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

Environmental Assessment on Issuance of a Scientific Research Permit for Sea Turtle Research in North Carolina

May 2011

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

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Location: Core Sound, North Carolina

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue a scientific research permit. The purpose of File No. 15135 (Blake Price) is to test commercial gillnet gear that may have the potential to eliminate or reduce sea turtle bycatch. The research involves testing large mesh (> 5 inches) commercial gillnets targeting southern flounder *(Paralichthys lethostigma)* in shallow waters of Core Sound, North Carolina. Test nets would be configured with illuminated, green Lindgen-Pitman Electralume lights that have shown promise for reducing sea turtle bycatch in Baja California. 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.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF ACTION

NMFS proposes to issue a scientific research permit 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:

- Mr. Blake Price, 132 Conch Court, Emerald Isle, NC 28594

1.1.1 Background

In 1999, the North Carolina sea turtle stranding network noted significant increases in sea turtle strandings throughout Pamlico Sound. Subsequent observations and consultations between state, federal and industry representatives implicated the large mesh southern flounder (*Paralichthys lethostigma*) fishery as a primary cause of sea turtle takes in this area (Gearhart 2001). Based on this information, NMFS issued an emergency rule closing southeastern Pamlico Sound to large mesh gillnets. The North Carolina Division of Marine Fisheries (NCDMF) applied for and received an ESA Section 10 Incidental Take Permit (ITP) in 2000 establishing the Pamlico Sound Gillnet Restricted Area (PSGNRA). The PSGNRA was designed to establish a conservation plan that protects sea turtles and monitors limited shallow water gillnet operations along the Outer Banks and mainland side of Pamlico Sound in the fall of each year.

Management of this area continues today, and has been successful in reducing sea turtle mortality. For example, once turtle thresholds have been reached by the fishery, management has prevented further sea turtle takes from occurring. However, recent observations have shown increases in the number of total live sea turtle takes each year (Price 2009). Delayed mortality from live interactions in these fisheries may be from 30 - 50%.

While the PSGNRA is a functional management unit, the need to continue to seek solutions to reduce if not eliminate sea turtle takes in gillnet fisheries still exists. Under NMFS Permit No. 1563, NCDMF tested a low-profile gillnet in the closed portion of Pamlico Sound, which showed great promise in this area (Price and Salisbury 2007). However, this deep water area remains closed and interactions in and around the shallow waters of the PSGNRA continue. Recently, in the summer and fall of 2009, a NMFS alternative platform gillnet observer program throughout Core Sound (adjacent to Pamlico Sound) indicated increased sea turtle interactions in large mesh gillnet fisheries. Subsequently, the NCDMF implemented management measures (e.g., yardage restrictions, mesh restrictions) in an attempt to eliminate these interactions. However, NMFS and NCDMF continue to observe sea turtle interactions in these large mesh gillnet fisheries.

Research in gillnet fisheries elsewhere also has examined methodology and gear testing for the purpose of identifying a gear modification that can reduce or eliminate sea turtle interactions

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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."

(Gilman et al. 2009). Recently, an independent study was conducted from 2006 - 2008 near Punta Abreojos, Baja California to compare sea turtle catch rates in an experimental gillnet incorporating battery-powered green LED lightsticks placed at 10 m intervals along the net (Wang et al., 2009). Results of this study were promising, finding a significant ($p < 0.05$) reduction in the catch rates of sea turtles compared to control gillnets with no lights. Simultaneously, no significant reduction was observed in the catch rates of the target fish species.

The large mesh gillnets, target species (demersal flatfish), and the sea turtle bycatch issues in Baja California (Wang et al. 2009) are very similar to these conditions in the estuarine waters of North Carolina. The proposed research would investigate if the use of LED lights in gillnets may significantly reduce sea turtle bycatch.

Recent Lawsuit

On February 23, 2010 the Karen Beasley Sea Turtle Rescue and Rehabilitation Center filed suit against the NCDMF in the United States District Court for the Eastern District of North Carolina, Southern Division. In the complaint, the plaintiff contended that NCDMF was in violation of the ESA by authorizing gill nets to operate and take sea turtles in state waters not covered by the NMFS ITP and not complying with the ITP requirements for observer coverage and enforcement. On May 13, 2010 a settlement was reached in the case. The settlement agreement includes many terms and conditions, including restrictions to large mesh gill nets such as when they can be set and removed, the maximum net height, maximum yardage of nets, and distance between nets.

Although the proposed research is not directly affected by the lawsuit, the settlement agreement does affect the proposed study design. Because the goal of the research is to mimic commercial fishing situations, the applicant has made a few modifications to the originally proposed study design so that the research follows all requirements of the settlement agreement. For example, since fishermen are no longer allowed to set gill nets over the weekend, the research would not occur on weekends.

1.1.2 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's 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.

1.1.3 Research Objectives

Study objectives are to test commercial gillnet gear that may have the potential to eliminate or reduce sea turtle bycatch. The research involves testing large mesh (> 5 inches) commercial gillnets targeting southern flounder in shallow waters of Core Sound, North Carolina. Control and test nets would be set following the fishery standards. Control and experimental nets would

be identical, except that test nets would be configured with illuminated, green Lindgen-Pitman lights that have shown promise for reducing sea turtle bycatch.

1.2 OTHER EA/EIS THAT INFLUENCE SCOPE OF THIS EA

While working for NCDMF, the applicant participated in two gear research projects designed to investigate methods to reduce takes of sea turtles. Permit No. 1446 (issued September 20, 2004) compared low profile gill nets with the standard high profile net in Pamlico Sound, NC. An EA was prepared on the research and concluded with a Finding of No Significant Impact (FONSI). Permit No. 1563 (issued August 29, 2006) also authorized comparisons between higher and lower profile nets in the area. An EA was prepared on that study and also concluded with a FONSI. Both Permit No. 1446 and 1563 authorized mortalities of sea turtles at approximately the same level as is presently proposed. Biological Opinions prepared on both prior projects determined that the research was not likely to jeopardize the continued existence of these turtles and was not likely to destroy or adversely modify designated critical habitat.

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 that have been 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.

1.3.1 Comments on application

A Notice of Receipt of the permit application was published in the *Federal Register*, announcing the availability of File No. 15135 for public comment (75 FR 11863, March 12, 2010). No substantive comments were received.

1.4 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action, as well as who is responsible for obtaining them. Even when it is the applicant's responsibility to obtain such permissions, NMFS is obligated under NEPA to ascertain whether the applicant is seeking other federal, state, or local approvals for their action.

1.4.1 National Environmental Policy Act

NEPA is applicable to "major" federal actions significantly affecting the quality of the human environment. A federal action is considered "major" if a federal agency fully or partially funds, regulates, conducts, or approves this action. NMFS' issuance of research permits is considered a major federal action. NEPA requires consideration of environmental issues in federal agency planning and decision making. CEQ's implementing regulations (40 CFR Parts 1500-1508) outline federal agency responsibilities under NEPA.

Through NOAA Administrative Order (NAO) 216-6, NOAA established agency procedures for complying with NEPA and the implementing regulations issued by CEQ. NAO 216-6 specifies that issuance of scientific research permits under the MMPA and ESA are categorically excluded from further environmental review, except under extraordinary circumstances.

NMFS must prepare an EA or EIS when a proposed action:

- is the subject of public controversy based on potential environmental consequences,
- has uncertain environmental impacts or unknown risks,
- establishes a precedent or decision in principle about future proposals,
- may result in cumulatively significant impacts, or
- may have an adverse effect upon endangered or threatened species or their habitats.

While issuance of scientific research permits is typically subject to a categorical exclusion, as described in NAO 216-6, NMFS is preparing an EA for this action to provide a more detailed analysis of effects to ESA-listed species. This EA is prepared in accordance with NEPA, CEQ's implementing regulations, and NAO 216-6.

