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

APR 07 2011

Finding of No Significant Impact
Issuance of Scientific Research Permit No. 15566

Background

In May 2010, the National Marine Fisheries Service (NMFS) received an application for a permit (File No. 15566) from the South Carolina Department of Natural Resources, Marine Resources Division to conduct research on sea turtles in coastal waters of the Northwest Atlantic Ocean between Winyah Bay, SC and St. Augustine, FL, almost exclusively (99.8%) in state territorial waters within 12 nm of shore. In accordance with the National Environmental Policy Act, NMFS has prepared an Environmental Assessment (EA) analyzing the impacts on the human environment associated with permit issuance (Environmental Assessment: Issuance of a Scientific Research Permit for Sea Turtle Research in the Northwest Atlantic Ocean [File No. 15566]; April 2011). In addition, a Biological Opinion was issued under the Endangered Species Act (ESA; April 2011) summarizing the results of an intra-agency consultation. The analyses in the EA, as informed by the Biological Opinion, support the below findings and determination.

Analysis

National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat (EFH) as defined under the Magnuson-Stevens Act and identified in Fishery Management Plans?

Response: A series of 21 mud rollers would be deployed along the trawl foot-rope to facilitate the net 'rolling' over topographical features that might otherwise be snagged during trawling. The permit would include conditions to minimize the impacts of the research on sea grass and other live bottom habitat. NMFS requested review of potential effects to EFH from the Southeast Region, Habitat Conservation Division (HCD). In a memorandum dated December 16, 2010, the HCD indicated that they had no conservation recommendations to provide. Given the limited time, scope, and duration of sampling, the overall impacts to EFH are not expected to be significant.

2) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity,

Printed on Recycled Paper

predator-prey relationships, etc.)?

Response: The effects of the action on ESA-listed species and their habitat, coral reef ecosystems, EFH, marine sanctuaries, and marine mammals were all considered. Trawling activities occur in coastal waters and are not conducted near any officially designated marine protected areas. No substantial impact on biodiversity and ecosystem function within the affected area would be expected. The action would result in 90% of non-target species returned alive to the water. It is expected that the target species would also be returned alive to the water, but the action could result in the accidental death of nine turtles over the course of the five-year permit. The loss of these individuals is not anticipated to have a detectable effect on the numbers or reproduction of the affected subpopulation, and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species.

3) Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

Response: The proposed action involves basic research (e.g., handling, measuring, and sampling) of sea turtles and does not involve hazardous methods, toxic agents or pathogens, or other materials that would have a substantial adverse impact on public health and safety.

4) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

Response: As determined in the Biological Opinion, the proposed action would affect the sea turtles captured and sampled during the research. However, the Biological Opinion concluded that the effects of the proposed action would not jeopardize the populations or species. The proposed action would not likely jeopardize the continued existence of any ESA-listed species and would not likely destroy or adversely modify designated critical habitat. The permit would contain mitigation measures to minimize the effects of the research on target sea turtles.

Critical habitat is designated for North Atlantic right whales in the action area; however, the action would not alter the physical and biological features that were the basis for determining this habitat to be critical. Therefore, North Atlantic right whale critical habitat is not expected to be adversely modified by the proposed action. As a precautionary measure, the permit would contain conditions designed to prevent interactions with right whales.

The permit would also contain mitigation measures to minimize the effects of the research and to avoid unnecessary stress to any listed species by requiring use of specific research protocols. Dolphins and porpoises are known to interact with trawling vessels. To avoid capturing the animals in the gear, the researchers would monitor their location in relation to the gear at all times. In addition, conditions would be included in the permit to reduce the potential for marine mammal interactions.

5) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: There would be no significant social or economic impacts interrelated with significant natural or physical environmental effects.

6) Are the effects on the quality of the human environment likely to be highly controversial?

A *Federal Register* notice (75 FR 67682) was published to provide the public the opportunity to review and comment on the action. No substantive public comments were received; therefore NMFS does not expect the issuance of the proposed permit to have highly controversial effects on the quality of the human environment.

7) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?

Response: See response to Question #1 for impacts to EFH and live bottom habitat. The trawl would include mud rollers to reduce potential impact to benthic species. Researchers would avoid conducting research over, on, or immediately adjacent to any sea grass species and areas where live bottom habitat was encountered in previous sampling efforts. Research would not affect any other unique areas.

8) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: The proposed research activities are not new or unique. The same type of research has been conducted previously and has not resulted in significant impacts to the environment. NMFS believes that the effects on the human environment would not be highly uncertain and the risks would be minimal and known.

9) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: The proposed action is not related to other actions with individually insignificant, but cumulatively significant impacts. The short-term stresses (separately and cumulatively when added to other stresses the turtles face in the environment) resulting from the research activities would be expected to be minimal. The permit would contain conditions to mitigate adverse impacts to turtles from these activities.

A limited number of accidental mortalities due to the trawling would be authorized but are not expected. These takes would kill the individual; however NMFS does not anticipate that the loss of these animals would have a detectable effect on the numbers or reproduction of the affected populations. A limited number of mortalities would be

authorized over a limited time period (i.e., the life of the permit).

Overall, the proposed action would be expected to have no more than minimal effects on endangered and threatened sea turtle species. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions discussed in the EA would be minimal and not significant.

10) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

Response: The action would not take place in any of these areas nor affect them indirectly, thus none would be impacted.

11) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

Response: The action would not introduce any species; therefore, it would not result in the introduction or spread of a non-indigenous species.

12) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Response: The decision to issue this permit would not be precedent setting and would not affect any future decisions. Issuing a permit to a specific individual or organization for a given activity does not in any way guarantee or imply that NMFS will authorize other individuals or organizations to conduct the same or similar activity.

13) Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

Response: The action would not result in any violation of Federal state or local laws for environmental protection. The permit applicant is required to obtain any state and local permits necessary to carry out the action.

14) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

Response: The action is not expected to result in any cumulative adverse effects to the species that are the subject of the proposed research. The proposed action would be expected to have no more than minimal effects on the target species (sea turtles). A limited number of accidental mortalities due to the trawling would be authorized but not expected, however, NMFS anticipates that the mortalities would not have a detectable effect on the numbers or reproduction of the affected populations. The mortalities are authorized over a limited time period with limits on the total level of take. The effects on non-target species were also considered and no substantial effects are expected. No

cumulative adverse effects that could have a substantial effect on any species would be expected.

DETERMINATION

In view of the information presented in this document, and the analyses contained in the EA and Biological Opinion prepared for issuance of Permit No. 15566, it is hereby determined that permit issuance will not significantly impact the quality of the human environment. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary.

James H. Lecky
Director, Office of Protected Resources

APR 07 2011
Date

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

APR 07 2011

Environmental Assessment
Issuance of a Scientific Research Permit for Sea Turtle Research in the Northwest Atlantic Ocean [File No. 15566]

April 2011

Lead Agency: USDC National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Office of Protected Resources

Responsible Official: James H. Lecky, Director, Office of Protected Resources

For Further Information Contact: Office of Protected Resources
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
(301) 713-2289

Location: Northwest Atlantic Ocean, in coastal waters between Winyah Bay, SC and St. Augustine, FL

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue a scientific research permit, File No. 15566, to the South Carolina Department of Natural Resources, Marine Resources Division (Responsible Party: Mike Arendt). The purpose of this research is to assess temporal change in catch rates, size distributions, sex and genetic ratios, and health of sea turtles. Turtles would be handled, blood sampled, measured, flipper and passive integrated transponder tagged, photographed, and released. A subsample of animals would be authorized for barnacle, keratin, and fecal sampling, cloacal swabs, ultrasound, and attachment of satellite and/or VHF transmitters. Under NOAA Administrative Order 216-6, NMFS' issuance of scientific research permits is generally categorically excluded from the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.) requirements to prepare an environmental assessment (EA) or environmental impact statement (EIS). However, for this permit NMFS prepared an EA to facilitate a more thorough assessment of potential impacts on endangered and threatened sea turtles. This EA evaluates the potential impacts to the human environment from issuance of the proposed permit.

