Final Environmental Assessment
and
Regulatory Impact Review
Regulatory Flexibility Act Analysis
of Sea Turtle Conservation Measures
for the Atlantic Sea Scallop Dredge Fishery

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National Marine Fisheries Service
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Acronyms

AA	Assistant Administrator for Fisheries
ACOE	Army Corps of Engineers
CAA	Controlled Access Area
CE	Categorical Exclusion
CeTAP	Cetacean and Turtle Abundance Program
CFR	Code of Federal Regulations
cm	centimeter
CV	Coefficient of Variation
CY	Calendar Year
DA	Days Absent
DAS	Days at Sea
DRS	Scallop Dredge Gear
EA	Environmental Assessment
EFP	Exempted Fishing Permit
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
E.O.	Executive Order
ESA	Endangered Species Act
km	kilometer
ft	feet
FMP	Fishery Management Plan
FONSI	Finding of No Significant Impact
FSB	Fisheries Sampling Branch
FSF	Fisheries Survival Fund
FY	Fishing Year
GEN	General Category
GNS	Sink Gillnet
GSC	Great South Channel
GSSA	Garden State Seafood Association
HMS	Highly Migratory Species
ITS	Incidental Take Statement
lat.	latitude
long.	longitude
m	meters
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
mt	metric tons
NEFMC	New England Fisheries Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OC	Organochlorine

OTC	Otter Trawl, conch
OTF	Otter Trawl, fish
OTS	Otter Trawl, scallops
PA	Preferred Alternative
PCBs	Polychlorinated Byphenyls
PTs	Pots, lobster, hagfish, whelk, monkfish
PUR	Purse Seine
RFA	Regulatory Flexibility Analysis
RIR	Regulatory Impact Review
SEFSC	Southeast Fisheries Science Center
STSSN	Sea Turtle Stranding and Salvage Network
TEWG	Turtle Expert Working Group
USFWS	United States Fish and Wildlife Service
VIMS	Virginia Institute of Marine Science
VTR	Vessel Trip Report

1.0 INTRODUCTION

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the Endangered Species Act of 1973 (ESA). The Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) sea turtles are listed as endangered. The loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles are listed as threatened, except for breeding populations of green sea turtles in Florida and on the Pacific coast of Mexico that are listed as endangered[1]. Under the ESA and its implementing regulations, taking sea turtles – even incidentally – is prohibited, with exceptions identified in 50 CFR 223.206 for threatened sea turtles. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in such conduct. The incidental take of endangered species may only legally be exempted by an incidental take statement or an incidental take permit issued pursuant to Section 7 or 10 of the ESA, respectively. Existing sea turtle conservation regulations at 50 CFR 223.206(d) exempt fishing activities and scientific research from the prohibition on takes of threatened sea turtles under certain conditions.

Until the 2001 fishing year, it was not believed that dredge gear employed in the Atlantic sea scallop fishery posed a threat to sea turtles. Single takes of sea turtles observed in scallop dredges in 1996, 1997, and 1999 were considered anomalies[2] (NMFS 2000, NMFS 2003b). In 2001, observer coverage was increased in the Mid-Atlantic Controlled Access Areas (CAAs) and, in 2003; this coverage was expanded outside the CAAs. Concomitant with this increase in observer coverage, an increase in sea turtle takes was observed. During 1996 through December 2007, 65 takes (excluding the experimental fishery described below) were observed in the scallop dredge fishery based on observer coverage: 1 each in 1996, 1997, and 1999, 11 in 2001, 17 in 2002, 22 in 2003, 8 in 2004, 1 in 2006, and 3 in 2007 (NEFSC, FSB, Observer Database). During this period, 16 additional sea turtles were reported taken while the observer was off-watch (when an observer is on the vessel but not on duty) or on unobserved hauls (when an observer is on duty but is unable to collect all information on a haul) (NEFSC, FSB, Observer Database). Two turtle were captured during pilot testing of the chain mats (DuPaul and Smolowitz 2003), and eight turtles, six of which were observed, were captured during the course of the experimental fishery to test the use of chain mats on scallop dredge gear (DuPaul *et al.* 2004a). During the 2003 and 2004 fishing years, 749 and 180 loggerhead sea turtles, respectively, were estimated to have been captured from June 1 through November 30 by vessels operating in the Mid-Atlantic sea scallop dredge fishery (Murray 2004a, 2005). Of the 16 off-watch takes, three were documented by observers in the 2005 fishing year. However, there was insufficient data associated with these events to allow these interactions to be used in the estimation of total turtle bycatch in the fishery (Murray 2007). Hence, the estimate provided by the Northeast Fisheries Science Center (NEFSC) for the 2005 fishing year was zero turtles (Murray 2007).

[1] Due to the inability to distinguish between populations of green sea turtles away from the nesting beach, green sea turtles are considered endangered wherever they occur in U.S. waters.
[2] For the purposes of this assessment, with respect to interactions between sea scallop dredge gear and sea turtles, "observed take" and "observed" refer to interactions that were seen and documented by a NMFS approved observer while on-watch.

Given the information on interactions between the scallop dredge fishery and sea turtles and the fact that the scallop fishery is likely to continue to result in takes of sea turtles, the National Marine Fisheries Service (NMFS) published a regulation on August 25, 2006 to require the use of chain-mat modified dredges in the Atlantic sea scallop fishery ("chain mat regulation", 71 FR 50361). The chain-mat modified dredge prevents sea turtles from entering the dredge bag and incurring injuries, including serious injury and mortality, resulting from such capture. In November 2006, NMFS revised this regulation through an emergency rulemaking to require that the chain-mat modified dredge gear be configured such that the length of each side of the square or rectangle created by the intersecting chains is less than or equal to 14 inches ("emergency rule"; 71 FR 66466, November 15, 2006). These actions were necessary to help conserve and recover sea turtles. The action described and analyzed in this Environmental Assessment (EA) is being undertaken to: (1) further correct a procedural error in the August 2006 rulemaking; (2) clarify the existing requirements related to the use of chain-mat modified dredges; and (3) add a transiting provision to the chain-mat requirements.

2.0 PURPOSE AND NEED FOR ACTION

The existing requirements to use chain-mat modified dredge gear in the Atlantic sea scallop fishery result from two final rules: one issued in August 2006 after prior public notice and opportunity for comment; and an emergency rule issued in November 2006 for which prior notice and opportunity for comment was waived for good cause. Under the current regulations, any vessel with a sea scallop dredge and required to have a Federal Atlantic sea scallop fishery permit present in waters south of 41° 9' N latitude, from the shoreline to the outer boundary of the Exclusive Economic Zone (EEZ), must have each dredge configured with a chain mat from May 1 through November 30 each year. Vessels that harvest scallops in or from these waters are required to have the chain-mat configuration on all dredges for the duration of the trip.