1.4.2 Endangered Species Act

Section 9 of the ESA, as amended, and Federal regulations pursuant to section 4(d) of the ESA, prohibit the take of endangered and threatened species, respectively, without special exemption such as by a permit. Permits to take ESA-listed species for scientific purposes, or for the purpose of enhancing the propagation or survival of the species, may be granted pursuant to Section 10(a)(1)(A) of the ESA.

NMFS has promulgated regulations to implement the permit provisions of the ESA (50 CFR Part 222) and has produced Office of Management and Budget approved application instructions that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the ESA.

Section 10(d) of the ESA stipulates that, for NMFS to issue permits under section 10(a)(1)(A) of the ESA, the Agency must find that the permit: was applied for in good faith; if granted and exercised will not operate to the disadvantage of the species; and will be consistent with the purposes and policy set forth in Section 2 of the ESA.

Section 2 of the ESA sets forth the purposes and policy of the Act. The purposes of the ESA are to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of

the treaties and conventions set forth in Section 2(a) of the ESA. It is the policy of the ESA that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of the ESA. In consideration of the ESA's definition of conserve, which indicates an ultimate goal of bringing a species to the point where listing under the ESA is no longer necessary for its continued existence (i.e., the species is recovered), exemption permits issued pursuant to Section 10 of the ESA are for activities that are likely to further the conservation of the affected species.

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or adversely modify critical habitat. NMFS' issuance of a permit affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these Section 7 consultation requirements. Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. NMFS is further required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species. Regulations specify the procedural requirements for these consultations (50 Part CFR 402).

1.4.3 Marine Mammal Protection Act

The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. NMFS has sole jurisdiction for all species of cetacean, and for all pinnipeds except walrus[2]. Permits for *bona fide*[3] scientific research on marine mammals, or to enhance the survival or recovery of a species or stock, issued pursuant to section 104 of the MMPA are one such exception.

The proposed research is not eligible for a section 104 permit because it is not directed at marine mammals. However, the potential for incidental take of marine mammals was considered when analyzing the research (see Section 4.2.1).

1.4.4 Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA)

Under the MSFCMA 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 MSFCMA offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., research permits), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes renewals, reviews or substantial revisions of actions.

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2 The U.S. Fish and Wildlife Service has jurisdiction for walrus, polar bears, sea otters, and manatees.

3 The MMPA defines bona fide research as "scientific research on marine mammals, the results of which – (A) likely would be accepted for publication in a refereed scientific journal; (B) are likely to contribute to the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems."

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: *http://www.nmfs.noaa.gov/habitat/habitatprotection/profile/southatlanticcouncil.htm.*

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective, as well as alternatives eliminated from detailed study. This chapter also summarizes the expected outputs and any related mitigation of each alternative. One alternative is the "No Action" alternative where the proposed permit would not be issued. The No Action alternative is the baseline for rest of the analyses. The Proposed Action alternative represents the research proposed in the submitted application for a permit, with standard permit terms and conditions specified by NMFS.

2.1 ALTERNATIVE 1 – NO ACTION

An alternative to the Proposed Action is no action, i.e., denial of the permit request. This alternative would eliminate any potential risk to the environment from the proposed research activities. However, it would not allow the researcher to conduct the proposed research and the opportunity would be lost to study gear modifications that may reduce sea turtle bycatch in the southern flounder fishery. This information may prove transferable to other fisheries within North Carolina and throughout the East Coast. Reducing bycatch would help conserve and recover sea turtles and would assist NMFS in making important management decisions concerning fisheries, sea turtle species and their habitat.

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

Under the Proposed Action alternative, a permit would be issued for activities as proposed by the applicant, with the permit terms and conditions standard to such permits as issued by NMFS. Alternative 2 is the preferred alternative.

The permit would be valid until December 31, 2012. The applicant hopes to be able to complete the project within a single calendar year (i.e., 2011), but an additional year would be authorized in case weather, funding, or some other unforeseen circumstance interferes with the schedule. See Appendix 1 for a summary of the takes that would be authorized under the preferred alternative.

Action area

The research would take place in Core Sound, North Carolina, in areas typically used by commercial fishermen. The gillnets would be deployed in relatively shallow water (1' - 3') throughout the sound and set almost exclusively on sandy bottom. See Figure 1 for a map of the study area.

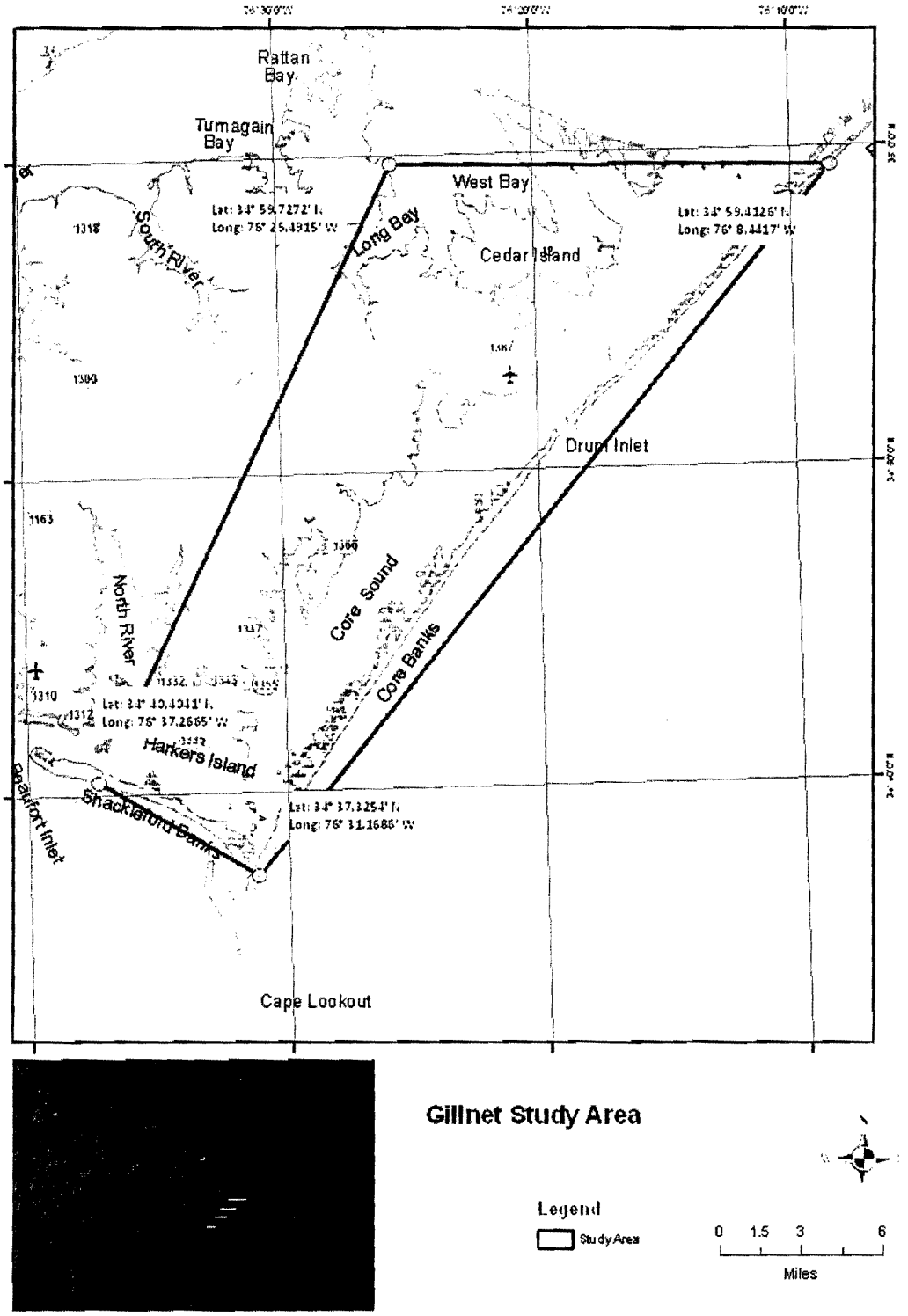


Figure 1. Proposed study area

The following sections describe the proposed research activities:

Capture

Turtles would be captured using a large mesh gillnet. Both control and experimental gillnets would be constructed identically (5 3/4 inch stretch mesh; 15 meshes deep; # 177 twine; 20 lb lead core lead line, and 5/16 inch float line). Green (Lindgen-Pitman Elactralume) LED fishing lights would be placed along the floatline at 10 m intervals along the nets. The floatline would have floating buoy lines (~5 ft in length) attached to each end. Reduced line length is made feasible because the nets would be deployed in shallow water. Anchors would be used on each end of gillnet sets, which would create only minimal bottom disturbance along the sandy bottom. See Figure 2 for the proposed net designs.

