefore, estimating that 8 turtles will be killed in this project leads us to conclude that 8 other turtles (up to 7 loggerheads and up to 2 Kemp's ridley) will be safely deflected. We believe these interactions will not cause injury to sea turtles and will not rise to the level of a take, as the deflectors themselves do not have sharp edges and move slowly; thus, we believe these deflection effects will be insignificant.

6.2 Effects of Relocation Trawling

The applicant will conduct sea turtle abundance trawling 5 days in advance of hopper dredging if SST is above 10°C in the action area. If any sea turtles are encountered during abundance trawling, then relocation trawling will be implemented per the Terms and Conditions of this Opinion. If used, once dredging begins, relocation trawling will continue simultaneously with dredging operations.

Nets are typically dragged on the bottom for 30 minutes or less before each retrieval and re-setting. Its effects are mostly nonlethal and non-injurious to trawl captured sea turtles. Over the course of 20+ years that relocation trawling has been conducted by the USACE, very few sea turtle mortalities[7] have occurred, while approximately 2,000 sea turtles have been relocated.

[7] Approximately 8 sea turtles have been documented to die in relocation trawling. Three of these drowned during relocation trawling efforts conducted during unusually high sea turtle abundances off Louisiana during intensive relocation trawling associated with the *Deepwater Horizon* event.

The number and species of sea turtles collected or captured by trawlers in association with hopper dredging projects varies considerably by project area, amount of effort, and time of year. Additionally, sea turtle distribution can be very patchy, resulting in significant differences in number of turtle captures by relocation trawler, and in some areas, 1 or 2 species may dominate the captures. For example, Canaveral, Florida, is known for its abundance of loggerhead and green turtles; Calcasieu, Louisiana, and Gulfport, Mississippi, for their almost exclusive capture of Kemp's ridleys; while Brunswick, Georgia, and Mississippi-River Gulf Outlet, Louisiana, captures are predominantly loggerheads (E. Hawk, NMFS, pers. comm., May 27, 2014, to Kelly Logan, NMFS).

From October 1, 2006, through August 30, 2013 (i.e., fiscal years 2006-2013), 1,435 sea turtle captures were made by relocation trawlers associated with hopper dredging projects, the majority of which occurred in the Gulf of Mexico (USACE Sea Turtle Data Warehouse, April 1, 2014 data). Dickerson et al. (2007) evaluated the effectiveness of relocation trawling for reducing incidental interactions with sea turtles by analyzing incidental interactions recorded in endangered species observer reports, relocation trawling reports, and hopper dredging project reports from 1995 through 2006. From 1995 through 2006, 319 hopper dredging projects throughout the Gulf of Mexico (n = 128) and Atlantic Ocean (n = 191) used endangered species monitoring, and a total of 358 dredging-related sea turtle interactions were reported (Regions: Gulf = 147 sea turtles; Atlantic = 211 sea turtles). During the 70 projects with relocation trawling efforts, 1,239 sea turtles were relocated (Gulf Regions = 844; Atlantic Region = 395). Loggerhead is the predominant species for both dredge interactions and relocation trawling interactions with sea turtles. Kemp's ridley ranks second. Green turtles have been captured in trawls only during December through March in the Gulf of Mexico. Although 2 hawksbills and 6 leatherbacks were relocated during 1995-2006, neither of these species has ever been reported taken or killed by a dredge, although 1 leatherback has been killed by relocation trawling.

Relocation trawling is required only when it can be done safely, as a means to reduce sea turtle mortalities, because it is a proven method of reducing sea turtle density in front of an advancing hopper dredge and very likely results in reduced sea turtle /hopper dredge interactions.

Two projects in and around the action area have employed relocation trawling (Table 3). Information in table 3 indicates that 4.5 million cubic yards have been dredged with 12 turtles being captured in relocation trawls. However, the Nags Head beach project, where zero turtles were relocated, was during winter and early spring months when sea turtles are far less abundant in the area, therefore, to be conservative we will not use this project in our calculation of relocation trawl captures. That leaves the Virginia Beach project during 2001-2002, which relocated 12 turtles with 3.5 million cubic yards of material dredged, resulting in a CPUE of 0.0000034 turtles per cubic yard of material dredged (12/3,500,000). The proposed action is expected to dredge 4.825 cubic yards of material, with the possibility of year round dredging. To determine the number of turtles captured by relocation trawling we multiplied 0.0000034 turtles per cubic yard CPUE times 4.825 million cubic yards of material to be dredged and we get 16.4 turtles which we will round up to 17 to be conservative, and because it is not possible to capture a fraction of an animal.

In order to determine the species composition of the trawl captures we will use the proportion of trawl captures in the 2001-2002 Virginia Beach project. The 2001-2002 Virginia Beach project captured 9 loggerhead turtles and 3 Kemp's ridleys during relocation trawling. This works out to 75% loggerhead and 25% Kemp's ridleys. Therefore, we estimate that the proposed action has the potential to capture (by relocation trawling) up to 12.75 loggerheads, rounded to 13 and up to 4.25 Kemp's ridleys rounded up to 5 but still not to exceed a total of 17 turtles.

NMFS believes there is a remote possibility that the proposed relocation trawling could injure or kill a sea turtle that may already have impaired health. Stressed or unhealthy turtles or turtles exposed to repeated forced submergences are more likely to be injured or killed during relocation trawling than healthy turtles (NMFS 2003). In addition, there is a remote possibility that sea turtles could be injured by the heavy trawl doors. Only 5 sea turtles (0.4%) of 1,216 turtles captured by relocation trawlers from October 1, 2006, to June 14, 2011, during USACE dredging projects resulted in mortality (USACE Sea Turtle Data Warehouse 2014). Based on this historic low rate of lethal interactions, we believe that relocation trawling, properly carried out, is extremely unlikely to injure or kill sea turtles during this project; i.e., the risk is discountable. All the turtles captured via trawling will be released unharmed in a nearby area that contains the same habitat as the areas where the trawling will occur; thus, any habitat displacement effects associated with the relocation trawling capture are expected to be insignificant.

6.3 Effects of Habitat Loss

Sand mined from federal waters will be pumped onto the beach and into the nearshore waters adjacent to the Towns. As discussed above, sand placement in state waters is authorized by the USACE, but the activity is interrelated and interdependent with BOEM's authorization to mine sand from federal waters. Therefore, the effects of the sand placement must be evaluated as effects of BOEM's action.

NMFS believes the proposed sand placement in nearshore waters is not likely to adversely affect sea turtles. Sea turtles may be attracted to the sand pump out sites, to forage on the bycatch that may be occasionally found in the dredged material being dumped. As such, these species could be potentially impacted by the sediments being discharged overhead. However, NMFS has never received a report of an injury to a sea turtle resulting from burial in, or impacts from, dredged material disposal, neither from inshore or offshore disposal sites, anywhere the USACE conducts dredged material disposal operations. Sea turtles are highly mobile and apparently are able to avoid a descending sediment plume discharged at the surface by a hopper dredge. Even if temporarily enveloped in a sediment plume, NMFS believes the possibility of injury, or burial of normal, healthy sea turtles by dredged material (i.e., sand and silt) disposal, is discountable.

NMFS believes that foraging habitat for sea turtles is not likely a limiting factor in the action area due to the expansive amount of similar habitat nearby. Further, the action area does not contain hard bottom or seagrass resources generally used as foraging habitat by these species. Therefore, we believe that the loss of potential sand bottom foraging habitat adjacent to the nearshore disposal areas from burial by dredged material sediments will have insignificant effects on sea turtles.

Sea turtles may be temporarily unable to use the offshore borrow area described above for forage and shelter habitat due to avoidance of construction activities and related noise. However, the proposed borrow area does not contain resources (coral or seagrasses) typically used by these species as foraging habitat. Therefore, we expect that effects to foraging habitat from beach placement will be insignificant.

7 Cumulative Effects

Cumulative effects include the effects of *future* state, tribal, or local private actions— i.e., that are not already in the baseline—that are reasonably certain to occur in the action area considered in this 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 (50 CFR 402.14). Actions that are reasonably certain to occur would include actions that have some demonstrable commitment to their implementation, such as funding, contracts, agreements or plans.

Sea turtle habitats have been degraded or modified throughout the southeastern United States from activities like coastal development, channel dredging, and boating activities. These threats were discussed above for each species. While the degradation and modification of habitat is not likely the primary reason for the decline of sea turtle abundance or distribution, it has likely been a contributing factor. No future actions with effects beyond those already described are reasonably certain to occur in the action area.

8 Jeopardy Analysis

The analyses conducted in the previous sections of this Opinion provide the basis on which we determine whether the proposed action would be likely to jeopardize the continued existence of Kemp's ridley and loggerhead sea turtles. In Section 6, we outlined how the proposed action would affect these species at the individual level and the magnitude of those effects based on the best available data. Next, we assessed each of these species' response to the effects of the proposed action in terms of overall population effects and whether those effects will jeopardize their continued existence in the context of the status of the species (Section 4), the environmental baseline (Section 5), and the cumulative effects (Section 7).