First, this action is necessary to address a procedural error in the rulemaking for the original chain mat regulation (71 FR 50361, August 25, 2006). NMFS prepared an EA, which analyzed the impacts on the human environment, and a Finding of No Significant Impact (FONSI) for the August 2006 chain mat regulation (NMFS 2005a, 2006a). While the draft EA and FONSI were circulated for review during the decision-making process at the proposed and final rule stages, due to an oversight, the FONSI was not signed concurrent with the decision to issue the final rule (memo from Patricia A. Kurkul to William T. Hogarth, October 19, 2006). However, the EA was reconsidered and the FONSI was signed subsequent to the publication of the final rule. This rulemaking would further address this procedural oversight by ensuring that NMFS follows all of the National Environmental Policy Act (NEPA) procedures in the proper sequence.

Second, the action is necessary to clarify the current regulatory text. The first change to the regulatory language would modify the text in paragraph (d)(11)(i) that states "…that are configured such that the length of each side of the square or rectangle formed by the intersecting chains is less than or equal to 14 inches…" The intersection of the horizontal and vertical chains and the sweep may, in some cases, result in openings with three sides rather than four. To clarify that all sides of the openings, regardless of whether they are 3- or 4-sided, must be less than or equal to 14 inches, NMFS would modify this text to read “The chain mat must be composed of horizontal (“tickler”) and vertical (‘up-and-down”) chains configured such that the opening created by the intersecting chains has no more than 4 sides. Each side of the opening created by the intersecting chains, including the sweep, must be less than or equal to 14 inches.” The second change to the regulatory text would modify the text in paragraph (d)(11)(ii) of 50 CFR 223.206 that reads, "Any **vessel that harvests sea scallops in or from** the waters..." to read, "Any **vessel that enters** the waters...." This revision would clarify that once a vessel has entered the waters described, it must comply with the requirement to have the chain mat affixed to the dredge for the duration of the trip regardless of whether the vessel is still in those waters. The third change to the regulatory text would revise the text in paragraph (d)(11)(i) that reads, “…any vessel…**present in** waters…” to “…any vessel…**that enters** waters.” This change would be made so that this subparagraph uses the same terminology as (d)(11)(ii). The regulations apply to all vessels required to have a Federal Atlantic sea scallop fishery permit and with sea scallop dredge gear entering waters south of 41° 9.0' N. latitude from May 1 through November 30 each year.

Lastly, with the change in the regulatory language described above, vessels that transit through areas south of 41° 9.0' N. latitude would be required to use chain mats while fishing north of that line. This is not the intent of the regulation as sea turtle interactions, as described below, north of the line are unlikely. Therefore, this action would add a transiting provision to the chain-mat requirements. Vessels would be exempted from the chain-mat requirements provided there are no sea scallops on board and the gear is stowed.

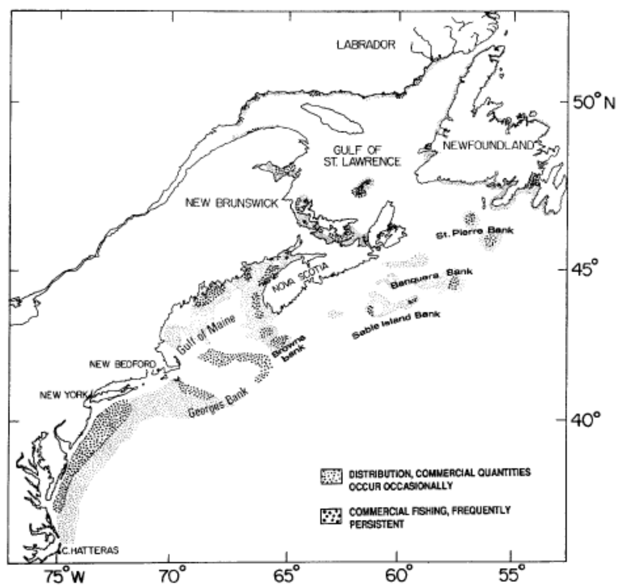
2.1 Background

2.1.1 Sea Scallop Fishery

This EA considers the action within the context of the fishery as a whole. The sea scallop fishery has been previously described in various documents (NEFMC 2000a, 2003, 2004, 2005; NMFS 2004a, 2007a, 2007b, 2007c), and the following will serve as a brief summary. The scallop fishery is one of the most valuable U.S. fisheries (NMFS 2007a, NMFS 2007b) and has continued to generate an increasing economic benefit to the nation. The landings from the sea scallop fishery increased dramatically to over 50 million pounds in 2002 and 2003, over 60 million pounds in 2004 (NEFMC 2005) and over 56 million pounds in 2005 (NMFS 2007a). Revenues exceeded $320 million in 2004 and $430 million in 2005 (NMFS 2007a). In 2006, sea scallop landings were 59 million pounds valued at $386 million (NMFS 2007b). Sea scallop fishing occurs year round (Hart 2006) and the fishing year (FY) is defined as March 1 through February 28/29.

In general, sea scallops are found in the northwest Atlantic Ocean from Cape Hatteras, North Carolina to the north shore of the Gulf of St. Lawrence along the continental shelf, typically on sand and gravel bottoms (Figure 2.1; Hart and Chute 2004, Hart 2006). However, scallops are not evenly distributed throughout this area and they often occur in aggregations called beds (Hart and Chute 2004). Sea scallops typically occur at depths ranging from 18 – 110 m, but may also occur in estuaries and embayments in waters as shallow as 2 m along the Maine coast and in Canada (Serchuk *et al.* 1982, Naidu and Anderson, 1984, Hart and Chute 2004). Although sea scallops are not common at depths greater than 110 m, some populations have been found as deep as 384 m (Merrill 1959, Hart and Chute 2004). The scallop fishery over Georges Bank and in the Mid-Atlantic is a deeper water fishery in comparison with the Gulf of Maine (NEFMC 2005). South of Cape Cod and on Georges Bank, scallops are typically found at depths between 25 and 200 m (Hart 2006), with commercial concentrations generally between 30 and 100 m (NMFS 2007c).

Figure 2.1: Distribution of sea scallop spawning beds off the northeast coast of North America.



Source: Hart and Chute (2004)

In terms of the U.S. Atlantic scallop fishery, it is generally described as occurring in three areas: the Gulf of Maine, Georges Bank, and the Mid-Atlantic[3]. The bulk of the Gulf of Maine landings are from relatively shallow waters (< 40 m) near-shore (NMFS 2007c). Gulf of Maine and southern New England landings account for a very small portion of the overall annual scallop landings. During 1997-2006, landings in the Gulf of Maine averaged 316 mt meats per year during 1997-2006, while landings in southern New England averaged 139 mt meats per year (NMFS 2007c). Georges Bank and the Mid-Atlantic are more productive in terms of scallop landings. During 1997-2006, landings from Georges Bank averaged 6032 mt per year; while landings from the Mid-Atlantic averaged 12,059 mt per year (NMFS 2007c).