The only difference between the experimental and control nets would be the illumination of the green LED fishing lights on the experimental net. Lights would also be hung on the control nets, but would not be illuminated.

On each fishing day, two fishermen would each deploy 1,000 yards of alternating control and experimental gillnet in an approximate continuous line. Refer to Figure 3 for the net set configurations. Nets would be deployed in relatively shallow water (1 – 3 ft) throughout Core Sound, and set almost exclusively on sandy bottom. Each 1,000 yards would consist of five pairs of 200 yard net shots comprised of 100 yards of control net and 100 yards of experimental net. There would be approximately 25 feet of space between the control and experimental nets in each 200 yard pair. Each 200 yards of gillnet would be separated by approximately 75 ft so that each matched pairs (control and experimental) fishes independently. Each fisherman would deploy nets within the study region in the same general area based upon their experience and knowledge of target species distribution on a given day, but the fishermen would remain sufficiently apart (1/4 - 1/2 mile) from one another to eliminate potentially confounding factors between the two fishermen.

In order to mimic the commercial fishery, nets would be set at dusk and retrieved at daylight for approximately 8- to 12-hour sets. Nets would not be monitored over night. Nets would be removed from the water during daylight hours. The days of the week when sets would occur would be limited, in accordance with the settlement agreement for the recent litigation.

Each fishing operation would consist of the fisherman and an observer. Observers would be hired and trained to collect all data. Upon retrieval of the nets, the scientific observer would sample and record all finfish catch and bycatch information including: identifying, counting and weighing all catch by species and net origin of catch (control or experimental net). Finfish catch and bycatch would be sorted, sampled and coded. Observers would record the location in the net of all sea turtle captures with relation to where the animal was captured in the length of the net. Captures would also be recorded by proximity to the control or test nets.

The matched-pair sampling design would allow for a total of ten matched paired samples each fishing day. This study would be conducted for 30 days (60 fishing trips) for a total of 300 matched pairs. The applicant conducted a power analysis which indicated that this

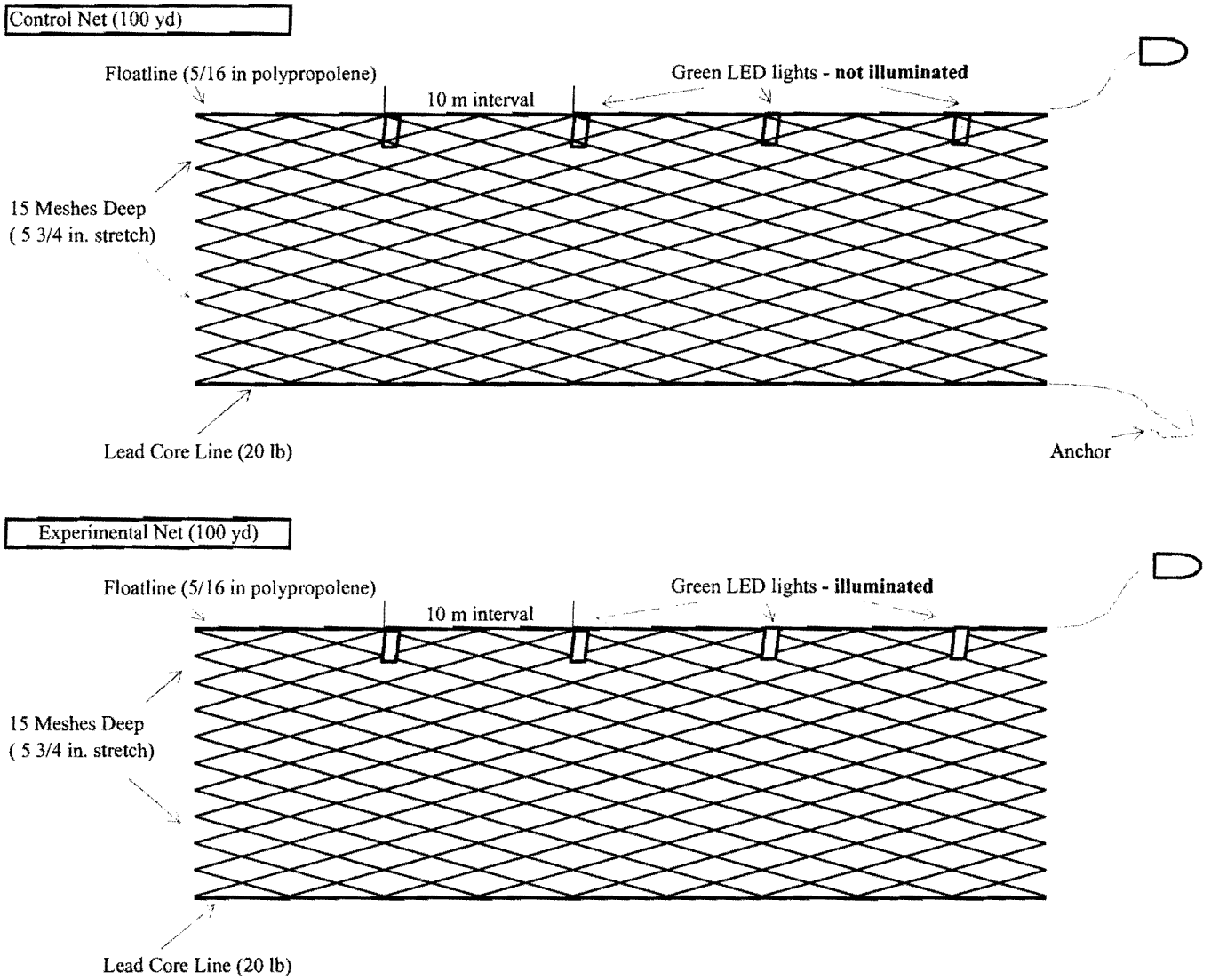
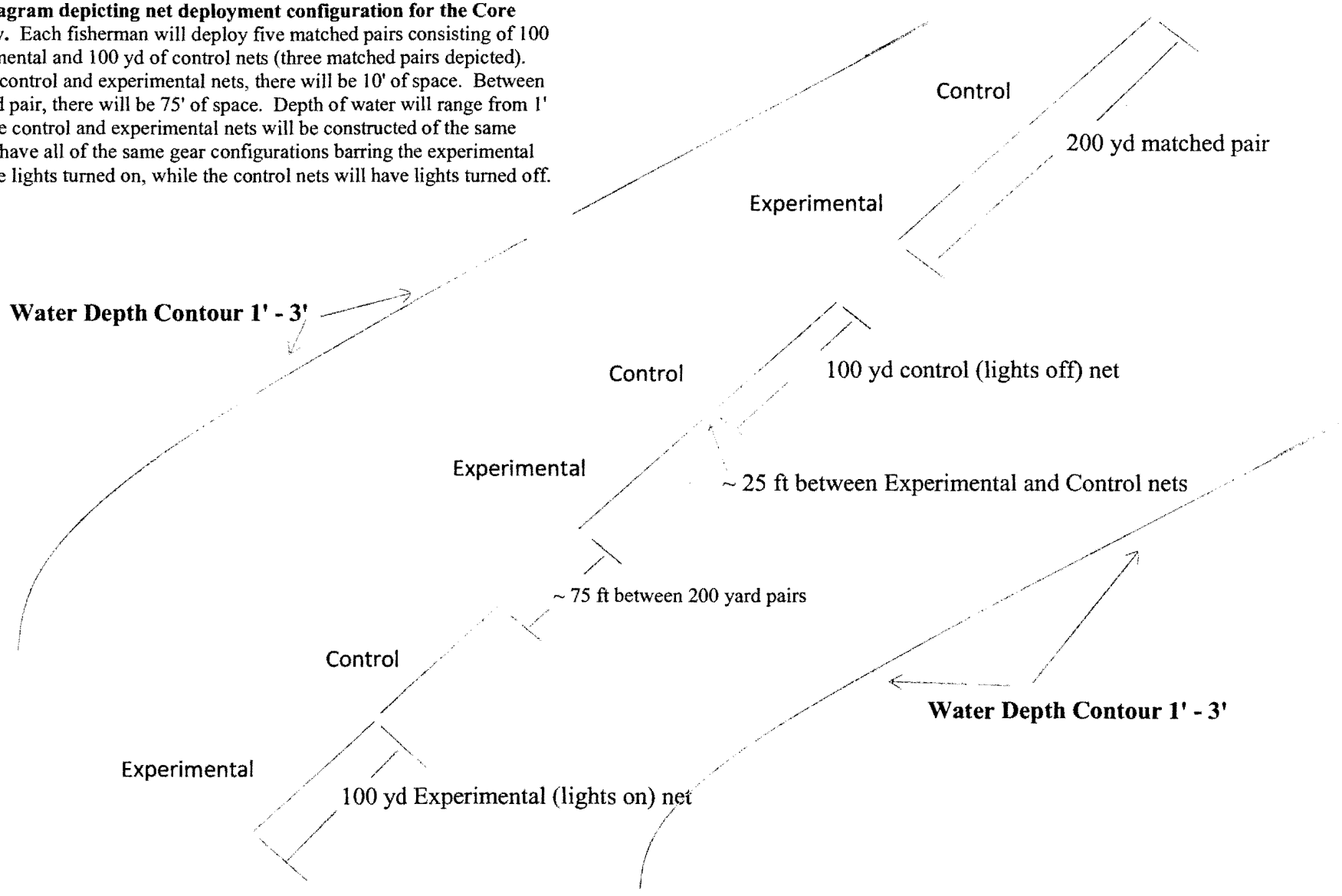