It is the responsibility of the action agency to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species…" (ESA Section 7(a)(2)). Action agencies must consult with and seek assistance from the NMFS to meet this responsibility. NMFS must ultimately determine in a Biological Opinion whether the action jeopardizes listed species. To *jeopardize the continued existence of* is defined as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). The following jeopardy analysis first considers the effects of the action to determine if we would reasonably expect the action to result in reductions in reproduction, numbers, or distribution of loggerhead, and Kemps ridley sea turtles. The analysis next considers whether any such reduction would in turn result in an appreciable reduction in the likelihood of survival of these species in the wild, and the likelihood of recovery of these species in the wild.

8.1 Loggerhead Turtles (NWA DPS)

The nonlethal trawl capture of up to 13 loggerheads will not result in a reduction in the species' numbers, because relocation efforts are not expected to result in mortality. Turtles captured in the trawling efforts will be released in nearby areas soon after capture. Given the wide spread distribution of sea turtles, and the fact that the animals have large ranges, the capture of turtles and release in nearby areas is not expected to have any effect on the species' distribution. The lack of any lasting impact to animals encountered in relocation trawls also indicates that the activity is not likely to have any effect on the species' reproduction.

The potential lethal take of up to 7 loggerhead sea turtles by hopper dredge is a reduction in numbers. This lethal take could also result in a reduction in reproduction as a result of lost reproductive potential, as this individual could be a female who would have survived other threats and reproduced in the future, thus eliminating her contribution to future generations. All life stages are important to the survival and recovery of sea turtles; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. For example, the take of male juveniles may affect survivorship and recruitment rates into the reproductive population in any given year, and yet not significantly reduce the reproductive potential of the population. A very low percent of hatchlings is typically expected to survive to reproductive age, so the take of hatchlings would have even less potential impact on the population. The death of mature, breeding females can have an immediate effect on the reproductive rate of the species. Sublethal effects on adult females may also reduce reproduction by hindering foraging success, as sufficient energy reserves are probably necessary for producing multiple clutches of eggs in a breeding year. Different age classes may experience varying rates of mortality and resilience. Further, an adult female loggerhead sea turtle can lay 3-4 clutches of eggs every 2-4 years, with 100-130 eggs per clutch. The annual loss of adult female sea turtles, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. A reduction in the distribution of loggerhead sea turtles is not expected from lethal takes during the proposed action. Because all the potential interactions are expected to occur at random throughout the proposed action area and sea turtles generally have large ranges in which they disperse, the distribution of loggerhead sea turtles in the action area is expected to be unaffected.

Whether or not the reductions in loggerhead sea turtle numbers and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival for loggerheads depends on what effect these reductions in numbers and reproduction would have on overall population sizes and trends, i.e., whether the estimated reductions, when viewed within the context of the environmental baseline and status of the species, are of such an extent that adverse effects on population dynamics are appreciable. In Section 4.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (i.e., (Conant et al. 2009b; NMFS-SEFSC 2009). Below we synthesize what that information means both in general terms and the more specific context of the proposed action.

Loggerhead sea turtles are a slow growing, late-maturing species. Because of their longevity, loggerhead sea turtles require high survival rates throughout their life to maintain a population. In other words, late-maturing species cannot tolerate much anthropogenic mortality without going into decline. Conant et al. (2009b) concluded loggerhead natural growth rates are small, natural survival needs to be high, and even low- to moderate mortality can drive the population into decline. Because recruitment to the adult population is slow, population modeling studies suggest even small increased mortality rates in adults and subadults could substantially impact population numbers and viability (Chaloupka and Musick 1997; Crouse et al. 1987; Crowder et al. 1994; Heppell et al. 1995).

The best available information indicates that the NWA loggerhead DPS is still large, but is possibly experiencing more mortality than it can withstand. All of the results of population models in both NMFS SEFSC (2009) and Conant et al. (2009b) indicated western North Atlantic loggerheads were likely to continue to decline in the future unless action was taken to reduce anthropogenic mortality. With the inclusion of newer nesting data beyond the 2007 data used in those analyses, the status of loggerhead nesting is beginning to show improvement. As previously described in the Status of the Species section (Section 4), in 2008 nesting numbers were high, but not enough to change the negative trend line. Nesting dipped again in 2009, but rose substantially in 2010. With the addition of data through 2010, the nesting trend for the NWA DPS of loggerheads is only slightly negative and not statistically different from 0 (no trend) (NMFS and USFWS 2010). Additionally, although the best fit trend line is slightly negative, the range from the statistical analysis of the nesting trend includes both negative and positive growth (NMFS and USFWS 2010). The 2011 nesting was on par with 2010, providing further evidence that the nesting trend may have stabilized and the 2012 index nesting number was the largest since 2000.

To be conservative, we assume that the loggerhead sea turtles that will be taken will be reproductive females, with a higher potential impact on the species relative to take of other stages.

NMFS SEFSC (2009) estimated the minimum adult female population size for the western North Atlantic in the 2004-2008 time frame to likely be between 20,000 and 40,000 (median 30,050) individuals, with a low likelihood of being as many as 70,000 individuals. Estimates were based on the following equation: Adult females = (nests/nests per female) x remigration interval. The estimate of western North Atlantic adult loggerhead female was considered conservative for several reasons. The number of nests used for the western North Atlantic was based primarily on U.S. nesting beaches. Thus, the results are a slight underestimate of total nests because of the inability to collect complete nest counts for many non-U.S. nesting beaches. In estimating the current population size for adult nesting female loggerhead sea turtles, NMFS SEFSC (2009) simplified the number of assumptions and reduced uncertainty by using the minimum total annual nest count over the relevant 5-year period (2004-2008) (i.e., 48,252 nests). This was a particularly conservative assumption considering how the number of nests and nesting females can vary widely from year to year (compared to 2008's nest count of 69,668 nests, which would have increased the adult female estimate proportionately, to between 30,000 and 60,000). In addition, minimal assumptions were made about the distribution of remigration intervals and nests per female parameters, which are fairly robust and well known parameters. Florida's long-term loggerhead nesting data (1989-2012) has shown 3 distinct trends. Following a 23% increase between 1989 and 1998, nest counts declined sharply for over a decade. During the period between the high-count nesting season in 1998 and the most recent (2012) nesting season, researchers found no demonstrable trend, indicating a reversal of the post-1998 decline. The overall change in counts from 1989-2012 is positive. Nest counts in 2012, corrected for subtle variation in survey effort, were slightly below the high nest count recorded in 1998.

Based on the total numbers of adult females estimated by NMFS SEFSC for the western North Atlantic population of loggerhead sea turtles, the anticipated lethal take of 7 loggerheads–in the extremely unlikely worst case that they are all female and adult–resulting from the proposed action would represent the removal of approximately 0.02% ([7/30,000] x 100) of the estimated adult loggerhead female population. This removal is very small and contributes only minimally to the overall mortality on the population. Further, these percentages are likely an overestimation of the impact of the anticipated lethal take resulting from the proposed project on loggerhead sea turtles for the following reason. These percentages represent impacts to adult female loggerhead sea turtles only, and not to the population as a whole. Because this estimated contribution to mortality is a tiny part of our range of uncertainty across what total mortality might be for loggerhead sea turtles, we believe that the small effect posed by the lethal take resulting from the proposed project will not result in a detectable or appreciable reduction in the species' likelihood of survival in the wild.

We also considered the recovery objectives in the recovery plan prepared for the U.S. populations of loggerhead sea turtles that may be affected by the predicted reduction in numbers and reproduction. The Services' recovery plan for the Northwest Atlantic population of the loggerhead turtle (NMFS and USFWS 2009), which is in essence the same population of turtles as comprise the NWA DPS, provides explanation of the goals and vision for recovery for this population. The objective of the recovery plan most pertinent to the threats posed by dredging and beach nourishment activities is Objective 1:

1. Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females.

There are 5 recovery units of loggerhead sea turtles: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). Turtles affected by the proposed action could be from any of the recovery units.

A near-complete nest census of the Peninsular Florida Recovery Unit (all beaches including index nesting beaches) undertaken from 1989 to 2007 showed a mean of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008). The statewide estimated total for 2012 was 98,601 nests (FWRI nesting database). Looking at the data from 1989 through 2012 for index beaches within this unit, FWRI concluded that there was an overall positive change in the nest counts. Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches. Overall, there is strong statistical data to suggest the NRU had experienced a long-term decline during the period from 1980 to 2008. Data since that analysis are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the past declining trend. Nest counts for the Dry Tortugas Recovery Unit ranged from 168-270, with a mean of 246, but with no detectable trend during this period. The dataset from 1997-2008 for index beaches within the Northern Gulf of Mexico Recovery Unit (NGMRU) shows a statistically significant declining trend of 4.7% annually (NMFS and USFWS 2008). Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches and no trend can be determined for this subpopulation. Zurita et al. (2003b) found a statistically significant increase in the number of nests on 7 of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. However, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

As noted above the proposed project may result in the removal of up to 7 female nesting turtles which would result in a reduction in numbers when take occurs and possibly a loss of future reproduction through lost nests and future female offspring. However, given the magnitude of current nesting trends and likely large absolute population size, it is unlikely that a loss of up to 7 individuals will have any detectable influence on the population objectives and trends noted above for any of the recovery units. Therefore, the loss of up to 7 nesting female loggerhead turtles will not interfere with achieving Objective 1. Thus, the proposed action will not result in an appreciable reduction in the likelihood of loggerhead sea turtles' recovery in the wild.

