DRAFT Environmental Assessment
on
the Effects of Issuing an Incidental Take Permit No. 16230 to the
North Carolina Division of Marine Fisheries for the Continued Operation of the
North Carolina Inshore Gillnet Fishery

July 2013

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Location: North Carolina inshore waters

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue an incidental take permit (ITP) to the North Carolina Division of Marine Fisheries (NCDMF), under Section 10(a)(1)(B) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.), and the regulations governing the incidental taking of endangered and threatened species (50 CFR 222.307). The ITP would authorize the incidental capture, with some mortality, of five species of endangered and threatened sea turtles, including green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) sea turtles, in the North Carolina inshore gillnet fishery and would be valid for ten years.

Since 2000, NMFS has issued four separate incidental take permits to NCDMF for the incidental take of sea turtles in inshore gillnet fisheries occurring in Pamlico Sound. Since 2006, incidental take of sea turtles has been documented in areas outside Pamlico Sound, which are not covered under an existing ITP. In 2010, the Duke Environmental Law and Policy Clinic filed suit against NCDMF and the North Carolina Marine Fisheries Commission (NCMFC) on behalf of the Karen Beasley Sea Turtle Rescue and Rehabilitation Center (Beasley Center) for the illegal taking of

sea turtles in state regulated inshore gillnet fisheries. As a result of the lawsuit and resulting settlement agreement, NCDMF has amended their commercial fishing regulations for their inshore gillnet fishery to minimize the incidental capture of sea turtles. NCDMF has also submitted a completed application to NMFS for an ESA Section 10(a)(1)(B) ITP, including a conservation plan, for the operation of the state-wide inshore gillnet fishery with measures intended to further monitor, minimize, and mitigate the impacts of incidental take in the fishery to the maximum extent practicable.

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1.0 Purpose of and Need for Action

Proposed Action: The National Marine Fisheries Service (NMFS), Office of Protected Resources (OPR) proposes to issue an incidental take permit to the North Carolina Division of Marine Fisheries (NCDMF), under Section 10(a)(1)(B) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.) and the regulations governing the incidental taking of endangered and threatened species (50 CFR 222.307). The incidental take permit, identified as ITP Number 16230, would be valid for ten years and would authorize the lethal and nonlethal take of sea turtles in the North Carolina inshore gillnet fishery, require specific levels of observer monitoring and will require specific reporting protocols. A permit implementing agreement will also be develop to define roles and responsibilities of NMFS and NCDMF to provide a common understanding of actions to be undertaken to minimize and mitigate the effects of anchored gillnet fishing in inshore waters on threatened and endangered sea turtles for the duration of the permit.

Purpose of and Need for Action: Section 9(a)(1)(B) of the ESA prohibits "take[1]" of threatened and endangered species with only a few specific exceptions. Under ESA Section 10(a)(1)(B), incidental take permits authorize the take of endangered species if the taking is incidental to, not the purpose of, an otherwise lawful activity; those takes will not jeopardize the endangered species; the applicant will to the maximum extent practicable monitor, minimize and mitigate the impacts of the taking; implement additional measures deemed necessary or appropriate by NMFS; and ensure adequate funding to implement its commitments under the conservation plan and ITP.

The purpose of the permit is to provide the applicant with an exemption from the take prohibitions under the ESA for sea turtles, including those listed as endangered, associated with gillnet fisheries in North Carolina's inshore estuarine system consistent with the ESA issuance criteria.

The need for issuance of the permit is related to the purposes and policies of the ESA. NMFS has a responsibility to implement the ESA to protect, conserve, and recover threatened and endangered species under its jurisdiction. ITPs and associated conservation plans are in place to ensure the conservation and management of endangered and threatened species and minimize the impact of otherwise lawful activities, such as the operation of the North Carolina inshore gillnet fishery. Working with state agencies to develop conservation plans for state managed actions, such as the operation of state fisheries, is a critical effort to reduce impacts from state managed actions and promote the conservation and recovery of species.

Background: North Carolina's inshore estuarine system is created by a chain of barrier islands that run along nearly the entire coast. These waters are described as the internal coastal waters of North Carolina. Inlets within these barrier islands allow saline ocean water to mix with fresh water which is provided by a network of river systems to the west. This estuary provides prime habitat for numerous finfish species that are harvested by residents and visitors to North Carolina in both the commercial and recreational fisheries. Commercial and recreational fishermen deploy

[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."

gillnets in North Carolina's estuarine and ocean waters. Gillnet fishing in North Carolina is regulated by NCDMF through proclamations issued by the Director of NCDMF. Existing NCDMF proclamation requirements include mandatory attendance of gillnets in some areas and gear, yardage limits, soak-time restrictions, net shot limits, tie down requirements, closed areas, mesh size restrictions, minimum distance between fishing operations, marking requirements, reporting requirement, and monitoring requirements. Gillnet fisheries and related restrictions differ throughout the state depending on the season, target species, location, and physical characteristics of water body being fished. In general, there are three primary set techniques: anchored set nets, floating drift nets, and strike or runaround nets. Anchored gillnets are the primary concern for sea turtle interactions in North Carolina.

Large mesh (≥4-inch stretched mesh (ISM)) fisheries consist primarily of five target species including southern flounder, striped bass (*Morone saxatilis*), American shad (*Alosa sapidissima*), hickory shad (*Alosa mediocris*), and catfishes (*Ictalurus sp*). The most common mesh size for all large mesh gillnet fisheries is 5 ½ ISM. Small mesh (<4 ISM) gillnet operations target a more diverse array of species relative to large mesh gillnet fisheries. Mesh sizes generally fall between 3 and 3 ¾ ISM. Small mesh gillnet fisheries primarily target spot (*Leiostomus xanthurus*), striped mullet (*Mugil cephalus*), bluefish (*Pomatomus saltatrix*), spotted seatrout (*Cynoscion nebulosus*), weakfish (*Cynoscion regalis*), Atlantic menhaden (*Brevoortia tyrannus*), Spanish mackerel (*Scomberomorus maculatus*), white perch (*Morone americana*), and kingfishes (*Menticirrhus sp*).

During the fall of 1999, increased sea turtle strandings were noted by the North Carolina Sea Turtle Stranding and Salvage Network (NC STSSN) in the southeastern portion of Pamlico Sound. As a result, initial monitoring of the gillnet fisheries in 1999 identified the large mesh gillnet fishery as the probable source of sea turtle interactions in Pamlico Sound during the fall months. With this information, NMFS issued an emergency 30-day rule closing Pamlico Sound to large mesh gillnet fishing (≥5 ISM) for the end of the 1999 fall season (64 FR 70196, December 16, 1999).

In the fall of 2000, NMFS issued Incidental Take Permit (ITP) 1259 to NCDMF to manage the deep and shallow water gillnet fishery in Pamlico Sound, establishing the Pamlico Sound Gillnet Restricted Area (PSGNRA). The goal of the Habitat Conservation Plan (conservation plan) for ITP 1259 was for NCDMF to monitor sea turtle interactions in the fall gillnet fishery in the PSGNRA and to implement management measures to reduce sea turtle mortality by 50% between September 15 and December 15, 2000, as compared to the levels of take seen in the strandings of 1999. The ITP also set corresponding limits on the allowed levels of observed takes of sea turtles, both lethal and non-lethal takes, and documented strandings.

NCDMF was forced to close the fishery to gillnets ≥5 ISM on October 27, 2000 when sea turtle takes exceeded the levels authorized in ITP 1259. However, from October 28 to December 15, 2000, 59 sea turtles stranded within the PSGNRA. It was found that some fisherman reequipped their nets with 4-7/8 ISM, to circumvent the closure and continued fishing and targeting flounder. Fisherman using small-mesh gear to target sea trout or mackerel were also unaffected by the closure and continue to fish within the PSGNRA. Due to demonstrated capture and mortality of sea turtles in large-mesh gillnets before the closure, NMFS believed that the

continued, unmonitored gillnet fishing in and around the PSGNRA after the closure contributed to much of the subsequent sea turtle strandings.

In the fall of 2001, NMFS issued ITP 1348 to NCDMF which authorized the incidental taking of sea turtle in the fall gillnet fisheries in Pamlico Sound and mandated further restrictions for the 2001 fishing season. The conservation plan for ITP 1348 included the creation of three specified Shallow-water Gillnet Restricted Areas (SGNRAs) around the inside of the Outer Banks in Pamlico Sound and two inlet corridors at Hatteras and Ocracoke Inlets. Large and small mesh gillnet fishing operations in the SGNRAs were required to have a special permit from NCDMF, were required to accept observers, and were required to file weekly reports of fishing catch and effort to NCDMF. On August 22, 2001 NCDMF Director issued a state fisheries proclamation that implemented these management measures, effective September 15, 2001. NMFS published an interim final rule (66 FR 50350, October 3, 2001) restricting fishing with gillnets greater than 4 ¼ ISM in Pamlico Sound from September 28 through December 15, 2001. NCDMF permit holders were exempted from the closure if they complied with the ITP conditions required in the NCDMF proclamation.

The ITP 1348 application and conservation plan only addressed the gillnet fisheries that occur in the SGNRAs and inlet areas. They did not include a requested take authorization or management measures for the large-mesh, deep-water component of the gillnet fishery in Pamlico Sound. This component of the fishery used more net per vessel, soaked the nets longer and had higher sea turtle catch and mortality rates in 2000 than the shallow-water components. This deep-water component of the fishery remained closed for the 2001 season.

NMFS then published a final rule the following year on September 6, 2002 (67 FR 56931, September 6, 2002) closing all waters of Pamlico Sound to fishing with gillnets greater than 4 ¼ ISM on a seasonal basis from September 1 through December 15 each year. The closed area included all inshore waters of Pamlico Sound, and remains in place.

In the summer of 2002, NMFS issued ITP 1398 to NCDMF which authorized the incidental take of sea turtles in shallow-water, large mesh gillnets in Pamlico Sound for a period of 3 years, including the fall seasons of 2002, 2003 and 2004. ITP 1398 expanded the management area to include waters within 200 yards of the mainland shore of Pamlico and Hyde Counties. The associated conservation plan required intensive sea turtle monitoring and a characterization program throughout the PSGNRA from September through December.

In 2005, NMFS issued ITP 1528 to NCDMF which authorized the incidental take of sea turtles in shallow-water, large mesh gillnets in Pamlico Sound for a period of 6 years, including the fall seasons between 2005 and 2010. The conservation plan for ITP 1528 included management measures, restricted and prohibited areas, and monitoring requirements similar to past management actions, as well as several changes from past permits. The changes made to the PSGNRA in 2005 included: establishment of a state closure in addition to the federal closure to provide state jurisdiction and enforcement authority, modification of observer program procedures to better direct resources to times and areas of higher potential for sea turtle interactions, and elimination of the permit requirements along the mainland side of Pamlico Sound due to the small number of interactions in this area NCDMF has monitored the shallow

water gillnet fishery in Pamlico Sound since 2001. From 2002-2004 there were 25 observed turtle interactions throughout the PSGNRA in large mesh gillnets. Of the 25 observed turtle interactions, green turtles were the most common species observed (n=17), followed by loggerheads (n=5) and Kemp's ridleys (n=3). The majority of the interactions (72%) were live individuals that were subsequently sampled, tagged and released at or near inlets in good condition. During this period no sea turtle interactions were observed in small mesh gillnet gear.

From 2005-2011 there were 103 observed turtle interactions throughout the PSGNRA in large mesh gillnets. Of the 103 observed turtle interactions, green turtles were the most common species observed (n=83), followed by Kemp's ridleys (n=10), then loggerheads (n=9) and hawksbill turtles (n=1). The majority of interactions (69%) were live individuals that were subsequently tagged and released.

In addition to the PSGNRA observed takes, 16 sea turtle interactions were observed outside of the PSGNRA from 2007-2011 in large mesh gillnet operations in North Carolina estuarine waters. The interactions were comprised of green turtles (n = 5), loggerhead turtles (n = 2), and Kemp's ridley turtles (n = 8), and one unidentified hard-shelled turtle.

NMFS operated an Alternative Platform (AP) observer program in Core Sound, North Carolina from June through November 2009. Through this program, NMFS observers' documented 22 sea turtle takes in large mesh gillnets. Similar to NCDMF observer effort, green turtles were the most common species observed (n = 12), followed by Kemp's ridley (n = 5) and loggerhead (n = 5). The majority of interactions (73%) involved live individuals that were subsequently tagged and released (NMFS unpublished data). As a result of this effort, NMFS notified NCDMF of its concern for these unauthorized takes in Core Sound and potentially other North Carolina inshore waters.

NCDMF began operating an AP observer program in 2010 for both large and small mesh gillnets. In 2010-2011, in all season, 55 sea turtle interactions were observed by the AP program. Of these interactions Kemp's ridleys were the most common (n = 29), followed by green turtles (n = 22) and loggerhead turtles (n = 4).

In 2012, 26 sea turtle interactions were observed by NCDMF in the state-wide large mesh gillnet fishery. Similar to previous years, green turtles were the most common species observed (n = 19), followed by Kemp's ridley (n = 4), loggerhead (n = 1) and unidentified hard-shell species (n = 2). The majority of interactions (n = 22) involved live individuals that were subsequently tagged and released.

On February 23, 2010, the Duke Environmental Law and Policy Clinic filed suit against NCDMF and the North Carolina Marine Fisheries Commission (NCMFC) on behalf of the Karen Beasley Sea Turtle Rescue and Rehabilitation Center (Beasley Center) for the illegal taking of sea turtles in state regulated inshore gillnet fisheries. Negotiations between the parties occurred in the spring of 2010 resulting in a final Settlement Agreement between the Beasley Center and NCDMF and the NCMFC. As a result of the Settlement Agreement, NCDMF issued proclamation M-8-2010 effective May 15, 2010, implementing the provisions discussed in the Settlement Agreement. Gillnet restrictions implemented by the proclamation included: a stretch

mesh size range of 4 ISM to, and including, 6 ½ ISM for large mesh gillnets; soak times limited to overnight soaks an hour before sunset to an hour after sunrise, Monday evenings through Friday mornings; large mesh gillnets were restricted to a height of no more than 15 meshes, constructed with a lead core or leaded bottom line and without corks or floats other than needed for identification; a maximum of 2,000 yards of large mesh gillnets allowed to be used per vessel; and maximum individual net (shot) length of 100 yards with a 25-yard break between shots. Fishermen in the southern portion of the state were allowed to use floats on nets but were restricted to the use of a maximum of 1,000 yards of large mesh gillnet per fishing operation.

Section 5(a) of the Settlement Agreement specifies: "The restrictions as listed in Paragraph 1, 2(e) and 2(i) are minimum requirements for the 2010 statewide ITP application." Paragraph 1 specifies the restrictions on large mesh gillnetgillnets, Section 2(e) pertains to different restrictions in the southern portion of the state as described above, and Section 2(i) specifies that the restrictions apply to standard commercial fishing license holders and recreational commercial gear license holders.

Section 5(d) of the Settlement Agreement states "The restrictions as listed in Paragraphs 1, 2(e) and 2(i) are deemed solely interim measures and will be in effect within internal coastal waters, not otherwise exempt, until NMFS issues NCDMF an ITP for the affected areas. The Settlement Agreement also states that the Agreement shall not foreclose more lenient or more restrictive provisions in future ITPs if warranted by biological data collected through reliable sources including, but not limited to, NMFS and NCDMF.

On June 14, 2010, the NCDMF submitted an application for an ITP to address sea turtle interactions with set gillnets in North Carolina internal coastal waters. Based on comments from NMFS, a revised ITP application was submitted on August 17, 2011. On October 5, 2011 NMFS published a Notice of Receipt of the State's draft application for a Section 10(a)(1)(B) ITP for its commercial inshore gillnet fishery and made available the application and conservation plan for public review and comment for 30 days (76 FR 61670, October 5, 2011). Upon reviewing the public comments, NMFS requested that NCDMF make several modifications to the application.