[3] "Mid-Atlantic" as used here refers to the Mid-Atlantic Bight, which is defined as the area between Cape Hatteras, NC and Long Island, NY.

Many fishermen tend to consistently fish in the same areas and in areas close to their home and landing ports (NEFMC 2003). The location of scallop fishing effort is, therefore, often characterized based on area fished. Eight scallop resource areas have been identified. These are:

- Gulf of Maine (statistical areas 511-515);
- South Channel (statistical areas 521, 522, and 526);
- Georges Bank North (statistical areas 561 and 562)
- Georges Bank South (statistical area 525);
- Southern New England (statistical areas 537-539);
- New York Bight (statistical areas 611-616);
- Delmarva (statistical areas 621-623, 625-627); and,
- Virginia/North Carolina (statistical areas 631-638) (NEFMC 2000a) (Appendix A).

Among the eight areas, three were major production areas in FY 2003 (March 1, 2003 – February 29, 2004) that accounted for 90% of the total scallop landings. These three areas and their respective contribution to the scallop landings are: South Channel (11%), New York Bight (35%), and Delmarva (44%) (NMFS Preliminary Fisheries Statistics). In FY 2004, the New York Bight (36%) and Delmarva (45%), Georges Bank North (8%) and South Channel (7%) accounted for greater than 95% of the landings (NMFS Preliminary Fisheries Statistics). In FY 2005, New York Bight (42%), Delmarva (19%), South Channel (17%), and Georges Bank North (11%) accounted for approximately 90% of the landings (NMFS 2007d). In FY 2006, South Channel (30%), Georges Bank North (25%), New York Bight (22%), and Georges Bank South (12%) accounted for approximately 90% of the total scallop landings (NMFS 2007e).

The commercial scallop fishery operates year round (Hart 2006). Seasonal peaks in sea scallop landings are evident but must be considered in light of management measures that can influence when vessels fish. For example, part of Closed Area II over Georges Bank was reopened to scallop fishing for a portion of the 1999 scallop fishing year. The seasonality of the opening likely affected landings for those months when the closed area was accessible to scallop fishing. Similarly, in 2001 – 2003, the Hudson Canyon Access Area in the Mid-Atlantic was accessible to scallop fishers for a portion of each scallop year which may have influenced the trend in monthly landings.

The commercial scallop fishery has been a limited access fishery since Amendment 4 to the Atlantic Sea Scallop Fishery Management Plan (Scallop FMP) was developed and implemented in 1994 (NEFMC 2003). There were 363 limited access permits issued for the 2005 fishing year (NMFS 2006b) and 346 for the 2006 fishing year (memo from Ryan Silva to Ellen Keane, September 24, 2007). There are eight different types of scallop limited access permits (Table 4.2). Fishing effort for vessels with a limited access permit is managed through the use of crew size restrictions, gear restrictions, and Days at Sea (DAS) allocations. DAS and trip allocations for special access areas are varied by permit category. Depending on the type of limited access permit for which the vessel qualified, a scallop limited access vessel may have the option of fishing with dredge gear (permit categories 2, 3 and 4), with a small dredge (categories 5 and 6), or with trawl nets (categories 7, 8 and 9). Owners of limited access vessels assigned to either the part-time or occasional categories (permit categories 3 and 4, respectively) may opt to be placed one category higher (permit categories 5 and 6, respectively), provided they agree to comply with the small dredge program restrictions. Vessels in the small dredge program must: (1) fish exclusively with one dredge no more than 10.5 ft in width; (2) not have more than one dredge on board or in use; and (3) have no more than five people, including the operator, on board (NEFMC 2003).

Dredge gear is the primary gear type used in the scallop fishery. Typically, eighty to ninety percent of scallop landings are made by vessels that use two 15-foot dredges (NEFMC 2003). Another five percent of landings come from smaller vessels using a single dredge that is limited by regulation to no more than 10.5 feet in total width (NEFMC 2003). Approximately ten percent of landings are from vessels using trawl gear, mainly in the Mid-Atlantic region. Fishing by these vessels often occurs during the summer when other species (e.g., summer flounder) are not available (NEFMC 2003).

Although the scallop fishery is a limited access fishery, alternative measures are in place to allow vessels that did not qualify for a limited access permit to possess and land scallops as well. These are: (1) through possession of a general category permit or (2) in accordance with the exemption for vessels that have neither a limited access nor general category permit. Scallop possession and landing limits vary depending on which of these apply to the vessel. Framework Adjustment 17 of the Atlantic sea scallop FMP established two general category designations: a VMS general category permit and a non-VMS general category permit. Vessels with a VMS general category permit, and limited access vessels that have declared out of the DAS program, are prohibited from possessing or landing more than 400 pounds of shucked scallops or 50 U.S. bushels of in-shell scallops per trip, unless exempted under the state waters exemption program (70 FR 48860, August 22, 2005). Vessels without a scallop permit, vessels issued a non-VMS general category permit, and vessels issued a VMS general category permit that have declared out of the general scallop fishery, except those fishing exclusively in state waters, are prohibited from possessing and landing more than 40 pounds of scallop meat or 5 bushels of shell stock per trip. Vessels without a scallop permit are also prohibited from selling, bartering, or trading scallops harvested from Federal waters. The possession limit is the primary effort control mechanism for the general category vessels.

2.1.2 Interaction of Dredge Gear with Sea Turtles

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the ESA. The incidental take of endangered species may only legally be exempted by an incidental take statement or an incidental take permit issued pursuant to Section 7 or 10 of the ESA, respectively. Existing sea turtle conservation regulations at 50 CFR 223.206(d) exempt fishing activities and scientific research from the prohibition on takes of threatened sea turtles under certain conditions. The incidental take and mortality of sea turtles as a result of scallop dredging has been documented in the Atlantic sea scallop fishery from June through October. Interactions between sea turtles and scallop dredge gear could occur when the dredge is dragged along the bottom or in the water column.

NMFS currently has information documenting the take of sea turtles in sea scallop dredge gear, as observed from on deck. Sea turtles have been observed captured in the dredge bag as well as in the forward portion of the dredge and on top of the gear. See section 4.2.2.1 for more information on interactions in the sea scallop fishery.

2.1.3 Summary of Sea Turtle Bycatch from 1996 through May 2007

Until the 2001 fishing year, it was not believed that dredge gear employed in the Atlantic sea scallop fishery posed a threat to sea turtles and single takes of sea turtles observed in scallop dredges in 1996, 1997, and 1999 were considered anomalies (NMFS 2000, NMFS 2003b). The Hudson Canyon and Virginia Beach CAAs, which had been closed in April 1998 to allow juvenile scallops to recover, were reopened in May 2001 on a conditional basis. With this reopening, observer coverage in the CAAs was increased and, in 2003, this coverage was expanded to outside the CAAs. Concomitant with this increase in observer coverage, an increase in sea turtle takes was observed.