8.2 Kemp's Ridley Turtles

As demonstrated by nesting increases at the main nesting sites in Mexico, adult Kemp's ridley numbers have increased over the last decade. Recent calculations of nesting females determined from nest counts show that the population trend is increasing towards that recovery goal, with an estimate of 4,047 nesters in 2006 and 5,500 in 2007 (Gladys Porter Zoo 2007; NMFS and USFWS 2007c). Recent nesting data indicated a population of an estimated 8,460 females in 2009 and 5,320 females in 2010 (J. Peña, Gladys Porter Zoo, pers. comm. to S. Heberling, NMFS, March 21, 2011). NMFS et al. (2011b) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population is steadily increasing over the long term. Based on this information, the anticipated lethal take of up to 2 Kemp's ridley sea turtles would not be expected to have a detectable effect on the Kemp's ridley sea turtle reproduction or population numbers. Changes in distribution are not expected from lethal takes by hopper dredging during this action. Because the action area is small and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of Kemp's ridley sea turtles is expected from the take of up to 2 individuals.

The nonlethal take of up to 5 Kemp's ridley sea turtles by capture relocation trawling will have no more than temporary, non-injurious effects on them; thus, it will have no effect on numbers or reproduction. Changes in distribution, even short-term, are not expected from nonlethal takes (interactions/releases from relocation trawling, vessel strikes, etc.) during the project. Turtles captured in the trawling efforts will be released in nearby areas soon after capture. Interactions with vessels and/or relocation trawlers may elicit startle or avoidance responses and the effects of the proposed action may result in temporary changes in behavior of sea turtles (minutes to hours) over small areas, but are not expected to change the distribution of any sea turtles in the action area.

Based on the above analysis, we believe that take of Kemp's ridley sea turtles associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of these species in the wild.

The following analysis considers the effects of the take on the likelihood of recovery in the wild. We considered the recovery objectives in the recovery plan prepared for Kemp's ridley sea turtles that may be affected by the predicted reduction in numbers and reproduction.

The recovery plan for Kemp's ridley sea turtles (NMFS and USFWS 1992), herein incorporated by reference, lists the following relevant recovery objective:

- Attain a population of at least 10,000 females nesting in a season.

The potential injury or mortality of up to 2 Kemp's ridley sea turtles will result in a reduction in overall population numbers. We already have determined this take is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Capture of sea turtles by relocation trawlers will not affect the adult female nesting population or number of nests per nesting season because Kemp's ridley sea turtles are not known to nest regularly in or near the project area, and relocated turtles are not prevented from nesting. Thus, the proposed action will not interfere with achieving the recovery objective and will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

9 Conclusion

Using the best available data, we analyzed the effects of the proposed action in the context of the status of the species, the environmental baseline, and cumulative effects, and determined that the proposed action is not likely to jeopardize the continued existence of loggerhead and Kemp's ridley sea turtles. These analyses focused on the impacts to, and population responses of, these species. Because the proposed action will not appreciably reduce the likelihood of survival and recovery of loggerhead or Kemp's ridley sea turtles, it is our Opinion that the proposed action is also not likely to jeopardize the continued existence of these species.

10 Incidental Take Statement

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit take of endangered and 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. *Incidental take* is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

NMFS must estimate the extent of take expected to occur from implementation of the proposed action to frame the limits of the take exemption provided in the Incidental Take Statement. These limits set thresholds that, if exceeded, would be the basis for reinitiating consultation. The following section describes the extent of take that NMFS anticipates will occur as a result of implementing the proposed activity authorized by BOEM in federal waters. The take resulting from the interrelated and interdependent activities authorized by the USACE are covered by and count against incidental take statements in Opinions issued to the USACE. If actual take exceeds an amount (or geographic or temporal extent) specified here, the exemption from the prohibition on take will be invalid for the excess amount, and re-initiation of consultation is required.

10.1 Anticipated Amount of Take

NMFS anticipates incidental take will consist of a total of 8 sea turtles killed during hopper dredging for the Towns' beach renourishment projects. The take will consist of up to 7 loggerhead sea turtles and up to 2 Kemp's ridley sea turtles but still not to exceed a total of 8 turtles of both species combined. Based on previous experience, we believe only 4 of these takes may be entrained, detected, and/or documented by onboard protected species observers if UXO screens are not used. If the UXO screens are used, then we believe that all takes will go unobserved. Therefore, we believe that there will be up to 4 *observed* take of a loggerhead or Kemp's ridley sea turtle in the event that UXO screens are not utilized (up to 3 loggerhead [0.85 x 4] and 1 Kemp's ridley [0.15 x 4]), and there will be no observed take of a loggerhead or Kemp's ridley sea turtle in the event that UXO screens are used. NMFS also anticipates the non-injurious incidental take, by relocation trawling, of up to a total 17 sea turtles (up to 5 Kemp's ridleys, and up to13 loggerheads). Reinitiation of consultation will be required if any of the limits of observed take by hopper dredges is exceeded, or if any of the limits of relocation trawling captures are exceeded, or if there are any lethal takes during relocation trawling.

Effect of the Take
NMFS has determined the anticipated level of incidental take specified in Section 10.1 is not likely to jeopardize the continued existence of loggerhead (NWA DPS) or Kemp's ridley sea turtles.

10.2 Monitoring Incidental Take

The potential use of UXO screening means that any take of sea turtles may go unobserved. In situations where individual takes cannot be observed, a proxy must be considered. This proxy must be rationally connected to the taking and provide an obvious threshold of exempted take that, if exceeded, provides a basis for reinitiating consultation. As explained in Section 8.0 of this Opinion, the estimated number of sea turtles to be adversely affected by this action is related to the volume of material removed via dredge, the time of year and the duration of dredging activity. Therefore, the volume of material removed from the action area can serve as a proxy for monitoring actual take. As explained in the Effects of the Action, we anticipate 9 sea turtles will be killed as a result of dredging 4,825,000 yd^3 of material with a hopper dredge.
This estimate provides a proxy for monitoring the amount of incidental take during dredging operations when UXO screening is in place and direct observations of interactions may not occur. This will be used as the primary method of determining whether incidental take has occurred; that is, we will consider that 8 sea turtles have been taken once 4,825,000 yd^3 of material has been removed during hopper dredging operations with UXO screens employed. There is a possibility that a sea turtle may remain impinged on UXO screens after the suction has been turned off. These animals can be visually observed, via a lookout, when the draghead is lifted above the water. Animals documented on the draghead by the lookout will be considered a take and this monitoring will be considered as a part of the monitoring of the actual take level. Monitoring of the discharge cages will also be used as part of the monitoring. Similarly, should we receive any reports of injured or killed sea turtles in the area (i.e., via the STSSN) and necropsy documents that detail interactions with the hopper dredge operating during this project was the cause of death, we will consider those animals to be taken by these activities.

As soon as the estimated number of sea turtles are observed or believed to be taken any additional entrainment of a sea turtle will be considered to exceed the exempted level of take. We expect exceedance of the exempted amount of take to be unlikely given the conservative assumptions made in calculating this estimate. Lookouts will be present on the vessel and volumes of material removed will be continuously monitored during dredge operations.

11 Reasonable and Prudent Measures (RPMs)

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with Section 7(a)(2) of the ESA. It also states the reasonable and prudent measures (RPMs) necessary to minimize the impacts of take and the terms and conditions to implement those measures, must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required, by 50 CFR 402.01(i)(1)(ii) and (iv), to document the incidental take by the proposed action and to minimize the impact of that take on ESA-listed species. These measures and terms and conditions are nondiscretionary, and must be implemented by BOEM in order for the protection of Section 7(o)(2) to apply. BOEM has a continuing duty to regulate the activity covered by this incidental take statement. If BOEM fails to adhere to the terms and conditions through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

NMFS has determined that the following reasonable and prudent measures must be implemented by BOEM (directly or through mandatory conditions of its authorization for the action):

1. BOEM will have measures in place to monitor and report all interactions with any protected species resulting from the proposed action. Reports shall be sent to the Assistant Regional Administrator (Mr. David Bernhart) for NMFS's Protected Resources Division, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, Florida 33701-5505.

2. If hopper dredging is used once SST are above 10°C (50°F) in the area, then sea turtle abundance trawling will be used prior to dredging. Depending on the results of abundance trawling, relocation trawling may be required as specified in Term and Condition 3 below.

3. BOEM shall implement best management practices, including the use sea turtle deflector dragheads, intake, and overflow screening to reduce the risk of injury or mortality of listed species and lessen the number of sea turtles killed by the proposed action.

13 Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, BOEM and/or the lessee are required to comply with the terms and conditions that implement the RPMs. The following terms and conditions are nondiscretionary. BOEM shall condition the lease/permit to require the following terms and conditions to minimize the effects of take on loggerhead, green, and Kemp's ridley sea turtles:

1. A project report summarizing the results of the dredging and the sea turtle take (if any) must be submitted to NMFS within 30 working days of completion. Reports shall contain information on project location, start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takings (include photographs, if available) and sightings of protected species, mitigating actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the BOEM and/or

contractor deems relevant. This report must be provided to NMFS's Protected Resources Division at the address provided in RPM No. 1 above, and notification of take shall be provided to NMFS at the following email address within 24 hours, referencing the present Opinion by NMFS identifier number (SER-2015-15988), title, and date: takereport.nmfsser@noaa.gov. BOEM shall provide NMFS's Southeast Regional Office (address provided in RPM No. 1 above) with an end-of-project relocation trawling report within 30 days of completion of relocation trawling. This report may be included within the project report (RPM No. 1).