Printed on Recycled Paper

CONTENTS

CHAPTER 1 PURPOSE OF AND NEED FOR ACTION....3

1.1 DESCRIPTION OF ACTION 3
1.1.1 Purpose and Need....3
1.1.2 Research Objectives....3
1.2 OTHER EA/EIS THAT INFLUENCE SCOPE OF THIS EA 3
1.3 SCOPING SUMMARY 3

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION 4

2.1 ALTERNATIVE 1 – NO ACTION 4
2.2 ALTERNATIVE 2 – PROPOSED ACTION (ISSUANCE OF PERMIT WITH STANDARD CONDITIONS)....4

CHAPTER 3 AFFECTED ENVIRONMENT 8

3.1 SOCIAL AND ECONOMIC ENVIRONMENT 8
3.2 PHYSICAL ENVIRONMENT 8
3.3 BIOLOGICAL ENVIRONMENT....9
3.3.1 ESA Target Species....9
3.3.2 Non-Target Species....13

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES 15

4.1 EFFECTS OF ALTERNATIVE 1: NO ACTION 15
4.2 EFFECTS OF ALTERNATIVE 2: ISSUE PERMIT WITH STANDARD CONDITIONS....16
4.3 COMPARISON OF ALTERNATIVES 17
4.4 MITIGATION MEASURES 18
4.5 UNAVOIDABLE ADVERSE EFFECTS 18
4.6 CUMULATIVE EFFECTS 18
4.6.1 Research permits 19
4.6.2 Other human activities....19
4.6.3 Summary of cumulative effects....19

LITERATURE CITED 22

APPENDIX A. ANNUAL TAKES OF MALE AND FEMALE SEA TURTLES IN THE ATLANTIC OCEAN....25

APPENDIX B. ACTIVE PERMITS IN OR NEAR THE ACTION AREA 27

CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF ACTION

NMFS proposes to issue a scientific research permit (File No. 15566) that authorizes "takes"[1] under the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.), and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226) to the South Carolina Department of Natural Resources, Marine Resources Division (Responsible Party: Mike Arendt).

1.1.1 Purpose and Need

The primary purpose of the permit is to provide an exemption from the take prohibitions under the ESA to allow "takes". The need for issuance of the permit is related to NMFS' mandates under the ESA. NMFS has a responsibility to implement the ESA to protect, conserve, and recover threatened and endangered species under its jurisdiction. The ESA prohibits takes of threatened and endangered species, with only a few specific exceptions, including for scientific research and enhancement purposes. Permit issuance criteria require that research activities are consistent with the purposes and policies of the ESA and will not have a significant adverse impact on the species.

1.1.2 Research Objectives

The purpose of the research is to assess temporal change in catch rates, size distributions, sex and genetic ratios, and health of sea turtles.

1.2 OTHER EA/EIS THAT INFLUENCE SCOPE OF THIS EA

An Environmental Assessment (EA) was completed in 2006 for the applicant's current permit (No. 1540; expires April 1, 2011) to conduct this research and resulted in a Finding of No Significant Impact (FONSI). Research was conducted in the same manner and same area as in the proposed action.

1.3 SCOPING SUMMARY

The purpose of scoping is to:

- identify the issues to be addressed,
- identify the significant issues related to the proposed action,
- identify and eliminate from detailed study the non-significant issues,
- identify and eliminate issues covered by prior environmental review, and
- identify the concerns of the affected public and Federal agencies, states, and Indian tribes.

The Council on Environmental Quality's (CEQ) regulations implementing the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 et seq.) do not require that a draft EA be made available for public comment as part of the scoping process.

---

1 The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The term "harm" is further defined by regulations (50 CFR §222.102) as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering."

Comments on Application

A Notice of Receipt of the application was published in the *Federal Register*, announcing the availability of File No. 15566 (75 FR 67682, November 3, 2010) for public comment. No public comments were received.

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action alternative, no permit would be issued and the applicant would not receive an exemption from the ESA prohibitions against take.

2.2 ALTERNATIVE 2 – PROPOSED ACTION (ISSUANCE OF PERMIT WITH STANDARD CONDITIONS)

Under the Proposed Action, a permit would be issued to exempt the applicant from ESA take prohibitions during conduct of research that is consistent with the purposes and policies of the ESA and applicable permit issuance criteria.

The permit would be valid for five years and would contain terms and conditions standard to such permits as issued by NMFS.

Action area

Activities would occur in coastal waters of the Northwest Atlantic Ocean between Winyah Bay, SC and St. Augustine, FL, almost exclusively (99.8%) in state territorial waters within 12 nm of shore. Trawling is targeted for waters 15' and 40' deep and would be conducted predominantly over sand bottom that defines the sea floor in this region, though patches of low-profile "live bottom" communities consisting of sponges, soft corals and occasionally hard corals are also present.

Proposed Activities

The purpose of the proposed research would be to study loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) sea turtles in the southeastern United States. The research would document sea turtle movement, size distributions, sex ratios, genetic contributions, and the health of animals in this area.

All turtles would be captured by in-water trawling from May through September. Sampling would be completed during six multi-day and overnight research cruises. Three cruises would be conducted to the north and three cruises are conducted to the south of the homeport of each vessel. Sampling would be conducted during daylight, commencing approximately an hour after sunrise and ceasing approximately an hour before sunset. Researchers would attempt to conduct 300 sampling events along the South Carolina coast and 300 along the Georgia coast to St. Augustine, Florida each year.

Turtles would be handled, blood sampled, measured, flipper and passive integrated transponder (PIT) tagged, photographed, and released. A subsample of animals would be authorized for

barnacle, keratin, tissue and fecal sampling, cloacal swabs, ultrasound, and attachment of satellite and/or VHF transmitters. See Appendix A for proposed take numbers.

Capture

Sampling would be conducted aboard 75 ft double-rigged shrimp trawlers towing at speeds of 2.5-3.0 kts. Vessels would use standardized nets routinely used in turtle surveys associated with channel dredging operations: paired 60' (head-rope), 4-seam, 4-legged, 2-bridal; net body of 4" bar and 8" stretch mesh; top and sides of #36 twisted with the bottom of #84 braided nylon line; cod end consisting of 2" bar and 4" stretch mesh. Trawl perimeter around the mouth is 137 ft (60 ft head rope + 65 ft foot rope + 2 x 6 ft wing end height). Maximum tow times would be 42-min (doors in the water to doors out of the water) with no more than 30 min bottom trawl time (doors on the bottom to doors off the bottom). Nets would be brought on-board using winches and turtles would be removed from nets and immediately checked for health status and existing tags.

Loggerheads would be measured, weighed, sampled, tagged, and photographed and released at the point of capture within approximately 30 min of capture.

Flipper and PIT Tagging

All sea turtles would receive a PIT tag (125 kHz) and turtles greater than 5 kg would also receive two Inconel flipper tags. Triple tagging will minimize the probability of complete tag loss. PIT tags would be sterile-packed; Inconel flipper tags would be cleaned to remove oil and residue prior to application. Inconel tag insertion sites, located between the first and second scales on the trailing edge of the front flippers, would be swabbed with Betadine prior to tag application. The PIT tag insertion point, located in the right front shoulder, would also be swabbed with Betadine prior to intramuscular injection.

Measuring

Turtles would be measured, weighed, and photographed. A suite of morphometric measurements would be collected for all sea turtle species. Six straight-line measurements would be made using tree calipers. Curved measurements would also be recorded using a nylon tape measure. All measurements would represent standard measurements accepted by sea turtle researchers globally (Bolten 1999). Placing turtles on top of foam-filled go-kart tires would restrict movements (for ease and greater accuracy) while measurements were completed. Body weight would be measured using spring scales; turtles would be placed in a nylon mesh harness and carefully raised off of the deck using on-board winches.

Prior to release, the turtles would be digitally photographed in a standard pose (dorsal surface exposed, taken looking from anterior to posterior) including a marker board with the turtle identification number. The identification number and trawl collection number would be recorded. Additional photographs of unusual markings or injuries would be taken.

Blood Sampling

Blood samples would be collected from all sea turtles over 5kg. Blood would be collected in vacutainer tubes (with or without a heparin agent) using a vacutainer hub and a sterile 21-guage, 1.5" vacutainer needle from the dorsal cervical sinus as described by Owens and Ruiz (1980).

Turtles would be oriented head-down in a reclined position to facilitate blood flow to the cervical sinus. Prior to inserting the sterile vacutainer needle, the blood draw site would be prepped with a Betadine-soaked cotton ball. A maximum of four blood sticks (two per side of the neck) would be attempted per sea turtle. Blood samples would consist of a maximum of 45 ml total volume and no more than 3ml per kg of body weight (<10% of total blood volume).