On September 6, 2012 (updated January 18, 2013), NCDMF submitted an amended application to NMFS for an ITP to incidentally take ESA-listed sea turtles associated with large and small mesh gillnet fisheries operating in all inshore state waters year round. The ITP application includes the existing provisions of the Settlement Agreement and resulting proclamations, as well as additional management measures as part of a state-wide conservation plan. The application and conservation plan includes take requests for endangered Kemp's ridley, leatherback, and hawksbill sea turtles and threatened green and loggerhead sea turtles. On October 31, 2012, NMFS published a second Notice of Receipt of NCDMF's application and a request for public comment in the Federal Register (77 FR 65864, October 31, 2012). The 30-day public comment period ended on November 30, 2012.

Scope of Environmental Assessment (EA): This EA will analyze the effects to the human and natural environment caused by the issuance of ITP 16230 to NCDMF for the incidental take of threatened and endangered sea turtles during management of North Carolina inshore gillnet fisheries. The proposed take is described in the application and associated conservation plan

submitted by NCDMF and later modified by NCDMF in consultation with NMFS. As required by regulations implementing Section 10(a)(1)(B) of the ESA, the conservation plan must, based on the best scientific and commercial data available, specify:

- The impact which will likely result from the taking;
- How the applicant will minimize and mitigate those impacts, and the funding available to implement;
- What alternative actions the applicant considered, and why those actions are not being pursued;
- Other measures the Secretary of Commerce may require; and
- All sources of data relied on in preparing the plan.

The proposed ESA Section 10(a)(1)(B) ITP would authorize the incidental take of green, hawksbill, Kemp's ridley, leatherback and loggerhead sea turtles. In addition to sea turtles, NMFS anticipates that the proposed action may affect Atlantic sturgeon; however NCDMF has submitted a separate application for a section 10(a)(1)(B) ITP to specifically address impacts to Atlantic sturgeon from this fishery. This EA focuses on the environmental concern and effects to the five species of sea turtles resulting from NMFS issuance of the proposed ITP.

The conservation plan prepared by NCDMF describes measures designed to monitor, minimize, and mitigate the incidental take of ESA-listed sea turtles. The conservation plan includes managing inshore gillnet fisheries by dividing estuarine waters into 6 management units (i.e., A, B, C, D1, D2, E). Each of the management units would be monitored seasonally. This ITP applies to the areas defined as follows:

Management Unit A encompasses all estuarine waters north of 35° 46.30'N to the North Carolina/Virginia state line. This includes all of Albemarle, Currituck, Croatan, and Roanoke Sounds as well as the contributing river systems in this area. Most of this area is currently defined as the Albemarle Sound Management Area (ASMA).

Management Unit B encompasses all estuarine waters south of 35° 46.30'N, east of 76° 30.00'W, and north of 34° 48.27'N. This Management Unit includes all of Pamlico Sound and the Northern portion of Core Sound.

1. Shallow Water Gillnet Restricted Area (SGNRA) 1 is the area from Wainwright Island to Ocracoke Inlet bound by the following points: Beginning at a point on Core Banks at 34° 58.7963'N - 76° 10.0013'W, running northwesterly to Marker # 2CS at the mouth of Wainwright Channel at 35° 00.2780'N - 76° 12.1682'W, then running northeasterly to Marker "HL" at 35° 01.5665'N - 76° 11.4277'W, then running northeasterly to Marker #1 at 35° 09.7058'N - 76° 04.7528'W, then running southeasterly to a point at Beacon Island at 35° 05.9352'N - 76° 02.7408'W, then running south to a point on the northeast corner of Portsmouth Island at 35° 03.7014'N - 76° 02.2595'W, then running southwesterly along the shore of Core Banks to the point of beginning.

2. SGNRA 2 is the area from Ocracoke Inlet to Hatteras Inlet bound by the following points: Beginning at a point near Marker #7 at the mouth of Silver Lake at 35°

06.9091’N - 75° 59.3882’W, running north to Marker # 11 near Big Foot Slough Entrance at 35° 08.7890’N - 76° 00.3606’W, then running northeasterly to a point at 35° 13.4489’N’N - 75° 47.5531’W, then running south to a point northwest of the Ocracoke/Hatteras Ferry terminal on the Ocracoke side at 35° 11.5985’N - 75° 47.0768’W, then southwesterly along the shore to a point of beginning.

3. SGNRA 3 is the area from Hatteras to Avon Channel bound by the following points: The area from Hatteras to Avon Channel bound by the following points: Beginning at a point near Marker “HR” at 35° 13.3152’N – 75° 41.6694’W, running northwest near Marker “42 RC” at Hatteras Channel at 35° 16.7617’N – 75° 44.2341’W, then running easterly to a point off Marker #2 at Cape Channel at 35° 19.0380’N – 75° 36.2993’W, then running northeasterly near Marker #1 at the Avon Channel Entrance at 35° 22.8212’N – 75° 33.5984’W, then running southeasterly near Marker #6 on Avon Channel at 35° 20.8224’N - 75° 31.5708’W, then running easterly near Marker #8 at 35° 20.9412’N – 75° 30.9058’W, then running to a point on shore at 35° 20.9562’N - 75° 30.8472’W, then following the shoreline in a southerly and westerly direction to the point of beginning.

4. SGNRA 4 is the area from Avon Channel to Rodanthe bound by the following points: Beginning at a point near Marker #1 at the Avon Channel Entrance at 35° 22.8212’N - 75° 33.5984’W, then running northerly to a Point on Gull Island at 35° 28.4495’N - 75° 31.3247’W, then running north near Marker “ICC” at 35° 35.9891’N – 75° 31.2419’W, then running northwesterly to a point at 35° 41.0000’N – 75° 33.8397’N – 75° 29.3271’W, then following the shoreline in a southerly direction to a point on shore near Avon Harbor at 35° 20.9562’N - 75° 30.8472’W, then running westerly near Marker #8 at 35° 20.9412’N - 75° 30.9058’W, then running westerly near Marker #6 on Avon Channel at 35° 20.8224’N - 75° 31.5708’W, then running northwesterly to the point of beginning.

5. Ocracoke Corridor (OC) is the area in Ocracoke Inlet bound by the following points: Beginning at a point at 35° 07.9390’N - 76° 03.8080’W, then running northeasterly to Marker #9 at Nine Foot Shoal Entrance at 35° 08.4411’N - 76° 02.6848’W, then running northeasterly to Marker "14 BF" at 35° 09.3627’N - 76° 00.6259’W, then running southeast to Marker #7 at the mouth of Silver Lake at 35° 06.9091’N - 75° 59.3882’W, then following the shoreline southwesterly to a point at the north side of Ocracoke Inlet at 35° 04.4200’N - 75° 59.9245’W, then crossing the inlet to a point on Portsmouth Island at 35° 03.7014’N - 76° 02.2595’W, then in a northerly direction to a point on Beacon Island at 35° 05.9352N - 76° 02.7408’W, then running in a northwesterly direction to the point of beginning.

6. Hatteras Corridor (HC) is the area in Hatteras Inlet bound by the following points: Beginning at a point at 35° 13.4489’N - 75° 47.5531’W, running east to the site of an old platform at 35° 14.0100’N - 75° 45.8097’W, then running northeast to Marker "42 RC" at the mouth of Hatteras Channel at 35° 16.7617’N - 75° 44.2341’W, then following the channel to Marker "HR" at 35° 13.3152’N - 75° 41.6694’W, then following the shoreline

to a point on the north side of Hatteras Inlet at 35° 11.3408'N - 75° 44.9907'W, then crossing the inlet to the south side to a point on Ocracoke Island at 35° 11.0793'N - 75° 45.9645'W, then following the shoreline northwest to a point northwest of the Ocracoke/Hatteras ferry terminal at 35° 11.5985'N - 75° 47.0768'W, then running in a northerly direction to the point of beginning.

7. Oregon Inlet Corridor (OIC) is the area in Oregon Inlet bound by the following points: Beginning at a point at Marker #12 at Old House Channel at 35° 45.0883'N - 75° 35.9600'W, then following the channel in a northeasterly direction to Marker #53 at 35° 47.2157'N - 75° 34.4264'W, then running easterly to Marker #13 near Oregon Inlet Fishing Center harbor entrance at 35° 47.7076'N - 75° 32.9762'W, then running southerly to a point on the south side of Oregon Inlet at 35° 46.0500'N- 75° 31.6166'W, then running in a southerly direction along the shoreline to a point at 35° 41.0000'N - 75_ 29.3271'W, then running west to a point at 35° 41.0000'N - 75° 33.8397'W, then in a northerly direction to the point of beginning.

8. Mainland Gillnet Restricted Area (MGNRA) is the area on the mainland side of Pamlico Sound, from the shoreline of Hyde and Pamlico Counties out to 200 yards between 76° 30'W and 75° 42'W.

Management Unit C includes the Pamlico, Pungo, and Neuse river drainages west of 76° 30.00'W.

Management Unit D1 encompasses all estuarine waters south of 34° 48.27'N and east of a line running from 34° 40.70'N – 76° 22.50'W to 34° 42.48'N – 76° 36.70'W. Management Unit D-1 includes Southern Core Sound, Back Sound, and North River.

Management Unit D2 encompasses all estuarine waters west of a line running from 34° 40.70'N – 76° 22.50'W to 34° 42.48'N – 76° 36.70'W to the Highway 58 bridge. Management Unit D-2 includes Newport River and Bogue Sound.

Management Unit E encompasses all estuarine waters south and west of the Highway 58 bridge to the North Carolina/South Carolina state line. This includes the Atlantic Intracoastal Waterway (ICW) and adjacent sounds and the New, Cape Fear, Lockwood Folly, White Oak, and Shallotte rivers.

2.0 Alternatives Including the Proposed Action

Alternative 1 - No Action:
Under the no a alternative no ITP would be issued for the incidental take of sea turtles. Under this alternative, the NMFS seasonal closure would remain in effect in Pamlico Sound prohibiting gillnets greater than 4 ¼ ISM from September 1 through December 15 each year. (67 FR 56931, September 6, 2002).

While NMFS cannot know for certain what measures the State would implement absent the ITP,

we will assume for purposes of analysis in the EA that NCDMF would not likely implement the full suite of specific monitoring, minimization, and mitigation measures included in the proposed conservation plan and ITP. It is possible that NCDMF would amend their commercial inshore gillnet fishing regulations to be less restrictive than they are under the existing regulatory structure.

Alternative 2 - Issue ITP as Requested in Application:
Under Alternative 2, an ITP would be issued to exempt NCDMF from the ESA prohibition on taking sea turtles during the otherwise lawful commercial inshore gillnet fishery. As requested in the application, the ITP would be valid for ten years and would require NCDMF to operate the inshore gillnet fishery as described below in the proposed conservation plan. This alternative would include issuing the take levels proposed in the September 6, 2012 (updated January 18. 2013) application and conservation plan.

Summary of Conservation Plan

The conservation plan prepared by NCDMF describes measures designed to monitor, minimize, and mitigate the incidental take of ESA-listed sea turtles. The conservation plan includes managing inshore gillnet fisheries by dividing estuarine waters into 6 management units (i.e., A, B, C, D1, D2, E), as specified above. Each of the management units would be monitored seasonally and by fishery. Management units were delineated on the basis of three primary factors: similarity of fisheries and management, extent of known protected species interactions in commercial gillnet fisheries, and unit size and the ability of NCDMF to monitor fishing effort.

Management measures identified in the proposed conservation plan include:

(1) Restricted soak times for large mesh gillnets from one hour before sunset on Monday through Thursday and one hour after sunrise from Tuesday through Friday (i.e., fishing is prohibited from one hour after sunrise on Friday through one hour before sunset on Monday);
(2) Restrictions on the maximum net length per large mesh fishing operation (i.e., 2,000 yards (1.83 km, 6,000 ft.) per operation except south of the North Carolina Highway 58 bridge and Management Area D2 where 1,000 yards (0.91 km, 3,000 ft.) is maximum;
(3) Restrictions on large mesh net-shot lengths to 100 yards (91.44 m, 300 ft.) with a 25 yard (22.86 m, 75 ft.) separation between each net-shot;
(4) Requirement for large mesh nets to be low profile (e.g., maximum of 15 meshes in depth, tie-downs prohibited, floats or corks prohibited along float lines north of the North Carolina Highway 58 bridge);
(5) Closure of Management Area D1 to unattended large mesh gillnets from May 8 – October 14 annually;
(6) Prohibition on large mesh gillnets in the deep water portions of the PSGNRA and Oregon, Hatteras, and Ocracoke inlets from September 1 – December 15; and
(7) Adaptive fishery management measures and restrictions through state proclamation authority (e.g., gear and/or area restrictions, attendance requirements, increased observer coverage and/or enforcement).
(8) Continuation of North Carolina's regulations for small mesh gillnet attendance

requirements.

Monitoring and Bycatch Estimates:
NCDMF proposes to monitor sea turtle interactions through the NCDMF sea turtle bycatch monitoring program (traditional observer program) and the NCDMF AP observer program. Together these two programs are referred to as "the observer program." The state will also monitor sea turtle interactions through reports received from fishermen and NCDMF Marine Patrol.

The observer program will maintain statewide gillnet fishery coverage in all Management Units while gillnet fishing efforts are occurring. Weekly observer coverage will be estimated for each Management Unit based upon fisheries effort data (i.e., trips), sea turtle abundance, open Management Units, and in areas where protected species have been reported. With coverage based upon fishing effort, observer coverage will be relative to the fishing effort in each Management Unit, unless protected species reports indicate that an increase in coverage is needed within a Management Unit. Reports of increased numbers of protected species in an area will allow NCDMF to increase observer coverage in areas where high concentrations of protected species populations may potentially interact with fishing gear. Increasing observer coverage will allow for greater precision of bycatch estimates in the areas with higher take. Data collected from the observer programs will be used to estimate sea turtle interactions, and determine if total estimated take levels are within the level authorized. To develop the model used to estimate bycatch, an estimate of total effort for North Carolina's estuarine gillnet fisheries was needed to predict the number of interactions for the entire fishery. Total effort was estimated by combining information from multiple NCDMF monitoring programs, and effort was measured as soak time (days) multiplied by net length (yards).

A generalized linear model (GLM) framework was used to estimate sea turtle interactions in North Carolina's estuarine gillnet fisheries based on data collected from 2007 through 2011. Estimated numbers of interactions will be calculated based on observed interactions using the same best-fitting GLM for each species and assuming effort levels equivalent to those observed in 2010. Through this model, NCDMF will be able to estimate take based on mesh size, year, season, and Management Unit. Mesh sizes are categorized as large (≥4 ISM) or small (<4 ISM). Seasons are designated as: winter (December–February); spring (March–May); summer (June–August); and fall (September–November). Management Units are defined elsewhere in the ITP (A, B, C, D1, D2, and E, as described above). Estimates will be calculated weekly as well as monthly and will be provided to the NMFS OPR.

Reporting:
In the conservation plan, NCDMF has specified that several mechanisms of reporting will be in place. The NC STSSN will be contacted within 24 hours of an observed interaction, and within 48 hrs the standard interaction reports will be submitted to the NC STSSN. Additionally, if a take occurs, NMFS will be informed within 24 hrs, and summary reports will be provided monthly to the NMFS OPR, the NMFS Southeast Regional Office (SERO), and the North Carolina Sea Turtle Advisory Committee with estimates of total sea turtle takes by Management Unit, season, species, and disposition (alive/dead).

Adaptive Management:
NCDMF also proposes to use a variety of adaptive fishery management measures and restrictions through their state proclamation authority to reduce sea turtle mortality and prohibit fishing in management units where incidental take thresholds are approaching authorized take levels. NCDMF will use proclamation authority to implement management measures necessary to reduce sea turtle takes in estuarine gillnet fisheries in North Carolina. Proclamation authority allows NCDMF to implement timely responses (i.e., within 48 hours) that may provide increased protection of sea turtles, for example appropriate restrictions may include gear or area restrictions, attendance requirements, modifications in observer coverage, increased enforcement, or a combination of these and other restrictions. The need for additional management measures or better direction of resources will be determined by NCDMF in consultation with NMFS.

Potential adaptive management restrictions may include gear or area restrictions, attendance requirements, modifications in observer coverage, increased enforcement, or a combination of these and other restrictions. The NCDMF will consult regularly with the NMFS SERO and the NMFS OPR to ensure that monitoring and management programs maintain the flexibility for the NCDMF to monitor, anticipate, respond, and implement needed action. A long-term adaptive approach will provide for the protection and conservation of sea turtles and other protected species.