Figure 2. Control and Experimental Net Designs. All net materials and construction will be identical for both the Control and Experimental nets. Both net types will have LED lights affixed to the floatline at 10 m intervals, but only the experimental net will have these lights illuminated. The nets will be paired together (with ~ 10' between the control and test net), with an anchor on each end of the pair. A pair consists of 100 yd of Control and 100 yd of Experimental net bridled together. Between each matched pair, there will be 75' of space. Each fisherman will deploy 5 matched pairs per fishing day.

Figure 3. Diagram depicting net deployment configuration for the Core Sound Study. Each fisherman will deploy five matched pairs consisting of 100 yd of experimental and 100 yd of control nets (three matched pairs depicted). Between the control and experimental nets, there will be 10' of space. Between each matched pair, there will be 75' of space. Depth of water will range from 1' – 3'. Both the control and experimental nets will be constructed of the same material and have all of the same gear configurations barring the experimental nets will have lights turned on, while the control nets will have lights turned off.



design would provide statistical power to detect bycatch reduction potential.

Before deployment of the net a careful visual inspection of the area would be made to ensure there are no marine mammals present near the study site. In the case where marine mammals are sighted near the netting sight, nets would either not be deployed or would be pulled in and netting activity would cease until the area is clear.

With the exception of the LED lights, all gear and fishing methods used during the study would conform to the restrictions of the summer flounder gillnet fishery. This includes unmonitored sets at night.

Handling, measuring, photographing

Observers would monitor the retrieval of the net and sample all catch. All sea turtles would be counted, measured, and identified by species. A curved carapace length and curved carapace width would be measured and recorded for each animal. Every attempt would be made to take photographs of all captured sea turtles before release and recorded by date, location, study and net type. Additional information on the capture would also be recorded such as the location in the net where the turtle was captured and how the animal was entangled.

Upon capture, turtles would also be thoroughly examined for any possible injuries. Observers would be trained to identify, handle, tag, and if necessary resuscitate sea turtles under NMFS protocols (NMFS-Beaufort Lab).

In order to compare the catch per soak hour between the experimental and control nets, the species composition and weight of all animals captured in each set would be recorded. Flounder, other finfish, and bycatch would be sorted, sampled, and recorded.

Flipper and Passive Integrated Transponder (PIT) tagging

All live turtles captured in good condition would be tagged with two inconel tags in the rear flippers and one PIT tag in the left front flipper. All tagging equipment including the PIT tag applicator and Inconel tag pliers would be washed and disinfected following each application and prior to use on another animal.

Before insertion of any tags, all flippers would be scanned for the presence of pre-existing PIT or flipper tags. Identification numbers from any pre-existing tags would be recorded and included in the annual report. Turtles with fibropapillomas would be kept separate from other turtles and separate sets of towels, pads, and measuring and tagging gear would be used.

Holding, Transport, and Release

While onboard, all turtles would be restricted to a small area to prevent injury and either kept warm or cool depending on the air temperature. Temperature would be regulated either by shading or exposing to the sun. If temperatures allow, turtles would also be kept moist by periodically drenching with water.

Healthy turtles would be returned to the water following identification, measurement and tagging. Turtles would be released after the removal of all nets and away from the research area, to eliminate the possibility of immediate recapture. However turtles would be released in the same general habitat as the capture site.

Resuscitation attempts would be made on all sea turtles that are lethargic or comatose for a minimum of two hours. This would consist of placing the turtle on its breastplate, and securing the hindquarters upward using a small flat board (e.g. measuring board). Every effort would be made to ensure removal of any potential water in the turtle's lungs by opening the mouth (use of pencil), elevation and gently rocking the turtle back and forth raising the turtle up to 3 inches on each side.

All comatose or debilitated turtles will be brought to shore and transferred to the North Carolina Sea Turtle Stranding and Salvage Network (NCSTSSN) staff for examination, data collection, and treatment. The Principal Investigator is in the process of contacting the NC Wildlife Resource Commission (NC WRC) sea turtle biologist to confirm acceptance of any comatose, debilitated or dead sea turtles, and would ensure this coordination is established prior to initiation of the project. All sea turtle mortalities will be turned over to the NC WRC Sea Turtle Stranding Network for postmortem examinations. Once on shore, observers would remain with all turtles until NCSTSSN personnel arrive to complete the transfer. While on shore, all live turtles would be restricted to a small area to prevent injury to themselves or other turtles. Holding times would not exceed 6 hours including transport time to shore. The final disposition (e.g., released alive, died) of all turtles taken to a rehabilitation facility would be included in the annual report.

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, 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 under File No. 15135 would occur in Core Sound, North Carolina. These shallow water sites consist of mainly sandy bottom. The study area would not occur in any sanctuaries, parks, historic areas, designated critical habitat, or other protected areas.

3.2.1 Essential Fish Habitat

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.

Because the proposed research involves setting fishing gear, the Permits Division contacted the NMFS Southeast Region's Habitat Conservation Division (HCD) and asked them to review the application and its potential effects on EFH.

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 accepting comments on changing the listing of the loggerhead sea turtle to endangered (75 FR 12598).*

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 United States 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 growing trend in total number of nests suggests that the adult nesting female population is about 7,400 individuals.