Barnacle, Keratin, Tissue, and Fecal Sampling and Cloacal Swabs

Barnacles would be removed from sea turtles as needed to ensure accurate measurements for morphometric studies. Carapace barnacles would be removed by gently positioning the terminal end of a metal chisel under the barnacle foot and rotating/twisting the chisel handle to pry the barnacle loose. Skin and flipper barnacles would be removed by simply pulling them off with gentle tactile traction. Five barnacles from each of the carapace, skin, and flippers would be collected per turtle and stored in 95% ethanol for later identification to species and genetic sequencing of barnacle DNA.

Keratin biopsies would be collected from the posterior margin of the third caudal scute (left or right side) in an area devoid of abnormalities or epibionts but cleaned with an alcohol swab. A sterile 6 mm biopsy punch would be pushed and twisted/rotated through the carapace approximately 6 mm deep. Once the scute bottom has been reached, the biopsy punch would be gently rocked side-to-side to sever the sample, which would be removed from the biopsy punch using sterile forceps and cryo-preserved for later analysis. The biopsy wound would be swabbed with Betadine and SSD (Silver sulfadiazine) cream applied after sample extraction.

Fecal material would be collected from the deck after deposition and therefore would not require any manipulation of turtles. Fecal samples would be collected and double bagged in ziplock bags and refrigerated for later analysis. Personnel would wear latex gloves during collection and samples would be refrigerated separate from food items, minimizing human health risks to individuals.

Cloacal swabs would be collected from a subset of loggerheads. The sterile-packed swab would penetrate the cloaca approximately 5 cm, after which the swab would be inserted into a media tube and stored between at -80° C (in liquid nitrogen). Swabs samples would be processed to culture bacteria that may be present. The goal is to document bacterial communities found in turtles as they relate to possible antibacterial release in marine systems.

Unusual growths or lesions on soft or hard tissues would be photographed and gently removed using a 6 mm biopsy tool as appropriate. The sample site would be prepped with 10% Betadine/topical disinfectant solution and allowed 5-10 minute contact time before sampling. If the vertical surface of the growth is <6 mm the biopsy punch would be passed perpendicular to the growth (i.e., along the body axis of the turtle) to gently ‘shave off’ the sample at the surface of the growth; however, if the vertical surface of the growth is deeper than the biopsy punch, the punch would be gently pushed downward to isolate the sample (which would then be cut away from rest of the growth using surgical scissors). Bleeding caused by sampling would be treated with ice and pressure or cauterizing powder as needed. The sample would be split into a vial containing 10% neutral buffered formalin to preserve the sample for histology and a second vial containing 95% ethanol for genetic testing of the sample.

Satellite and Acoustic Tags

Satellite and acoustic transmitters would be attached to a subset of captured loggerheads. Satellite transmitters would be similar to or smaller than Telonics ST-20 tags used previously by the applicant (13.97 cm (L) x 3.0 cm (W) x 3.8 cm (H), and approximately 0.3 kg) and would be less than one percent of the body weight of median-sized juveniles in the survey.

Transmitters would be attached directly to the second vertebral scute on the carapace using epoxy (Arendt et al., 2009). Prior to attachment, barnacles and other organisms would be removed from the carapace with a chisel. The carapace would then be sanded, washed with Betadine, and dried with acetone. Quick-setting T-308TM marine epoxy resin would be used to form an attachment base for each tag. Sonic WeldTM would be used secondarily to coat the tag and create a smooth hydrodynamic surface (Mansfield et al. 2009). Heat generated by curing epoxy is noted by researchers during the application process; however, the methods described here are standard among global sea turtle satellite-telemetry studies (McClellan et al. 2010). Anti-fouling paint may be applied to the cured epoxy. The time elapsed between initiation of epibiont removal and the completion of epoxy curing would be roughly 30 minutes.

Acoustic transmitters would be no larger than the largest transmitter (16 mm diameter by 98 mm length; weight = 36 g in water) made by Vemco. Transmitters would be no more than 1/10 of one percent of the body weight for median sized juvenile loggerheads (36 kg) collected in the survey. Transmitters would be attached directly to the fourth vertebral scute on the carapace using epoxy, a small amount of which would be used to build a tear drop shaped, hydro-dynamically efficient fairing in front of transmitter to reduce drag and limit the effects of the transmitter on the turtle's energetics (Watson and Granger 1998).

Prior to attaching transmitters, the attachment site would be cleared of epibionts using a combination of gentle leverage and mild scraping with a chisel and scrubbing via plastic mesh pad. The cleared area would be rinsed, then dried prior to sanding the same area with sand paper (100 grit) to produce a smooth finish (i.e., devoid of shedding keratin) for the epoxy to adhere to. After sanding, the preparation area would be treated with Betadine and then rinsed with acetone to ensure a dry surface for the epoxy to contact. Anti-fouling paint (e.g., Interlux Micron 66) may be applied to the cured epoxy. Time lapse between removing the epibionts to completion of epoxy curing would be approximately 30 minutes.

Ultrasonography

Ultrasonography would be conducted on a subset of loggerheads to help evaluate the gonadal condition. This procedure is a noninvasive technique (Owens 1999) commonly used in human medicine that allows the imaging of gonadal tissue and takes a maximum of 15 minutes per turtle. While the turtle is restrained by hand on its carapace on a rubber tire, the probe would be placed on the inguinal region cranial to the hind leg. A coupling gel would be used to ensure transmission of the ultrasonic signal.

Transport and Holding

If an injured turtle is caught while sampling, the turtle would be transferred to shore to receive medical attention at the closest rehabilitation facility (e.g., the Georgia Sea Turtle Center (GSTC) on Jekyll Island or the South Carolina Aquarium in Charleston).

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information necessary for consideration of the alternatives, and describes the resources that would be affected by the alternatives, as well as environmental components that would affect the alternatives if they were to be implemented. The effects of the alternatives on the environment are discussed in Chapter 4.

3.1 SOCIAL AND ECONOMIC ENVIRONMENT

A variety of human activities may occur in the action area such as commercial fishing, shipping, military activities, recreational uses (such as fishing and boating), and ecotourism. The social and economic effects of the proposed action mainly involve the effects on the people involved in the research, as well as any industries that support the research, such as charter vessels and suppliers of equipment needed to accomplish the research. Permitting the proposed research could result in a low level of economic benefit to local economies in the action area. However, such impacts would be negligible on a national or regional (state) level and therefore are not considered significant. There are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects. Thus, the EA does not include any further analysis of social or economic effects of the Proposed Action.

3.2 PHYSICAL ENVIRONMENT

Activities proposed under File No. 15566 would occur in coastal waters of the Northwest Atlantic Ocean from Winyah Bay, South Carolina to St. Augustine, Florida, almost exclusively (99.8%) in state territorial waters within 12 nm of shore. Trawling would not be conducted near any officially designated marine protected areas, with the exception of seasonally closed areas (for migrating whales, which do not occur during the time of year that the study would be conducted). Live bottom habitats are sporadically located throughout the southeastern United States (Cummins et al. 1962) and these flora and fauna have been collected in ~15% of the applicant's past trawling events. A series of 21 mud rollers would be deployed along the trawl foot-rope to facilitate the net 'rolling' over topographical features that might otherwise be snagged during trawling.

Essential Fish Habitat

Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. EFH has been designated for federally managed fisheries. Details of the designations and descriptions of the habitats within the action area can be found at www.habitat.noaa.gov/protection/efh/habitatmapper.html.

Activities that have been shown to adversely affect EFH include disturbance or destruction of habitat from stationary fishing gear, dredging and filling, agricultural and urban runoff, direct discharge, and the introduction of exotic species. NMFS requested review of potential effects to EFH from the Southeast Region, Habitat Conservation Division (HCD). In a memorandum dated December 16, 2010, the HCD indicated that, "considering the experimental design, nature of the survey, and limited scope of subject activity the HCD has no EFH conservation recommendations to provide."