Another key component of an adaptive monitoring program is the identification of areas of high potential for bycatch of protected species in gillnet fisheries through observed interactions and on the water sightings of sea turtles by the NCDMF observers, biological staff, the NC STSSN, Marine Patrol, reports from commercial and recreational fishermen, and the general public. These areas will be referred to as hotspots and will provide managers the opportunity to address bycatch concerns through timely implementation of conservation measures such as increased observer and Marine Patrol coverage, additional gear restrictions, and temporary and/or seasonal closures. A hotspot will be defined as any area where sea turtle observations and/or sightings are above the previous two-year average for the season and Management Unit and has the potential for increased interactions. Hotspot areas will be identified and handled proactively and reactively. For any given Management Unit during a season that shows high sea turtle abundance, NCDMF may close the Management Unit for the duration of the defined season.

Annual Anticipated Incidental Take

Requested levels of annual incidental take are specified in the tables below. The amount of incidental take is expressed as either estimated or observed takes depending on the amount of data available for modeling predicted takes. For green and Kemp's ridley sea turtle takes in large mesh gillnet gear, sufficient historical take data is available to appropriately model the total annual estimated number of interactions that are likely to occur in Management Units B, D1, D2, and E. Under Alternative 2, NCDMF will calculate total annual estimated take levels for green and Kemp's ridley sea turtles in each Management Unit by using a model that will extrapolate the observed takes that are documented (Table 1).

For loggerhead, leatherback and hawksbill sea turtles, sufficient data does not currently exist to allow for the appropriate modeling exercise to extrapolate the number of annual estimated takes in large mesh gillnet gear. As such, the take request for these species in large mesh gillnet gear is requested based on the actual number of observed takes (Table 2). Similarly, sufficient data does not currently exist to allow for the appropriate modeling exercise to extrapolate the number overall estimated takes in small mesh gillnet gear for any sea turtle species in Management Units B, D1, D2 and E, nor for any takes that might occur in Management Units A and C. As such, the take request for small mesh gillnets and for all takes occurring in Management Units A and C are requested based on the actual number of annual observed takes (Tables 3 and 4).

Table 1. Requested annual estimated takes in large mesh (≥4 inch stretched mesh) gillnets in application.

Species	Area								Total Estimated Take
	B		D1		D2		E		
	Estimated		Estimated		Estimated		Estimated		
	live	dead	live	dead	live	dead	live	dead	
Green	225	112	9	5	0	0	96	48	495
Kemp's Ridley	53	26	15	7	6	3	24	13	147
Total Estimated Take	**278**	**138**	**24**	**12**	**6**	**3**	**120**	**61**	**642**

Table 2. Requested annual observed (not estimated) takes in large mesh (≥4 inch stretched mesh) gillnets in application.

Species	Area				Total Observed Take
	B	D1	D2	E	
	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	
Green	2	2	6	2	12
Hawskbill	1	1	1	1	4
Leatherback	1	1	1	1	4
Loggerhead	6	4	6	6	22
Total Observed Take	**10**	**8**	**14**	**10**	**42**

Table 3. Requested annual observed (not estimated) takes in small mesh (<4 inch stretched mesh) gillnets in application.

Species	Area				Total Observed Take
	B	D1	D2	E	
	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	
Green	6	4	6	6	22
Hawskbill	1	1	1	1	4

Kemp's Ridley	6	4	6	6	22
Leatherback	1	1	1	1	4
Loggerhead	6	4	6	6	22
Total Observed Take	**20**	**14**	**20**	**20**	**74**

Table 4. Requested annual observed (not estimated) takes in large mesh (≥4 inch stretched mesh) and small mesh (<4 inch stretched mesh) gillnets combined in application.

Species	Area		Total Observed Take
	A	C	
	Observed (live/dead)	Observed (live/dead)	
Green, Hawksbill, Kemp's Ridley, Leatherback, Loggerhead	8 turtles of any species	8 turtles of any species	16
Total Observed Take	**8**	**8**	**16**

Table 5. Total annual requested take (estimated and observed) by species and condition in application.

	Total Takes Requested		
	Observed	Estimated	Estimated
	live/dead	live	dead
Green	34	330	165
Hawskbill	8	0	0
Kemp's Ridley	22	98	49
Leatherback	8	0	0
Loggerhead	44	0	0
Any Species	16	0	0
Total Annual Take	**132**	**428**	**214**

Alternative 3 - Issue ITP as Requested in Application, with Modifications and Additional Requirements (Preferred Alternative):

Under Alternative 3, a ITP would be issued as described in Alternative 2 with the following modifications:

Annual Anticipated Incidental Take

In consultation with NCDMF, NMFS determined that adjustments were warranted to the incidental take requested included in the NCDMF ITP application dated January 18, 2013. NCDMF modeled fishing effort and potential interactions by season and by management area. After consultation with NMFS, NCDMF modified the take request to an annual request by area rather than 4 specific seasonal requests by area. This approach reduces the number of observed

takes requested by approximately 59%, from 132 to 78 observed takes across all areas and species. This also increases flexibility for NCDMF to manage gillnet fishing throughout the year by allowing them to implement seasonal restrictions in a particular area through proclamation.

Similar to Alternative 2, requested levels of annual incidental take are specified in the tables below for Alternative 3. The amount of incidental take is expressed as either estimated or observed depending on the amount of data available for modeling the predicted takes. For green and Kemp's ridley sea turtle takes in large mesh gillnet gear, sufficient historical take data is available to appropriately model the total annual estimated number of interactions that are likely to occur in Management Units B, D1, D2, and E. Under Alternative 3, NCDMF will calculate total annual estimated take levels for green and Kemp's ridley sea turtles in each Management Unit by using a model that will extrapolate the observed takes that are documented (Table 6).

For loggerhead, leatherback and hawksbill sea turtles, sufficient data does not currently exist to allow for the appropriate modeling exercise to extrapolate the number overall estimated takes in large mesh gillnet gear. As such, the take request for these species in large mesh gillnet gear is requested based on the actual number of annual observed takes (Table 7). Similarly, sufficient data does not currently exist to allow for the appropriate modeling exercise to extrapolate the number overall estimated takes in small mesh gillnet gear for any sea turtle species in Management Units B, D1, D2 and E, nor for any takes that might occur in Management Units A and C. As such, the take request for small mesh gillnets and for all takes occurring in Management Units A and C are requested based on the actual number of annual observed takes (Tables 8 and 9).

Table 6. Requested annual estimated takes in large mesh (≥4 inch stretched mesh) gillnets in *Revised Application, June 13, 2013*

Species	Area								Total Estimated Take
	B		D1		D2		E		
	Estimated		Estimated		Estimated		Estimated		
	live	dead	live	dead	live	dead	live	dead	
Green	225	112	9	5	0	0	96	48	495
Kemp's Ridley	53	26	15	7	6	3	24	13	147
Total Estimated Take	**278**	**138**	**24**	**12**	**6**	**3**	**120**	**61**	**642**

Table 7. Requested annual observed (not estimated) takes in large mesh (≥4 inch stretched mesh) gillnets in *Revised Application, June 13, 2013*

Species	Area				Total Observed Take
	B	D1	D2	E	
	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	

Green	0	0	6	0	6
Hawskbill	1	1	1	1	4
Leatherback	1	1	1	1	4
Loggerhead	3	3	3	3	12
Total Observed Take	**5**	**5**	**11**	**5**	**26**

Table 8. Requested annual observed (not estimated) takes in small mesh (<4 inch stretched mesh) gillnets in *Revised Application, June 13, 2013*

Species	Area				Total Observed Take
	B	D1	D2	E	
	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	Observed (live/dead)	
Green	3	3	3	3	12
Hawskbill	1	1	1	1	4
Kemp's Ridley	3	3	3	3	12
Leatherback	1	1	1	1	4
Loggerhead	3	3	3	3	12
Total Observed Take	**11**	**11**	**11**	**11**	**44**

Table 9. Requested annual observed (not estimated) takes in large mesh (≥4 inch stretched mesh) and small mesh (<4 inch stretched mesh) gillnets combined in *Revised Application, June 13, 2013*

Species	Area		Total Observed Take
	A	C	
	Observed (live/dead)	Observed (live/dead)	
Green, Hawksbill, Kemp's Ridley, Leatherback, Loggerhead	4 turtles of any species	4 turtles of any species	8
Total Observed Take	**4**	**4**	**8**

Table 10. Total annual requested take (estimated and observed) by species and condition in *Revised Application, June 13, 2013*.

	Total Takes Requested		
	Observed	Estimated	Estimated
	live/dead	live	dead
Green	18	330	165
Hawskbill	8	0	0
Kemp's Ridley	12	98	49
Leatherback	8	0	0
Loggerhead	24	0	0

Any Species	8	0	0
Total Annual Take	**78**	**428**	**214**

Monitoring Requirements

The monitoring plan submitted by NCDMF in their original application and described in Alternative 2 has been modified by NCDMF during consultations with NMFS to develop a more comprehensive and specific monitoring plan as an alternative.

Under Alternative 3, NCDMF will maintain a monitoring program that consists of a combination of onboard and AP observers, trip ticket program, and marine patrol officer activities (when needed). NCDMF will monitor six primary management units in inshore waters as described in the conservation plan (see Figure 10). NCDMF will monitor at least 7% (with a goal of 10%) of large mesh (≥4.0 ISM) gillnet trips in each area during each of 3 seasons (i.e., spring, summer, fall) as defined in the conservation plan. NCDMF will monitor at least 1% (with a goal of 2%) of small mesh (<4.0 ISM) gillnet trips in each area during each of 3 seasons (i.e., spring, summer, fall) as defined in the conservation plan.

Small mesh observer coverage will be maintained at a lower level than large mesh gillnet coverage due to existing small mesh gillnet attendance requirements that are in place to minimize undersized red drum bycatch. The attendance requirements apply to approximately 95% of the small mesh gillnets in operation between May and November each year, and therefore occur in areas and times where sea turtles are most commonly found. It is expected that a lower level of observer coverage will be necessary, as fisherman are required to tend their nets and report any interactions to NCDMF.

NCDMF will utilize data collected through the Observer Program using the methodologies outlined in the conservation plan to conduct annual analysis to better understand bycatch estimates for Kemp's ridley and green turtles. Weekly and monthly estimated sea turtle takes will be calculated by NCDMF to ensure authorized estimated and/or observed take levels are not being approached. After the first three years, NCDMF will utilize data collected through the Observer Program using the methodologies outlined in the conservation plan to conduct an analysis to determine whether bycatch may be estimated for loggerhead turtles in each area. Observer data collected prior to the issuance of the permit will also be used to create a more robust data set. If it is possible to conduct this analysis, NCDMF will provide those estimates to NMFS and discuss whether adaptive management is necessary.

NCDMF will monitor data collected and identify, in a timely manner, whether unusually high sea turtle bycatch occurred within a management unit or subunit, such that NCDMF determines that closure and evaluation is necessary to (1) avoid approaching a take limit, or (2) provide adequate protection for sea turtles, or (3) to allow sea turtles to complete a seasonal migration and minimize interactions. NCDMF will confer with the NMFS on the identification of hotspots.

Reporting Requirements

The reporting requirements submitted by NCDMF in their original application, and described in Alternative 2, have been modified by NMFS and NCDMF during consultations to develop a more comprehensive and specific reporting plan under this alternative.

Under Alternative 3, NCDMF will provide progress reports and annual reports to NMFS on a regular basis to monitor implementation of the original conservation plan and permit and determine whether adaptive management is necessary.

Take Reports: NCDMF will report all incidental sea turtle takes to NMFS via email within 24 hours of their occurrence, whether documented by an observer or reported by a fisherman. Reports of incidental take should include the date of the take, the condition of the turtle, the species (if known), photographs, and any other pertinent details of the circumstances of the taking (e.g., location, gear description, etc.). NCDMF will also provide copies of all take reports to the NC STSSN.

Weekly Progress Reports: For those weeks in which sea turtle interactions are documented, a weekly report must be submitted to the NMFS by Friday of the following week. The weekly reports must include the weekly take estimates and cumulative totals, including: observed takes with species, location, condition, and photos; and the total number of observed trips in that area.

Seasonal Progress Reports: Progress reports must be submitted to the NMFS OPR within 30 days after the end of the spring, summer, and fall seasons (*i.e.*, June 30, September 30, and December 31). The reports must include:

a) A summary of the weekly reporting information previously submitted;
b) Descriptions of any additional management measures taken by NCDMF;
c) One or more maps or graphical displays illustrating the geographic distribution of all observed large and small mesh gillnet trips and the locations of all observed incidental takes of sea turtles;
d) The number of law enforcement contacts made with gillnet vessels the nature of these contacts; and
e) Any violations detected by NCDMF of the proclamations implementing the requirements of this ITP, and the status of all resulting enforcement actions.

Annual Reports: NCDMF will prepare annual written reports for each year during which the conservation plan is in effect. Annual reports will be submitted to the NMFS by May 31 of the year following the calendar year to which the report applies. A summary of the key contents of each annual report is provided below:

f) Actual and estimated incidental takes (including mortality) and the level of uncertainty of the estimates (e.g., confidence intervals) of Covered Species by management units as described in the conservation plan;
g) Size composition, disposition (alive/dead), location, and dates of incidental take of Covered Species recorded during monitoring program as described in the conservation plan and conservation plan Appendix;

h) One or more maps or graphical representations illustrating the geographic distribution of all observed large and small mesh gillnet hauls and the locations of all observed incidental sea turtle takes; and
i) A description of the mitigation activities, adaptive management actions, and enforcement activities conducted.

Additionally, within 2 years of ITP implementation, NCDMF will obtain certifications from each fisherman intending to use anchored gillnets in inshore waters as defined in the conservation plan that the fisherman acknowledges the permit requirements and wishes to be included under that permit. NCDMF will periodically compare trip ticket data to the certifications to ensure that any new entrants into the fishery are certified. NCDMF will annually remind certified fishermen of the ITP requirements. Alternatively, NCDMF will implement a permit or license system, whereby the permit or license would serve as a certificate of inclusion, for fishermen using anchored gillnets in inshore waters to ensure compliance with the conservation plan, ITP, and this Agreement.

Mitigation Activities and Adaptive Management

NCDMF must ensure (i.e. issue a proclamation) that all commercial and recreational fishermen report all incidental captures of sea turtle to NCDMF and require that fisherman follow the requirements listed below for the safe handling, resuscitation and disposition of any incidentally captured turtles.

<u>Sea Turtle Handling and Resuscitation Requirements:</u>

a) Fishermen must bring captured turtles aboard immediately upon detecting them in their net and remove them from the net with all due care to avoid further injury to the turtle.
b) Resuscitation must be attempted on sea turtles that are inactive or comatose by placing the turtle in its normal position on its breastplate (plastron) and elevating its hindquarters several inches for a period of 4 up to 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Sea turtles being resuscitated must be kept moist and protected from excessive heat and cold.
c) Sea turtles that are actively moving or begin actively moving following resuscitation must be held aboard the vessel in an open container (e.g. a fish box) that allows the turtle to rest normally on its breastplate, while restricting its movement and preventing the possibility of injury from any fishing operations. Turtles that are too large to fit inside a holding container must be otherwise confined to an area of the vessel that is free of sharp objects or harmful materials and where chance of injury from fishing operations is minimal.

<u>Incidentally Taken Sea Turtle Specimens:</u>

a) For sea turtles that are active and uninjured, fishermen must transport the turtle to the nearest open water inlet and release it into the water. Turtles must be released over the stern or side of the boat with the engine out of gear, in an area where they are unlikely to be recaptured by other nets or injured by vessels. Turtles must be brought as near as possible to the actual mouth of the inlet for release, consistent with safe operation of the

vessel given the sea and weather conditions, but in no case should turtles be released farther than 2.5 nautical miles from the inlet mouth.

b) For sea turtles that are injured, lethargic, or dead, fishermen must contact the NCDMF Marine Patrol and transfer the turtle to an NCDMF patrol vessel. If no NCDMF patrol vessel is in the vicinity, fishermen must transport the turtle to the nearest U.S. Coast Guard Station and contact the NC STSSN immediately to arrange for transfer of the turtle to a rehabilitation facility.