Table 1: Total number of nests at Rancho Nuevo

Year	# of Nests
1985	702
1995	1,940
2000	5,800
2003	8,300
2005	10,300
2006	12,000

Adult Kemp's ridley sea turtles appear to be restricted somewhat to the Gulf of Mexico (GOM) 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 GOM. 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 GOM, juvenile/subadult ridleys occupy shallow, coastal regions. The near shore waters of the GOM 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 GOM.

Ogren (1989) suggested that in the northern GOM 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 GOM 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 GOM. 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 GOM (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 GOM (especially Texas), in the Greater and Lesser Antilles, and along the Central American mainland south to Brazil.

In Florida, hawksbills are regularly observed 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. These small turtles are believed to originate from nesting beaches in Mexico.

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 immatures 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 1999b). 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 1999a, 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 1999b).

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 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 U.S. and throughout the Caribbean Sea. Non-nesting, adult female loggerheads are reported throughout the U.S. 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 (TEWG 1998) suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions:

- 54% in the southeast U.S. Atlantic
- 29% in the northeast U.S. Atlantic
- 12% in the eastern Gulf of Mexico
- 5% in the western Gulf of Mexico

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; the South Pacific DPS; the North Indian Ocean DPS; the Southeast Indo-Pacific Ocean DPS; the Southwest Indian Ocean DPS; the Northwest Atlantic Ocean DPS; the Northeast Atlantic Ocean DPS; the Mediterranean Sea DPS; and the 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 nearshore.

The leatherback ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). 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 distributed pelagically, however can be found in nearshore waters.

Recent analysis suggests that seven stocks exist in the Atlantic including Florida, Northern Caribbean, Western Caribbean, Southern Caribbean-Guyana Shield-Trinidad, West Africa, South Africa, and Brazil (Turtle Expert Working Group, 2007). The primary western Atlantic leatherback nesting beaches occur in French Guiana, Suriname, Trinidad, and Costa Rica.

The Turtle Expert Working Group (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 will 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 (Turtle Expert Working Group, 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, U.S. Virgin Islands, 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

<u>Protected Species under the ESA or the Marine Mammal Protection Act (MMPA)</u>

Florida manatee

Manatees are listed as endangered under the ESA and protected under the MMPA. They inhabit both marine and fresh water of sufficient depth (1.5 meters to usually less than 6 meters)

throughout their range of the southeastern U.S. The West Indian manatee stock is divided into two subspecies, the Antillean manatee (*Trichechus manatus manatus*) and the Florida manatee (*Trichechus manatus latirostris*). Florida manatees may be encountered in canals, rivers, estuarine habitats, saltwater bays, and on occasion have been observed as much as 3.7 miles off the Florida Gulf coast.

Shortnose sturgeon

Shortnose sturgeon (*Acipenser brevirostrum*) are listed as endangered under the ESA. They occur along the east coast of North America in rivers, estuaries and the sea. Though once present in most major rivers systems along the Atlantic coast (Kynard 1997), their current distribution extends north to the Saint John River, New Brunswick, Canada and south to the Saint Johns River, FL (NMFS 1998). Shortnose sturgeon were thought to be extirpated from North Carolina until 1987, when Ross et al. (1988) obtained a shortnose sturgeon from the Brunswick River. Much additional gill net sampling from 1990 to 1993 established shortnose sturgeon were present but rare within the lower Cape Fear River (Moser and Ross 1995). A shortnose sturgeon was captured in western Albemarle Sound in 1998 by the NCDMF (Armstrong and Hightower 1999).

Atlantic sturgeon

Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)* are similar in appearance to shortnose sturgeon, but can be distinguished by their larger size, smaller mouth, different snout shape, and scutes. Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from St. Croix, ME to the Saint Johns River, FL, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of them. In October 2010, NMFS issued proposed rules dividing Atlantic sturgeon into five DPSs and proposing that four of those DPS's be listed as endangered and the fifth as threatened. Any Atlantic sturgeon in the study area would be considered members of the Carolina DPS, which is proposed to be listed as endangered.

In the past, Atlantic sturgeon were abundant in most North Carolina coastal rivers and estuaries, with the largest fisheries occurring in the Roanoke River/Albemarle Sound system and in the Cape Fear River (Kahnle et al., 1998). Since 1990, gill net surveys in Albemarle Sound captured 842 young-of-the-year (YOY) and subadult sturgeon. Evidence suggests that spawning continues, and catch records indicate that this population seemed to be increasing until 2000, when recruitment began to decline. Since 1997, Atlantic sturgeon CPUE doubled between the years of 1997 and 2003 (Williams and Lankford, 2003). However, it is unknown whether this is an actual population increase reflecting the effects of North Carolina's ban on Atlantic sturgeon fishing that began in 1991, or whether the results were skewed by one outlier year. There was a large increase observed in 2002, though the estimates were similar among all other years of the 1997 to 2003 study.

Bottlenose dolphins

Bottlenose dolphins (*Tursiops truncatus*) in the proposed study area would be from the newly designated Northern North Carolina Estuarine System stock (NNCES). The stock is bounded in the south by the Beaufort Inlet and in the north by the border between North Carolina and

Virginia, and encompasses all estuarine waters in between, including but not limited to the Intracoastal Waterway, Pamlico, Albemarle and Currituck Sounds, and tributaries (Waring et al. 2009). Population size for the stock is considered unknown. However, a July 2000 study that did not sample all waters within the stock's boundaries, estimated the number of animals to be 919 (95% CI 730 - 1,190, CV=0.13) (Read *et al.* 2003).

The NNCES stock interacts with 3 Category II fisheries: the Atlantic blue crab trap/pot fishery, North Carolina long haul seine fishery, and North Carolina inshore gillnet fishery (Waring et al. 2009). There is no systematic observer coverage of these fisheries by NMFS, although the NCDMF operates systematic coverage of the fall flounder gillnet fishery in Pamlico Sound (Price 2008). From 2003 through 2007, 64 bottlenose dolphins were found stranded or entangled in gear within the NNCES area (Waring et al. 2009). Nine of which were determined to have been involved in a fisheries interaction based on direct observation of entanglement or by entanglement lesions (Read and Murray 2000).

There are insufficient data to determine population trends for this stock. Total human-caused mortality and serious injury for this stock is not known. However, considering the evidence from stranding data, the total human-caused mortality and serious injury is likely not insignificant, and, therefore, the levels are likely not approaching zero mortality and serious injury rate. NMFS considers this stock to be a strategic stock.

Other species

Finfish and bycatch species

Because this research is designed to mimic the size and type of catch associated with a commercial fishery, it is expected that other marine species would be captured in the gillnets. As the target species of the fishery is southern flounder, it is expected that the majority (by number and biomass) of fish caught will be southern flounder. Based on similar gear testing studies in the area, the applicant expects the primary bycatch species to be:

Sheepshead	*Archosargus probatocephalus*
Weakfish	*Cynoscion regalis*
Kingfishes	*Menticirrhus* spp.
Bluefish	*Pomatomus saltatrix*
Black drum	*Pogonias cromis*
Atlantic menhaden	*Brevoortia tyrannus*

Other bycatch may include: stingrays (*Dasyatidae*), skates (*Rajidae*), and horseshoe crabs (*Limulus polyphemus*) and other finfish.

Seabirds

Seabirds are present within the study area and could become entangled in the gillnets. However, since the sets are at night and the birds mainly hunt by sight, this is less likely than if the nets were in the water during daylight. The main species expected to interact with the nets are:

Double crested cormorants	*Phalacrocorax auritus*
Common loons	*Gavia immer*
Surf scoters	*Melanitta perspicillata*

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

An alternative to the Proposed Action is no action, i.e. denial of the permit request. This alternative would eliminate any potential risk to all aspects of the environment, including sea turtles, from the proposed research activities. However, it would not allow the applicant to conduct the proposed research, thus losing the opportunity to study gear modifications that may reduce sea turtle bycatch in the summer flounder fishery. The information gained from the research may prove transferable to other fisheries within North Carolina and throughout the East Coast. Identifying fishing techniques that reduce bycatch, would give wildlife managers another tool in their goal to try to conserve and recover sea turtles.