Three sea turtles were observed taken in the sea scallop dredge fishery from 1996 through 2000, one each in 1996, 1997, and 1999. For the initial Biological Opinion on the Scallop FMP and subsequent Biological Opinions, these sea turtles were considered unidentified hard-shelled sea turtles (NMFS 2003b, 2004b, 2004c), based on conversations with NEFSC staff (NMFS 2006b). In 2005, the records maintained by the NEFSC Fisheries Sampling Branch (FSB) were reexamined and indicated that the species identification of the 1996 turtle should be loggerhead sea turtle and the 1997 turtle should be green sea turtle based on written documentation provided by the observer and the observer's experience (memo from John Boreman to Patricia A. Kurkul, August 23, 2005).

From June through October 2001, 11 sea turtles were observed taken in the sea scallop dredge fishery operating in the reopened CAAs. Furthermore, a scallop dredge vessel fishing in the Hudson Canyon CAA reported that they had captured two additional turtles. Of the 11 observed takes in 2001[4], 6 were alive with no apparent injuries, 2 were alive and injured, 1 was fresh dead, and 2 were alive but their condition is unknown because the observer did not have sufficient opportunity to examine the turtle. Two of the 11 takes were identified as loggerheads, while the remaining nine animals were hard-shelled sea turtles that could not be positively identified (NEFSC, FSB, Observer Database).

In the 2002 fishing year, sea turtles were again captured in the sea scallop dredge fishery, despite substantially reduced vessel participation, suggesting that the turtles captured in 2001 were not an anomaly. Twenty-four turtles were captured in vessels operating from July through October. Five of the takes occurred while the observer was off-watch or on unobserved hauls. Two of the 24 takes were decomposed carcasses, and the cause of death could not be determined. The state of decomposition suggested that the deaths

[4] Note that prior to March 2007, the NEFSC FSB utilized a number of codes to record the condition of a live sea turtle including "alive, injured", "alive, not injured", and alive, condition unknown". In March 2007, the FSB converted the "alive condition" codes into a single pooled code called "alive, see comments."

occurred well before the turtles were captured in the dredge, and NMFS did not attribute these two deaths to the scallop dredge fishery. Of the 17 observed takes, 5 were alive with no apparent injuries, 5 were alive and injured, 6 were alive but their condition unknown and 1 was fresh dead. Fifteen of the 17 turtles were identified as loggerheads, while the remaining animals were hard-shelled turtles that could not be positively identified (NEFSC, FSB, Observer Database).

In the 2003 scallop fishing year, a total of 30 turtles (excluding the experimental fishery) were reported captured in scallop dredge gear. However, six of these were severely decomposed upon retrieval of the dredge. Given the state of decomposition, it was surmised that the six turtles did not die as a result of the particular scallop dredge tow in which they were retrieved and were not attributed to the scallop fishery. Two of the takes reported in 2003 occurred on unobserved hauls or while the observer was off-watch. The condition of the 22 turtles varied: 5 were alive with no apparent injuries, 1 was fresh dead, 12 were alive and injured, 1 was resuscitated, and 3 were alive yet condition unknown. Seventeen of the 22 interactions were with loggerhead sea turtles, and 5 were with hard-shelled turtles that could not be positively identified (NEFSC, FSB, Observer Database).

In the 2004 fishing year, there were 8 observed turtle takes in the Atlantic sea scallop dredge fishery. Two of the turtles were alive and uninjured, 5 were alive and injured, and 1 was fresh dead. All were identified as loggerhead sea turtles. An additional loggerhead turtle was reported captured during July (NEFSC, FSB, Observer Data). The takes were observed in the scallop dredge fishery during 1,695 observer days for the period of March 1, 2004 – October 31, 2004 compared to 22 turtle takes observed during 911 observer days for the same period in 2003 (NEFSC, FSB, Observer Program, pers. comm.).

In 2005, there were three sea turtles captured in the sea scallop dredge fishery, all of which occurred while the observer was off-watch. In August 2005, a Kemp's ridley was taken on southern Georges Bank, and the animal was reported as alive with no apparent injuries. The species identification was confirmed through photos. During October, there were two takes identified as loggerhead sea turtles. One animal was reported as alive, condition unknown. The other was reported as alive and injured. The capture and species identification for each of the 2005 takes was confirmed and recorded by the on-board observer in accordance with the NEFSC protocols after the turtle was brought on board.

In 2006, there was one observed take of a sea turtle. This sea turtle was reported as a loggerhead that was alive and injured (NEFSC, FSB, Observer Data). In 2007, subsequent to the implementation of the chain-mat requirements, there were five reported takes of sea turtles in the sea scallop dredge fishery. Two of these takes, both loggerheads, occurred while the observer was off-watch. Three takes, two loggerhead sea turtles and one Kemp's ridley, were observed while the observer was on-watch. The interaction with the Kemp's ridley was north of 41° 9.0' N. lat., while the remaining interactions were south of this line. The Kemp's ridley sea turtle was reported as fresh dead, while the loggerhead sea turtles were reported as alive and the observers' comments noted injuries (NEFSC, FSB, Observer Database) (see section 5.1.2.2 for additional details on these interactions).

In summary, during 1996 through December 2007, 65 sea turtles (excluding the experimental fishery) were observed taken in the scallop dredge fishery while an observer was on-watch: 1 each in 1996, 1997, and 1999, 11 in 2001, 17 in 2002, 22 in 2003, 8 in 2004, 1 in 2006, and 3 in 2007. Of the 65 takes of sea turtles, 46 were loggerhead sea turtles, 1 was a green sea turtle, 1 was a Kemp's ridley sea turtle and the remaining turtles were hard-shelled sea turtles that could not be positively identified. Of the 65 turtles, 5 were fresh dead upon retrieval or died on the vessel, 1 was alive but required resuscitation, 28 were alive but injured, 19 were alive with no apparent injuries, and 12 were listed as alive but condition unknown because the observer did not have sufficient opportunity to examine the turtle. During this same period, 16 additional sea turtles were reported taken while the observer was off-watch or on unobserved hauls. One of these takes was verified to be a Kemp's ridley sea turtle, while the remaining takes were loggerhead or unidentified hard-shelled sea turtles. Eight turtles, six of which were observed, were captured during the course of the experimental fishery to test the use of chain mats on scallop dredge gear (see below), and two turtles were reported captured during the pilot testing (DuPaul *et al.* 2004a).

Interactions with sea turtles have been observed in the fishery from late June to late October. The potential for interactions exists in May and November due to the overlap of sea turtles (Shoop and Kenney 1992; Braun-McNeill and Epperly 2002) and dredge fishing effort in the southern range of the fishery. NMFS does not anticipate any fishing south of Cape Hatteras, North Carolina due to a lack of scallop resource. Thus, the timing of these measures is based on Cape Hatteras as the lower boundary.