Tagging of Incidentally Taken Sea Turtle Specimens:
Observers must tag all live, active turtles prior to release with two flipper tags and one passive integrated transponder (PIT) tag. Tagging procedures must be coordinated with and tag data must be submitted to the Cooperative Marine Turtle Tagging Program of the University of Florida. NCDMF must coordinate with NMFS on observer training programs. NMFS will provide, based on available staff, training for observers on handling and tagging sea turtles.

Stranding Monitoring:
Independent from this ITP, the NC STSSN, operated by the North Carolina Wildlife Resources Commission (NCWRC), monitors the strandings of sea turtles in inshore areas. NCDMF will provide copies of all take reports to the NC STSSN to facilitate information exchange necessary to compare stranding and incidental take locations for analysis, such as identifying hot spots.

3.0 Affected Environment

This section present 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 Section 4.

Physical Environment

The affected environment is described as all portions of the North Carolina internal coastal waters (inshore waters) that are open to commercial small mesh and large mesh gillnet fishing. The North Carolina inshore waters are separated from offshore waters by a chain of barrier islands that run along nearly the entire coast.

The North Carolina inshore waters include the following 6 management areas (also described in more detail above):

Management Unit A: This includes all of Albemarle, Currituck, Croatan, and Roanoke sounds as well as the contributing river systems in this area. Most of this area is currently defined as the Albemarle Sound Management Area (ASMA).

Management Unit B: This includes all of Pamlico Sound and the Northern portion of Core Sound, broken into 8 individual sections.

1. Shallow Water Gillnet Restricted Areas (SGNRA) 1: The area from Wainwright Island to Ocracoke Inlet.
2. SGNRA 2: The area from Ocracoke Inlet to Hatteras Inlet.
3. SGNRA 3: The area from Hatteras to Avon Channel.
4. SGNRA 4: The area from Avon Channel to Rodanthe.
5. Ocracoke Corridor (OC): The area in Ocracoke Inlet.
6. Hatteras Corridor (HC): The area in Hatteras Inlet.
7. Oregon Inlet Corridor (OIC): The area in Oregon Inlet.
8. Mainland Gillnet Restricted Area (MGNRA): The area on the mainland side of Pamlico Sound, from the shoreline of Hyde and Pamlico Counties out to 200 yards.

Management Unit C: This includes the Pamlico, Pungo, and Neuse river drainages west of 76° 30.00'W.

Management Unit D1: This includes Southern Core Sound, Back Sound, and North River.

Management Unit D2: This includes Newport River and Bogue Sound.

Management Unit E: This includes all estuarine waters south and west of the Highway 58 bridge to the North Carolina/South Carolina state line. This includes the Atlantic Intracoastal Waterway (ICW) and adjacent sounds and the New, Cape Fear, Lockwood Folly, White Oak, and Shallotte rivers.

Biological Environment - Status of Affected Species

<u>Endangered</u>	
Green turtle	*Chelonia mydas*[*]
Kemp's ridley turtle	*Lepidochelys kempii*
Hawksbill turtle	*Eretmochelys imbricata*
Leatherback turtle	*Dermochelys coriacea*
<u>Threatened</u>	
Loggerhead 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.*

The following subsections provide a synopsis of the best available information on the status of the species that are likely to be affected by the proposed action, including information on the distribution, population structure, life history, abundance, and population trends of each species and threats to each species.

Additional background information on the status of sea turtle species can be found in a number of published documents, including: recovery plans for the Atlantic green sea turtle (NMFS and

USFWS 1991), hawksbill sea turtle (NMFS and USFWS 1993), Kemp's ridley sea turtle (NMFS and USFWS 1992), leatherback sea turtle (NMFS and USFWS 1992), and loggerhead sea turtle (NMFS and USFWS 2008); Pacific sea turtle recovery plans (NMFS and USFWS 1998a; NMFS and USFWS 1998b; NMFS and USFWS 1998c; NMFS and USFWS 1998d); and sea turtle status reviews, stock assessments, and biological reports (NMFS and USFWS 1995; TEWG 1998; TEWG 2000; NMFS-SEFSC 2001; TEWG 2007; NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e; Conant *et al*. 2009; TEWG 2009; NMFS-SEFSC 2009d).

Green sea turtle

Distribution

Green sea turtles have a circumglobal distribution, occurring throughout tropical, subtropical waters, and, to a lesser extent, temperate waters. Green turtles appear to prefer waters that usually remain around 20º C in the coldest month, but may be found considerably north of these regions during warm-water events, such as El Niño. Stinson (1984) found green turtles to appear most frequently in U.S. coastal waters with temperatures exceeding 18º C. Further, green sea turtles seem to occur preferentially in drift lines or surface current convergences, probably because of the prevalence of cover and higher prey densities that associate with flotsam. For example, in the western Atlantic Ocean, drift lines commonly containing floating *Sargassum* spp. are capable of providing juveniles with shelter (NMFS and USFWS 1998b). Underwater resting sites include coral recesses, the underside of ledges, and sand bottom areas that are relatively free of strong currents and disturbance. Available information indicates that green turtle resting areas are near feeding areas (Bjorndal and Bolten 2000).

Populations are distinguished generally by ocean basin and more specifically by nesting location. Based upon genetic differences, two distinct regional clades are thought to exist in the Pacific: western Pacific and South Pacific islands, and eastern Pacific and central Pacific, including the rookery at French Frigate Shoals, Hawaii. In the eastern Pacific, green sea turtles forage from San Diego Bay, California to Mejillones, Chile. Individuals along the southern foraging area originate from Galapagos Islands nesting beaches, while those in the Gulf of California originate primarily from Michoacán. Green turtles foraging in San Diego Bay and along the Pacific coast of Baja California originate primarily from rookeries of the Islas Revillagigedos (Dutton 2003).

Reproduction

Estimates of reproductive longevity range from 17 to 23 years (Fitzsimmons *et al*. 1995; Carr *et al*. 1978; Chaloupka *et al*. 2004). Considering that mean duration between females returning to nest ranges from 2 to 5 years (Hirth 1997), these reproductive longevity estimates suggest that a female may nest 3 to 11 seasons over the course of her life. Based on an expected level of three nests per season and 100 eggs per nest (Hirth 1997), a female may deposit 9 to 33 clutches or total of 900-3300 eggs during her lifetime. Once hatched, sea turtles emerge and orient towards a light source, such as light shining off the ocean. They enter the sea in a "frenzy" of swimming activity, which decreases rapidly in the first few hours and gradually over the first several weeks (Okuyama *et al*. 2009; Ischer *et al*. 2009). Factors in the ocean environment have a major influence on reproduction (Chaloupka 2001; Solow *et al*. 2002; Limpus and Nicholls 1988). It is also apparent that during years of heavy nesting activity, density dependent factors (beach

crowding and digging up of eggs by nesting females) may affect hatchling production (Tiwari *et al*. 2005; Tiwari *et al*. 2006). Precipitation, proximity to the high tide line, and nest depth can also significantly affect nesting success (Cheng *et al*. 2009). Precipitation can also be significant in sex determination, with greater nest moisture resulting in a higher proportion of males (Leblanc and Wibbels 2009).

Green sea turtles often return to the same foraging areas following nesting migrations (Broderick *et al*. 2006; Godley *et al*. 2002). Once there, they move within specific areas, or home ranges, where they routinely visit specific localities to forage and rest (Seminoff *et al*. 2002; Seminoff and Jones 2006; Godley *et al*. 2003; Makowski *et al*. 2006; Taquet et al. 2006). However, it is also apparent that some green sea turtles remain in pelagic habitats for extended periods, perhaps never recruiting to coastal foraging sites (Pelletier *et al*. 2003).

In general, survivorship tends to be lower for juveniles and subadults than for adults. Adult survivorship has been calculated to range from 0.82-0.97 versus 0.58-0.89 for juveniles (Seminoff *et al*. 2003; Chaloupka and Limpus 2005; Troëng and Chaloupka 2007), with lower values coinciding with areas of human impact on green sea turtles and their habitats (Bjorndal *et al*. 2003; Campbell and Lagueux 2005).

Movement and migration

Green sea turtles are highly mobile and undertake complex movements through geographically disparate habitats during their lifetimes (Plotkin 2003; Musick and Limpus 1997). The periodic migration between nesting sites and foraging areas by adults is a prominent feature of their life history. After departing as hatchlings and residing in a variety of marine habitats for 40 or more years (Limpus and Chaloupka 1997), green sea turtles make their way back to the same beach from which they hatched (Meylan *et al*. 1990; Carr *et al*. 1978). However, green sea turtles spend the majority of their lives in coastal foraging grounds. These areas include both open coastline and protected bays and lagoons. While in these areas, green sea turtles rely on marine algae and seagrass as their primary dietary constituents, although some populations also forage heavily on invertebrates. There is some evidence that individuals move from shallow seagrass beds during the day to deeper areas at night (Hazel 2009).

Feeding

While offshore and sometimes in coastal habitats, green sea turtles are not obligate plant eaters as widely believed, and instead consume invertebrates such as jellyfish, sponges, sea pens, and pelagic prey (Seminoff *et al.* 2002; Hatase *et al.* 2006; Heithaus *et al.* 2002; Godley *et al.* 1998; Parker and Balazs 2008). However, a shift to a more herbivorous diet occurs when individuals move into neritic habitats, as vegetable mater replaces an omnivorous diet at around 59 cm in carapace length off Mauritania (Cardona *et al*. 2009). Localized movement in foraging areas can be strongly influenced by tidal movement (Brooks *et al*. 2009). Based on the behavior of post-hatchlings and juvenile green turtles raised in captivity, it is presumed that those in pelagic habitats live and feed at or near the ocean surface, and that their dives do not normally exceed several meters in depth (NMFS and USFWS 1998b; Hazel *et al.* 2009). The maximum recorded dive depth for an adult green turtle was just over 106 m (Berkson 1967).

Status and trends

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered (43 FR 32800). The International Union for Conservation of Nature (IUCN) has classified the green turtle as "endangered." No trend data are available for almost half of the important nesting sites, where numbers are based on recent trends and do not span a full green sea turtle generation; impacts occurring over four decades ago that caused a change in juvenile recruitment rates may have yet to be manifested as a change in nesting abundance. Additionally, these numbers are not compared to larger historical numbers. The numbers also only reflect one segment of the population (nesting females), who are the only segment of the population for which reasonably good data are available and are cautiously used as one measure of the possible trend of populations.

Current nesting abundance is known for 46 nesting sites worldwide (Tables 10). These include both large and small rookeries and are believed to be representative of the overall trends for their respective regions. Based on the mean annual reproductive effort, 108,761-150,521 females nest each year among the 46 sites. Overall, of the 26 sites for which data enable an assessment of current trends, 12 nesting populations are increasing, 10 are stable, and four are decreasing. Long-term continuous datasets of 20 years are available for 11 sites, all of which are either increasing or stable. Despite the apparent global increase in numbers, the positive overall trend should be viewed cautiously because trend data are available for just over half of all sites examined and very few data sets span a full green sea turtle generation (Seminoff 2004). Green turtles are thought to be declining throughout the Pacific Ocean, with the exception of Hawaii, from a combination of overexploitation and habitat loss (Seminoff *et al.* 2002; Eckert 1993). In the western Pacific, the only major (>2,000 nesting females) populations of green turtles occur in Australia and Malaysia, with smaller colonies throughout the area. Indonesian nesting is widely distributed, but has experienced large declines over the past 50 years. Hawaii green turtles are genetically distinct and geographically isolated, and the population appears to be increasing in size despite the prevalence of fibropapillomatosis and spirochidiasis (Aguirre *et al*. 1998). There are no reliable estimates of the overall number of green turtles inhabiting foraging areas within the southeast United States, and it is likely that green turtles foraging in the region come from multiple genetic stocks. However, information from some sites is available. A long-term in-water monitoring study in the Indian River Lagoon of Florida has tracked the populations of juvenile green turtles in a foraging environment and noted significant increases in catch-per-unit effort (more than doubling) between the years 1983-85 and 1988-90. An extreme, short-term increase in catch per unit effort of ~300% was seen between 1995 and 1996 (Ehrhart *et al.* 1996). Catches of benthic immature turtles at the St. Lucie Nuclear Power Plant intake canal, which acts as a passive turtle collector on Florida's east coast, have also been increasing since 1992 (Martin and Ernst 2000).

Critical habitat

On September 2, 1998, critical habitat for green sea turtles was designated in coastal waters surrounding Culebra Island, Puerto Rico (63 FR 46693). Aspects of these areas that are important for green sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for green sea turtle prey. The proposed activity would not take place in designated green sea turtle critical habitat.

Hawksbill sea turtle

Distribution

The hawksbill sea turtle has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical waters of the Atlantic, Indian, and Pacific oceans. Populations are distinguished generally by ocean basin and more specifically by nesting location. Satellite tagged turtles have shown significant variation in movement and migration patterns. In the Caribbean, distance traveled between nesting and foraging locations ranges from a few kilometers to a few hundred kilometers (Byles and Swimmer 1994; Miller *et al.* 1998; Horrocks *et al.* 2001; Hillis-Starr *et al.* 2000; Prieto *et al.* 2001; Lagueux *et al.* 2003). Hawksbill turtles are considered common in French Polynesian waters, but are not known to nest on the islands. Confirmed sightings have also been made near the proposed study area off Tonga, Fiji, and Niue (SPREP 2007). Hawksbill sea turtles are highly migratory and use a wide range of broadly separated localities and habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Small juvenile hawksbills (5-21 cm straight carapace length) have been found in association with *Sargassum* spp. in both the Atlantic and Pacific oceans (Musick and Limpus 1997) and observations of newly hatched hawksbills attracted to floating weed have been made (Hornell 1927; Mellgren and Mann 1996; Mellgren *et al.* 1994). Post oceanic hawksbills may occupy a range of habitats that include coral reefs or other hard bottom habitats, sea grass, algal beds, mangrove bays and creeks (Musick and Limpus 1997), and mud flats (R. von Brandis, unpublished data in NMFS and USFWS 2007). Individuals of multiple breeding locations can occupy the same foraging habitat (Bass 1999; Bowen *et al.* 1996; Bowen *et al.* 2007; Diaz-Fernandez *et al.* 1999; Velez-Zuazo *et al.* 2008). As larger juveniles, some individuals may associate with the same feeding locality for more than a decade, while others apparently migrate from one site to another (Musick and Limpus 1997; Mortimer *et al.* 2003; Blumenthal *et al.* 2009). Larger individuals may prefer deeper habitats than their smaller counterparts (Blumenthal *et al*. 2009).

Reproduction

Hawksbill sea turtles breed while in the water, but eggs are laid on beaches worldwide. Females typically lay 3-5 clutches at 2-week intervals during a single nesting season (Witzell 1983; Mortimer and Bresson 1999; Richardson *et al.* 1999; Beggs *et al.* 2007). Nesting for each female occurs between 1.8-7 year intervals, depending upon nesting site (Mortimer and Bresson 1999; Richardson *et al.* 1999; Limpus 2004; Pita and Broderick 2005; Beggs *et al.* 2007; Chan and Liew 1999; Pilcher and Ali 1999; Garduño-Andrade 1999). Following incubation, hatchlings emerge from sand-covered pits in which their eggs were laid and enter the sea. Hawksbill sea turtles reach sexual maturity at >20 years in Atlantic waters (León and Diez 1999; Diez and Dam 2002; Boulon 1983; Boulon 1994). Ages of 30-38 years have been estimated for individuals from Indo-Pacific waters, with males reaching maturity later than females (Limpus and Miller 2000). Duration of reproductive potential in the Caribbean is 14-22 years (Parrish and Goodman 2006). Based on the reasonable means of 3-5 nests per season (Mortimer and Bresson 1999; Richardson *et al.* 1999) and 130 eggs per nest (Witzell 1983), a female may lay 9 to 55 egg clutches, or about 1,170-7,190 eggs during her lifetime. However, up to 276 eggs have been recorded in a single nest (Kamel and Delcroix 2009). In the Cayman Islands, juvenile growth has been estimated at 3.0 cm/year (Blumenthal *et al*. 2009).