4.2 EFFECTS OF ALTERNATIVE 2: Issue permit with standard conditions

Any impacts of the Proposed Action would be limited primarily to the biological environment, specifically the animals that would be caught in the nets. The research proposed in the permit application would minimally affect the immediate physical environment where nets are set, but is not expected to affect water quality or air quality. Furthermore, no unique areas such as prime farmland, parks, or other cultural or historical resources would be affected by the research. The proposed research would be unlikely to affect the socioeconomic environment or pose a risk to public health and safety.

4.2.1 Effects on Biological Environment

<u>Effects on Target Species (Sea Turtles)</u>

Capture

The research was modeled after the standard operating procedures of the summer flounder fishery in Core Sound. Thus, the nets would be set overnight and would not be manned. Although the goal of the research is to test nets that may reduce the number of sea turtle interactions, the only way to test the hypothesis is to actually catch sea turtles in the nets.

The capture could result in stresses due to interaction with the gillnet. Turtles can be affected by entanglement in the nets and may drown as a result of forced submergence. Sea turtles are particularly prone to entanglement as a result of their body configuration and behavior. Records of stranded or entangled sea turtles reveal that fishing debris can wrap around the neck, flipper,

or body of a sea turtle and severely restrict swimming or feeding. Sea turtles may also experience constriction of appendages as a result of the entanglement. Constriction may cut off blood flow, causing deep gashes, some severe enough to remove an appendage. Sea turtles that are forcibly submerged undergo respiratory and metabolic stress that can lead to severe disturbance of their acid-base balance. While most voluntary dives by sea turtles appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status (pH level of the blood), sea turtles that are stressed as a result of forced submergence through entanglement consume oxygen stores, triggering an activation of anaerobic glycolysis. This disturbs their acid-base balance and raises lactic acid loads, sometimes to lethal levels. The rapidity and extent of the physiological changes that occur during forced submergence are functions of the intensity of struggling as well as the length of submergence (Lutcavage and Lutz 1997). Other factors to consider in the effects of forced submergence include the size of the turtle, ambient water temperature, and multiple submergences. Larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to stress due to entanglement. During the warmer months routine metabolic rates are higher, so the impacts of the stress due to entanglement may be magnified. With each forced submergence, lactate levels increase and require a long time (as much as 20 hours) to recover to normal levels.

Despite the fact that the shallow water (1-3') where the nets would be set may allow some entangled turtles to surface to breathe, some sea turtle mortalities would be expected. Specifically, 25 turtles (15 green, 5 Kemp's ridley, and 5 loggerhead) would be authorized as observed mortalities in the permit. Although rare in North Carolina, the permit would also authorize the capture, and potentially the mortality of two hawksbill and two leatherback sea turtles. Mortalities would be limited to the numbers above and the permit would be conditioned to ensure the applicant does not go over the allotted number of mortality takes.

Mortalities would be well documented and reported. Conditions in the permit would require that the applicant contact NMFS PR as the field research progresses, specifically, at intervals of three turtles caught (3, 6, 9, etc.). Another condition would require that if four or more turtles were captured in a single set, that research cease and NMFS PR be notified. Following suspension of research, the permit holder and NMFS PR would try and identify any new mitigation measures that could be adopted or any changes to protocol that could be implemented to try and reduce the likelihood of additional mass mortalities.

The mortalities under the Proposed Action would occur for a limited time period, with limits on the total level of take. The applicant wishes to conduct the research during a single field season, preferably in summer and fall of 2011. The permit would be valid until December 31, 2012 to allow for the potential loss of the 2011 field season due to extreme weather or other unforeseen circumstances. The take level would not be sufficient to appreciably reduce the likelihood of any of these species surviving and recovering in the wild.

Post-release mortality

Only those sea turtles that are alert and uninjured would be released. The permit would require the resuscitation of comatose turtles and the transfer of turtles to rehabilitation facilities if necessary. This required treatment and care if needed is expected to minimize the chances of post-release mortality. However, in the absence of reliable data, NMFS decided to err on the

side of caution in analyzing the effects of the research. In the Biological Opinion prepared on the proposed action, NMFS conservatively estimated that approximately 30% of the 13 Kemp's ridley, 10 loggerhead, 16 green, 2 hawksbill, and 2 leatherback turtles captured alive could be expected to die post release. The analysis used data from a study by Snoddy and Williard (2010) that examined the movements and post-release mortality of juvenile sea turtles released from gill nets in the lower Cape Fear River, North Carolina. While the study area and soak time of the proposed research is not identical to the Cape Fear River study, it is similar and represents a reasonable estimate based on available knowledge. Applying the 30% estimate and rounding would mean that an additional 4 Kemp's ridley, 3 loggerhead, 5 green, 1 hawksbill, and 1 leatherback could die post-release. In order to collect data regarding post-release mortalities, the permit would require that the holder include in the annual report the final disposition of any turtles taken to rehabilitation facilities.

Summary of mortalities
The Biological Opinion examined the impact of the loss of individual animals and the loss of the reproductive potential of each turtle to its respective population. The analysis states that the sea turtles that may interact with the fishery would be primarily immature turtles. Furthermore, there is no evidence of a disproportionate number of females versus males being captured in the gill net fishery. For all five species of sea turtles, the Biological Opinion concluded that the proposed activities would not be expected to, directly or indirectly, reduce appreciably the likelihood of both survival and recovery of the species in the wild by reducing the reproduction, numbers, and distribution of the species. The research may produce gear modifications that help reduce the mortality of turtles in fisheries, eventually benefiting populations, potentially offsetting any mortalities from the research.

Handling, measuring, photographing

NMFS does not expect that individual turtles would experience more than short-term stresses during handling, measuring, and weighing. No injury would be expected from these activities. Turtles would be worked up as quickly as possible to minimize stresses resulting from capture. The permit holders would also be required to follow procedures designed to minimize the risk of either introducing a new pathogen into a population or amplifying the rate of transmission from animal to animal of an endemic pathogen when handling animals.

Flipper and PIT tagging

The proposed tagging methods have been regularly employed in sea turtle research with little lasting impact on the individuals tagged and handled (Balazs 1999). Turtles may experience some discomfort during the application of external and/or internal tagging procedures, and these procedures would likely produce some level of pain. The discomfort appears highly variable between individuals (Balazs 1999). Most seem to barely notice, while some exhibit a marked response. PIT tags have the advantage of being encased in glass, which makes them inert, and are positioned inside the turtle where loss or damage due to abrasion, breakage, corrosion, or age over time is virtually non-existent (Balazs 1999). NMFS expects the stresses to be minimal and short-term, and that the small wound-site resulting from a tag applied to the flipper would heal completely in a short period of time. NMFS does not expect that individual turtles would

experience more than short-term stresses during the application of the PIT tags. In the nine years that the NMFS Southeast Fisheries Science Center has been PIT tagging turtles, turtle behavior indicative of discomfort was observed to be temporary, and the turtles exhibited normal behavior shortly after tagging and swam normally after release. These tags have been used for cattle and pets for years without any adverse effects. In addition, the permit holder would be required to follow procedures designed to minimize the risk of either introducing a new pathogen into a population or amplifying the rate of transmission from animal to animal of an endemic pathogen when handling animals.

Holding, Transport, and Release

NMFS does not expect that individual turtles would experience more than short-term stresses while being held, transported or released. Several mitigation measures, such as spraying the animals with water to prevent dehydration and limiting the total holding/transport time, would be used to reduce the stressors on the animals. No injury would be expected from these activities.