2.1.4 Bycatch Estimates

Estimates of sea turtle bycatch in the sea scallop dredge fishery have been completed for each year from 2001 through 2005. Estimates for 2001 and 2002 are available for the scallop dredge fishery that operated within the Hudson Canyon and Virginia Beach CAAs. From May to December in 2001 and 2002, observers sampled approximately 11% of the commercial dredge effort in the Hudson Canyon CAA. In the Virginia Beach CAA, observers sampled approximately 16% of the effort. No trips were observed in the Virginia Beach CAA during 2002 due to low fishing effort. The NEFSC estimated sea turtle bycatch in the sea scallop dredge fishery in the Hudson Canyon CAA to be 69 turtles in 2001 and 95 turtles in 2002. Estimated bycatch in the Virginia Beach CAA was 5 turtles in 2001 and 0 in 2002 (Murray 2004b). During 2001 and 2002, observer coverage outside the CAAs in the Mid-Atlantic was less than 1%. A total bycatch estimate outside of the closed areas in 2001 or 2002 was not extrapolated from observed takes within the CAAs due to scientific concerns that bycatch rates could differ between closed and open areas based on environmental factors, fishing practices, or gear characteristics (NMFS 2004b). In 2003, observer coverage in the Mid-Atlantic was expanded to allow bycatch to be estimated throughout the area (Murray 2004a).

From June 1 through November 30, 2003, observer coverage (% of dredge hours observed) was 2.7% in the entire Mid-Atlantic sea scallop dredge fishery from Long Island, NY to Cape Hatteras, NC (approximately 41° 09'N/71° 0.0'W to 35° 15'N/71° 0.0'W). There was higher coverage (9.7%) in the Hudson Canyon CAA compared to outside the CAA (1.4%). An assessment of sea turtle bycatch in the 2003 fishing year was completed by the NEFSC in October 2004. This assessment estimated 749 (CV = 0.28) loggerhead sea turtle captured in scallop dredge gear operating in the Mid-Atlantic from June 1 through November 30 (Murray 2004a). Out of the 749 interactions, 16% was estimated to have occurred in the Hudson Canyon CAA and 84% outside of this area (Murray 2004a).

Sea surface temperature was found to be a significant factor influencing sea turtle bycatch rates in the Mid-Atlantic CAAs (2001-2002) (Murray 2004b) and in the Mid-Atlantic from New York to North Carolina (2003) (Murray 2004a). A higher probability of sea turtle bycatch occurred in waters ≥ 19 ºC in 2001 and 2002 and in waters > 22 ºC in 2003. These differences may reflect inter-annual variations in sea surface temperature (SST) or turtle distributions, shifting patterns in the fishery, or the interaction between random samples and statistical models (Murray 2004a). Murray (2004a) concluded that there may be a minimal temperature threshold above which turtle bycatch is likely to occur, although this minimal temperature threshold is likely to fluctuate from year to year.

An assessment of the sea turtle bycatch in the 2004 fishing year was completed by the NEFSC in August 2005. This assessment estimated 180 loggerhead sea turtles (CV = 0.37) to have been captured in sea scallop dredge gear operating in the Mid-Atlantic from June 1 through November 30, 2004. During June – November 2004, bycatch rates were lower inside the Hudson Canyon CAA than outside this area. Both inside and outside the Hudson Canyon CAA, estimated turtle bycatch rates were influenced by depth zone fished, with highest rates in both areas occurring in the intermediary depth zone (54 – 70 m) (Murray 2005). In 2004, area and depth were selected as the factors with the best fit, but were not strong predictors (Murray 2005). In 2004, SST was not found to have a significant effect on estimated bycatch rates (Murray 2005). However, the small number of takes in 2004 relative to the number of dredge hours examined may have precluded the detection of significant effect (Murray 2005).

In 2005, the total estimated bycatch of loggerhead sea turtles in dredge gear was 0 (CV = 0.19; Murray 2007). However, as described above, two loggerhead sea turtles and one Kemp's ridley sea turtle were captured in this fishery while the observer was off-watch. There were insufficient data associated with the off-watch events to allow these interactions to be used in the estimation of turtle bycatch in the dredge fishery, and therefore, based on traditional sampling protocols that only on-watch takes be used in the analysis, the estimated bycatch was 0 (Murray 2007). However, NMFS recognizes that the actual number of takes was higher.

As described above, the NEFSC has attempted to identify a variable for predicting sea turtle bycatch in the dredge component of the scallop fishery (Murray 2004a, 2004b, 2005). Annual analyses of sea turtle bycatch from 2001-2005 suggest that sea surface temperature (SST), depth, time-of-day, and tow time affect estimated bycatch rates of sea turtles in sea scallop dredge gear (Murray 2004a, 2004b, 2005). However, the variable(s) associated with the highest bycatch rates changed from one year to another (e.g., SST, depth) or could not be further analyzed (e.g., time-of-day and tow time) because the information is not collected for the entire fishery (Murray 2004a, 2004b, 2005). Therefore, a consistent set of variables has not yet been found for forecasting sea turtle bycatch with scallop dredge gear.

2.1.5 Experimental Testing of Modified Gear

In response to the increase in observed takes, NMFS worked with the scallop fishing industry and Virginia Institute of Marine Science (VIMS) on the development and testing of a chain mat to keep sea turtles from being captured in the dredge bag. The chain mat consisted of evenly spaced "tickler" (horizontal) and vertical ("up-and-down" chains hung forward of the sweep between the cutting bar and the sweep. This is a modified rock chain arrangement and was constructed of lighter, but stronger chain. For 14- and 15- ft dredges, 11 vertical and 6 horizontal chains were used; for smaller dredges, 9- verticals were used (DuPaul *et al* 2004a).

The experimental fishery to test the chain mat gear was conducted from July 17, 2003 – October 9, 2004, with preliminary trials conducted in 2002 - 2003 (DuPaul *et al.* 2004a). The preliminary trials were conducted from October 2002 through January 2003 by five scallop vessels (letter from William DuPaul to Mary Colligan, August 21, 2007). NMFS-approved observers were not present during the preliminary trials (memo from Ellen Keane to The File, August 24, 2007). During these trials, each vessel fished one side with and one side without the modified dredge. DuPaul *et al.* (2004a) reported two sea turtle interactions during the preliminary trials. One turtle was reported captured in the unmodified (control) dredge in October. The second turtle was reported on the experimental chain mat, subsequently swimming away. The date of the second take is not known (DuPaul and Smolowitz 2003; DuPaul *et al.* 2004a; letter from William DuPaul to Mary Colligan, August 21, 2007; memo from Ellen Keane to The File, August 24, 2007).