Movement and migration
Upon first entering the sea, neonatal hawksbills in the Caribbean are believed to enter an oceanic phase that may involve long distance travel and eventual recruitment to nearshore foraging habitat (Boulon 1994). In the marine environment, the oceanic phase of juveniles (i.e., the "lost years") remains one of the most poorly understood aspects of hawksbill life history, both in terms of where turtles occur and how long they remain oceanic.

Feeding
Dietary data from oceanic stage hawksbills are limited, but indicate a combination of plant and animal material (Bjorndal 1997). Studies have shown post-oceanic hawksbills to feed on sponges throughout their range (reviewed by Bjorndal 1997), but appear to be especially spongivorous in the Caribbean (Van Dam and Diez 1997; León and Bjorndal 2002; Meylan 1988). Jellyfish are also ingested on occasion (Blumenthal *et al*. 2009).

Status and trends
Hawksbill sea turtles were protected on June 2, 1970 (35 FR 8495) under the Endangered Species Conservation Act and since 1973 have been listed as endangered under the ESA. This species is currently listed as endangered throughout its range. Only five regional nesting populations remain with more than 1,000 females nesting annually (Seychelles, Mexico, Indonesia, and two in Australia) (Meylan and Donnelly 1999). Most populations are declining, depleted, or remnants of larger aggregations. The most significant nesting within the United States occurs in Puerto Rico and the U.S. Virgin Islands, specifically on Mona Island and Buck Island, respectively. Each year, about 500-1000 hawksbill nests are laid on Mona Island, Puerto Rico (Diez and van Dam 2006) and another 100-150 nests on Buck Island Reef National Monument off St. Croix in the United States Virgin Islands (Meylan 1999).

Critical habitat
On September 2, 1998, critical habitat was declared for hawksbill sea turtles around Mona and Monito Islands, Puerto Rico (63 FR 46693). Aspects of these areas that are important for hawksbill sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for hawksbill sea turtle prey. The proposed activity would not take place in designated hawksbill sea turtle critical habitat.

Kemp's ridley sea turtle

Distribution
Adult Kemp's ridley turtles are restricted 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. Females rarely leave the Gulf of Mexico and adult males do not migrate. Juveniles feed along the east coast of the United States up to the waters off Cape Cod, Massachusetts (Spotila 2004). A small number of individuals reach European waters (Spotila 2004; Brongersma 1972) and the Mediterranean (Pritchard and Mtirquez 1973). Juvenile Kemp's ridley sea turtles are the second most abundant sea turtle in the mid-Atlantic region from New England, New York, and the Chesapeake Bay, south to coastal areas off North Carolina. Juvenile Kemp's ridley sea turtles migrate into the region during May and June and forage for crabs in submerged aquatic vegetation (Keinath *et al.* 1987; Musick and Limpus 1997). In the fall, they migrate south along

the coast, forming one of the densest concentrations of Kemp's ridley sea turtles outside of the Gulf of Mexico (Musick and Limpus 1997).

Reproduction

Mating is believed to occur about three to four weeks prior to the first nesting (Rostal 2007), or late March through early to mid-April. It is presumed that most mating takes place near the nesting beach (Morreale *et al.* 2007; Rostal 2007). Females initially ovulate within a few days after successful mating and lay the first clutch approximately two to four weeks later; if a turtle nests more than once per season, subsequent ovulations occur within approximately 48 hours after each nesting (Rostal 2007). Approximately 60% of Kemp's ridley nesting occurs along an approximate 25-mile stretch of beach near Rancho Nuevo, Tamaulipas, Mexico from April to July, with limited nesting to the north (100 nests along Texas in 2006) and south (several hundred nests near Tampico, Mexico in 2006; USFWS 2006). Nesting at this location may be particularly important because hatchlings can more easily migrate to foraging grounds (Putman *et al.* 2010). The Kemp's ridley sea turtle tends to nest in large aggregations or arribadas (Bernardo and Plotkin 2007). The period between Kemp's ridley arribadas averages approximately 25 days, but the precise timing of the arribadas is unpredictable (Rostal *et al.* 1997; Bernardo and Plotkin 2007). Like all sea turtles, Kemp's ridley sea turtles nest multiple times in a single nesting season. The most recent analysis suggests approximately 3.075 nests per nesting season per female (Rostal 2007). The annual average number of eggs per nest (clutch size) is 94 to 100 and eggs typically take 45 to 58 days to hatch, depending on temperatures (Marquez-M. 1994; USFWS 2000; USFWS 2001; USFWS 2002; USFWS 2003; USFWS 2004; USFWS 2005; USFWS 2006; Rostal 2007). The period between nesting seasons for each female is approximately 1.8 to 2.0 years (Marquez *et al.* 1989; Rostal 2007; TEWG 2000). The nesting beach at Rancho Nuevo may produce a "natural" hatchling sex ratio that is female-biased, which can potentially increase egg production as those turtles reach sexual maturity (Wibbels 2007; Coyne and Landry Jr. 2007). Kemp's ridleys require approximately 1.5 to two years to grow from a hatchling to a size of approximately 7.9 inches long, at which size they are capable of making a transition to a benthic coastal immature stage, but can range from one to four years or more (Ogren 1989; Caillouet *et al.* 1995; Zug *et al.* 1997; Schmid 1998; Schmid and Witzell 1997; TEWG 2000; Snover *et al.* 2007). Based on the size of nesting females, it is assumed that turtles must attain a size of approximately 23.6 inches long prior to maturing (Marquez-M. 1994). Growth models based on mark-recapture data suggest that a time period of seven to nine years would be required for this growth from benthic immature to mature size (Schmid and Witzell 1997; Snover *et al.* 2007). Currently, age to sexual maturity is believed to range from approximately 10 to 17 years for Kemp's ridleys (Snover *et al.* 2007). However, estimates of 10 to 13 years predominate in previous studies (Caillouet *et al.* 1995; Schmid and Witzell 1997; TEWG 2000).

Movement and migration

These migratory corridors appear to extend throughout the coastal areas of the Gulf of Mexico and most turtles appear to travel in waters less than roughly 164 feet in depth. Turtles that headed north and east traveled as far as southwest Florida, whereas those that headed south and east traveled as far as the Yucatan Peninsula, Mexico (Morreale *et al.* 2007). Following migration, Kemp's ridley sea turtles settle into resident feeding areas for several months (Byles and Plotkin 1994; Morreale *et al.* 2007). Females may begin returning along

relatively shallow migratory corridors toward the nesting beach in the winter in order to arrive at the nesting beach by early spring. Stranding data indicate that immature turtles in their benthic stage are found in coastal habitats of the entire Gulf of Mexico and U.S. Atlantic coast (TEWG 2000; Morreale *et al.* 2007). Developmental habitats for juveniles occur throughout the entire coastal Gulf of Mexico and U.S. Atlantic coast northward to New England (Schmid 1998; Wibbels *et al.* 2005; Morreale *et al.* 2007). Key foraging areas in the Gulf of Mexico include Sabine Pass, Texas; Caillou Bay and Calcasieu Pass, Louisiana; Big Gulley, Alabama; Cedar Keys, Florida; and Ten Thousand Islands, Florida (Carr and Caldwell 1956; Ogren 1989; Coyne *et al.* 1995; Schmid 1998; Schmid *et al.* 2002; Witzell *et al.* 2005). Foraging areas studied along the Atlantic coast include Pamlico Sound, Chesapeake Bay, Long Island Sound, Charleston Harbor, and Delaware Bay. Near-shore waters of 120 feet or less provide the primary marine habitat for adults, although it is not uncommon for adults to venture into deeper waters (Byles 1989a; Mysing and Vanselous 1989; Renaud *et al.* 1996; Shaver *et al.* 2005; Shaver and Wibbels 2007). Benthic coastal waters of Louisiana and Texas seem to be preferred foraging areas for Kemp's ridley sea turtles (particularly passes and beachfronts), although individuals may travel along the entire coastal margin of the Gulf of Mexico (Landry and Costa 1999; Landry *et al.* 1996; Renaud 1995). Sightings are less frequent during winter and spring, but this is likely due to lesser sighting effort during these times (Shoop and Kenney 1992; Keinath *et al.* 1996).

Feeding

Kemp's ridley diet consists mainly of swimming crabs, but may also include fish, jellyfish, and an array of mollusks. Kemp's ridley sea turtles can dive well over two and a half hours, although most dives are from 16 to 34 minutes (Mendonca and Pritchard 1986; Renaud 1995). Individuals spend the vast majority of their time underwater; over 12-hour periods, 89% to 96% of their time is spent below the surface (Byles 1989b; Gitschlag 1996).

Status and trends

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970 (35 FR 18319). Internationally, the Kemp's ridley is considered the most endangered sea turtle (USFWS 1999; National Research Council 1990). In 1947, 40,000 female Kemp's ridley sea turtles were observed nesting on the beaches at Rancho Nuevo on a single day (Carr 1963; Hildebrand 1963). By the early 1970s, the estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. Between the years of 1978 and 1991 only 200 Kemp's ridleys nested annually. Today the Kemp's ridley population appears to be in the early stages of recovery. Nesting has increased steadily over the past decade. During the 2000 nesting season, an estimated 2,000 females nested at Rancho Nuevo, a single arribada of 1,000 turtles was reported in 2001, and an estimated 3,600 turtles produced over 8,000 nests in 2003. In 2006, a record number of nests were recorded since monitoring began in 1978; 12,143 nests were documented in Mexico, with 7,866 of those at Rancho Nuevo. By 2004, the number of adult females in the Gulf of Mexico is estimate to have increased to about 5,000 individuals (Spotila 2004). The Turtle Expert Working Group (2000) estimated that the population size of Kemp's ridley sea turtles grew at an average rate of l1.3 percent per year (95% C.I. slope = 0.096-0.130) between 1985 and 1998. Over the same time interval, hatchling production increased at a slightly slower rate (9.5% per year).

Critical habitat

NMFS has not designated critical habitat for Kemp's ridley sea turtle.

Leatherback sea turtle

Distribution

Leatherbacks range farther than any other sea turtle species, having evolved physiological and anatomical adaptations that allow them to exploit cold waters (Frair *et al.* 1972; Greer *et al.* 1973; NMFS and USFWS 1995). Leatherbacks typically associate with continental shelf and pelagic environments and are sighted in offshore waters of 7-27° C (CETAP 1982). However, juvenile leatherbacks usually stay in warmer, tropical waters >21° C (Eckert 2002). Males and females show some degree of natal homing to annual breeding sites (James *et al*. 2005). Leatherbacks break into four nesting aggregations: Pacific, Atlantic, and Indian oceans, and the Caribbean Sea. Detailed population structure is unknown, but is likely dependent upon nesting beach location.

Atlantic Ocean. Nesting aggregations have been documented in Gabon, Sao Tome and Principe, French Guiana, Suriname, and Florida (Márquez 1990; Bräutigam and Eckert 2006; Spotila *et al.* 1996). Widely dispersed but fairly regular African nesting also occurs between Mauritania and Angola (Fretey *et al.* 2007). Many sizeable populations (perhaps up to 20,000 females annually) of leatherbacks are known to nest in West Africa (Fretey 2001).

Caribbean Sea. Nesting occurs in Puerto Rico, St. Croix, Costa Rica, Panama, Colombia, Trinidad and Tobago, Guyana, Suriname, and French Guiana (Márquez 1990; Bräutigam and Eckert 2006; Spotila *et al.* 1996). Beaches bordering the action area along the western Puerto Rican coast are home to roughly 15-30 nests per year (Scharer pers. comm.).

Indian Ocean. Nesting is reported in South Africa, India, Sri Lanka, and the Andaman and Nicobar islands(Hamann *et al*. 2006).

Pacific Ocean. Leatherbacks are found from tropical waters north to Alaska within the North Pacific and is the most common sea turtle in the eastern Pacific north of Mexico (Eckert 1993; Stinson 1984; Wing and Hodge 2002). The west coast of Central America and Mexico hosts nesting from September-March, although Costa Rican nesting peaks during April-May (Chacón-Chaverri and Eckert 2007; LGL Ltd. 2007). Leatherback nesting aggregations occur widely in the Pacific, including Malaysia, Papua New Guinea, Indonesia, Thailand, Australia, Fiji, the Solomon Islands, and Central America (Limpus 2002; Dutton *et al.* 2007). Significant nesting also occurs along the Central American coast (Márquez 1990).

Movement and migration

Leatherback sea turtles migrate throughout open ocean convergence zones and upwelling areas, along continental margins, and in archipelagic waters (Morreale *et al.* 1994; Eckert 1998; Eckert 1999). In a single year, a leatherback may swim more than 9,600 km to nesting and foraging areas throughout ocean basins (Eckert 1998; Eckert 2006; Eckert *et al.* 2006; Hays *et al.* 2004; Ferraroli *et al.* 2004; Benson *et al.* 2007a; Benson *et al.* 2007b; Sale *et al.* 2006). However, much of this travel may be due to movements within current and eddy features, moving individuals along (Sale and Luschi 2009). Return to nesting beaches may be accomplished by a form of geomagnetic navigation and use of local cues (Sale and Luschi 2009). Leatherback females will

either remain in nearshore waters between nesting events, or range widely, presumably to feed on available prey (Byrne *et al.* 2009; Fossette *et al.* 2009).

Reproduction

Leatherback sea turtles probably mate outside of tropical waters (Eckert and Eckert 1988). Mating may occur starting at 3-6 years (Rhodin 1985). However, this is disputed at least in the western North Atlantic and may not occur until 29 years (Rhodin 1985; Pritchard and Trebbau 1984; Avens and Goshe 2007; Dutton *et al.* 2005; Zug and Parham 1996). Leatherback turtles tend to forage in temperate waters except for nesting females; males are generally absent from nesting areas. Females can deposit up to seven nests per season of 100 eggs or more and return to nest every 2-3 years, although this varies geographically, and some eggs in each clutch are infertile. Nesting along the Pacific coast of Mexico runs from November-February, but may occur as early as August and as late as March (Fritts *et al.* 1982; NMFS and USFWS 1998a). In the late 1970's, roughly one half of the world's leatherbacks nested along these shores (Pritchard 1982). Here, females deposit from 1-11 nests per season at 9- to 10-day intervals (NMFS and USFWS 1998a). Nesting in other Pacific locations occurs in China from May-June, Malaysia from June-July, and Queensland, Australia from December-January. Temperature is important to leatherback egg survival, with higher temperatures increasing mortality (Tomillo *et al*. 2009). Along Costa Rica, eggs laid earlier in the nesting season have higher hatching success than those deposited later in the season. Possibly because of this, females who nest more frequently (for more years) appear to lay their nests earlier in the season than leatherback females who nest less frequently. Survival is extremely low in early life, but greatly increases with age.

Feeding

Leatherbacks may forage in high-invertebrate prey density areas formed by favorable features (Ferraroli *et al.* 2004; Eckert 2006). Although leatherbacks forage in coastal waters, they appear to remain primarily pelagic through all life stages (Heppell *et al*. 2003). The location and abundance of prey, including medusae, siphonophores, and salpae, in temperate and boreal latitudes likely has a strong influence on leatherback distribution in these areas (Plotkin 1995). Leatherback prey are frequently found in the deep-scattering layer in the Gulf of Alaska (Hodge and Wing 2000). North Pacific foraging grounds contain individuals from both eastern and western Pacific rookeries, although leatherbacks from the eastern Pacific generally forage in the Southern Hemisphere along Peru and Chile (Dutton *et al.* 2000; Dutton *et al.* 1998; Dutton 2005-2006). Mean primary productivity in all foraging areas of western Atlantic females is 150% greater than in eastern Pacific waters, likely resulting in twice the reproductive output of eastern Pacific females (Saba *et al*. 2007). Leatherbacks have been observed feeding on jellyfish in waters off Washington State and Oregon (Stinson 1984; Eisenberg and Frazier 1983).