2. The BOEM project manager shall notify the Sea Turtle Stranding and Salvage Network (STSSN) state representative (contact information available at http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and ask to be notified of any sea turtle strandings in the project area that, in the estimation of the STSSN personnel, bear signs of potential draghead impingement or entrainment. Information on any such strandings shall be reported in writing within 30 days of project end to NMFS's Southeast Regional Office (address provided in RPM No. 1 above), or included in the project report (RPM No. 1).

3. Abundance trawling will be employed 5 days prior to the commencement of hopper dredging if SST is above 10°C, to determine relative abundance of sea turtles in the area. If 1 turtle is captured during preliminary abundance trawling, then relocation trawling shall be employed during the remainder of the dredging operation. If no turtles are captured during abundance trawling, relocation trawling shall not be required and dredging may proceed. The taking of one sea turtle of any species during hopper dredging will trigger the need for relocation trawling to be enacted for the remainder of the dredge operation. The dredge will shut down until relocation trawling can commence. If during subsequent months of relocation trawling no turtles are taken, then the County may ask BOEM to confer with NMFS for a cessation of relocation trawling (RPM No. 2).

4. If relocation trawling is used then the following conditions must be observed during relocation trawling (RPM No. 2):

   a. Trawl Time: Trawl tow-time duration shall not exceed 42 minutes (doors in-doors out) and trawl speeds shall not exceed 3.5 kt.

   b. Handling During Trawling: Sea turtles and sturgeon captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, by implementing the measures below.

   c. Captured Turtle Holding Conditions: Captured turtles shall be kept moist, and shaded whenever possible, until they are released. They may be held for up to 24 hours if opportunistic, ancillary, “piggy-back” data gathering (e.g., opportunistic satellite tagging) is proposed. This Opinion provides the authority to NMFS-approved observers to satellite tag captured sea turtles without the need for an ESA Section 10 permit.

d. Weight and Size Measurements and Tagging: All turtles shall be measured (standard carapace measurements including body depth), tagged (PIT or Inconel), and weighed prior to release when safely possible; smalltooth sawfish shall be measured (fork length and total length) and, when safely possible, tagged, weighed, and a tissue sample taken prior to release. Only NMFS-approved observers or observer candidates in training under the direct supervision of a NMFS-approved observer shall conduct the tagging/measuring/weighing/tissue sampling operations.

Flipper Tagging: All sea turtles captured by relocation trawling shall be flipper-tagged prior to release with external tags that shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. This Opinion serves as the permitting authority for any NMFS-approved endangered species observer a relocation trawler to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this authority.

PIT Tagging and Scanning: All sea turtles captured by relocation trawling or dredges shall be thoroughly scanned for the presence of PIT tags prior to release using a scanner powerful enough to read dual frequencies (125 and 134 kHz) and read tags deeply embedded deep in muscle tissue (e.g., manufactured by Biomark or Avid). Turtles which have been previously PIT tagged shall nevertheless be externally flipper-tagged. PIT tagging may only be conducted by observers with PIT-tagging training or experience. This Opinion provides the authority to NMFS-approved observers to PIT tag captured sea turtles without the need for an ESA Section 10 permit. The data collected (PIT-tag scan data and external tagging data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa Belskis at the following email address: Lisa.Belskis@noaa.gov.

e. Take and Release Time During Trawling - Turtles: Turtles shall be kept no longer than 24 hours prior to release (except as noted in 5.c. above) and shall be released not less than 3 nmi from the dredge site. Recaptured turtles shall be released not less than 5 nmi away and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f. Injuries and Incidental Take Quota: Any protected species injured or killed in federal waters during or as a consequence of relocation trawling shall count toward the incidental take quota. Minor skin abrasions resulting from trawl capture are considered non-injurious. Injured sea turtles shall be immediately transported by Dare County or its contractor at its own expense to the nearest sea turtle rehabilitation facility; all rehabilitation costs and sea turtle transportation costs shall be borne by Dare County or its contractor. If it is determined that the turtle cannot be released NMFS and the rehab facility will determine the best course of action along with a cost estimate for continued care.

g. CMTTP: External flipper tag and PIT-tag data generated and collected by relocation trawlers shall also be submitted to the Cooperative Marine Turtle Tagging Program (CMTTP), on the appropriate CMTTP form, at the University of Florida's Archie Carr Center for Sea Turtle Research.

h. Tissue Sampling: All live or dead sea turtles captured by relocation trawling or dredging shall be tissue-sampled prior to release, according to the protocols described in Appendix II or Appendix III of the November 19, 2003, Gulf of Mexico Regional Biological Opinion on Hopper Dredging, as revised through Revision No. 2, included as Appendix C of this opinion. Tissue samples shall be sent within 60 days of capture to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. A copy of the Protected Species Incidental Take Form should accompany the sample. The present opinion to BOEM serves as the permitting authority for any NMFS-approved endangered species observers aboard relocation trawlers or hopper dredges to tissue-sample live- or dead-captured sea turtles, without the need for an ESA Section 10 permit.

5. For the proposed action, 100% shipboard observer monitoring of inflow screens is required year-round. If conditions disallow 100% inflow screening, inflow screening can be reduced gradually. But effective, 100% overflow screening is then required, and an explanation must be included in the project report, and NMFS notified beforehand.

   If the dredge is not using UXO screening, then the hopper's inflow screens should initially have 4-in by 4-in screening, for effective screening and capture of entrained protected species body parts. NMFS believes this is workable for sand mining operations where a minimum of debris is expected to be encountered. However, if BOEM, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the mesh size may be increased after prior consultation with and approval by NMFS, to 8-in by 8-in; if this still clogs, then 16-in by 16-in openings. NMFS believes that this flexible, graduated-screen option is prudent since the need to constantly clear the inflow screens will increase the time it takes to complete the project; therefore, it will increase the exposure of sea turtles to the risk of impingement or entrainment. Inflow screen clogging should be greatly reduced with these flexible options; however, further clogging (e.g., as when encountering heavy clay or debris) may compel removal of the inflow screening altogether, in which case *effective* 100% overflow screening is mandatory.

   BOEM shall notify NMFS *beforehand* if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved. NMFS, in consultation with the dredging company and BOEM, shall determine what constitutes effective overflow screening (RPM 3).

6. BOEM will require the use of rigid sea turtle deflectors on all hopper dragheads. The hopper dredge's sea turtle deflector draghead is to be inspected prior to startup of hopper dredging operations. In addition, BOEM shall ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize sea turtle takes (RPM 3).

14 Conservation Recommendations

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

NMFS believes the following conservation recommendations further the conservation of listed and proposed coral species. NMFS strongly recommends that these measures be considered and implemented, and requests to be notified of their implementation.

1. To the extent practicable, BOEM should schedule dredging operations at times of year when listed species are least likely to be present in the borrow area.

2. Whenever it is possible, outfit a hopper dredge with a rigid deflector draghead as designed by the USACE Engineering Research and Development Center. Or if that is unavailable, a rigid sea turtle deflector should be attached to the draghead.

3. To the extent practicable, BOEM should minimize the use of hopper dredges in favor of cutterhead dredges.

4. BOEM should conduct studies in conjunction with cutterhead dredging where disposal occurs on the beach to assess the potential for improved screening to: (1) establish the type and size of biological material that may be entrained in the cutterhead dredge, and (2) verify that monitoring the disposal site without screening is providing an accurate assessment of entrained material.

5. BOEM should support studies to determine the effectiveness of using a sea turtle deflector to minimize the potential entrainment of sturgeon during hopper dredging.

6. BOEM should explore alternative means for monitoring for interactions with listed species when UXO screening is in place including exploring the potential for video or other electronic monitoring and consider designing pilot studies to test the efficiency of innovative monitoring and screening techniques.

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

15 Reinitiation of Consultation

As provided in 50 CFR Section 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 taking specified in the ITS is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Biological Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

Dredging/Trawling Operations During Reinitiation of Consultation: Once the need for reinitiation is triggered, BOEM is not necessarily required to suspend dredging or relocation trawling operations pending the conclusion of the reinitiated consultation, so long as the continuation of operations would not violate Section 7(a)(2) or 7(d) of the ESA. In that case, BOEM is advised to document its determination that these provisions would not be violated by continuing activities covered by this Opinion during the reinitiation period and to seek NMFS's concurrence with its findings.

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APPENDIX A

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

APPENDIX B

Background

Vessel Strike Avoidance Measures and Injured or Dead Protected Species Reporting
NOAA Fisheries Service, Southeast Region

NOAA Fisheries Service has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures are recommended to reduce the risk associated with vessel strikes or disturbance of these protected species. NOAA Fisheries Service should be contacted to identify any additional conservation and recovery issues of concern for protected species in your operating area.