Effects on Non-Target Species

Florida manatee

Although the primary habitat of the manatee is Florida waters, manatees are known to expand their range north and west during the warmer months. A 2001 report showed that it had been greater than 20 years since a manatee has been seen in Pamlico Sound (LeGrand et al. 2001). Researchers do not expect to interact with the Florida manatee. The U.S. Fish and Wildlife Service (Ms. Nicole Adimey, USFWS, Jacksonville FL) was contacted regarding the potential impacts of the proposed activity on the endangered Florida manatee. The USFWS asked that precautionary measures be implemented to ensure that interactions are avoided. The permit would contain conditions provided by the USFWS and designed to prevent interactions with endangered Florida manatees.

Due to the lack of observations of manatees in the study area and the very shallow waters in the study area, it is not expected that any manatees would be adversely affected by the proposed research. Because of the extreme remote possibility that a manatee may be spotted, precautionary conditions would be placed in the permit to avoid interactions with manatees.

Shortnose sturgeon

Although shortnose sturgeon may occur in the study area, they are not expected to be affected by the research. The 2000 and 2001 observer program for the fishery did not record a shortnose sturgeon interaction in the flounder gillnet fishery (B. Price, *pers. comm.*). During the 2004 research project, the composition of all 120 sets was cataloged and again no shortnose sturgeon were captured. In the Biological Opinion on this action, NMFS states that the chance of shortnose sturgeon occurring in the action area with shallow water (1-3 feet) and sandy bottom is unlikely. Therefore the species was not considered further in the Section 7 analysis.

Atlantic sturgeon

The 2000 and 2001 observer program for the fishery did not record an Atlantic sturgeon interaction in the flounder gillnet fishery. Likewise, during the 2004 research project, the composition of all 120 sets was cataloged and again no Atlantic sturgeon were captured. However, in the 2006 study in the deeper waters of Pamlico Sound, 34 Atlantic sturgeon were captured (22 in the control net; 12 in the low profile test net). All Atlantic sturgeon were returned to the water and 76% of these were released alive and in good condition (Price and Salisbury 2007). The 2006 project was comprised of 291 paired gillnet sets, deploying 292,500 yards of net. By comparison, the proposed study would set a maximum of 60,000 yards of net (1000yds X 2 fishermen X 30 days = 60,000) in shallower waters.

As part of the analysis under Section 7 of the ESA, NMFS spoke with sturgeon researchers in the proposed study area and determined that an interaction with Atlantic sturgeon would be rare and is not expected. Thus, the Biological Opinion did not include a discussion of this species.

Bottlenose dolphins

Bottlenose dolphins could potentially become entangled within the nets; however, the applicant indicated that entanglements have not occurred in the inshore waters where the research would be taking place. Furthermore, the extremely shallow waters where the research would be conducted (< 4 feet) would make it highly unlikely that any dolphins would be in the vicinity of the nets to become entangled. As a precautionary measure, the permit contains conditions prohibiting the researchers from setting nets when marine mammals are in the vicinity and to use methods to try and warn the animals if the net has already been set. If marine mammals remain within the vicinity of the research area, nets must be removed.

Other species

Finfish and bycatch species

All marketable fish caught would be sold since they are commercially valuable. The southern flounder fishery is a state managed fishery, which does not operate under a federal or state quota. However, there are multiple regulations that dictate mesh size, net shot length, buoys, etc. As a result of the recent litigation there are additional restrictions, such as which days of the week nets can be set. The research project would adhere to all fishery rules and regulations.

Based on data from the applicant's 2006 gear research in nearby Pamlico Sound and taking into account the amount of net that would be set for the proposed study, the majority of fish that may be caught are estimated to be:

Summer flounder (target species) = 3000

- The majority (~95%) would be kept and marketed
- Approximately 200 undersized fish would be released alive

Atlantic menhaden = 2000 (99% mortality)
Bluefish = 250 (of those 100 mortalities)

Sheepshead and black drum = 100 fish (30 mortalities)

The remainder of the catch would be made up of assorted species.

Animals that are unmarketable due to their species or condition and those that do not meet regulatory standards would be discarded after being cataloged. Due to the cooler water temperatures during the autumn study time frame, the high levels of dissolved oxygen, and the manner in which most animals become entangled in a large mesh gillnet, it is expected that the majority (possibly up to 90%) of the discarded animals caught at that time of year would be returned to the water alive.

Although some fish caught in the net would perish and others would be sold, it is important to note that the research project authorized by the permit would be very limited in time frame and scope and thus the number of non-target species caught would be minimized. Unlike most research permits that are valid for five years, the proposed research project would be completed over 30 days, optimally in summer and fall 2011, but potentially through 2012.

Seabirds

Based on the applicant's previous gear research, it is expected that approximately 15 seabird mortalities may result from interactions with the nets during the project. However, since the nets for this project would be set at night, in shallow water, and half of them illuminated, the rates of capture may be different. The primary species affected are expected to be double crested cormorants, common loons, and surf scoters. None of these species are endangered and they are all listed as "least concern" on the IUCN's Red List. It is not expected that the loss of the individual birds will affect their population levels.

4.2.2 Effects on Physical Environment and EFH

A 2001 NOAA Technical Memorandum on the potential effects of fishing gear on EFH stated that gillnets have a minimal impact on the benthic environment (Barnette 2001). Barnette summarizes many other studies that examined the effects of gillnets and found them not to be a major contributor to bottom disturbance (Carr 1988; ICES 1991, 1995; Kaiser et al. 1996; West et al. 1994). Gillnets can negatively impact coral reefs and other rough bottom environments if they become entangled and destroy benthic structures. However, the proposed study area does not have such bottom topography. Barnette (2001) also discusses the effects of ghostfishing from abandoned gillnets. In the proposed research, nets would be set and retrieved within less than 24 hours, so no ghostfishing would occur. Furthermore, fishermen familiar with the study area would be choosing where to set the nets.

The gillnets would be deployed in relatively shallow water (1-3 feet) throughout Core Sound and set almost exclusively on sandy bottom. Anchors would be placed on either end of the set, but these would create minimal bottom disturbance. Once nets are set, the lead core line should remain stationary and thus not disturb the substrate. If the edge of the operations is at or near a grassy bottom, every effort would be made to ensure that placement and removal of the anchors does not disturb submerged vegetation.

The effect of the nets and the anchor on bottom habitat is expected to be minimal. The Permits Division consulted with the NMFS Southeast Region's HCD. After reviewing the application and considering the experimental design, nature of the survey, and limited scope of the activity, the HCD did not see the need for EFH conservation recommendations. Thus, EFH will not be discussed further in this analysis.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

As summarized below, NMFS has determined that the proposed research is consistent with the purposes, policies, and applicable requirements of the ESA and NMFS regulations. NMFS' issuance of the permit would be consistent with the ESA.

4.3.1 Endangered Species Act

This section summarizes conclusions resulting from consultation as required under section 7 of the ESA. The consultation process was concluded after close of the comment period on the application to ensure that no relevant issues or information was overlooked during the initial scoping process summarized in Chapter 1. For the purpose of the consultation, the draft EA represented NMFS' assessment of the potential biological impacts. The conclusion of the opinion was that the proposed research activities that would be authorized under Permit No. 15135 are not likely to jeopardize the continued existence of leatherback, Kemp's ridley, green, hawksbill, and loggerhead sea turtles. Critical habitat that has been designated is not within the action area and thus is not affected by the proposed activity.

4.3.2 Marine Mammal Protection Act

The permit would not authorize direct or indirect take of marine mammals under the MMPA.

4.4 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 a better understanding of sea turtle fishery interactions. Such information assists NMFS and state wildlife agencies in making management decisions. The Proposed Action would affect the environment, primarily individual sea turtles and the other animals captured in the nets. Individual sea turtles and fish may perish as a result of the research. However, neither the No Action nor the Proposed Action is anticipated to have adverse population or stock-level effects on sea turtles or other non-target species. The data collected would help conserve and manage sea turtles as required by the ESA and NMFS' implementing regulations.