Status and trends

Leatherback sea turtles were protected on June 2, 1970 (35 FR 8491) under the Endangered Species Conservation Act and since 1973 have been listed as endangered under the ESA. However, recent declines in nesting have continued worldwide. Breeding females were initially estimated at 29,000-40,000, but were later refined to ~115,000 (Pritchard 1971; Pritchard 1982). Spotila *et al*. (1996) estimated 34,500 females, but later issued an update of 35,860 (Spotila 2004). The species as a whole is declining and local populations are in danger of extinction (NMFS 2001). Heavy declines have occurred at all major Pacific basin rookeries, as well as

Mexico, Costa Rica, Malaysia, India, Sri Lanka, Thailand, Trinidad, Tobago, and Papua New Guinea. This includes a nesting decline of 23% between 1984-1996 at Mexiquillo, Michoacán, Mexico (Sarti *et al*. 1996). Fewer than 1,000 nesting females nested on the Pacific coast of Mexico from 1995-1996 and fewer than 700 females are estimated for Central America (Spotila *et al*. 2000). Decline in the western Pacific is equally severe. Nesting at Terengganu, Malaysia is 1% of that in 1950s (Chan and Liew 1996). The South China Sea and East Pacific nesting colonies have undergone catastrophic collapse. Overall, Pacific populations have declined from an estimated 81,000 individuals to <3,000 total adults and subadults (Spotila *et al*. 2000). Drastic overharvesting of eggs and mortality from fishing activities is likely responsible for this tremendous decline (Sarti *et al.* 1996; Eckert 1997).

Critical habitat
On March 23, 1979, leatherback critical habitat was identified adjacent to Sandy Point, St. Croix, U.S.V.I. from the 183 m isobath to mean high tide level between 17° 42'12" Nand 65°50'00" W (44 FR 17710). This habitat is essential for nesting, which has beenincreasingly threatened since 1979, when tourism increased significantly, bringing nesting habitat and people into close and frequent proximity.

In January 2012, NMFS designated additional coastal and open water critical habitat along the U.S. West Coast, which was identified as essential foraging habitat for adult and subadult leatherback sea turtles. The proposed activity would not take place in designated leatherback sea turtle critical habitat.

Loggerhead sea turtle – Northwest Atlantic Ocean DPS

Distribution
Loggerheads are circumglobal occurring throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian oceans. Loggerheads are the most abundant species of sea turtle found in U.S. coastal waters. On September 22, 2011, NMFS designate nine distinct population segments (DPSs) of loggerhead sea turtles. Four were listed as threatened: Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean; and five were listed as endangered: Northeast Atlantic Ocean, Mediterranean Sea, North Indian Ocean, North Pacific Ocean, and South Pacific Ocean (76 FR 58868). The DPS that could be exposed to the proposed action is the Northwest Atlantic Ocean DPS. In the Northwest Atlantic, the majority of loggerhead nesting is concentrated along the coasts of the United States from southern Virginia through Alabama. Additional nesting beaches are found along the northern and western Gulf of Mexico, eastern Yucatan Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), on the southwestern coast of Cuba (F. Moncada-Gavilan, personal communication, cited in Ehrhart *et al.* 2003), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

Reproduction
Loggerhead nesting is confined to lower latitudes temperate and subtropic zones but absent from tropical areas (NMFS and USFWS 1991; Witherington *et al.* 2006; National Research Council 1990). The life cycle of loggerhead sea turtles can be divided into seven stages: eggs and hatchlings, small juveniles, large juveniles, subadults, novice breeders, first year emigrants, and

mature breeders (Crouse *et al.* 1987). Hatchling loggerheads migrate to the ocean (to which they are drawn by near-ultraviolet light; Kawamura *et al*. 2009), where they are generally believed to lead a pelagic existence for as long as 7-12 years. At 15-38 years, loggerhead sea turtles become sexually mature, although the age at which they reach maturity varies widely among populations (NMFS 2001; Witherington *et al.* 2006; Frazer and Ehrhart 1985; Casale *et al.* 2009). Loggerhead mating likely occurs along migration routes to nesting beaches, as well as in offshore from nesting beaches several weeks prior to the onset of nesting (NMFS and USFWS 1998c; Dodd 1988). Females usually breed every 2-3 years, but can vary from 1-7 years (Dodd 1988; Richardson *et al.* 1978). Females lay an average of 4.1 nests per season (Murphy and Hopkins 1984).

Movement and migration

As post-hatchlings, Northwest Atlantic loggerheads use the North Atlantic Gyre and enter Northeast Atlantic waters (Carr 1987). They are also found in the Mediterranean Sea. In these areas, they overlap with animals originating from the Northeast Atlantic and the Mediterranean Sea (Carreras *et al.* 2006; Eckert *et al.* 2008). After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, The Bahamas, Cuba, and the Gulf of Mexico (Musick and Limpus 1997; Spotila *et al.* 1997; Hopkins-Murphy *et al.* 2003). As adults, loggerheads shift to a benthic habitat, where immature individuals forage in the open ocean and coastal areas along continental shelves, bays, lagoons, and estuaries (NMFS 2001; Bowen *et al.* 2004).

Feeding

Loggerheads are omnivorous and opportunistic feeders (Parker *et al*. 2005). Hatchling loggerheads feed on macroplankton associated with *Sargassum* spp. communities (NMFS and USFWS 1991). Pelagic and benthic juveniles forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988; Wallace *et al.* 2009). Sub-adult and adult loggerheads prey on benthic invertebrates such as gastropods, mollusks, and decapod crustaceans in hard-bottom habitats, although fish and plants are also occasionally eaten (NMFS and USFWS 1998c).

Status and trends

Loggerhead sea turtles were listed as threatened under the ESA of 1973 on July 28, 1978 (43 FR 32800). On September 22, 2011, NMFS designate nine distinct population segments (DPSs) of loggerhead sea turtles. Four were listed as threatened: Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean; and five were listed as endangered: Northeast Atlantic Ocean, Mediterranean Sea, North Indian Ocean, North Pacific Ocean, and South Pacific Ocean (76 FR 58868). The DPS that could be exposed to the proposed action is the Northwest Atlantic Ocean DPS.

There is general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage, even though there are doubts about the ability to estimate the overall population size (Bjorndal *et al.* 2005). An important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females, but it may not reflect overall population growth rates well. Adult nesting females often account for less than 1% of total population numbers. Collectively, the Northwest Atlantic Ocean hosts the most significant nesting assemblage of loggerheads in the western

hemisphere and is one of the two largest loggerhead nesting assemblages in the world. Analyses by NMFS and USFWS (2008), Witherington *et al.* (2009), and TEWG (2009) indicate that there had been a significant, overall nesting decline within this DPS. However, nesting in 2008 showed a substantial increase compared to the low of 2007, and nesting in 2010 reached the highest level seen since 2000. The most current nesting trend for the Northwest Atlantic Ocean DPS, from 1989–2010, is very slightly negative, but the rate of decline is not statistically different from zero (76 FR 58868).

Critical habitat
NMFS has not designated critical habitat for loggerhead sea turtles, however a Critical Habitat Review Team has been convened to review available data and determine if a critical habitat designation for loggerhead sea turtles is warranted.

Atlantic sturgeon

Atlantic sturgeon are an anadromous and iteroparous fish that range from Newfoundland in Canada south to Florida. They are listed as five distinct population segments (DPSs): (1) the ‘‘Gulf of Maine (GOM) DPS” (*Threatened* in freshwater ranges), including Atlantic sturgeon originating from the Kennebec River and occurring in other GOM rivers; (2) the ‘‘New York Bight (NYB) DPS” (*Endangered*), including Atlantic sturgeon originating from the Hudson and Delaware Rivers; (3) the ‘‘Chesapeake Bay (CB) DPS” (*Endangered*), including Atlantic sturgeon originating from the James and York Rivers; (4) the “Carolina DPS” (*Endangered*), including all Atlantic sturgeon spawning in the watersheds from the Roanoke River, Virginia, southward along the southern Virginia, North Carolina, and South Carolina coastal areas to the Cooper River; and the (5) the “South Atlantic DPS” (*Endangered*), including all Atlantic sturgeon spawning in the watersheds of the ACE Basin in South Carolina to the St. Johns River, Florida. Further, the marine range of Atlantic sturgeon was found to contain individuals mixed from each of the defined population segments extending from the Bay of Fundy, Canada, to the Saint Johns River, Florida.

Concurrent to the application process for ITP #16320, NMFS has also received a separate ITP application requesting incidental take of Atlantic sturgeon in the same inshore gillnet fisheries. As such, this EA and associated ITP documents do not specifically consider the impacts to Atlantic sturgeon, as this species will be considered fully in the separate ITP process and corresponding ESA consultation.

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 et seq.) The EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act offer fishery resource managers a means to conserve fish habitat. North Carolina inshore waters are characterized as estuarine waters, and are considered EFH for various life stages of red drum, bluefish, summer flounder, gag grouper, gray snapper, cobia, king mackerel, Spanish mackerel, black sea bass, spiny dogfish, and various shrimp species.

Social and Economic Environment

A variety of human activities may occur in the action area such as commercial fishing, recreational fishing, recreational boating, ecotourism, and other commercial uses, such as shipping. The social and economic effects of the proposed action mainly involve the effects on the State of North Carolina, specifically NCDMF, and the commercial fishing industry. The issuance of an ITP to NCDMF would ensure that the commercial gillnet fishery could operate in North Carolina inshore waters and continue to support the area's economy through commerce of the target catch.

4.0 Environmental Consequences of Alternatives

This section presents 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 considerations of both the context and intensity of a proposed action (40 CFR§ 1508.27).

Effects Common to All Alternatives

Incidental Take of Sea Turtles

Each alternative is expected to result in both live captures (non-lethal take) and mortalities (lethal take) of sea turtles. Although Alternative 1 is "No Action", or denial of the ITP request, in this EA NMFS assumes that the status quo would largely be maintained for the fishery. No take authorization would be provided; however, it is likely that if the state continues to operate the fishery without an ITP, both live captures and mortalities would occur. For Alternatives 2 and 3, incidental take of sea turtles would be authorized for both live captures and mortalities.

The existing North Carolina proclamations, in place since 2010, were designed to minimize incidental capture of sea turtles in the commercial inshore gillnet fishery. These existing regulations have been incorporated within the conservation plan, with additional efforts to reduce incidental capture. All of these measures have been under consideration by NMFS in reviewing this ITP.

Negative effects would occur when the operation of the inshore gillnet fishery results in incidental takes of sea turtles, including live captures where the turtle is released alive and mortalities resulting from the capture. Sea turtles are vulnerable to incidental capture in the North Carolina commercial inshore gillnet fishery because they are commonly found foraging in the same area and seasons where fishing occurs. It is expected that the incidental capture of sea turtles, both lethal and nonlethal, will occur at varying levels, from each of the alternatives listed below. Therefore, an analysis of the effects of incidental capture is provided in this section.

Incidental capture of sea turtles in the inshore gillnet fishery will have negative impacts on the individuals captured. An adverse effect on a single individual or a small group of animals does not always translate into an adverse effect on the population or species unless it results in reduced reproduction or survival of the individual(s) that causes an appreciable reduction in the

likelihood of survival or recovery for the species. In order for the proposed action to have an adverse effect on a species, the take of individual animals by the fishery would first have to result in:

- mortality,
- serious injury that would lead to mortality, or
- disruption of essential behaviors such as feeding or migration, to a degree that the individual's likelihood of successful reproduction or survival was substantially reduced.

The mortality or reduction in the individual's likelihood of successful reproduction or survival would then have to result in a net reduction in the number of individuals of the species. The loss of the individual or its future offspring would not be offset by the addition, through birth or emigration, of other individuals into the population. That net loss to the species would have to be reasonably expected, directly or indirectly, to reduce the likelihood of both the survival and recovery of the listed species in the wild.

Since 2005, the majority (78.2%) of all observed sea turtle incidental captures in North Carolina inshore gillnets have been released alive. However, it is expected that some proportion of the sea turtles that are released alive after capture in a gillnet will succumb to post-release mortality due the physiological effects of the capture, or they will experience a decreased ability to forage or migrate, which may make the more susceptible to re-capture within a short period of time. Sea turtles can dive for prolonged periods and to great depths voluntarily because of their low metabolic rates, efficient blood oxygen transport mechanisms, and moderate tolerance to hypoxia (Lutcavage and Lutz, 1997). Although sea turtles can stay submerged for 20-180 minutes during voluntary dives, forced submergence due to net entanglement can be lethal (Lutz and Bentely, 1985). Turtles caught in a net will struggle in attempts to escape and surface for air, and oxygen stores will be rapidly depleted. It has been found that the physiological damage incurred due to net entanglement may affect the turtle's behavior and reduce its chances of survival post-release, and it has been suggested that a sea turtle's recovery from lactic acid build up can take over 15 hours, depending on the length of time submerged and level of acidosis (Lutz and Dunbar-Cooper, 1987).

In November 2009, NMFS Northeast Regional Office (NER) convened a panel of experts to discuss and provide individual expert advice on the potential injury and post-release mortality of sea turtles from capture in fishing gear. Based on the expert panel advice, NER developed formal guidance on assessing bycatch injury and post-release mortality in multiple gear types. The guidance allows experts to use data collected from observed takes to evaluate the condition of turtles and assign a potential post-release mortality rate. The guidance document was not meant to provide a specific post-release mortality rate for each gear-type, but rather to provide guidelines for how post-release mortality could be analyzed after a take occurs for a particularly fishery. To apply the guidance experts would review the data collected by the observers on the body condition, new and existing injuries, as well as the activity level of the animal prior to release. At this time, NMFS is unable to apply the NMFS NER guidelines to the interactions that may occur in the North Carolina inshore gillnet fishery, but anticipates the ability to apply the guidance to observed takes that occur in the future based on the data collected from observers.

In addition to the NMFS efforts to better characterize post-release mortality, a study was conducted in North Carolina waters to better determine the rate of survival for sea turtles that are captured in shallow-set gillnets and released alive (Snoddy and Southwood Williard, 2010). In this study, 14 live sea turtles captured in North Carolina gillnets were given health assessments, including biochemical analysis, and tagged with satellite transmitters prior to release. The primary goal of the study was to investigate the rate of post-release mortality of these turtles based on biochemical analysis and telemetry (Snoddy and Southwood Williard, 2010). The study documented one confirmed mortality and three suspected mortalities from the sample size of 14 turtles. Based on the data they collected, Snoddy and Southwood Williard have estimated the post-release mortality of sea turtles releases from shallow-set gillnets as potentially ranging from 7.1% to 28.6%, although they caution that these rates are specific to soak times of 4 hours or less (Snoddy and Southwood Williard, 2010).

Due to the small sample size, the results of this study may not be universally applicable to all inshore gillnets, but they do provide insight into the potential post-mortality rates for shallow-set gillnets in North Carolina. However, given that the study was conducted in North Carolina waters within the action area and fishery that will be covered under the ITP, we will evaluate the requested incidental take against the post-release mortality ranges described above for the purposes of this analysis. An analysis including the post-release criteria can be found below in the sections "Effects of Alternative 2" and "Effects of Alternative 3".

The mortalities resulting from the North Carolina inshore gillnet fishery may result in impacts to the recovery of sea turtle species in the wild. However, it is difficult to identify the impact of this individual fishery on sea turtle populations as there are a number of other stressors on the population that must be considered as cumulative effects. Additionally, due to the uncertainty of population estimates for each sea turtle species found in North Carolina's waters, it is not possible to know the direct and specific impact of the North Carolina gillnet fishery on these sea turtle species.

NMFS is currently preparing a biological opinion, pursuant to section 7(b) of the ESA, evaluating the effects of the issuance of the ITP on listed species under NMFS' jurisdiction. The biological opinion will conclude the potential impacts of the action and if the issuance of the ITP is likely to jeopardize the continued existence of any species of sea turtle.

Incidental Take of Other Species

In addition to sea turtles, gillnet fisheries also capture other fish and wildlife. Gillnets target species of flounder, sea trout and other species of fish, and incidentally capture non-target finfish, seabirds and marine mammals. In general, gillnets are considered selective of fish size, but not species. The proposed action is not expected to have an impact on manatees. Manatees are rare in North Carolina waters; and, therefore, it is not likely that any alternative would have a significant impact on manatees. Seabirds are susceptible to capture and drowning in the sink gillnets used in North Carolina inshore waters, and therefore there may be some negative impact (i.e. mortality) to seabirds from all of the alternatives.