North Atlantic Right Whale Critical Habitat
Designated North Atlantic right whale critical habitat (50 FR 28793) can be found in the action area from the mouth of the Altamaha River, Georgia, to Jacksonville, Florida, out 15 nautical miles (nm) and from Jacksonville, Florida, to Sebastian Inlet, Florida, out 5 nm. The action would not alter the physical and biological features (water depth, water temperature, and the distribution of right whale cow/calf pairs in relation to the distance from the shoreline to the 40-m isobath [Kraus *et al.* 1993]) that were the basis for determining this habitat to be critical; therefore this habitat is not considered further.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 ESA Target Species

ESA Endangered

Green sea turtle	*Chelonia mydas**
Kemp's ridley sea turtle	*Lepidochelys kempii*
Hawksbill sea turtle	*Eretmochelys imbricata*
Leatherback sea turtle	*Dermochelys coriacea*

ESA Threatened

Loggerhead sea turtle	*Caretta caretta***

**Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.*

*** NMFS is currently considering changing the listing of the loggerhead sea turtle to endangered.*

Green sea turtle
Green sea turtles are distributed around the world, mainly in waters between the northern and southern 20° C isotherms (Hirth 1971). The complete nesting range of the green sea turtle within the southeastern U.S. includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and at the U.S. Virgin Islands (USVI) and Puerto Rico (NMFS and USFWS 1991). Principal U.S. nesting areas for green turtles are in eastern Florida, predominantly Brevard through Broward counties. Regular green sea turtle nesting also occurs on the U.S. Virgin Islands and Puerto Rico.

Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12 to 14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs. After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris.

The green sea turtle was listed as threatened in 1978, except for the Florida and Pacific coast of Mexico breeding populations that were listed as endangered. Critical habitat for the green sea turtle has been designated for the waters surrounding Isla Culebra, Puerto Rico and its associated

keys from the mean high water line seaward to 3 nautical miles (5.6 km). These waters include Culebra's outlying Keys including Cayo Norte, Cayo Ballena, Cayos Geniqui, Isla Culebrita, Arrecife Culebrita, Cayo de Luis Pena, Las Hermanas, El Mono, Cayo Lobo, Cayo Lobito, Cayo Botijuela, Alcarraza, Los Gemelos, and Piedra Steven. Key physical or biological features essential for the conservation of the green sea turtle found in this designated critical habitat include important food resources and developmental habitat, water quality, and shelter.

Kemp's ridley sea turtle

Of the seven extant species of sea turtles of the world, the Kemp's ridley has declined to the lowest population level. This species has a very restricted range relative to other sea turtle species. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nests in this single locality (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 early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and there is cautious optimism that the population is now increasing (Turtle Expert Working Group (TEWG) 1998). The number of nests has grown from a low of approximately 702 nests in 1985, to greater than 1,940 nests in 1995, to approximately 5,800 nests in 2000, to approximately 8,300 nests in 2003, to approximately 10,300 nests in 2005. USFWS recorded approximately 12, 000 nests in 2006 suggesting that the adult nesting female population is about 7,400 individuals.

It appears that adult Kemp's ridley sea turtles are restricted somewhat to the Gulf of Mexico in shallow near shore waters, although adult-sized individuals sometimes are found on the eastern seaboard of the United States. Juvenile/subadult Kemp's ridleys have been found along the eastern seaboard of the United States and in the Gulf of Mexico. Atlantic juveniles/subadults travel northward with vernal warming to feed in the productive, coastal waters of Georgia through New England, returning southward with the onset of winter to escape the cold (Lutcavage and Musick 1985; Henwood and Ogren 1987; Ogren 1989). In the Gulf, juvenile/subadult ridleys occupy shallow, coastal regions. The near shore waters of the Gulf of Mexico are believed to provide important developmental habitat for juvenile Kemp's ridley sea turtles. Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. Ogren (1989) suggested that in the northern Gulf this species moves offshore to deeper, warmer water during winter. Studies suggest that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching, planktonic stage within the Gulf. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997).

The Kemp's ridley was listed as endangered on December 2, 1970. There is no designated critical habitat for the Kemp's ridley sea turtle.

Hawksbill sea turtle

The hawksbill sea turtle occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. The species is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf of Mexico (especially Texas); in the Greater and Lesser Antilles; and along the Central American mainland south to Brazil.

Within the United States, hawksbills are most common in Puerto Rico and its associated islands, and in the USVI. In the continental United States, hawksbill sea turtles have been recorded from all the Gulf States and from along the eastern seaboard as far north as Massachusetts, with the exception of Connecticut, but sightings north of Florida are rare (Meylan and Donnelly 1999). They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays, and coastal lagoons. At least some life history stages regularly occur in southern Florida and the northern Gulf of Mexico (especially Texas); in the Greater and Lesser Antilles; and along the Central American mainland south to Brazil.

In Florida, hawksbills are observed with some regularity on the reefs off Palm Beach County, where the warm Gulf Stream current passes close to shore, and in the Florida Keys. Texas is the only other state where hawksbills are sighted with any regularity. Most sightings involve post-hatchlings and juveniles.

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988), followed by residency in developmental habitats (foraging areas where immature turtles reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over periods of time as great as several years (van Dam and Diez 1998).

In the Western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Peninsula of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade et al. 1999). Important but significantly smaller nesting aggregations are documented elsewhere in the region in Puerto Rico, the USVI, Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999). Estimates of the annual number of nests for each of these areas are of the order of hundreds to a few thousand. Nesting within the southeastern United States and U.S. Caribbean is restricted to Puerto Rico (>650 nests/yr), the USVI (~400 nests/yr), and, rarely, Florida (0-4 nests/yr) (Eckert 1992; Meylan 1999; Florida Statewide Nesting Beach Survey database). At the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out, populations appear to be increasing (Mona Island, Puerto Rico) or stable (Buck Island Reef National Monument, St. Croix, USVI) (Meylan 1999).

The hawksbill sea turtle was listed as endangered under the ESA in 1970, and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN) based on global population declines of over 80 percent during the last three generations (105 years) (Meylan and Donnelly 1999). Critical habitat for the hawksbill sea turtle is designated under 50

CFR 226.209. It includes the waters surrounding the islands of Mona and Monito, Puerto Rico from the mean high water line seaward to 3 nautical miles (5.6 km).

Critical habitat for the hawksbill sea turtle includes the waters surrounding the islands of Mona and Monito, Puerto Rico from the mean high water line seaward to 3 nautical miles (5.6 km).

Loggerhead sea turtle

Loggerheads occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and inhabit continental shelves and estuarine environments. Developmental habitat for small juveniles includes the pelagic waters of the North Atlantic Ocean and the Mediterranean Sea.

Adults have been reported throughout the range of this species in the United States and throughout the Caribbean Sea. Non-nesting, adult female loggerheads are reported throughout the United States and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54 percent in the southeast U.S. Atlantic, 29 percent in the northeast U.S. Atlantic, 12 percent in the eastern Gulf of Mexico, and 5 percent in the western Gulf of Mexico (TEWG 1998).

The recent loggerhead status review (Conant et al. 2009) concluded that there are nine loggerhead distinct population segments (DPSs). These include the: North Pacific Ocean DPS; South Pacific DPS; North Indian Ocean DPS; Southeast Indo-Pacific Ocean DPS; Southwest Indian Ocean DPS; Northwest Atlantic Ocean DPS; Northeast Atlantic Ocean DPS; Mediterranean Sea DPS; and South Atlantic Ocean DPS. While NMFS has not yet officially recognized these DPSs, the information provided in the status review represents the most recent and available information relative to the status of this species. On March 16, 2010 NMFS published a Notice of a Proposed Rule (75 FR 12598) to formally designate the loggerhead with these nine DPS' worldwide. The notice also stated that NMFS plans to reclassify both DPS' within the United States as endangered (N. Pacific DPS and Northwest Atlantic Ocean DPS). The loggerhead was listed as a threatened species in 1978. Critical habitat has not been designated for the loggerhead.

Leatherback sea turtle

Leatherbacks utilize both coastal and pelagic waters. In the western Atlantic, adults routinely migrate between boreal, temperate and tropical waters, presumably to optimize both foraging and nesting opportunities (Bleakney 1965; Lazell 1980). Leatherbacks are deep divers, with recorded dives to depths in excess of 1000 m (Eckert et al. 1989), but they may come into shallow waters if there is an abundance of jellyfish near shore. TDR data recorded by Eckert et al. (1989) indicate that leatherbacks are night feeders.

The leatherback ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Leatherbacks are widely distributed throughout the oceans of the world, and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). Adult leatherbacks forage in temperate and subpolar

regions from 71° N to 47° S latitude in all oceans and undergo extensive migrations between 90° N and 20° S, to and from the tropical nesting beaches. In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (NMFS SEFSC 2001). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Suriname (NMFS SEFSC 2001). Leatherbacks are predominantly pelagic, however they can be found in near shore waters.