Twelve different vessels participated in the 2003 – 2004 experimental fishery of the chain mat. In each tow, the vessels fished with two sea scallop dredges, one unmodified on one side of the vessel and the other modified with the chain mat on the other side of the vessel (DuPaul *et al.* 2004a). The trials were performed with dredges measuring 11-, 14- and 15-ft wide. In total, side-by-side testing was conducted on 22 trips (Table 2.1), encompassing 277 fishing days and 3,248 tows (of which 2,823 were observed; DuPaul *et al.* 2004a). Eight turtle interactions occurred (6 of which were observed by NMFS-approved observers), all with the unmodified scallop dredge (DuPaul *et al.* 2004a). Of the 8 sea turtles caught, 3 were alive with no apparent injuries, 3 were alive released with injuries, 1 was killed when the dredge frame fell on the turtle, and 1 was killed prior to coming aboard (Table 2.2). The 6 observed interactions were with loggerhead sea turtles.

One of the unobserved interactions was reported by the fisherman as a loggerhead sea turtle. The second unobserved interaction was reported by the fisherman as a leatherback. The principal investigators interviewed the captain reporting the leatherback and determined, based on the captain's description of the turtle, that it was likely to have been a leatherback. Thus, the turtle was reported as such in the final report of the experiment (DuPaul *et al.* 2004a). Based on information collected by the principal investigators from an interview with the vessel captain, the turtle was described as being very large (estimated by the captain as 5 – 5.5 feet in length, and requiring a rope sling to get the turtle over the rail of the boat and back into the water).

Table 2-1: Trip length and number of tows for the experimental fishery on the chain mat configuration.

Trip Number	Date Departed	Date Returned	Trip Length	Number of Tows
1	7/11/2003	7/21/2003	11	125
2	7/17/2003	7/31/2003	15	220
3	7/28/2003	8/10/2003	14	125
4	7/31/2003	8/12/2003	13	154
5	8/5/2003	8/16/2003	12	169
6	8/15/2003	8/28/2003	14	101
7	8/24/2003	9/5/2003	13	168
8	8/26/2003	9/8/2003	14	210
9	8/27/2003	9/4/2003	9	93
10	9/10/2003	9/25/2003	16	142
11	9/6/2003	9/18/2003	13	181
12	9/20/2003	10/1/2003	12	151
13	10/9/2003	10/21/2003	13	173
14	9/26/2003	10/16/2003	21	230
15*	9/28/2003	10/6/2003	8	107
16	10/24/2003	11/12/2003	20	223
17	10/16/2004	10/27/2004	11	147
18	6/22/2004	6/30/2004	9	61
19	7/7/2004	7/16/2004	10	107
20	7/12/2004	7/19/2004	8	78
21	8/16/2004	8/28/2004	13	153
22	10/1/2004	10/9/2004	8	130
Total			**277**	**3248**

* indicates trip was not part of program, but data included in final report on the experimental fishery.
Source: DuPaul et al. 2004a

Table 2-2: Interactions with sea turtles during the experimental fishery. All takes occurrred with the unmodified dredge.

Month/Year	Condition	Depth (fathoms)	Tow Time (hrs)	Dredge Size (ft)	Tow Speed (kts)
Jul-03	Fresh dead	24	1.33	11	4.0
Aug-03	Alive, injured	28	1.30	15	4.3
Aug-03	Alive, injured	27	1.17	15	4.3
Sep-03	Alive, injured	27	1.03	15	4.0
Sep-03	Alive, uninjured	27	1.15	15	4.0
Sep-03	Fresh dead	23	1.18	15	4.3
Oct-03	Alive, uninjured	34	1.82	14	5.0
Oct-04	Alive, uninjured	30	1.16	14	4.1

Source: DuPaul *et al.* 2004a

The NEFSC's general protocol for confirmation of at-sea species identification requires that the species be considered as unknown unless either the observer is experienced in sea turtle identification and has confidence in the identification, or the observer is inexperienced and has provided supporting information (i.e., photos, tissue samples). For both of these unobserved takes, the NEFSC is considering the species identification to be "unknown turtle species". As far as the NEFSC is aware, the fishermen reporting the take of the leatherback and the take of the loggerhead have not been trained nor are they experienced in identifying sea turtle species. No supporting materials, such as photos or tissue samples, have been provided. Therefore, based on the confirmation protocol for at-sea species identification, the NEFSC considers the species identification of both the unobserved takes to be "unknown turtle species".

During the experimental fishery, scallop catches were highly variable from vessel to vessel and trip to trip, with differences between the unmodified and the modified dredge ranging from -31% to 7% caught with the modified dredge. On average, the chain mat modified dredge caught 6.71% fewer scallops on average than the unmodified dredge (DuPaul *et al.* 2004a). The study concluded that the chain mats can be effective in preventing the capture of sea turtles in the dredge bag without substantial concomitant reductions in the capture of the target species (DuPaul *et al.* 2004a).

There have been three recent projects that have used video to try to document sea turtle behavior and interactions with sea scallop dredges. First, researchers used video to during the 2003-2004 field trials of the chain-mat modified dredge. During this study, one trip was designated as a research camera cruise where underwater video was taken of the modified dredge during normal fishing operations (DuPaul *et al*. 2004a). In addition, video was used on two other cruises. No sea turtles were documented by video on the three cruises that utilized cameras (memo from Ellen Keane to The File, February 24, 2006; R. Smolowitz, pers. comm.).

Second, in 2004 and 2005, the NEFSC worked with researchers and commercial fishermen to conduct approximately 80 hours of videotaping of dredges as they are fished. These studies were designed to observe sea turtle behavior around sea scallop dredge gear. In 2004, 7 hours of video over 16 tows was taken on a 3-day trip. During this project, video techniques and tools were developed to document the behavior of sea turtles. However, no sea turtles were recorded during the 3-day trip (Smolowitz *et al.* 2005). In 2005, video was collected over 2 trips, one in August and one in September (Smolowitz and Weeks 2006). On the first trip, approximately 50 hours of video were collected using two cameras; while approximately 30 hours were collected on the second trip. This video has been reviewed and no sea turtles were documented (Smolowitz and Weeks 2006). Further video work will be conducted in conjunction with other projects.

Third, in 2005 and 2006, NMFS worked with scallop industry participants to test a dredge with a modified cutting bar and bail designed to minimize impacts to turtles that may be encountered by the dredge on the bottom. In 2005, a standard New Bedford style dredge was used as a control, and both dredges were equipped with the chain mat configuration. One dredge was modified to increase the probability of a sea turtle encountering the gear passing up and over the gear rather than under the cutting bar. The project used turtle carcasses and model turtles to simulate a worst case scenario of a dredge overtaking a sea turtle lying motionless on the bottom (NMFS 2005b). During the 2005 study, the turtle carcasses were observed lodged in front of the cutting bar and pushed along, eventually going under the cutting bar and getting caught on the chain mat (NMFS 2005b). The model turtle was deployed on one tow with the modified dredge. During this tow, the model turtle was deflected over the bail of the modified dredge (NMFS 2005b), indicating that this type of modification might be effective at reducing the severity of injury during encounters on the bottom. It is important to note that the project was limited in that behavioral responses of a live turtle encountering a dredge could not be assessed.