Protected Species Identification Training
Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify the species of marine mammals and sea turtles that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance
The following measures must be taken in order to avoid causing injury or death to marine mammals and sea turtles:

1. Vessel operators and crews will maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 kt or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel will attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners should check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners.

Injured or Dead Protected Species Reporting

Vessel crews will report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 305-862-2850
Report sea turtles to the Southeast Regional Office: 727-824-5312

If your vessel is responsible for the injury or death, the responsible parties will remain available to assist the respective salvage and stranding network as needed. In addition, if the injury or death was caused by a collision with your vessel, you must notify the Southeast Regional Office immediately of the strike by telephone at (727) 824-5312, or by fax at (727) 824-5309. The report should include the following information:

a. the time, date, and location (latitude/longitude) of the incident;

b. the name and type of the vessel involved;

c. the vessel's speed during the incident;

d. a description of the incident;

e. water depth;

f. environmental conditions (e.g., wind speed and direction, sea state, cloud cover, and visibility);

g. the species identification or description of the animal, if possible; and

h. the fate of the animal.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Fl 33701

Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov

APPENDIX C

DEPARTMENT OF THE ARMY
SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS
ROOM 313, 77 FORSYTH ST., S.W.
ATLANTA, GEORGIA 30335-6801

REPLY TO
ATTENTION OF:

CESAD-ET-PR (1105-2-10b)

29 OCT 1997

MEMORANDUM FOR

COMMANDER, CHARLESTON DISTRICT
COMMANDER, JACKSONVILLE DISTRICT
COMMANDER, SAVANNAH DISTRICT
COMMANDER, WILMINGTON DISTRICT

Subject: National Marine Fisheries Service, Regional Biological Opinion on Hopper Dredging along the South Atlantic Coast

1. Reference the Endangered Species Act Section 7 Consultation, Biological Opinion for The Continued Hopper Dredging of Channels and Borrow Areas in the Southeastern United States, National Marine Fisheries Service (NMFS) 25 September 1997 (Encl 1).

2. The referenced document was sent to your District Sea Turtle Coordinator by electronic mail on 29 September 1997, without the signed NMFS transmittal letter. The purpose of this memorandum is to transmit copies of the complete document to you, and to provide some guidance on its implementation.

3. During the spring of 1997 we experienced an unanticipated high level of sea turtle entrainments in our hopper dredges along the Atlantic coast. Within a month of starting work, we were approaching our incidental take limit for loggerheads, despite having taken all sea turtle protection measures we had available to us. Our commitment to protect sea turtles while maintaining safe navigation channels for defense and commerce, forced us to make some very hard choices. The result was that from March until the new Regional Biological Opinion (RBO) went into effect on 1 October 1997, we had taken 29 loggerhead sea turtles, completed work at six projects and terminated the remaining six projects with less than about half of the work being completed. Fortunately we did not take any of the endangered species of sea turtles and we were able to complete most of the critical work, or critical project reaches, during that period.

4. The Corps of Engineers has a commitment to protect sea turtles, as was exemplified by our willingness to terminate Corps projects and the NMFS reciprocated by being very cooperative during the Section 7 Consultation process.

29 OCT 1997

We received an Interim Biological Opinion which extended our incidental take of loggerhead sea turtles from 20 to 35, enabling us to resume our necessary hopper dredging after just a brief delay. We must continue to do everything we can to maintain this excellent working relationship with the NMFS.

5. In implementing the new 1997 RBO, we again renew our commitment to maintaining a balance between reducing sea turtle entrainments to the lowest levels we can achieve while performing necessary dredging for navigation. The Hopper Dredging Protocol for Atlantic Coast (Encl 2) is our guidance for helping achieve this objective. The Protocol is a living document and will be revised by CESAD as appropriate. Your input into improving the Protocol is welcomed at any time, as are any suggestions you may have on how we can further reduce sea turtle takes. I also encourage you to share your views and ideas on this through our Internet newsgroup, usace.sad.turtles.

6. Should you have any questions or would like additional information, you may contact John DeVeaux, CESAD-ET-CO, at (404) 331-6742 or Rudy Nyc, CESAD-ET-PR, at (404) 331-4619 or by e-mail which is preferred.

I know you all are working this hard... your thoughts/suggestions are welcome –

R. L. Vanantwerp

2 Encl
as

R. L. VANANTWERP
Brigadier General, USA
Commanding

CF (w/encls):
COMMANDER, MOBILE DISTRICT

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

SEP 25 1997

R. L. VanAntwerp
Brigadier General, U.S. Army
Division Engineer
South Atlantic Division, Corps of Engineers
Room 313, 77 Forshyth St., S.W.
Atlanta, Georgia 30355-6801

Dear Brigadier General VanAntwerp;

Enclosed is the regional biological opinion concerning the use of hopper dredges in channels and borrow areas along the Southeast U.S. Atlantic coast. This biological opinion amends the regional opinion conducted in 1995, and supersedes the interim biological opinion issued on April 9, 1997. The opinion recognizes the efforts of the Corps of Engineer's (COE) South Atlantic Division (SAD) to minimize sea turtle takes through application of new technology such as draghead deflectors, seasonal dredging windows, termination of projects in which high rates of turtle takes are observed, and elevated staff effort to identify and resolve site-specific problems. Despite these major efforts and continuing plans by the COE to improve the effectiveness of the rigid draghead deflector and to resolve dredging schedules to reduce the likelihood of sea turtle interactions, NMFS believes that further sea turtle takes are likely in future years. However, we believe that these takes are not likely to jeopardize the continued existence of any species. An annual incidental take, by injury or mortality of 35 loggerheads 7 Kemp's ridleys, 7 green turtles, 2 hawksbills, and 5 shortnose sturgeon is listed in the incidental take statement appended to the enclosed opinion. This annual take level can be monitored over fiscal years to be consistent with project contracts.

I appreciate your continued commitment to reduce sea turtle takes associated with dredging in your Division. COE Division and District staff have facilitated the excellent working relationship that exists between our offices within the SAD. We look forward to continuing these cooperative efforts in sea turtle conservation.

Sincerely,

for Montanio
Hilda Diaz-Soltero
Office Director
Office of Protected Resources

Endangered Species Act - Section 7 Consultation

Biological Opinion

Agency: U.S. Army Corps of Engineers, South Atlantic Division

Activity: The continued hopper dredging of channels and borrow areas in the southeastern United States

Consultation Conducted By: National Marine Fisheries Service, Southeast Regional Office

Date Issued: September 25, 1997

Background

Hopper dredging in channels and borrow areas along the southeastern coast of the United States during the spring of 1997 resulted in an unanticipated high rate of loggerhead turtle take. The number of takes quickly approached the incidental take level established in the regional biological opinion (BO) issued to the Army Corps of Engineers (COE) on August 25, 1995. A formal consultation considering the take rates as well as the dredging locations and conditions was conducted and an interim biological opinion (IBO) was issued on April 9, 1997 and is incorporated herein by reference. The IBO concluded that continued hopper dredging during the 1997 fiscal year was likely to take additional sea turtles but was not likely to jeopardize the continued existence of any species. The incidental take, by injury or mortality, of seven (7) documented Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, sixteen (16) loggerhead turtles, and five (5) shortnose sturgeon was set pursuant in the IBO. This modification added 15 loggerheads to the annual incidental take level, bringing the 1997 fiscal year total incidental take level to 35 loggerheads.

The history of Endangered Species Act (ESA) Section 7 consultations on the deployment of hopper dredges to maintain the depths of southeastern channels is discussed in the August 25, 1995 BO and is incorporated herein by reference. Although no endangered sea turtles have been taken in any channel dredging projects during the 1997 fiscal year, 28 loggerheads have been taken, including 9 loggerheads taken subsequent to the issuance of the IBO (Table 1).

During 1997, the COE responded to high rates of sea turtle takes by assessing each dredging project, modifying draghead deflectors when apparently necessary, conducting relative abundance surveys and relocation trawling, and ultimately ending a number of projects prior to completion (Kings Bay, Brunswick Harbor, Savannah Harbor, Morehead City).

1991 Biological Opinion

Two hundred twenty-five sea turtle takes, including 22 live turtles, were documented between 1980 and 1990 in the Southeast channels despite limited observer coverage in most channels throughout most of that decade (Table 2a.). Seventy-one of these turtles were taken in four months of dredging in the Canaveral ship channel in 1980, the first year in which observers were required. Twenty-one were observed in over two years of dredging in the Kings Bay Channel in 1987-1989, after observers were first deployed on dredges in that channel. Observers were required on most hopper dredges after 1989. Documented takes of turtles on dredges in Brunswick and other Southeast U.S. channels indicated that sea turtles were vulnerable to hopper dredges in all southeastern channels during warmer months. These observations resulted in the Section 7 consultation that concluded with a BO issued on November 25, 1991.