The TEWG (2007) estimated the adult leatherback sea turtle population of the North Atlantic to be approximately 34,000-94,000 animals. The range of the estimate is large, reflecting the Working Group's uncertainty in nest numbers and their extrapolation to adults. The Working Group believes that as estimates improve the range would likely decrease. However, this is the most current estimate available. It is important to note that while the analysis provides an estimate of adult abundance for all populations in the greater North Atlantic, it does not provide estimates for the number or origin of leatherbacks in specific foraging areas, nor does it provide an estimate of subadult abundance. Trends in the adult population size estimate were not possible since trends in sex ratio and remigration rates were not available (TEWG 2007).

The leatherback was listed as endangered on June 2, 1970. Critical habitat for the leatherback includes the waters adjacent to Sandy Point, St. Croix, USVI, up to and inclusive of the waters from the hundred fathom curve shoreward to the level of the mean high tide with boundaries at 17° 42'12" North and 65°50'00" West. Key physical or biological features essential for the conservation of the leatherback sea turtle found in this designated critical habitat include elements important for reproduction.

3.3.2 Non-Target Species

Whales

North Atlantic right whales (*Eubalaena glacialis*) and humpback whales (*Megaptera novaeangliae*) are coastal animals that have been sighted in the Atlantic Ocean along the southeastern United States, primarily from November through March. The applicants would use the same vessels and same gear used by shrimp trawlers, and they would trawl in a similar manner as shrimp trawlers do when they are in whale habitat. There have been no reported interactions between large whales and shrimp vessels in the Atlantic or Gulf of Mexico (NMFS 2002). Additionally, trawlers move slowly (approximately 1 to 3 knots) when nets are deployed, which would give a whale or the fishing vessel time to avoid a collision.

The permit would also include right whale ship strike avoidance information and conditions that require monitoring for large whales and restrict trawling when marine mammals are observed (see below for details). Based on the above information and the conditions that would be part of the permit, NMFS believes that the chance of the proposed action affecting these whale species is minimal; therefore they are not considered further.

Dolphins or Porpoises

Dolphins and porpoises are known to interact with research and commercial fishing trawlers for the purpose of foraging. In some cases, interaction with the dolphins or porpoises is unavoidable as they follow the trawler and pursue the fish that are caught in the net. In the unlikely event that a dolphin or porpoise is captured it would be released unharmed.

The researchers have never caught or harmed a dolphin or porpoise with their trawling gear during any sampling trip. Based on the researchers' past experiences NMFS believes that it is unlikely that researchers would entangle a dolphin or porpoise during their sampling efforts, therefore they are not considered further.

In addition, the proposed permit would contain conditions that prohibit trawling activities (or require stopping them) if

- a small cetacean, with the exception of dolphins or porpoises, is sighted within 50 yards,
- a large whale is sighted within 100 yards, or
- a right whale is sighted within 500 yards.

Shortnose sturgeon (*Acipenser brevirostrom*)

Shortnose sturgeon occur in estuaries and rivers along the east coast of North America (Vladykov and Greeley 1963). Their southerly distribution historically extended to the Indian River, Florida (Everman and Bean 1898). Shortnose sturgeon appear to spend most of their life in their natal river systems, only occasionally entering the marine environment. Those fish captured in the ocean are usually taken close to shore, but in full salinity (Schaefer 1967; Holland and Yelverton 1973; Wilk and Silverman 1976).

The species appears to be estuarine anadromous in the southern part of its range, but in some northern rivers, it is "freshwater amphidromous" (i.e., adults spawn in freshwater but regularly enter saltwater habitats during their life; Kieffer and Kynard 1993). Adult sturgeon occurring in freshwater or freshwater/tidal reaches of rivers in summer and winter often occupy only a few short reaches of the total length (Buckley and Kynard 1985). Summer concentration areas in southern rivers are cool, deep, thermal refugia, where adults and juveniles congregate (Flournoy *et al.* 1992; Rogers and Weber 1994; Rogers and Weber 1995; Weber 1996).

While this species is occasionally collected near the mouths of rivers, shortnose sturgeon are not known to participate in coastal migrations (Dadswell *et al.* 1984). NMFS believes it is unlikely researchers would capture sturgeon during sampling efforts, therefore they are not considered further.

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*)

The Carolina and South Atlantic Distinct Population Segments of Atlantic sturgeon, both of which are proposed for listing as Endangered under the ESA, can be found in the action area. NMFS bottom trawl surveys have previously captured sub-adults at depths up to 85 feet; however the applicant has only collected six Atlantic sturgeon during 5,237 trawling events since 2000. All six were collected in May (5 in 2005, 1 in 2006) in the Charleston, SC shipping entrance channel in federal waters.

Given the historical absence of Atlantic sturgeon during the applicant's regional survey (i.e., when not sampling in shipping channels) and their limited regional survey sampling during May, NMFS believes it is unlikely researchers would capture sturgeon during sampling efforts, therefore they are not considered further.

Florida manatee (*Trichechus manatus*)

The United States Fish and Wildlife Service (USFWS) (Ms. Nicole Adimey, Jacksonville FL) was contacted regarding the potential impacts of the proposed activity on the Florida manatee. The USFWS indicated via e-mail (December 1, 2010) that they had no comments. In addition, the proposed permit would contain standard conditions provided by the USFWS to prevent adverse interactions

Other bycatch

Finfish, invertebrates, and elasmobranchs (sharks and rays) could be caught during trawls and would be highly dependent on trawling location. To date, more than 300 bycatch species have been recorded in this sea turtle trawl survey. Large mesh nets would result in low levels of bycatch (e.g., during the 2000-2003 regional survey, an average of 20 individual fish (range = 0 to 480) and 15 individual or distinct clusters of invertebrate organisms (range = 0 to 700) were collected.

Bycatch survival rates are species-specific, but the applicant estimates that attempts to release bycatch alive are 90% successful. Selected by-catch specimens would be sampled (non-lethal) or sacrificed for scientific purposes consistent with state permit stipulations (e.g., the collection of blood samples for conducting health assessments with stingrays, bonnethead and Atlantic sharpnose sharks as well as blood collection from several crab species to test for the presence of a parasite, *Hematodinium sp*. Sacrificial sampling has been infrequently utilized to collect voucher specimens for (or to have identified by) the Southeast Regional Taxonomic Center; for life history studies (blacknose sharks, cobia); and for evaluation of stable isotope concentrations in potential loggerhead prey items (whelks, swimming crabs, horseshoe crabs, sea stars, urchins, squid, jellyfishes, etc.). Annually, less than 20 specimens per species are expected to be sampled or sacrificed. Sacrificed specimens frequently come from species that are not managed by any agency.

Because of the low levels of bycatch and the applicant's past success at releasing bycatch alive, other bycatch species are not considered further.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

4.1 EFFECTS OF ALTERNATIVE 1: No Action

No action, i.e., denial of the permit request, would eliminate any potential risk to target species from the proposed research activities. This alternative would prohibit researchers from gathering information that could help endangered and protected sea turtles.

4.2 EFFECTS OF ALTERNATIVE 2: Issue permit with standard conditions

Impacts of the Proposed Action would be limited to the biological environment, specifically the target sea turtles. The type of action proposed in the permit request would be unlikely to affect the physical or socioeconomic environment or pose a risk to public health and safety.

The effects of the proposed activities were previously analyzed for Permit No. 1540 (NMFS 2006), which the proposed permit would replace. In that analysis, NMFS determined that:

- The short-term stresses (separately and cumulatively) to sea turtles resulting from the non-lethal research activities were expected to be minimal and did not expect the additional short-term stress of the non-lethal research activities to significantly affect the turtles.
- A limited number of accidental mortalities due to the trawling were authorized but not expected. These takes would kill the individual animal, but were not expected to have a detectable effect on the numbers or reproduction of the affected populations.
- Activities were not expected to have more than short-term effects on target populations, either separately or cumulatively.
- No more than short-term, non-lethal effects were expected on sturgeon, either separately or cumulatively.
- No whales or other marine mammals were expected to be adversely affected.
- Some fish and invertebrate bycatch were expected to be affected, resulting in up to approximately 10% mortality, but the activities were not expected to have adverse cumulative effects on their populations.
- The proposed action was not expected to adversely affect other portions of the environment, including the physical or socioeconomic environment, or result in any cumulatively significant effects on them.