Based on the results of the 2005 field trials, the dredge design was further modified to increase the probability of sea turtles going over the frame rather than under the cutting bar (Milliken *et al.* 2007). As in 2005, the purpose of this study was not to evaluate the chain mat, but the dredge was configured with a chain mat. The project again used turtle carcasses and turtle models to simulate the "worst case scenario" of a dredge overtaking and hitting a motionless sea turtle on the bottom (Milliken *et al*. 2007). One successful trial was completed with the model turtle and twelve successful trials were completed with the carcasses. It should be noted that the same carcasses were used in multiple trials. The model turtle became trapped under the bail by its rigid flippers. In eight of the trials, the carcasses went over the dredge (n=7) or were deflected to the side (n=1). In three of the trials, the carcasses were held from going over the dredge by the bail. In one trial, the carcass was outfitted with weights that caught on the frame of the dredge. In addition to the weights, the front flippers may have been caught on the dredge frame (Milliken *et al*. 2007). During the trials, no turtle carcasses were observed to go under the dredge (Milliken *et al*. 2007), and therefore, no turtle carcasses would have interacted with the chains. As with the previous study, it is important to note that the project was limited in that behavioral responses of a live turtle encountering a dredge could not be assessed. Research on the catch retention of scallops for this dredge design was conducted in the commercial fishery in 2006 and 2007 under the RSA program. Vessels fished one side with the modified dredge and the other with unmodified (control) dredge. During these studies, one sea turtle was reported captured in the unmodified (control) dredge. The sea turtle was reported by a crew member as wedged between two of the bail bars and against the pressure plate. The turtle struck the side of the vessel as the gear was hauled, dropping from the gear before it was brought aboard. The turtle was reported as alive and injured (Smolowitz *et al.*, 2008). Currently, there is not sufficient information to determine whether the tested dredge frame modifications would minimize the severity of interactions that would occur and further testing is necessary to assess the benefits to sea turtles from such a modification. This research is on-going.

2.1.6 Regulatory Actions

ESA Section 7

The first Biological Opinion for the Scallop FMP was completed on February 24, 2003. The Biological Opinion concluded that the continued operation of the scallop fishery, including measures as proposed for Framework Adjustment 15 to the Scallop FMP, may adversely affect loggerhead, leatherback, Kemp's ridley and green sea turtles, but was not expected to result in jeopardy for any of these species (NMFS 2003b). ESA Section 7 consultation was subsequently reinitiated on November 21, 2003, for two reasons. First, new information on sea turtle takes revealed that the continued authorization of the Atlantic sea scallop fishery may affect listed species or critical habitat in a manner or to an extent not previously considered (the NEFSC completed an estimate of bycatch for the CAAs) and, second, the Agency action was proposed to be modified by Amendment 10 to the Scallop FMP and emergency measures in a manner that caused an effect to the listed species or critical habitat not considered in the previous Biological Opinion. This second Biological Opinion concluded, on February 23, 2004, that the continued operation of the scallop fishery, including implementation of Amendment 10 and the emergency measures, may adversely affect loggerhead, leatherback, Kemp's ridley and green sea turtles, but was not expected to result in jeopardy for any of these species (NMFS 2004b). NMFS reinitiated Section 7 consultation on September 3, 2004, following receipt from the NEFSC of the 2003 sea turtle bycatch estimate for the Mid-Atlantic sea scallop dredge fishery. A third Biological Opinion for the scallop fishery was completed December 15, 2004 and concluded that the continued implementation of the Scallop FMP may adversely affect, but is not likely to jeopardize the continued existence of loggerhead and leatherback sea turtles (NMFS 2004c).

In the December 2004 Biological Opinion, NMFS determined that requiring modification of Atlantic sea scallop dredge gear at times and in areas where sea turtle interactions are likely to occur was a Reasonable and Prudent Measure (RPM) necessary or appropriate to minimize impact of the incidental take of sea turtles. The August 2006 requirement for chain-mat modified dredges in the Mid-Atlantic sea scallop fishery was intended to comply with that RPM. Consultation was again reinitiated on November 1, 2005 (memo from Patricia A. Kurkul to The Record, November 1, 2005) to consider new information on the observed take of sea turtles in the Atlantic sea scallop fishery. The consultation (September 2006) concluded that the continued authorization of the Scallop FMP may adversely affect but is not likely to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, and green sea turtles (NMFS 2006b).

Subsequently, the NEFSC completed an estimate of the take of sea turtles in the sea scallop trawl fishery during the 2004 and 2005 fishing years (Murray 2007). This represents new information regarding the capture of sea turtles in scallop trawl gear that reveals an effect of the action that may affect listed sea turtles in a manner or to an extent not previously considered. Therefore, formal consultation was reinitiated on this fishery to reconsider the effects of the Atlantic sea scallop fishery on ESA-listed sea turtles (memo from Patricia A. Kurkul to The Record, April 3, 2007). Consultation was concluded in March 2008. In the March 2008 Biological Opinion, NMFS anticipates the take of up to 929 loggerhead sea turtles biennially in scallop dredge gear as a result of the continued operation of the fishery (NMFS 2008). The use of the chain mat-modified scallop dredge gear is not expected to reduce the number of sea turtles interactions that occur (see Environmental Impact section). The gear modification is, however, expected to reduce the likelihood that a turtle interaction with scallop dredge gear will result in serious injury or mortality given that the use of chain mats on scallop dredge gear will: (1) reduce the likelihood that turtles that encounter the gear on the bottom will enter the dredge bag and be at further risk of injury and death, and (2) reduce the likelihood that turtles that encounter the gear in the water column will enter the dredge bag and be subsequently injured or killed. However, NMFS cannot quantify the reduction in mortality rate. Therefore, NMFS is using the mortality rates for loggerhead sea turtles captured in the scallop dredge fishery in 2003, prior to the use of chain mats (NMFS 2008). NMFS anticipates that up to, but most likely less than, 595 of the anticipated 929 loggerhead sea turtles will suffer injuries to the extent that they will die, cease to function in other respects (eventually leading to death), or fail to reproduce. The remaining 334 loggerhead turtles that are taken by scallop dredge gear biennially and released alive are not expected to suffer any ill effects as a result of capture and there should be no negative impact to the species from the capture of these 334 turtles. In sea scallop trawl gear, NMFS anticipates the take of up to 154 loggerhead sea turtles annually. Up to 20 of these sea turtles are expected to be immediately killed or seriously injured to the extent that they will die or fail to reproduce. In addition, NMFS anticipates the annual take of up to 1 leatherback sea turtle (non-lethal), 2 Kemp's ridley sea turtles (lethal or non-lethal), and 2 green sea turtles (lethal or non-lethal) in scallop dredge gear and the annual take of up to 1 leatherback (lethal or non-lethal), 1 Kemp's ridley (lethal or non-lethal) and 1 green sea turtle (lethal or non-lethal) in scallop trawl gear (NMFS 2008). The chain-mat modification will provide ancillary benefits to these species by preventing capture in the dredge bag, and subsequent injury and mortality.