The November 1991 BO was the first cumulative area consultation between NMFS and COE's South Atlantic Division (SAD) regarding hopper dredging. The BO considered hopper dredging in channels from the Canaveral in Florida through Oregon Inlet, North Carolina. The 1991 BO concluded that continued unrestricted hopper dredging in Southeast U.S. channels could jeopardize the continued existence of listed sea turtles. The Opinion established a reasonable and prudent alternative to unrestricted hopper dredging which prohibited the use of a hopper dredge in the Canaveral ship channel, and from April 1 through November 30 in other southeastern channels north of Canaveral. An incidental take level was established based on assumptions that takes would be significantly reduced due to limited dredging windows, but that water temperatures in some years would result in turtle presence in channels during December and March. Observers were required on dredges equipped with outflow and/or inflow screening in March and December. The presence or absence of turtles in December would determine the further need for observer coverage into January. The documented incidental take of a total of five (5) Kemp's ridley, green, hawksbill or leatherback turtle mortalities in any combination of which no more than two (2) are Kemp's ridley, or fifty (50) loggerhead turtle mortalities was set. The Opinion anticipated that seasonal restrictions on hopper dredging would be adjusted on a channel-by-channel basis as better information on turtle occurrence was collected.

Additionally, the development and testing of a draghead deflector was promoted.

1995 Biological Opinion

Between 1992 and 1995, only 16 sea turtle takes were documented (Table 2b.), including three that were alive when collected during dredging operations in the SAD under the dredging windows established in the November 1991 BO (see above). During that period COE developed a rigid draghead deflector that appeared to be effective during videotaped dredging trials using mock turtles, as well as during experimental dredging associated with trawling in the Canaveral Channel. COE also completed a study of six Southeast channels to determine seasonal abundance and spatial distribution of these turtles. A discussion of the findings can be found in the COE report entitled "Assessment of Sea Turtle Abundance in Six South Atlantic U.S. Channels" (Dickerson et al. 1994), summarized in the 1995 BO. Based on the new information, COE requested expanded dredging windows and observer requirements. NMFS considered their request and developed alternative dredging windows and observer requirements and added requirements for the use of hopper dredges in borrow areas along the east coast.

After 1995, COE districts within the SAD generally required observers in some channels, such as Kings Bay, throughout the winter, beyond the new monitoring windows. SAD hopper dredge projects were initially conducted in the middle of the dredging windows, when nearshore waters were cool. During 1996, only nine sea turtle takes, including one green turtle and eight loggerheads, were documented (Table 2c.). No more than three takes occurred in any project. The new dredging windows and draghead deflector requirements appeared to provide good protection to sea turtles.

Hopper dredging operations contracted for the 1997 fiscal year were planned for early in the calendar year, however a number of operations were not begun until late winter. Beginning on March 2, 1997, loggerhead takes occurred in Kings Bay at rates higher than previously observed. Six turtles were taken in four days of dredging. While consulting with NMFS regarding this unprecedented rate of loggerhead takes, a COE specialist from the Waterways Experiment Station proposed some modifications to the draghead with the potential to reduce sea turtle takes. Relocation trawling was also initiated, beginning March 9,1997; however, as can be seen on Table 2, these efforts did not preclude further sea turtle takes in Kings Bay. Dredging was terminated on March 12, 1997, with only 53 percent of the project completed.

Table 1 lists the sea turtle takes observed in hopper dredges throughout the SAD during 1997, as well as the steps taken by COE to reduce the likelihood of takes. Deflector dragheads were re-engineered to fit specific dredges wherever possible and relocation trawling was initiated. Dredging was terminated prior to completion of projects in Kings Bay, Brunswick Harbor, Savannah Harbor and Charleston Harbor. Consultation was reinitiated to consider the effects of the remaining hopper dredging projects anticipated for the 1997 fiscal year. In addition to those specific projects listed in the resulting April 1997 IBO, dredging at Reach II of the Myrtle Beach dredge disposal area is likely to begin before the fiscal year ends. Despite ongoing dredging at the Oregon Inlet, no sea turtle takes have been documented since May 15.

Proposed Activity

This consultation addresses the use of hopper dredges in channels and borrow areas along the Atlantic portion of COE's SAD within the existing dredging windows (Table 3). Channels dredged by hopper dredges include: Oregon Inlet, Morehead and Wilmington Harbors, Charleston, Port Royal and Savannah harbors, Brunswick, Kings Bay, Jacksonville, St. Augustine and Ponce de Leon inlets, West Palm Beach, Miami and Key west channels. Borrow areas that may be dredged by hopper dredges include areas off of Dade County Florida and Myrtle Beach South Carolina.

Draghead deflectors will be used on all projects and observers will be required at least during those periods identified in Table 3. Year-round observer coverage will likely be required by the COE for most channels, particularly those with histories of high sea turtle catch rates such as Kings Bay. Within the South Atlantic Division, the COE will try to schedule dredging of the highest risk areas (Canaveral, Brunswick, Savannah, and Kings Bay) during periods when nearshore waters are coolest -- after December 15 but well before March. Priority for winter dredging will also be given to areas that have substrates that reduce the efficiency of the deflector (Wilmington Harbor channel, Reach 1 of Myrtle Beach). Completion of all projects during the cold-water months will be attempted when possible.

Listed Species and Critical Habitat

Listed species under the jurisdiction of the NMFS that may occur in channels along the southeastern United States and which may be affected by dredging include:

THREATENED:
(1) the threatened loggerhead turtle - Caretta caretta

ENDANGERED:

(1) the endangered right whale - Eubalaena glacialis
(2) the humpback whale - Megaptera novaeangliae
(3) the endangered/threatened green turtle - Chelonia mydas
(4) the endangered Kemp's ridley turtle - Lepidochelys kempii
(5) the endangered hawksbill turtle - Eretmochelys imbricata
(6) the endangered shortnose sturgeon - Acipenser brevirostrum

Green turtles in U.S. waters are listed as threatened, except for the Florida breeding population which is listed as endangered.

Additional endangered species which are known to occur along the Atlantic coast include the finback (Balaenoptera physalus), the sei (Balaenoptera borealis), and sperm (Physeter macrocephalus) whales and the leatherback sea turtle (Dermochelys coriacea). NMFS has determined that these species are unlikely to be adversely affected by hopper dredging activities.

Information on the biology and distribution of sea turtles can be found in the 1991 and 1995 BOs, which are incorporated by reference. Channel specific information has been collected by COE for channels at Morehead City, Charleston, Savannah, Brunswick, Fernandina and Canaveral, and is presented in detail in COE summary report entitled "Assessment of Sea Turtle Abundance in Six South Atlantic US Channels" (Dickerson et al., 1994) and in the COE Biological Assessment.

There is no significant new information regarding the status of these species that has not been discussed in the BOs that have been incorporated by reference (March 12, 1997 and August 25, 1995).

Assessment of Impacts

The Biological Opinion issued in 1991 contained strict dredging windows that appeared to be very effective at limiting the number of sea turtles taken by hopper dredges during channel maintenance dredging in the Southeast U.S. along the Atlantic coast. Between 1991 and 1995, no more than 8 turtles were taken in any year, and many of those taken were released alive. Studies conducted by the COE (Dickerson et al., 1994) documented turtle distribution and abundance in six channels that suggesting the existing windows were accurate. However, the COE requested expansion of existing windows to lessen the burden of maintenance dredging while testing and further developing a rigid draghead deflector design. The deflector was effective at pushing aside mock turtles when tested during 1994, and preliminary field trials in the Canaveral shipping channel had encouraging results. NMFS considered this new information, presented by the COE in a biological assessment forwarded to NMFS in November 1994. The resulting BO, issued August 25 1995 expanded dredging windows and modified observer requirements.

Only 9 sea turtle takes were documented in 1996, suggesting that the expanded dredging windows and the deflector requirements provided protection to sea turtles that was similar to the previously more-restrictive windows. However, the COE's internal policy resulted in conduct of most of the hopper dredging projects during months when coastal waters were still cold, consistent with the previous dredging. The increased rate of take observed during 1997 and discussed below suggests that the restriction of hopper dredging to months when nearshore waters are cold remains the best method for minimizing sea turtle takes.

Unfortunately, a number of dredging projects contracted for early 1997 in the SAD but not restricted to mid-winter months, were delayed into the Spring. This delay coincided with a unseasonably warm winter, when the waters of Kings Bay reached 60°F in early March. The incidental take of nine loggerheads in Kings Bay over only 11 days of dredging indicated that the nearshore abundance of loggerheads was high, apparently higher than during the late 1980's when observers were first deployed on hopper dredges in Kings Bay.

There were other indicators of high nearshore sea turtle abundance along the Southeast U.S. Atlantic coast during 1997. Commercial shrimp trawling conducted without the use of turtle excluder devices (TEDs) offshore of South Carolina and Georgia between May 15 and July 15 resulted in sea turtle catch rates higher than previously documented. Sixty nine sea turtles were taken in 29 days of shrimping off of South Carolina, including 65 loggerheads, 3 ridleys and 1 leatherback. Forty-six sea turtles were taken in 17 days of towing off of Georgia. The sea turtle catch per unit effort (CPUE) for this operation is about 0.35 turtles per hour of trawling, standardized to 100 feet (30.5 m) of total headrope length fished. The CPUE (same units) for commercial shrimp trawling in the 1970s and 1980s reported by Henwood and Stuntz (1987a) was only 0.0487. Loggerhead turtles were the predominant species reported by Henwood and Stuntz and have also been predominantly observed in this study. They account for most of the increase in overall CPUE. The CPUE for loggerheads alone has been greater than 0.30 turtles per hour, while the value reported in Henwood and Stuntz was 0.0456 turtles per hour. The rates of taking for leatherback and Kemp's ridley turtles in the Atlantic study area have also been higher than anticipated.