SCDNR has reported that they captured and processed 668 sea turtles under Permit No. 1540 from 2006 to 2010 (plus another 15 that escaped and 69 that were released without processing). No sea turtles collected in that time period required resuscitation due to forced submergence and there were no accidental mortalities.

The effects of the Proposed Action would not be expected to differ from those analyzed in the 2006 EA. The number of target loggerhead sea turtles in the Proposed Action is comparable to what was previously analyzed; takes of other targeted sea turtle species would be the same or less than what was previously analyzed and authorized. The number of unintentional mortalities authorized for all sea turtle species would be less than what was previously analyzed. The Biological and Conference Opinion prepared for the Proposed Action concluded that the effects were not likely to jeopardize targeted sea turtle species and Atlantic sturgeon (should they be listed).

The effects of the proposed activities would primarily be limited to short-term harassment of individual sea turtles, with a limited number of unintentional mortalities. Conditions in the proposed permit would be similar to those in Permit No. 1540, and were designed to minimize effects to individual sea turtles and non-target species.

Tow times would be slightly longer (30 min bottom tow time vs. 20 min) than those authorized in Permit No. 1540, but NMFS does not believe this would result in increased accidental mortalities of sea turtles; in fact, the applicant requested and NMFS is proposing to authorize fewer accidental mortalities for each species than were authorized in Permit No. 1540. The 30 min bottom tow time was previously permitted and safely conducted by the applicant (Permit No. 1245). During 2000-2003 the SCDNR completed 3,020 trawling events of which 746 events (25%) yielded 925 loggerhead, 67 Kemp's ridley and 8 green sea turtles. Among those 1,000 sea turtle collections, only five (0.5%) were collected comatose and required intubation, which was 100% successful (note: one revived turtle later died in captivity).

The intubation and mortality rates under Permit No. 1245 were substantially lower than the 11% comatose and mortality rate reported for the Southeastern shrimp fishery during 1973-1984 (Sasso and Epperly, 2006), for which mortality only exceeded 1% after 50 minutes (Figure 1).

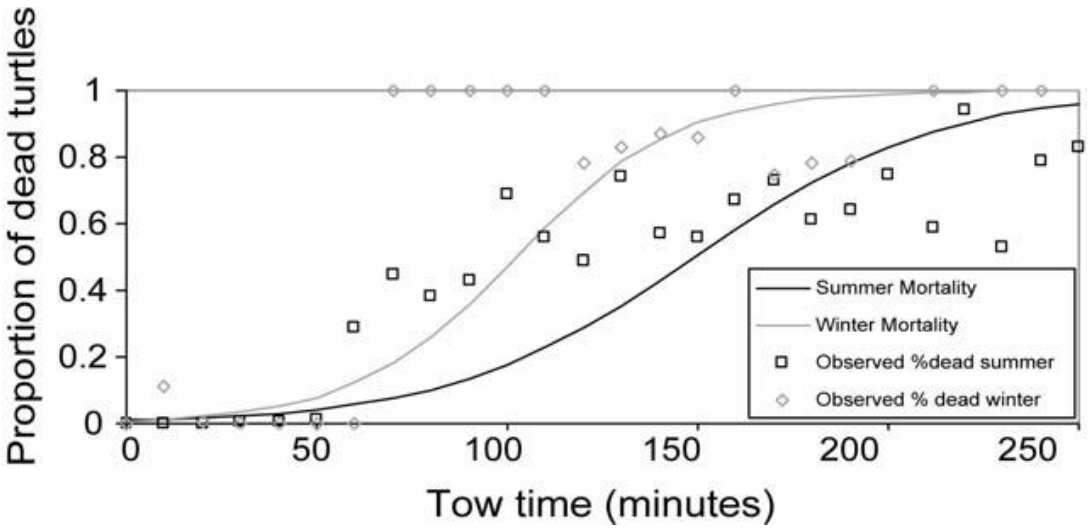

Figure 1. Logistic curves and observed proportion of sea turtle mortalities relative to tow time in summer and winter. From Sasso and Epperly 2006.

The anti-fouling paint likely to be used, Micron 66, is advertised as a non-TBT co-polymer that reacts with saltwater to chemically release unspecified biocides in a controlled manner resulting in excellent coverage during two seasons; thus, biocide release is expected to be slow and highly diluted.

4.3 COMPARISON OF ALTERNATIVES

While the No Action alternative would have no environmental effects, the opportunity would be lost to collect information that would contribute to better understanding sea turtles and that would provide information needed to implement NMFS' management activities to help conserve and manage sea turtles, as required by the ESA and NMFS' implementing regulations. The Proposed Action would affect individual sea turtles. However, the effects would be minimal and the alternative would allow the collection of valuable information that could help NMFS' efforts

to recover sea turtles. Neither the No Action nor the Proposed Action alternatives are anticipated to have adverse population or stock-level effects on sea turtles.

4.4 MITIGATION MEASURES

There are no additional mitigation measures beyond those that are part of the applicant's protocols or conditions that would be required by permit (described in section 2.2). The applicant's protocols are incorporated into the permit by reference.

In summary, the permit conditions limit the level of take, minimize the effects of sampling activities on target sea turtles, minimize the effects to bycatch, and require notification, coordination, monitoring, and reporting. In addition, permit conditions prohibit trawling activities (or require stopping them) if

- a small cetacean, with the exception of dolphins or porpoises, is sighted within 50 yards,
- a large whale is sighted within 100 yards, or
- a right whale is sighted within 500 yards.

Review of monitoring reports of previous permits for the same or similar research protocols indicate that these types of mitigation measures are effective at minimizing stress, pain, injury, and mortality associated with takes.

4.5 UNAVOIDABLE ADVERSE EFFECTS

The measures required by permit conditions are intended to reduce, to the maximum extent practical, the potential for adverse effects of the research. Individual sea turtles may experience short-term stress and discomfort in response to the activities of researchers, but the research is not expected to have more than a minimal effect on individuals, and no effect on populations. Small numbers of unintentional mortality would be authorized for sea turtles, but are not expected based on the applicant's lack of mortality during previous permits. While not expected, mortalities are authorized to provide the applicant coverage in the event an accident occurs during the research. While not expected, NMFS must assume the worst case scenario that mortalities could occur.

4.6 CUMULATIVE EFFECTS

Cumulative effects are defined as those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (Federal or nonfederal) or person undertakes such actions.

Research under the Proposed Action is not expected to result in more than localized disturbance of animals in the action area. It is likely the effects of the disturbance would be short-term and that the affected areas would recover between disturbances and following conclusion of the permitted research. A limited number of accidental mortalities due to the trawling would be authorized but are not expected. If they occur, these takes would kill the individual animal, but are not expected to have a detectable effect on the numbers or reproduction of the affected populations.

4.6.1 Research permits

As summarized in Appendix B, nine active permits allow research on a combination of the target species in areas that could overlap with the Proposed Action area. The effects of many individual research activities (e.g., a survey, a field trip to capture animals) are short-term, lasting hours to days following the research event. There is not enough information about the exact location and timing of the research under the various permits to specifically identify the extent of overlap in time and space of all of the permitted research, or to identify the frequency with which any given local population may be disturbed.

It is a standard condition of NMFS permits for research on sea turtles that researchers coordinate their activities with those of other Permit Holders to avoid unnecessary disturbance of animals. In an effort to mitigate the risk of negative cumulative effects the researchers would scan the turtles for PIT tags before tagging. Turtles that have existing, functional flipper tags would not be tagged again. Permitted researchers are also required to notify the appropriate NMFS Regional Office at least two weeks in advance of any planned field work so that the Regional Office can facilitate this coordination and take other steps appropriate to minimize disturbance from multiple Permit Holders.

4.6.2 Other human activities

Historically, one of the major contributors to declines in sea turtle populations was the commercial harvest of eggs and turtles. Today, target sea turtles may be adversely affected by human activities including commercial and recreational fishing (as bycatch via entrapment and entanglement in fishing gear), habitat degradation, and tourism and recreation (via harassment from human approach and presence) within the action area. Of these activities, lethal takes of turtles and the disturbance that results in displacement of animals or abandonment of behaviors such as feeding or breeding by groups of animals are more likely to have cumulative effects on the species than the proposed research activities.