Essential Fish Habitat

As noted above, North Carolina inshore waters are characterized as estuarine waters, and are considered EFH for various life stages of red drum, bluefish, summer flounder, gag grouper, gray snapper, cobia, king mackerel, Spanish mackerel, black sea bass, spiny dogfish, and various shrimp species. NCDMF currently operates the gillnet fishery in these waters, so the issuance of the permit is not expected to increase the level of fishing activity, or further impact EFH. Although fishing vessels would pass through and over the water column, NMFS determined that this activity, under all alternatives would not adversely impact the water column and any portion considered EFH. NMFS also considered the potential impact setting and retrieving gillnet gear on 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; West *et al*. 1994; ICES 1995; Kaiser *et al*. 1996). As such, NMFS does not anticipate any impacts of issuing this ITP on EFH. NMFS will submit the proposed ITP application to NMFS Office of Habitat Conservation for review for further recommendations.

Social and Economic Impacts

Minimal social and economic impacts may result from each of the alternatives. Further discussion on the specific social and economic impacts from each alternative is provided below.

Effects of the No Action Alternative

An alternative to the proposed action is no action, or denial of the ITP request. In this EA, NMFS will assume for the no action alternative that the status quo would largely be maintained for the fishery. While NMFS cannot know for certain what measures the State would implement absent the ITP, we will assume that NCDMF will maintain the regulations it put in place by proclamation listed in Appendix C of its application. While the proclamations provide significant management measures for this fishery, they do not include the full suite of measures to monitor, minimize, and mitigate the impact of incidental take under the proposed conservation plan. Thus, the overall beneficial effects expected for the species from implementing that full suite of measures would not be achieved. In addition, it is possible that NCDMF would amend its commercial inshore gillnet fishing regulations to be less restrictive than they are under the existing regulatory structure.

Social and Economic Effects

Under the no action alternative, all large mesh gillnet fishing in Pamlico Sound in the fall of each year would be closed per NMFS regulations (67 FR 56931, September 6, 2002). Interactions and subsequent mortality of sea turtles in large mesh gillnet gear would be prevented in that area. Due to the seasonal nature of the flounder fishery, no fisherman is exclusively dependent on the flounder fishery, rather the participants are diversified into other fisheries, such as blue crab trap and gillnets in the ocean and other inshore areas for various target species. The fall Pamlico Sound large mesh gillnet closure would not result in a total loss of revenue from the flounder fishery and for the participating fisherman.

Under this alternative, the small mesh gillnet fishing in Pamlico Sound would remain open, and all waters outside of Pamlico Sound would remain open to large mesh gillnets. While we cannot know for sure how fishing practices may shift due to the closure, or if most effort would shift to small mesh gillnets and other areas open to large mesh, it is likely that the fisherman will identify alternate locations and gear to use and the overall fishing effort may not be significantly impacted.

Additionally, if no ITP is issued, NCDMF would not receive an exemption from the ESA prohibitions against take; therefore, any incidental takes of sea turtles resulting from the North Carolina commercial inshore gillnet fishery would not be exempted. If NCDMF continues to operate an inshore gillnet fishery without an ITP, and sea turtle takes continue to occur, both NCDMF and the individual fisherman could be liable to third party lawsuits and enforcement action by NMFS for violating the ESA and illegally taking endangered or threatened species. Any incidental takes of sea turtles would result in the effects described in the "Effects Common to All Alternatives" section.

To the extent that this alternative would limit additional burden on licensed commercial inshore gillnet fishermen (e.g. avoiding additional reporting requirements, education etc.), the no action alternative would have less of a socio-economic impact than the two action alternatives. However, this alternative would also prohibit fishing in Pamlico Sound in the fall of each year, which may increase the socio-economic impact of this action, as fisherman would be unable to use that area and would need to shift their effort to other open areas.

Effects of Alternative 2, Issuing the ITP as Requested in the Application

Implementation of Alternative 2 has the potential to result in both positive and negative effects on sea turtle species. In addition to the effects described in the "Effects Common to All Alternatives" section, additional effects of Alternative 2 are provided below.

Incidental Take of Sea Turtles

Under Alternative 2, issuing the ITP as requested in the Application (updated January 18, 2013), will result in 642 estimated annual takes of green and Kemp's ridley sea turtles, and 42 observed annual takes of loggerhead, leatherback and hawksbill sea turtles in the large mesh inshore gillnet fishery for Management Units B, D1, D2, and E (Tables 1 and 2, above). Additionally, this alternative will result in 74 observed annual takes of sea turtles, either live or dead, in the small mesh inshore gillnet fishery in Management Units B, D1, D2, and E (Table 3, above), and 16 observed annual takes of all species and gear types in Management Units A and C (Table 4, above).

As mentioned in the section "Effects Common to All Alternatives," the post-release mortality of live released turtles is an additional factor that must be considered when evaluating the effects of the authorized take on sea turtle populations. Although sea turtles can stay submerged for up to 180 minutes during voluntary dives, forced submergence due to net entanglement can be lethal

(Lutz and Bentely, 1985). If the capture is not immediately lethal, the physiological damage incurred during the net entanglement may affect the turtle's behavior after it is released and may reduce its chances of survival.

While we do not have sufficient observer data to apply the NMFS NER post-release mortality guidance to the North Carolina inshore gillnet fishery at this time, the results of the Snoddy and Southwood Williard study may be a useful tool for evaluating post-release mortality because the study occurred in the specific fishery and area subject to the ITP. Snoddy and Southwood Williard 2010 estimated the post-release mortality of live sea turtles released from shallow-set gillnets in North Carolina to range from 7.1% to 28.6%. This range was derived from a small sample size of 14 turtles, and the results may not be universally applicable to all inshore gillnets in North Carolina, given varying soak times. However, we are incorporating the post-release mortality ranges as part of this analysis to be precautionary and describe the potential total mortality that might occur as a result of Alternative 2.

When looking at the estimated annual takes of green and Kemp's ridley sea turtles in the large mesh inshore gillnet fishery occurring in Management Units B, D1, D2, and E, Alternative 2 would authorize 428 live sea turtle takes (330 greens, 98 Kemp's ridley), and 214 dead sea turtle takes (165 green, 49 Kemp's ridley). When applying the post-release mortality ranges to the 428 live captures, we might assume that of the 330 live green turtles captured, between 23.4 and 94.4 turtles might succumb to post-release mortality, and of the 98 live Kemp's ridley sea turtles, between 6.9 and 28 turtles might succumb to post-release mortality.

When looking at the observed annual takes across all species and mesh size, a total of 132 sea turtles, either live or dead, are requested. A conservative estimate would assume that all 132 should be classified as dead in this analysis, since condition of the animal is not specified in the take request. However, if we assume that all 132 turtles were captured alive and released, we could apply the post-release ranges to those live takes. In this scenario, of the 132 live observed takes, between 9.4 and 37.8 turtles might succumb to post-release mortality from the injuries and physiological impacts resulting from the capture, although it is likely that some mix of live and dead turtles will be observed as takes.

The expected mortalities and any post-release mortalities resulting from Alternative 2 may result in impacts to the recovery of sea turtle species in the wild. However, it is difficult to identify the impact of this individual fishery on sea turtle populations as there are a number of other stressors on the population that must be considered as cumulative effects. Additionally, due to the uncertainty of population estimates for each sea turtle species found in North Carolina's waters, it is not possible to know the direct and specific impact of the North Carolina gillnet fishery on these sea turtle species.

Issuance of the proposed ITP would not interfere with benthic productivity, predator-prey interactions, or other biodiversity or ecosystem functions. Issuance of the proposed ITP would not involve alteration of substrate, movement of water or air masses, or other interactions with physical features of ocean and coastal habitat. Thus, effects on biodiversity and habitat are not anticipated.

Alternative 2 includes an Adaptive Management provision, through which NCDMF may make regulatory changes to the fishing season, as needed, to decrease sea turtle interactions. Regulatory changes might include increasing monitoring, increasing restrictions and closing specific areas to fishing. By including an adaptive management provision, the ITP will allow NCDMF to respond to new information about populations of protected resources, changes in knowledge about sea turtle life history characteristics, and enhancements to targeted fishery gear types in a way that protects sea turtles and other endangered or threatened species as well as preserving a fishing industry that relies on access to North Carolina's estuarine waters. This process will ensure that the incidental take of sea turtles does not exceed the authorize level and will therefore ensure continued protection for endangered or threatened sea turtle populations and other protected species.

Social and Economic Impacts

Issuance of the proposed ITP would not occur in or indirectly affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources or preclude their availability for other scientific, cultural, or historic uses. Thus, effects on such unique areas are not anticipated.

Alternative 2 may result in a minimal additional burden to licensed North Carolina inshore gillnet fisherman, through a requirement to carry or work closely with observers within the fishery and for reporting sea turtle takes to NCDMF. The North Carolina observer program is not expected to cause significant additional burden to the fisherman because this fishery is already subject to both NCDMF and NMFS observer coverage independent of the state program, and further the gillnet fisherman in North Carolina have been working within the monitoring framework of the proposed application since 2010, through measures put in place by NCDMF's 2010 proclamation. Fishermen will be required to report incidental takes to NCDMF and undertake specific measures to resuscitate turtles as necessary, and follow disposition guidelines; however, as mentioned above, fishermen have been subject to these requirements since 2010, and therefore this Alternative is not expected to cause further socio-economic burden.

Effects of Alternative 3, Issue ITP as Requested in Application, with Modifications and Additional Requirements (Preferred Alternative)

Implementation of Alternative 3 has the potential to result in both positive and negative effects on the sea turtle species. In addition to the effects described in the "Effects Common to All Alternatives" section, additional effects of Alternative 2 are provided below.

Incidental Take of Sea Turtles

This alternative would result in both lethal and non-lethal take, with impacts of such take described above in the "Effect Common to All Alternatives" section. However, as described above, Alternative 3 would result in a lower number of takes authorized by the proposed ITP for sea turtles than in Alternative 2, resulting in fewer biological impacts than Alternative 2.

Under Alternative 3, the total estimated annual takes of Kemp's ridley and green sea turtles, for the large mesh inshore gillnet fishery in Management Units B, D1, D2, and E remains the same at 642 estimated takes (Tables 1 and 6, above). However, all observed annual take requests have been decreased. The level of observed annual takes in large mesh gillnets in Management Units B, D1, D2, and E has been reduced from 42 to 26 takes (Tables 2 and 7, above). The level of observed takes in small mesh gillnets in Management Units B, D1, D2 and E has been reduced from 74 to 44 takes (Tables 3 and 8, above). Additionally, the observed takes in Management Units A and C across all species and gear types has been reduced in half from 16 to 8 (Tables 4 and 9, above). In total, this represents an overall decrease in observed annual takes by 59%, from 132 in Alternative 2 to 58 in Alternative 3.

As mentioned in the section "Effects Common to All Alternatives," the post-release mortality of live released turtles is an additional factor that must be considered when evaluating the effects of the authorized take on sea turtle populations. Although sea turtles can stay submerged for up to 180 minutes during voluntary dives, forced submergence due to net entanglement can be lethal (Lutz and Bentely, 1985). If the capture is not immediately lethal, the physiological damage incurred during the net entanglement may affect the turtle's behavior after it is released and reduce its chances of survival.

While we do not have sufficient observer data to apply the NMFS NER post-release mortality guidance to the North Carolina inshore gillnet fishery at this time, the results of the Snoddy and Southwood Williard study may be a useful tool for evaluating post-release mortality because the study occurred in the specific fishery and area subject to the ITP. Snoddy and Southwood Williard 2010 estimated the post-release mortality of live sea turtles released from shallow-set gillnets in North Carolina to range from 7.1% to 28.6%. This range was derived from a study with a small sample size of 14 turtles, and the results may not be universally applicable to all inshore gillnets in North Carolina, given varying soak times. However, we are incorporating the post-release mortality ranges as part of this analysis to be precautionary and describe the potential total mortality that might occur as a result of Alternative 3.

As with Alternative 2, when looking at the estimated annual takes of green and Kemp's ridley sea turtles in the large mesh inshore gillnet fishery occurring in Management Units B, D1, D2, and E, Alternative 3 would authorize 428 live sea turtle takes (330 greens, 98 Kemp's ridley), and 214 dead sea turtle takes (165 green, 49 Kemp's ridley). When applying the post-release mortality ranges to the 428 live captures, we might assume that of the 330 live green turtles captured, between 23.4 and 94.4 turtles might succumb to post-release mortality, and of the 98 live Kemp's ridley sea turtles, between 6.9 and 28 turtles might succumb to post-release mortality.

When looking at the observed annual takes across all species and mesh size, a total of 78 sea turtles, either live or dead, are requested. A conservative estimate would assume that all 78 should be classified as dead in this analysis, since condition of the animal is not specified in the take request. However, if we assume that all 78 turtles were captured alive and released, we could apply the post-release ranges to those live takes. In this scenario, of the 78 live observed takes, between 5.5 and 22.3 turtles might succumb to post-release mortality from the injuries and physiological impacts resulting from the capture, although it is likely that some mix of live and

dead turtles will be observed as takes.

The expected mortalities and any post-release mortalities resulting from Alternative 3 may result in impacts to the recovery of sea turtle species in the wild. However, it is difficult to identify the impact of this individual fishery on sea turtle populations as there are a number of other stressors on the population that must be considered as cumulative effects. Additionally, due to the uncertainty of population estimates for each sea turtle species found in North Carolina's waters, it is not possible to know the direct and specific impact of the North Carolina gillnet fishery on these sea turtle species.

Similar to Alternative 2, this alternative includes an Adaptive Management provision, through which NCDMF may make regulatory changes to the fishing season, as needed, to decrease sea turtle interactions. Regulatory changes might include increasing monitoring, increasing restrictions and closing specific areas to fishing. By including an adaptive management provision, the ITP will allow NCDMF to respond to new information about populations of protected resources, changes in knowledge about sea turtle life history characteristics, and enhancements to targeted fishery gear types in a way that protects sea turtles and other endangered or threatened species as well as preserving a fishing industry that relies on access to North Carolina's estuarine waters. This process will ensure that the incidental take of sea turtles does not exceed the authorize level and will therefore ensure continued protection for endangered or threatened sea turtle populations and other protected species.

Similar to Alternative 2, the issuance of the proposed ITP under Alternative 3 would not interfere with benthic productivity, predator-prey interactions, or other biodiversity or ecosystem functions. Issuance of the proposed ITP would not involve alteration of substrate, movement of water or air masses, or other interactions with physical features of ocean and coastal habitat. Thus, effects on biodiversity and habitat are not anticipated.

Lastly, the additional monitoring and reporting requirements incorporated into Alternative 3 may benefit sea turtles through improving our knowledge of sea turtle interactions in the North Carolina inshore gillnet fisheries. This monitoring will potentially provide a more robust understanding of how and when sea turtles interact with inshore gillnets, so that future mitigation measures can focus on those times and areas. The model used to predict interactions can be updated to more accurately account for sea turtle bycatch in the fishery, which will then inform future ITP development. Additionally, observer data may illustrate which life stages of the various species are most commonly affected by gillnets, thereby providing some indication of the effects on population size and overall health of sea turtles found in North Carolina inshore waters. Based on this information NMFS and NCDMF can make more informed decisions to further reduce bycatch of sea turtle in gillnets.

Social and Economic Impacts

Similar to Alternative 2, Alternative 3 may result in a minimal additional burden to licensed North Carolina inshore gillnet fisherman, through a requirement to carry or work closely with observers within the fishery and for reporting sea turtle takes to NCDMF. The North Carolina observer program is not expected to cause significant additional burden to the fisherman because

this fishery is already subject to both NCDMF and NMFS observer coverage independent of the state program, and further the gillnet fisherman in North Carolina have been working within the monitoring framework of the proposed application since 2010, through measures put in place by NCDMF's 2010 proclamation. Fishermen will be required to report incidental takes to NCDMF and undertake specific measures to resuscitate turtles as necessary, and follow disposition guidelines; however, as mentioned above, fishermen have been subject to these requirements since 2010. As a result, this Alternative is not expected to cause further socio-economic burden.

Issuance of the proposed ITP under Alternative 3 would not occur in or indirectly affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or cause loss or destruction of significant scientific, cultural or historical resources or preclude their availability for other scientific, cultural, or historic uses. Thus, effects on such unique areas are not anticipated.

Cumulative Impacts

A cumulative impact is the impact on the environment resulting from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions, regardless of the agency (federal or nonfederal) or person undertaking such other actions. Significance from the proposed action cannot be avoided if it is reasonable to anticipate a significant cumulative impact on the environment. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time.