The high relative density of sea turtles during 1997 may be due to an unseasonably warm winter or other factors contributing to annual variations in abundance, due to an actual increase in the abundance of benthic immature sea turtles in the loggerhead population, or due to a combination of these factors. Trends in the status of loggerheads are generally identified at the nesting beach, when the most accessible life stage, adult nesting females, can be counted. Because they mature at 20 to 30 years of age, increases or decreases in the abundance of benthic immature loggerheads as determined by incidental captures in nearshore waters would not be observed for decades. While nesting beach surveys suggest that the South Florida population of loggerheads increased and now appears to be stable, increases have not been apparent on nesting beaches of Georgia and South Carolina. Further work on the development of multi-year in-water sampling sites is needed to identify trends in multiple age-classes of the loggerhead population.

The COE noted that 14 of the 28 takes that occurred during 1997 were on the same dredge, the Eagle. The high rate of takes, particularly on this dredge, suggested that the deflecting draghead was not installed properly or was not being operated properly. Takes occurred in a number of the 1997 dredge projects during clean-up. Ridges left behind after the initial dredging are leveled during clean-up, but the draghead passes over troughs. Takes occurring during clean-up may be difficult to avoid since the draghead deflector must remain hard on the bottom to be effective.

The COE has been conducting meetings between districts within the SAD to discuss the results of assessments of channel conditions and dredge inspections. They have determined that the draghead deflector has not been working properly due to poor education of the dredge operators on its proper use, and due to poor tailoring of the deflector to specific dragheads. Increased efforts to educate dredge operators are planned. Additionally, since fewer than 10 private hopper dredges operate within SAD, engineers that have designed the conceptual deflector will be sent to the dredges to insure that the deflectors are adapted to each draghead and that the operators understand how to use the deflector effectively.

CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal actions, that are reasonably certain to occur within the action area of the Federal action subject to consultation. These are discussed in detail in the biological opinions incorporated by reference.

Conclusion:

NMFS believes that the elevated rate of observed sea turtle takes by dredges in the southeastern United States during March of 1997 was likely due to increased abundance of loggerheads in nearshore waters due to an unseasonably warm winter. There is no way to predict whether similar conditions will be encountered in upcoming seasons. Over the past six years, the COE's SAD has continuously expressed a commitment to minimize sea turtle takes, and has conducted research and taken repeated steps to further this goal. Repeated termination of dredging operations due to high sea turtle takes during 1997 confirms their commitment to avoid sea turtle takes. Further efforts to educate the dredging industry and recruit their interest and involvement in avoiding sea turtle takes are necessary and are planned by the COE. Additionally, the COE has committed to additional efforts to improve the effectiveness of the deflecting draghead. The sea turtle deflector should be tailored to each hopper dredge draghead and the dredge operators should be fully trained in the operation of the draghead to ensure proper use and improve effectiveness. Improvements in operator and deflector performance are necessary prior to reliance on the draghead as a mechanism for reducing sea turtle takes.

NMFS anticipates that the COE's interest in improving the performance of the deflector, their commitment to limit the use of hopper dredges in channels of high sea turtle abundance during periods when nearshore waters are likely to be cold, and their overall goal of further reducing sea turtle takes during hopper dredge activities will minimize the interactions of hopper dredges with sea turtles. However, annual variation in the abundance of sea turtles in some channels and borrow areas make it likely that sea turtle takes will still occur. Additionally, overall increases in loggerhead and Kemp's ridley populations are anticipated due to TED requirements that have reduced the mortality rates of benthic lifestages of these species. Lastly, in some years high levels of hopper dredging activity may be necessary. For example, termination of projects prior to completion during FY 1997 may result in an increase in the number and length of hopper dredging projects necessary for channel maintenance during FY 1998. Therefore, NMFS believes that up to 35 loggerheads may be taken by injury or mortality, as well as 7 Kemp's ridleys, 7 green turtles, 2 hawksbills, and 5 shortnose sturgeon. These takes are not likely to jeopardize the continued existence of these species and the ongoing commitment by the COE to further minimize takes may reduce the likelihood of sea turtle takes in the future even if nearshore sea turtle abundances increase.

Conservation Recommendations

Pursuant to section 7(a)(1) of the ESA, conservation recommendations are made to assist COE in reducing or eliminating adverse impacts to loggerhead, green, and Kemp's ridley turtles that result from hopper dredging in the southeastern United States. The recommendations made in the 1995 BO are pertinent to this consultation as well, and therefore remain valid. Further recommendations are given below.

- Because of the possibility of annual variation in water temperatures, sea turtle abundance, and hopper dredging demand, NMFS has retained the dredging windows established in the 1995 BO. However, the COE has expressed a commitment to deploy hopper dredges during cold-water periods in channels with high sea turtle abundance or with substrates that render the deflector ineffective. NMFS appreciates the COE's commitment to do this, and recommends that the SAD priority list be finalized and distributed to the Districts and NMFS prior to the initiation of dredging during FY 1998.

- The COE should work with the dredging industry to insure their understanding of the importance of sea turtle conservation and to increase the industry's interest in minimizing sea turtle takes.

- Greater than 50% of the loggerheads taken in North Carolina may be from the northern nesting assemblage of loggerheads. While recent loggerhead nesting beach surveys did not identify a decline in the number of nesting females on beaches north of Cape Canaveral, increases observed in the south Florida nesting assemblage have not been noted. High sea turtle catch rates during only the early weeks of the wood debris clean-up conducted by COE off Cape Fear during 1997, as well as preliminary work conducted in North Carolina, suggest that turtles may be abundant in North Carolina channels primarily during migration into and emigration out of North Carolina inshore waters. The COE should work with the NMFS Beaufort Laboratory and the North Carolina Division of Marine Fisheries to document the movements of sea turtles off North Carolina during spring and fall months. Results from these studies may provide insights into further safe dredging windows to minimize the likelihood of takes of loggerheads from the more vulnerable northern nesting assemblage. Summer windows would reduce the pressure to complete all SAD hopper dredging during cold-water periods.

- The COE should investigate further modifications of the draghead to minimize the need for clean-up. Some method to level the peaks and valleys created by dredging would reduce the amount of time dragheads are removed from the bottom sediments.

Incidental Take Statement

Section 7(b)(4) of the Endangered Species Act (ESA) requires that when a proposed agency action is found to be consistent with section 7(a)(2) of the ESA, and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. It also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided that are necessary to minimize such impacts. Only incidental taking resulting from the agency action, including incidental takings caused by activities approved by the agency, that are identified in this statement and that comply with the specified reasonable and prudent alternatives, and terms and conditions, are exempt from the takings prohibition of section 9(a), pursuant to section 7 of the ESA.

Based on the high rate of sea turtle takes observed during of 1997, increases in the Kemp's ridley population, possible increases in the benthic lifestages of loggerhead populations, annual variation in nearshore abundance of sea turtles and hopper dredge demands, the NMFS anticipates that hopper dredging in the Southeast U.S. Atlantic area of the SAD may result in the injury or mortality of sea turtles and shortnose sturgeon. Therefore, a low level of incidental take, and terms and conditions necessary to minimize and monitor takes, are established. The annual (by fiscal year) documented incidental take, by injury or mortality, of seven (7) Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, thirty-five (35) loggerhead turtles, and five (5) shortnose sturgeon is set pursuant to section 7(b)(4) of the ESA.

To ensure that the specified levels of take are not exceeded early in any project, COE should reinitiate consultation for any project in which more than one turtle is taken within 24 hours, or once five or more turtles are taken. The Southeast Region, NMFS, will cooperate with COE in the review of such incidents to determine the need for developing further mitigation measures or to terminate the remaining dredging activity.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the Marine Mammal Protection Act of 1972 (MMPA). Since no incidental take in the Atlantic Region has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered right whales is provided.

The reasonable and prudent measures that the NMFS believes are necessary to minimize the impact of hopper dredging in channels and borrow areas in the southeastern United States have been discussed with COE. The following terms and conditions are established, in addition to those identified in the 1995 BO, to implement these measures and to document the incidental take should such take occur.

1. The COE's draghead deflector engineer that assistant in this design design should inspect the rigid draghead deflector annually to ensure that the deflector has been tailored appropriately to each draghead. Additionally, the inspector should assess whether the dredge operator appears to be familiar with the operation of the draghead deflector and provide necessary training where appropriate.

2. If the rigid draghead deflector appears to be ineffective in Wilmington Harbor and slows the dredging project such that the amount of time the hopper dredge will be deployed is increased, the deflector should be removed from the draghead for that channel.

3. The COE should develop an educational/training program for dredge operators to increase their understanding of how the draghead deflector works and why it is necessary.

Table 2a. Sea turtle takes (includes live, injured and killed) observed on hopper dredges prior to the regional consultation. Observers were not required on all projects until 1989, after which extensive monitoring was required.