The target species also benefit from human activities operated by Federal, state, and or local agencies and organizations including management, conservation, and recovery efforts, nest monitoring, education and outreach, and stranding response programs.

4.6.3 Summary of cumulative effects

It is likely that issuance of the proposed permit would have some cumulative adverse effects on target animals. These adverse effects would likely be additive to those resulting from disturbance under other permits, and to disturbances related to other human activities in the action area. Some animals may be acclimated to a certain level of human activity and may be able to tolerate disturbance associated with these activities with little adverse impacts on population or species vital rates. However, even animals acclimated to a certain level of disturbance may be adversely affected by additive effects that exceed their tolerance threshold. Based on the review of past, present and future actions that impact the target species, the incremental contribution of the short-lived impacts associated with the Proposed Action is not anticipated to result in significant cumulative impacts to the human environment.

Although a low number of mortalities could occur, the Proposed Action would not have more than minimal effects to the target species at the population or species level. Any increase in

stress levels to individual turtles or non-target species resulting from capture or procedures would dissipate within approximately a day. Injuries caused by tagging and sampling would be expected to heal. NMFS does not expect the authorization of the proposed research activities to appreciably reduce the species' likelihood of survival and recovery in the wild because it would not likely adversely affect their birth rates, death rates, or recruitment rates. In particular, NMFS does not expect the proposed research activities to affect adult female turtles in a way that appreciably reduces the reproductive success of adults, the survival of young, or the number of young that annually recruit into the breeding populations of any of the target species. Likewise, NMFS does not expect significant impacts to non-target species as a result of the Proposed Action.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

This document was prepared by Kristy Beard with the Permits, Conservation and Education Division of NMFS' Office of Protected Resources in Silver Spring, Maryland.

NMFS' Southeast Regional Office, Habitat Conservation Division was consulted in the preparation of this document.

LITERATURE CITED

Arendt, M., J. Byrd, A. Segars, P. Maier, J. Schwenter, D. Burgess, J. Boynton, J.D. Whitaker, L. Liguori, L. Parker, D. Owens and G. Blanvillain. 2009. Examination of local movement and migratory behavior of sea turtles during spring and summer along the Atlantic coast off the southeastern United States. South Carolina Department of Natural Resources, University of Georgia, and College of Charleston, Final Report to NOAA Fisheries, Contract Number NA03NMF4720281, 177p.

Bleakney, J.S. 1965. Reports of marine turtles from New England and eastern Canada. Canadian Field Naturalist 79: 120-128.

Bolten, A.B. 1999. Techniques for measuring sea turtles. Pages 110-114 *in* Eckert, K.L., K.A. Bjorndal, F.A. Abreu-Grobois and M. Donnelly (eds). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

Buckley, J. and B. Kynard. 1985. Yearly movements of shortnose sturgeons in the Connecticut River. Transactions of the American Fisheries Society 114:813-820.

Conant, T.A., P.H. Dutton, T. Eguchi, S.P. Epperly, C.C. Fahy, M.H. Godfrey, S.L. MacPherson, E.E. Possardt, B.A. Schroeder, J.A. Seminoff, M.L. Snover, C.M. Upite, and B.E. Witherington. 2009. Loggerhead sea turtle *(Caretta caretta)* 2009 status review under the U.S. Endangered Species Act. Report of the Loggerhead Biological Review Team to the National Marine Fisheries Service, August 2009. 222 pages.

Cummins, R., Jr., J.B.Rivers and P. Struhsaker. 1962. Snapper trawling explorations along the southeastern coast of the United States. Comm. Fish. Rev. 24: 1-7.

Dadswell, M.J., B.D. Taubert, T.S. Squires, D. Marchette and J. Buckley. 1984. Synopsis of biological data on shortnose sturgeon, *Acipenser brevirostrum* LeSueur 1818. FAO Fish. Synop. 140:1-45.

Eckert S.A., K.L. Eckert, P. Ponganis, and G.L. Kooyman. 1989. Diving and foraging behavior of leatherback sea-turtles (*Dermochelys coriacea*). Canadian Journal of Zoology; 672834-2840.

Epperly, S., L. Avens, L. Garrison, T. Henwood, W. Hoggard, J. Mitchell, J. Nance, J. Poffenberger, C. Sasso, E. Scott-Denton, and C. Yeung. 2002. Analysis of sea turtle bycatch in the commercial shrimp fisheries of southeast U.S. waters and the Gulf of Mexico. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-490, 88 pp.

Evermann, B.W. and B.A. Bean. 1897 (1898). Indian River and its fishes. U.S. Comm. Fish Fisher., Rep. Comm. 22:227-248.

Flournoy, P.H., S.G. Rogers, and P.S. Crawford. 1992. Restoration of shortnose sturgeon in the Altamaha River, Georgia. Final Report to the U.S. Fish and Wildlife Service, Atlanta, Georgia.

Garduño-Andrade, M., Guzmán, V., Miranda, E., Briseño-Dueñas, R., & Abreu-Grobois, F. A. 1999. Increases in hawksbill turtle (*Eretmochelys imbricata*) nestings in the Yucatán Peninsula, Mexico, 1977-1996: Data in support of successful conservation? *Chelonian Conservation and Biology, 3*(2), 286-295.

Henwood, T.A. and L.H. Ogren. 1987. Distribution and migrations of immature Kemp's ridley turtles (*Lepidochelys kempii*) and green turtles (Chelonia mydas) off Florida, Georgia, and South Carolina. Northeast Gulf Science, 9(2): 153-160.

Holland, B. F., Jr. and G. F. Yelverton. 1973. Distribution and biological studies of anadromous fishes offshore North Carolina. North Carolina Department of Natural and Economic Resources SSR 24, 132 pages.

Hildebrand, H. 1963. Hallazgo del area de anidacion de la tortuga "lora" *Lepidochelys kempii* (Garman), en la costa occidental del Golfo de Mexico (Rept. Chel.). Ciencia Mex., 22(4):105-112.

Hirth, H.F. 1971. Synopsis of biological data on the green sea turtle, *Chelonia mydas*. FAO Fisheries Synopsis No. 85: 1-77.

Kieffer, M.C. and B. Kynard. 1993. Annual movements of shortnose and Atlantic sturgeons in the Merrimack River, Massachusetts. Transactions of the American Fisheries Society 122:1088-1103.

Kraus, S.D., R.D. Kenney, A.R. Knowlton, and J.N. Ciano. 1993.Endangered right whales of the southeastern North Atlantic. Contract Report No. 14-35-0001-30486 for Minerals Management Service, March 1993.

Lazell, J. 1980. New England waters: critical habitat for marine turtles. Copeia 1980: 290-295.

Lutcavage, M. and J.A. Musick. 1985. Aspects of the biology of sea turtles in Virginia. Copeia 1985(2): 449-456.

Mansfield, K.L., V.S. Saba, J.A. Keinath and J.A. Musick. 2009. Satellite telemetry reveals a dichotomy in migration strategies among juvenile loggerhead turtles in the Northwest Atlantic. Marine Biology, 156:2555-2570.

McClellan, C.M., T. Tucker and L. Avens. 2010. Satellite tracking workshop, 30th International Sea Turtle Symposium, Goa, India, 30 April 2010. Presentations available online at: http://www.seaturtle.org/tagging/workshop2010.shtml.

Meylan, A.B. 1988. Spongivory in hawksbill turtles: a diet of glass. Science 239:393-395.

Meylan, A. B. 1999. Status of the hawksbill turtle (*Eretmochelys imbricata*) in the Caribbean region. *Chelonian Conservation and Biology, 3*(2), 177-184.

Meylan, A.B. and M. Donnelly. 1999. Status justification for listing the hawksbill turtle (*Eretmochelys imbricata* as critically endangered on the 1996 IUCN Red List of Threatened Animals. Chelonian Conservation and Biology 3(2): 200-204.

National Resource Council. 1990. Decline of the Sea Turltes: Causes and Prevention. National Academy Press, Washington, DC, 355p.

NMFS. 2002. Endangered Species Act section 7 consultation on shrimp trawling in the southeastern U.S. under the sea turtle conservation regulations. Biological Opinion. December 2.

NMFS. 2006. Environmental Assessment Scientific Research Permit to South Carolina Department of Natural Resources (SCDNR) (Permit File No. 1540) to Conduct Research on Endangered and Threatened Sea Turtles 31 pp.