Current Threats

Sea turtles face numerous natural and anthropogenic threats that help shape their status and affect the ability for each species to recover. The threats identified in the section below are discussed in a general sense for all listed sea turtles rather than solely for one species. Threats specific to a particular species are discussed in the corresponding status sections where appropriate.

Sea turtles have been impacted historically by domestic fishery operations that often capture, injure, and even kill sea turtles at various life stages. In the United States, the bottom trawl, sink gillnets, hook and line gear, and bottom longline managed in the Northeast Multispecies Fishery are known to capture sea turtles during normal fishery operations (Watson *et al*., 2004; Epperly *et al*., 1995; Lewison *et al*., 2003, Lewison *et al*., 2004; Richards, 2007) while the vertical buoy lines used for pot gear for the U.S. Lobster and Red Crab fisheries cause entanglement resulting in injury to flippers, drowning, and increased vulnerability to boat collisions (Lutcavage *et al*., 1997). In addition, various trawl, gillnet, longline, and hook gears used for the monkfish, spiny dogfish, summer flounder, scup, black sea bass, and Atlantic highly migratory species fisheries managed in the United States impact sea turtles at various degrees. The Southeast U.S. shrimp fishery (which uses otter trawl gear) has historically been one of the largest threats to sea turtles in the southeastern United States (Murray, 2006), and continues to interact with (and kill) large numbers of sea turtles each year.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further exacerbating the ability of sea turtles to survive and recover on a more global scale. For example, pelagic, immature loggerhead sea turtles circumnavigating

the Atlantic are exposed to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar *et al*., 1995; Bolten *et al*., 1994; Crouse, 1999). Bottom set lines in the coastal waters of Madeira, Portugal, are reported to take an estimated 500 pelagic immature loggerheads each year (Dellinger and Encamacao, 2000) and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. In addition to the reported takes, there are many unreported takes or incomplete records by foreign fleets, making it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to listed sea turtles' survival and recovery throughout their respective ranges. Although numerous efforts are underway to reduce sea turtle bycatch in both domestic and international fisheries, incidental capture in fishing gear remain a serious source of mortality for sea turtles due to the diversity and magnitude of the fisheries operating in the North Atlantic.

There are also many non-fishery impacts affecting the status of sea turtle species, both in the marine and terrestrial environment. In nearshore waters of the U.S., the construction and maintenance of Federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS, 1997a). Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, and scientific research activities. Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Lutcavage *et al*., 1997; Bouchard *et al*., 1998). These factors may directly, through loss of beach habitat, or indirectly, through changing thermal profiles and increasing erosion, serve to decrease the amount of nesting area available to females and may evoke a change in the natural behaviors of both adults and hatchlings (Ackerman, 1997; Witherington *et al*., 2003; Witherington *et al*., 2007). In addition, coastal development is usually accompanied by artificial lighting which has been known to alter the behavior of nesting adults (Witherington, 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal, 1991). Predation by various land predators is a threat to developing nests and emerging hatchlings. Additionally, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges.

Multiple municipal, industrial and household sources as well as atmospheric transport introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g. DDT and PCBs), and other pollutants that may cause adverse health effects to listed species including sea turtles (Iwata *et al*., 1993; Grant and Ross, 2002; Garrett, 2004; Hartwell, 2004). Loggerheads may be particularly affected by organochlorine contaminants as they were observed to have the highest organochlorine contaminant concentrations in sampled tissues (Storelli *et al*., 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Storelli *et al*. (1998) analyzed tissues from twelve loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that mercury accumulates in sea turtle livers while cadmium accumulates in

their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises (Law *et al.*, 1991). Recent efforts have led to improvements in regional water quality, although the more persistent chemicals are still detected and are expected to endure for years (Mearns, 2001; Grant and Ross, 2002). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci, 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis, 1997).

Climate change and variability are identified as major causes of changing marine productivity and may therefore influence sea turtle prey abundance in foraging areas throughout the globe (Mantua *et al*., 1997; Francis *et al*., 1998; Beamish *et al*., 1999; Hare *et al*., 1999; Benson and Trites, 2002). For example, decade-scale climatic regime shifts have been related to changes in zooplankton in the North Atlantic (Fromentin and Planque, 1996) and decadal trends in the North Atlantic Oscillation (NAO) (Hurrell, 1995) can affect the position of the Gulf Stream (Taylor *et al.*, 1998) and other circulation patterns in the North Atlantic that act as important migratory pathways for various life stages of sea turtles. All reptiles including sea turtles have a tremendous dependence on their thermal environment for regulating physiological processes and for driving behavioral adaptations (Spotila *et al*., 1997). Atmospheric warming creates habitat alteration which in turn may change sex ratios and affect reproductive periodicity for nesting sea turtles. Climate variability may also increase hurricane activity leading to an increase in debris in nearshore and offshore waters, thereby resulting in increased entanglement, ingestion, or drowning as well as increased physical destruction of sea turtle nests. However, gaps in information and the complexity of climatic interactions complicate the ability to predict the effects that climate variability may have to these species from year to year.

Conclusion and Summary of Cumulative Effects

As noted above, sea turtles found in the affected environment for this ITP may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, individuals found in an area can potentially be affected by activities anywhere within this wide range. The environmental baseline for determining impacts includes the past and present impacts of all state, tribal, local, private, and other human activities in the ITP area. A number of human activities have contributed to the current status of listed sea turtle species in the action area. Some of those activities, (e.g. commercial harvesting of individuals as well as eggs) no longer occur in the United States yet are still a problem in other countries. Other human activities are ongoing and appear to be directly or indirectly affecting these species. Additionally, unrelated factors may be acting together to affect listed species, such as global warming.

Taken together, the components of the environmental baseline for the action area include sources of natural mortality as well as influences from natural oceanographic and climatic features in the action areas. Circulation and productivity patterns influence food distribution and habitat quality for listed species. The effects of climatic variability on these species in the action areas and the availability of food remain largely undetermined; however, it is likely that any changes in weather and oceanographic conditions resulting in effects on population dynamics (i.e. sex ratios) as well as food availability would have dire consequences for sea turtle species. The most significant activities affecting sea turtles in the Atlantic are fisheries and conservation activities directed at fisheries. Other environmental impacts to turtles may result from vessel operations,

discharges, dredging, military activities, oil and gas development activities, industrial cooling water intake, aquaculture, recreational fishing, vessel traffic, coastal development, habitat degradation, directed take, marine debris, as well as scientific research and conservation efforts.

The ITP will authorize the incidental capture of sea turtles, resulting in both live captures that will be released alive and mortalities. Effects of past and ongoing human and natural factors (fisheries, vessel traffic, etc.) occurring in this broad area have contributed to the current status of the listed sea turtles. Based on the analysis in this EA and supported by ESA Section 7 consultation that is currently underway, NMFS expects that issuance of the proposed ITP would not appreciably reduce the species likelihood of survival and recovery in the wild, nor would it adversely affect reproductive or mortality rates. The incremental impact of the proposed authorization of takes of sea turtles incidental to the otherwise legal North Carolina inshore gillnet fishery, when added to other past, present, and reasonably foreseeable future actions, is not expected to result in population-level effects.

5.0 Mitigation Measures

No additional mitigation measures are required in the ITP beyond the measures included as ITP conditions, and discussed in the description of the Preferred Action.

However, additional mitigation measures may be implemented by the NCDMF to further minimize and reduce sea turtle and other protected species interactions in gillnet fisheries, if they determine additional measures to be necessary. These measures may include extensive outreach, timely response to hotspots, an adaptive observer program, and implementation of further restrictions through Fisheries Rules or NCDMF proclamations.

In summary, the ITP conditions sufficiently limit the level of take in the North Carolina inshore gillnet fishery. The required observer coverage will monitor the take levels so that adaptive management may be used, as necessary to further reduce the take of sea turtles.

6.0 ESA Section 7 Consultation

The Endangered Species Conservation Division is currently undergoing an ESA Section 7 consultation to determine if the issuance of the proposed ITP is likely to adversely affect NMFS ESA-listed sea turtles that are the subject of the ITP.

7.0 Public Review and Comment on the Incidental Take Permit Application

As part of the NEPA scoping process and review of all Section 10(a)(1)(B) ITP applications, NMFS makes each application and associated conservation plan available for public review. On October 5, 2011 NMFS published a Notice of Receipt (NOR) of the State's draft application for a Section 10(a)(1)(B) ITP for its commercial inshore gillnet fishery and made available the application and conservation plan for public review and comment for 30 days. Upon receiving

comments back, NMFS requested for NCDMF to make several modifications to the application. NCDMF submitted an amended application on September 6, 2012, and then on October 31, 2012 NMFS published a NOR of the state's amended application and made the application and conservation plan available for public review and comment for 30 days. Additionally, NMFS solicited input from three independent reviewers with expertise in sea turtle biology and conservation, population modeling, bycatch estimation, and observer programs on both the 2011 and 2012 versions of the application. Comments received during both comment periods from the public and independent reviewers have been considered in subsequent revisions of the conservation plan and have been incorporated into the analysis in this EA as well as an implementing agreement between NCDMF and NMFS.

Comments have been grouped together by topic, and will not be associated with the specific reviewer.

General Comments

Several commenters felt that the application and conservation plan (all or part) were inadequate and failed to meet the ESA minimum requirements. Commenters felt that NMFS should not issue a ITP at all or should only issue one after substantial revisions including terms and conditions. One commenter requested that NMFS include an annual provision in the ITP to publish an annual report in the Federal Register with a request for notice and comment before the ITP could be renewed for the following year. Other commenters suggested several clarifications throughout the application with respect to the various topics listed below.

One commenter believes all gillnets in North Carolina should be banned similar to other states in the southeast United States.

Requested Takes

NMFS received several comments on the number of takes requested by NCDMF in both applications that went out for public review. In general, commenters felt the number of takes requested was too high. Several noted that the second revision had improved the application and favored the reduced number of requested takes in large mesh gillnets. Commenters also asked how the number of takes requested compared with other authorized takes in fisheries or other activities in the northwest Atlantic Ocean. One commenter suggested comparing the North Carolina gillnet bycatch rate per metric ton of fish caught to the bycatch rates in other fisheries to ensure the rates are commensurate.

Commenters questioned how the number of requested takes was generated. In particular, commenters felt that extrapolating previous fishing effort and historic levels of take (to generate anticipated takes) was inappropriate for determining the number of requested takes as it did not consider reductions expected from mitigation measures or whether each population could withstand that level of take. With respect to the predictive model used to estimate takes, one commenter requested that NMFS include the model as an appendix to the permit and have it peer-reviewed while another commenter requested that NCDMF update the model with current fishing effort rather than historical effort. One reviewer requested that measures of error (e.g.,

confidence intervals) surrounding the "worse-case scenario" bycatch estimates be included in the application. Further, several commenters noted that the "worse-case scenario" is never fully explained or defined with respect to estimate takes. Another reviewer requested more information on how the preferred model was applied to unobserved fishing effort to estimate the total number of interactions. Along those lines, the reviewer suggested using an average of fishing effort from 2010 and 2011 instead of simply using 2010 data or clearly explaining why that was not done. One reviewer provided detailed, technical comments on the models, evaluation criteria, outputs, and conclusions.

Population Impacts

Several commenters feel the application fails to consider the population impact of the proposed levels of take, particularly on juveniles and with respect to post-release mortality and sub-lethal effects. The commenter noted that a large number of anticipated takes likely represents potentially significant impacts at the population level and issuing a Finding of No Significant Impact (FONSI) would be inappropriate. One commenter suggested assessing genetic composition, relative size and vulnerability, and overall population status of sea turtle species in North Carolina inshore waters. Another commenter noted that the application concludes that fishing will minimally affect the populations without providing any analysis to support that conclusion. One comment encouraged NMFS to consider effects of other fisheries in its baseline analysis of the direct and indirect effects of the proposed action as well as cumulative effects.

Several comments addressed post-release mortality. One noted that the 78.2% of all turtles being released alive since 2005 is misleading because it does not include post-release mortality that could range from 7.1-28.5%, which is an underestimate as it is based on soak times of 4 hours or less. One commenter noted that "18% for all observed interactions" would be more appropriately worded as "the immediate mortality rate" to take into account undocumented post-release mortality.

Mitigation Measures

Several commenters recommended additional mitigation measures, such as greater geographic or seasonal restrictions on gillnets; shorter net lengths; lower profile nets, particularly in deep water; different mesh sizes; reduced soak times; and mandatory attendance of all large mesh gillnets. Another felt the mitigation measures included were not comprehensive or detailed enough to minimize interactions. One commenter suggested that the same requirements imposed by the settlement agreement should be included in the permit. NMFS received some comments seeking clarification as to whether the requirements of the previous ITP (#1528) for the Pamlico Sound Gillnet Restricted Area would continue under this new ITP.

Monitoring Program

Commenters noted that the observer program should be designed to provide adequate levels of coverage geographically, temporally, and spatially. With respect to the level of coverage, one commenter recommended 15% coverage or that necessary to achieve a bycatch estimate with a CV of 20-30% while another noted the 10% goal and 7% minimum were a compromise during

the settlement process and are by no means an ideal level of coverage. One commenter asked NCDMF to include numerical estimates of uncertainty for bycatch estimates (i.e., CVs or other measures of accuracy and precision). Further, one commenter felt the low percentages by area depend far too heavily on extrapolation and are too imprecise to be protective of the species. One commenter asked for clarification as to how the proposed level of observer coverage represents "high" coverage, particularly whether the resulting bycatch estimates would be accurate and real-time. With respect to small mesh gillnets, one commenter felt the amount of observer coverage should be the same as for large mesh gillnets (7%) until more is known about capture rates.

After the first year of the permit, one commenter suggested conducting an analysis of vessel selection bias and observer effect to determine whether the observed trips are representative of the large and small mesh fisheries. Similarly, another commenter requested more information on the sampling methodology used to place the three types of observers (traditional, alternate platform, and NCDMF Marine Patrol) and their data collection procedures to evaluate the potential for bias.

Several commenters feel that Areas A and C should not be exempt from the observer program; if takes are requested in a particular area, that area should be subject to observer coverage. Further, commenters noted that if an area cannot be observed at required levels, NCDMF should be required to close the area by proclamation until minimum levels can be met. One commenter suggested alternative monitoring schemes.

Adaptive Management

NMFS received several comments relative to the adaptive management approach proposed by NCDMF to address hotspots of bycatch. One commenter encouraged NMFS to formalize standard practices for incorporating hotspot information into decision-making as a condition of the permit. Several comments highlighted the importance of the monitoring program for informing the adaptive management approach; those commenters were concerned that limited funding may preclude such an approach. Given that the adaptive management approach may encompass closures, commenters asked NMFS to clarify the criteria by which an area could be reopened following a closure. One idea posed by a commenter included delaying opening the Pamlico Sound Gillnet Restricted Area until the water reached a certain temperature, to be determined in consultation with the Sea Turtle Advisory Committee and NCWRC biologists. Lastly, one commenter requested that NMFS consider "changed circumstances" and "unforeseen circumstances" in the permit as those circumstances relate to adaptive management.

Funding

Several comments raised concerns with the information included in the application related to the level and stability of funding to implement the permit requirements (e.g., monitoring program). Commenters recommended including a mandatory provision in the permit that if funding is not available to monitor an area at the required level (7% for large mesh, 1% for small mesh), NCDMF would close that area to the relevant fisheries until funding and the associated observer coverage could be restored.

ITP Duration

Several commenters think that a 10-year ITP is too long, particularly given the limited data available to inform the application and potential lack of funding to implement the monitoring program. Some feel that a 2-3 year ITP is more appropriate to allow for reassessing take authorization, cumulative effects, management measures (including the adaptive management approach), area boundaries, and other new information (e.g., population shifts, technological advances, fishing changes, sea level rise, etc.). One commenter recommended that NMFS include a provision in the permit that would require NCDMF to confer with the Sea Turtle Advisory Committee prior to submitting an ITP modification request or a future application, and to include the Committee's comments with the application to NMFS.

8.0 List of Preparers and Agencies Consulted

This document was prepared by the Marine Mammal and Sea Turtle Conservation Division of NMFS' OPR (F/PR2) in Silver Spring, Maryland.

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