Year	Project	Turtle Takes
1980 Total = 71	Canaveral	50 Cc, 3 Cm, 18 Unidentified
1981 Total = 6	Canaveral	3 Cc, 1 Cm, 2 Unidentified
1984/1985 Total = 12	Canaveral	1 Cc, 11 Unidentified
1986 Total = 9	Canaveral	5 Cc
	Kings Bay	1 Cc, 3 Cm
1987 Total = 5	Kings Bay	3 Cc, 1 Cm, 1 Unidentified
1988 Total = 46	Brunswick	1 Cc
	Canaveral	13 Cc, 3 Cm, 18 Unidentified
	Kings Bay	6 Cc, 3 Lk, 2 Cm
1989 Total = 21	Canaveral	9 Cm, 2 Unidentified
	Kings Bay	8 Cc, 1 Cm
	Savannah	1 Cc
1990 Total = 12	Canaveral	3 Cc, 5 Cm
	Kings Bay	4 Cc
1991 Total = 43	Brunswick	20 Cc, 1 Lk, 1 Unidentified
	Charleston	3 Cc
	Kings Bay	1 Cc
	Savannah	17 Cc

Cc = *Caretta caretta*, Loggerhead ; Cm = *Chelonia mydas*, Green turtle; Lk = *Lepidochelys kempi*, Kemp's ridley turtle

SOUTH ATLANTIC COAST HOPPER DREDGING (Calendar Year 97)

Project	Dredge Period	Approximate Amount of Work Completed	Turtle Takes	Mitigative Measures Taken	Remarks
Kings Bay	3/1/97 to 3/12/97	Removed 437,000 out of 821,000 CY Approximately 53% completed.	L 3/2/97 L 3/4/97 L 3/5/97 L 3/6/97 L 3/6/97 L 3/6/97 L 3/8/97 L 3/8/97 L 3/12/97	Sea turtle deflecting draghead used. Jacksonville Dist. specialist inspected deflector on 3/6/97. Relocation trawling started 3/9/97. Extensive, ongoing consultation with NMFS as takes occurred. All work terminated 3/12/97 due to high take levels even though relocation trawling had become operational.	Water temp. 57 to 58 F. Dredge Eagle 1. Two takes in one batch on 3/6/97 and 3/8/97. Contract required removal of relatively small veneer of material. Most takes occurred through starboard dragarm. Rapidity of takes was a surprise to all concerned.
Brunswick Harbor	2/6/97 to 3/19/97	Removed 975,400 CY. Work stopped at 50% completion.	L 3/9/97	Sea turtle deflecting draghead used. Sea turtle abundance, based on visual observations, prompted termination of work because of potential for unacceptable levels of entrainment.	Water temp 63 F. Dredge RN Weeks. Historic abundance of sea turtles and high levels of entrainment in 1991 was part of the reason for termination of work.
Savannah Harbor	3/4/97 to 3/22/97	Removed about 545,500 CY, or about 52% of what could have been dredged.	L 3/14/97 L 3/22/97 L 3/22/97	Sea turtle deflecting draghead used. Dredging terminated so as not to take any more sea turtles.	Water temp. 63 F. Numerous sea turtles sighted. Dredge Ouachita was 'skimming' high areas to bring depth to acceptable levels quickly before leaving for urgent work in Mississippi River.
Charleston Harbor	3/14/97 to 3/26/97	Bid qty 900,000 CY Req. qty 408,000 CY Removed qty 350,000 CY. About 39% completed.	L 3/19/97 L 3/20/97 L 3/21/97 L 3/25/97 L 3/26/97	WES expert / developer of sea turtle deflecting draghead system, conducted onboard inspection and made recommendations. Some changes to draghead and dredging operation made. Relocation trawling performed.	Water temp. 61 F. Dredge Eagle 1.
Myrtle Beach borrow area (Phase 1)	9/15/96 to 5/13/97	Bid qty 2.5 million CY. Work completed.	L 4/15/97 L 5/04/97 L 5/09/97	Sea turtle deflecting draghead used. Relative abundance trawling on 3/28-29/97, with 12 hours of "nets in water", yielded one loggerhead. Trawling on 5/8 thru 5/13/97 yielded no sea turtles.	This is one of 3 phases / reaches of total project. Part of work in all phases is by pipeline dredge. Total quantity of material to be dredged is about 6 million CY
Morehead City Harbor	4/25/97 to 5/16/97)	About 120,000 CY removed out of about 1,720,000 CY. About 7% of work completed.	L 4/27/97 L 4/30/97 L 5/01/97 L 5/02/97 L 5/15/97 L 5/15/97	Sea turtle deflecting draghead. Relocation trawling began 5/8/97 and continued until termination of dredging. One loggerhead captured on 5/9/97. Nighttime trawling performed 5/10 & 5/11 with no turtles captured. Because of concern over extensive takes, dredging terminated with only 7 % of work done.	Dredge Manhatten Island
Wilmington Harbor (Interior Channels)	2/14/97 to 3/13/97	About 217,300 CY removed. Work completed.	No takes		Dredge McFarland
MOTSU	3/14/97 to 4/3/97	About 60,000 CY. removed. Work completed.	No takes		Dredge McFarland
Wilmington Harbor (Ocean Bar)	4/3/97 to 4/30/97	About 300,000 CY Work completed.	L 4/07/97	Sea turtle deflecting draghead.	Dredge RN Weeks
Dade County Beach (Miami Reach)	3/30/97 7/20/97 (estimate)	About 380,00 of 475,000 CY completed as of 6/6/97.	No takes	Based on past dredging and anecdotal information about sea turtlesin area, takes are not anticipated.	

L = Loggerhead CY = Cubic Yards

TABLE 3: Current requirements for dredging windows, observer requirements and use of hopper dredges in borrow areas along the east coast established in the August 1995 BO.

AREA		SEA TURTLE MONITORING: NAVIGATION CHANNELS		SEA TURTLE MONITORING: BORROW AREAS	
	WHALE MONITORING	WINDOWS	MONITORING	WINDOWS	MONITORING
North Carolina to Pawleys Island, SC (includes channels at Oregon Inlet, Morehead City and Wilmington)	One observer (daytime coverage) between 1 Dec and 31 Mar. Monitoring by dredge operator and sea turtle observer between 1 Apr and 30 Nov.	Year Round	Two observers (100% monitoring) 1 Apr - 30 Nov	Year Round	One observer (50% monitoring) 1 Apr - 30 Nov
Pawleys Island, SC to Tybee Island, GA (includes channels at Charleston, Port Royal and Savannah)	One observer (daytime coverage) between 1 Dec and 31 Mar. Monitoring by dredge operator and sea turtle observer between 1 Apr and 30 Nov.	1 Nov - 31 May	Two observers (100% monitoring) 1 Nov - 30 Nov and 1 Apr - 31 May	Year Round	One observer (50% monitoring) 1 Apr - 30 Nov
Tybee Island, GA to Titusville, FL (includes channels at Brunswick, Kings Bay, Jacksonville, St. Augustine, and Ponce de Leon Inlet)	Aerial surveys in right whale critical habitat, 1 Dec thru 31 Mar. One observer (daytime coverage) between 1 Dec and 31 Mar.	1 Dec - 15 Apr	Two observers (100% monitoring) 1 Apr - 15 Apr	Year Round	One observer (50% monitoring) 1 Apr - 15 Dec
Titusville, FL to Key West, FL (includes channels at West Palm Beach, Miami and Key West)	Whale observations are not necessary beyond those conducted between monitoring of dredge spoil.	Year Round	Two observers (100% monitoring) year round	Year Round	One observer (50% monitoring) year round

South Atlantic Division Corps of Engineers
Hopper Dredging Protocol for Atlantic Coast
FY 98 - FY 03

1. Sea turtle deflecting dragheads will be used at all times.

2. Districts will inspect sea turtle deflecting dragheads systems to ensure that they are fully operational, prior to initiation of work.

3. Districts will ensure that draghead operators know how to properly use the sea turtle deflecting system.

4. Maintenance dredging at Savannah, Brunswick and Kings Bay Harbors must be restricted to 15 December through the end of March. Maintenance dredging at Charleston and Wilmington Harbors must be restricted to 1 December through the end of March where the sea turtle deflecting draghead system can not be used effectively. Dredging may begin as soon as mid-November in those portions of the Wilmington and Charleston Harbor channels where the sea turtle deflecting draghead can be used effectively. All Districts will cooperate to ensure that their scheduling of hopper dredging contracts, does not interfere with this Division priority work area.

5. Sea turtle observers, inflow screens and overflow screens will be used during all dredging operations, except for the months of January and February, which are optional. Variations from this provision may be granted by Division, but must be justified from a technical perspective.

6. All sea turtle takes will be reported promptly to SAD-ET-CO/PD and posted at usace.sad.turtle newsgroup on the Internet.

7. If two sea turtle takes occur within 24 hours, you should immediately notify the Division POC so that he can initiate reconsultation with National Marine Fisheries Service.

8. If a third take occurs on the project the district will cease operations and notify the South Atlantic Division. Continuation of dredging will occur only after cleared by Division. Upon taking three turtles, District will develop a risk assessment along with an appropriate risk management plan, and submit that to Division for assessment. Generally relative abundance and relocation trawling would be an integral part of a risk assessment and management plan. Should a total take of 5 sea turtles occur, for whatever reason, all work will be terminated unless other prior agreements had been reached with Division.

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