NMFS Southeast Fisheries Science Center (SEFSC). 2001. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. U.S. Department of Commerce, National Marine Fisheries Service, Miami, FL, SEFSC Contribution PRD-00/01-08; Parts I-III and Appendices I-V1.

National Marine Fisheries Service and United States Fish and Wildlife Service. (NMFS USFWS) 1991. Recovery Plan for U.S. Population of Atlantic Green Turtle. National Marine Fisheries Service, Washington, D.C.

NMFS and USFWS. 1995. Status reviews for sea turtles listed under the Endangered Species Act of 1973. National Marine Fisheries Service, Silver Spring, MD. 139 pp.

Ogren, L.H. 1988. Biology and Ecology of Sea Turtles. Prepared for National Marine Fisheries, Panama City Laboratory. Sept. 7.

Ogren, L.H. 1989. Distribution of juvenile and sub-adult Kemp's ridley sea turtle: Preliminary results from 1984-1987 surveys. Pp. 116-123 *In* Caillouet, C.W. and A.M. Landry (eds), First Intl. Symp. on Kemp's Ridley Sea Turtle Biol, Conserv. and Management. Texas A&M Univ.Galveston, TX., Oct. 1-4, 1985, TAMU-SG

Owens, D.W. and G.W. Ruiz. 1980. New methods of obtaining blood and cerebrospinal fluid from turtles. Herpetologica 36(1):17-20.

Pritchard, P.C.H. 1969. Endangered species: Kemp's ridley turtle. Florida Naturalist, 49: 15-19.

Renaud, M.L. 1995. Movements and submergence patterns of Kemp's ridley turtles (*Lepidochelys kempii*). Journal of Herpetology 29: 370-374.

Rogers, S.G. and W. Weber. 1994. Occurrence of shortnose sturgeon (*Acipenser brevirostrum*) in the Ogeechee-Canoochee river system, Georgia, during the summer of 1993. Final Report of the United States Army to the Nature Conservancy of Georgia.

Rogers, S.G. and W. Weber. 1995. Status and restoration of Atlantic and shortnose sturgeons in Georgia. Final Report to the National Marine Fisheries Service, Southeast Regional Office, St. Petersburg, Florida.

Sasso, C.R. and S.P. Epperly. 2006. Seasonal sea turtle mortality risk from forced submergence in bottom trawls. Fisheries Research 81: 86-88.

Schaefer, R.H. 1967. Species composition, size, and seasonal abundance of fish in the surf waters of Long Island. New York Fish and Game Journal 14:1-46.

Schmid, J.R. and W.N. Witzell. 1997. Age and growth of wild Kemp's ridley turtles (*Lepidochelys kempii*): cumulative results of tagging studies in Florida. Chelonian Conservation Biology 2: 532 - 537.

Turtle Expert Working Group (TEWG). 1998. An assessment of the Kemp's ridley (*Lepicochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409. 96 pp.

Turtle Expert Working Group. 2007. An Assessment of the Leatherback Turtle Population in the Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-555, 116p.

van Dam, R. and C. Diez. 1998. Home range of immature hawksbill turtles (*Eretmochelys imbricata*) at two Caribbean islands. Journal of Experimental Marine Biology and Ecology, 220(1):15-24.

Vladykov, V.D., and J.R. Greeley. 1963. Order Acipenseroidei. Pages 24-60 *in* Fishes of the western North Atlantic. Part III. Memoirs of the Sears Foundation for Marine Research 1.

Watson, W.and R. Granger. 1998. Hydrodynamic Effect of a Satellite Transmitter on a Juvenile Green Turtle (*Chelonia mydas*). The Journal of Experimental Biology 201: 2497-2502.

Weber, W. 1996. Population size and habitat use of shortnose sturgeon, *Acipenser brevirostrum*, in the Ogeechee River system, Georgia. Unpublished Master Thesis, University of Georgia, Athens, Georgia.

Wilcox, J.R, G. Bouska, J.C. Gorham, B.D. Peery and M.J. Bresette. 1998. Knee deep in green turtles: recent trends in capture rates at the St. Lucie Nuclear Power Plant. *In*: Byles, R., Fernandez, Y. (Compilers) Proceedings of the sixteenth annual symposium on sea turtle biology and conservation. NOAA Technical Memorandum NMFS-SEFSC-412: 147-148.

Wilk, S.J., and M.J. Silverman. 1976. Summer benthic fish fauna of Sandy Hook Bay, New Jersey. NOAA Technical Report SSRF-698. National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, Massachusetts.

APPENDIX A. Annual Takes of Male and Female Sea Turtles in the Atlantic Ocean.

SPECIES	LIFESTAGE	NUMBER OF ANIMALS	TAKE ACTION	PROCEDURES	DETAILS
Turtle, loggerhead sea	Adult/ Subadult/ Juvenile	295	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fecal; Transport; Ultrasound; Weigh	standard processing
Turtle, loggerhead sea	Juvenile/ Subadult	40	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, scute scraping; Sample, tissue; Ultrasound; Weigh	standard plus telemetry, satellite and acoustic tags, and keratin biopsy
Turtle, loggerhead sea	Adult Males only	10	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Instrument, epoxy attachment (e.g., satellite tag, VHF tag); Mark, carapace (temporary); Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, cloacal swab; Sample, fecal; Sample, scute scraping; Ultrasound; Weigh	standard plus telemetry, satellite and acoustic tags, and keratin biopsy
Turtle, Kemp's ridley sea	Adult/ Subadult/ Juvenile	29	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fecal; Transport; Ultrasound; Weigh	standard processing
Turtle, green sea	Adult/ Subadult/ Juvenile	9	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fecal; Transport; Ultrasound; Weigh	standard processing
Turtle, leatherback sea	Adult/ Subadult/ Juvenile	1	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fecal; Ultrasound; Weigh	standard processing
Turtle, hawksbill sea	Adult/ Subadult/ Juvenile	1	Capture/ Handle/ Release	Collect, tumors; Epibiota removal; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Sample, blood; Sample, fecal; Ultrasound; Weigh	standard processing

SPECIES	LIFESTAGE	NUMBER OF ANIMALS	TAKE ACTION	PROCEDURES	DETAILS
Turtle, loggerhead sea	Adult/ Subadult/ Juvenile	5	Unintentional mortality	Unintentional mortality	Over the course of the permit
Turtle, green sea	Adult/ Subadult/ Juvenile	1	Unintentional mortality	Unintentional mortality	Over the course of the permit
Turtle, Kemp's ridley sea	Adult/ Subadult/ Juvenile	1	Unintentional mortality	Unintentional mortality	Over the course of the permit
Turtle, hawksbill sea	Adult/ Subadult/ Juvenile	1	Unintentional mortality	Unintentional mortality	Over the course of the permit
Turtle, leatherback sea	Adult/ Subadult/ Juvenile	1	Unintentional mortality	Unintentional mortality	Over the course of the permit

APPENDIX B. ACTIVE PERMITS IN OR NEAR THE ACTION AREA

Table 1. Existing Permits Authorizing Takes for the Target Sea Turtle Species In or Near the Action Area. The Proposed Action would replace the permit in **bold.**

Permit Number	Permit Holder	Expiration Date
1540	**South Carolina Department of Natural Resources**	**March 31, 2011**
1552	NMFS SEFSC	June 30, 2011
1557	Molly Lutcavage	June 30, 2011
1576	NMFS NEFSC	September 30, 2011
1570	NMFS SEFSC	December 31, 2011
1571	NMFS SEFSC	December 31, 2011
1551	NMFS SEFSC	July 1, 2013
13543	South Carolina Department of Natural Resources	April 30, 2014
14726	Blair Witherington	September 15, 2015

Table 2. Types of research activities authorized by active permits. The sex and age class of animals affected varies by permit, as does the time of year and frequency of activity. The Proposed Action appears in ***italics*** and will replace the **bold** permit.

Permit No.	Capture	Blood sampling	Fecal sampling/ lavage	Laparoscopy	Tissue sampling	Attach instruments	Tags or marks	Mortality
1540	√	√	√	√	√	√	√	√
1552					√		√	
1557	√	√			√	√	√	
1570	√				√		√	√
1571					√		√	
1576	√				√		√	√
1551	√	√	√	√	√	√	√	
13543							√	
14726	√		√		√	√	√	
15566	√	√	√		√	√	√	√