4.5 MITIGATION MEASURES

In his permit application, Mr. Price described protocols that would be used to minimize and mitigate effects of the Proposed Action. Many of these are discussed in Chapter 2. The applicant's protocols are incorporated into the permit by reference. In addition, the permit would

require specific conditions to ensure compliance with appropriate research protocols. In summary, the permit conditions limit the level of take, minimize the effects of sampling activities on target sea turtles, minimize the effects to non-target species, and require notification, coordination, monitoring, and reporting. All of the measures are intended to minimize adverse effects and to reduce the potential for mortality, injury, and stress during research activities. 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.

The permit conditions also require regular reports on the effectiveness of the research at achieving the applicant's stated objectives (and thus at achieving the purpose and need of the Federal action) and on the effectiveness of the mitigation measures required by the permit. By statute, regulation, and permit conditions, NMFS has authority to modify the permit or suspend the research if information suggests it is having a greater than anticipated adverse impact on target species or the environment.

4.6 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, injury, or even death in response to the activities of researchers. However, the permit would strictly limit the number of mortalities and the research is not expected to have any effect on sea turtle populations. The short-term stresses resulting from the non-lethal research activities on sea turtles are expected to be minimal. Netting activities would also result in the unavoidable capture of non-target species as outlined previously.

4.7 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. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

4.7.1 Scientific Research

Sea turtles have been the focus of field studies for decades. Research on sea turtles in the United States is carefully controlled and managed so that it does not operate to the disadvantage of the species. In addition to permits issued by NMFS for the scientific research of sea turtles in the marine environment, similar ESA Section 10 federal permits are issued by the USFWS for the taking of sea turtles on land during activities that aid the conservation and recovery of these species.

As summarized in Appendix 2, seven active permits allow research on one or more of the five target species in areas that could overlap with the proposed action area. None of the permits specifically work in Core Sound, North Carolina; however, all include North Carolina waters

within their study areas. Many of the permits are issued to NMFS science centers and authorize broad scale surveys or observer coverage as part of managed fisheries. It is unlikely that any of the other permits would directly overlap with the Proposed Action. Furthermore, it is expected that turtles released alive would recover within a day from the proposed research activities. Since turtles travel long distances, it is possible that turtles may be affected by more than one research study, though it would be expected that these instances would be separated in both time and space sufficiently to not cause cumulative effects.

The primary purpose of most studies is to monitor populations and gather data on sea turtle biology, behavior, and ecology. Typical research activities are: vessel surveys, photo-identification, capture, handling, biopsy sampling, lavage, laparoscopy, attachment of scientific instruments, and release (See Appendix 2 Table 2 for details). The effects of most research activities 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. However, 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. Permitted researchers are also required to notify the appropriate NMFS Regional Office at least two weeks in advance of planned field work so that the Regional Office can facilitate this coordination and take other steps appropriate to minimize disturbance from multiple permit holders. Furthermore, the researchers would scan the turtles for PIT tags before sampling, to mitigate the risk of negative cumulative effects. Turtles that have existing, functional flipper tags or PIT tags would not be tagged again.

Under the proposed permit, animals in the action area would be disturbed by research in the summer and fall over a maximum of two years. The applicant's goal is a total of 30 days of nets set over a single calendar year. Whether this frequency of disturbance, by itself or in combination with disturbance from other permitted research, would result in cumulative adverse effects depends on how long the effects of each disturbance last, whether the animals have sufficient time between disturbance events to resume or compensate for disrupted activities, and whether the effects of repeated disturbance are additive, synergistic or accumulate in some other way. However, as previously discussed, NMFS limits repeated harassment of individual turtles and avoids unnecessary duplication of research efforts by requiring coordination among permit holders. All scientific research permits are also conditioned with mitigation measures to ensure that the research impacts target and non-target species as minimally as possible. Given this low degree of adverse impacts and the mechanisms in place to limit repeated disturbance of individual animals, NMFS does not expect the combination of research activities in the action area to significantly impact sea turtles at the population or species level.

4.7.2 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 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.

4.7.3 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, such as the fisheries in which they are incidentally captured. However, the short-term stresses (separately and cumulatively) to sea turtles resulting from the non-lethal research activities of this permit are expected to be minimal. Any increase in stress levels from the research would dissipate within approximately a day and wounds from tagging would be expected to heal. The permit would contain conditions (outlined above) to mitigate adverse impacts to turtles from these activities. Even if an animal was exposed to additional research effort (e.g., a week later), no significant cumulative effects of research would be expected given the nature of the effects.

A limited number of mortalities would be authorized. However, NMFS anticipates that the mortalities of this research, even when added to the effects of other activities that have, are, or will take place (e.g., as discussed in the attached biological opinion and in this EA) would not have a detectable cumulative effect on the numbers or reproductive success of the affected populations. The mortalities would be authorized over a very limited time period with limits on the total level of take. Mortalities would be closely monitored and reported and the permit would contain conditions that specifically address the reporting of mortalities.

Overall, the Proposed Action would not be expected to have more than short-term effects on endangered and threatened sea turtle populations. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions would be minimal and not significant at a population or species level. The research would provide information that would help manage and recover threatened and endangered species and would outweigh any adverse impacts that may occur.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

This EA was prepared by the National Marine Fisheries Service, Office of Protected Resources in Silver Spring, Maryland.

Agencies consulted:
U.S. Fish and Wildlife Service
NOAA Office of Habitat Conservation

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APPENDIX 1: PROPOSED TAKE TABLE

Table 1. Maximum authorized takes (i.e., over the life of the permit) during gear research in Core Sound, North Carolina

SPECIES	LIFE STAGE	EXPECTED TAKE	TAKE ACTION	PROCEDURES	DETAILS
Green sea turtle	Adult/ Subadult/ Juvenile	16	Capture/ Handle/ Release	Bycatch reduction experiments; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video	
Green sea turtle	Adult/ Subadult/ Juvenile	15	Unintentional mortality	Bycatch reduction experiments; Measure; Unintentional mortality	
Kemp's ridley sea turtle	Adult/ Subadult/ Juvenile	13	Capture/ Handle/ Release	Bycatch reduction experiments; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/ Video	
Kemp's ridley sea turtle	Adult/ Subadult/ Juvenile	5	Unintentional mortality	Bycatch reduction experiments; Measure; Unintentional mortality	
Loggerhead sea turtle	Adult/ Subadult/ Juvenile	10	Capture/ Handle/ Release	Bycatch reduction experiments; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/ Video	
Loggerhead sea turtle	Adult/ Subadult/ Juvenile	5	Unintentional mortality	Bycatch reduction experiments; Measure; Unintentional mortality	
Hawksbill sea turtle	Adult/ Subadult/ Juvenile	2	Capture/ Handle/ Release	Bycatch reduction experiments; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/Video; Unintentional mortality	alive or dead
Leatherback sea turtle	Adult/ Subadult/ Juvenile	2	Capture/ Handle/ Release	Bycatch reduction experiments; Mark, flipper tag; Mark, PIT tag; Measure; Photograph/ Video; Unintentional mortality	alive or dead

APPENDIX 2: PERMITS AUTHORIZING DIRECTED TAKES OF THE TARGET SEA TURTLE SPECIES IN THE ACTION AREA

Table 1. Active permits in or near the proposed action area.

Permit No.	Permit Holder	Expiration Date
1551	NMFS SEFSC	July 1, 2013
1552	NMFS SEFSC	June 30, 2011
1570	NMFS SEFSC	December 31, 2011
1571	NMFS SEFSC	December 31, 2011
1576	NMFS NEFSC	September 30, 2011
13543	South Carolina DNR	April 30, 2014
14249	Coonamessett Farm Foundation, Inc	October 31, 2014

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. Proposed permit is in **bold.**

Permit No.	Capture	Blood sampling	Fecal sampling / lavage	Laparo-scopy	Tissue sampling	Attach instruments	Tags or marks	Mortality
1551	√	√	√	√	√	√	√	
1552					√		√	
1570	√				√		√	√
1571					√		√	
1576	√				√		√	√
13543							√	
14249	√	√			√	√	√	√
15135	√						√	√