Chain-mat modified dredge

On June 17, 2004, the Fisheries Survival Fund (FSF) and the Garden State Seafood Association (GSSA) submitted a petition requesting that NMFS develop and implement an emergency rule pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requiring the installation of the chain mesh configuration (as tested in the previously mentioned experimental fishery) in dredge gear and the installation of effective turtle excluder devices in trawl gear for sea scallop vessels fishing south of Long Island and north of Cape Hatteras from May 1 through October 15. On July 7, 2004, NMFS published a Notice of Receipt of the petition in the Federal Register and invited public comment for 30 days (69 FR 40850). Some industry representatives submitted comments in support of the petition. One commenter opposed the petition as the nature of the interaction between sea turtles and the chain mat on the bottom is unknown. A response to the petition was published in the Federal Register on November 2, 2004 (69 FR 63498). In its response, NMFS determined that it would not undertake an emergency rulemaking as requested by the petitioners because the circumstances outlined in the petition did not justify an immediate need for an MSFCMA emergency rule and the MSFCMA is not the appropriate authority for adequately addressing the incidental capture of sea turtles in scallop fishing gear (69 FR 63498, November 2, 2004). NMFS announced that it would conduct rulemaking under the authority of the ESA to enact measures to address incidental sea turtle takes in the Atlantic sea scallop fishery (69 FR 63498, November 2, 2004).

On August 25, 2006, NMFS issued a final rule to require the use of chain mats on dredges in the Atlantic sea scallop fishery in order to help protect and conserve sea turtles (71 FR 50361). The specific purpose of requiring the use of a chain mat is to keep sea turtles from being captured in the dredge bag and to prevent the injury and mortality associated with such capture. The chain mat regulation became effective on September 25, 2006. Shortly after the rule's effective date, NMFS became aware of a discrepancy between the two options allowed for configuring the chain mat. This discrepancy was corrected when NMFS issued an emergency rule (71 FR 66466, November 15, 2006) that removed one of the options for configuring the gear. Under the original chain mat regulation, the vessel was required to modify the dredges using either a defined number of evenly spaced horizontal and vertical chains based on dredge width (Table 2-3) or to configure the chains such that the length of each side of the squares or rectangles formed by the intersecting chain was less than or equal to 14 inches.

Table 2-3: Number of chains specified by dredge width in the August 2006 chain-mat regulation

Frame width of dredge	Number of verticals	Number of horizontals (ticklers)
>13 ft	11	6
11 to 13 ft	9	5
10 to <11 ft	7	4
<10 ft	5	3

The spacing of the chains based on dredge width was intended to be based on the experimental fishery (July 17, 2003 –October 9, 2004) to test the chain mat gear. During the experimental fishery, 11 vertical and 6 horizontal chains were used for the 14- and 15-foot dredges; while 9 vertical chains were used for the 11-foot dredge (DuPaul *et al.* 2004). As indicated in the final report, the number of chains in and of itself is not what drove the configuration tested. Rather, it was the target size of the openings that drove the number of chains to be used, and thus, the overall configuration. The openings were designed to prevent sea turtles of greater than 24 inches from entering the dredge bag (DuPaul *et al.* 2004). Other criteria were designed to minimize impacts from the gear and the wear of the gear (DuPaul *et al.* 2004). Although the size of the openings tested is not included in the final report on the experiment, the available information supports an opening of 14 inches or less in the chain-mat configured gear. During the pilot study in 2002, the chain mat was rigged so that a grid of 12-inch squares was formed (DuPaul and Smolowitz 2003); while the number of chains used during the experimental fishery (2003-2004), spaced on a normal sweep arrangement, should result in approximately a 12- to13-inch square pattern (DuPaul *et al.* 2004a Appendix 2: FSF/SeaGrant placard titled "Rigging of Turtle Chains"). The experimental fishery to test the chain-mat modified gear showed that the use of a chain mat with openings of the size tested prevented sea turtles from entering the dredge bag and incurring injuries that resulted from such capture (DuPaul *et al.* 2004a).

Within a week of the effective date, NMFS became aware that using the number of chains specified by dredge width may result in greater variability in the openings between the chains than anticipated with spacing of 16.5 inches or greater, in certain cases. Depending on the dredge width and the configuration of the dredge, the openings may be greater than 14 inches (71 FR 66466, November 15, 2006). Both configurations - the number of chains specified by dredge width and the spacing of 14 inches or less - were expected to result in openings of 14 inches per side or less; therefore, NMFS proceeded with rulemaking to correct the discrepancy. The November 2006 emergency rule corrected the configuration to ensure that sea turtles are protected to the extent expected by the August 2006 final rule (71 FR 66466, November 15, 2006).

This rule is currently in place and does not have an expiration date. The existing regulation requires that during the period of May 1 through November 30 each year, any vessel with a sea scallop dredge and required to have a Federal Atlantic sea scallop fishery permit, regardless of dredge size or vessel permit category, present in waters south of 41º 9.0'North latitude have on each dredge a chain mat. Under the existing regulations, the chain mat must be composed of horizontal ("tickler") and vertical chains configured such that the length of each side of the square or rectangle formed by the intersecting chain is less than or equal to 14 inches. In addition, under the existing requirements, any vessel that harvests sea scallops in or from these waters and that is required to have a Federal Atlantic sea scallop fishery permit must have the chain mat configuration installed on all dredges for the duration of the trip (71 FR 66466, November 15, 2006).

2.2 Conclusion

The best available scientific data show that sea turtle interactions with the scallop dredge fishery have been observed in the Atlantic during the months of June through October (NEFSC, FSB, Observer Database) and the take of sea turtles potentially may occur from May through November given the overlap of the sea turtle distribution (Shoop and Kenney 1992; Braun-McNeill and Epperly 2002) and Atlantic sea scallop fishery effort (NEFMC 2003, 2005). The experimental fishery shows that the modification of the scallop dredge with the addition of chain mats will prevent the capture of sea turtles in the dredge bag, as well as any ensuing injuries as a result of being caught in the dredge bag (e.g., crushing in the dredge bag, crushing on deck, etc.). Based the results of the experimental fishery, as well as the identification and size of sea turtles observed captured in this fishery as described in section 5.1.2.2, this modification is expected to prevent most captures of sea turtles in the dredge bag. NMFS recognizes that that on occasion, sea turtles that interact with the gear may be small enough to pass between the chains, and that this interaction may result in the capture of the sea turtle in the bag. In 2007, there were two sea turtles documented in the dredge bag. However, in both cases, some of the openings were likely greater than 14 inches, allowing the sea turtle to pass through the chains into the dredge bag (see section 5.1.2.2 for a complete description of these takes). NMFS expects the capture of sea turtles in the bag of a chain-mat equipped dredge to be a rare occurrence based on the size and identification of the sea turtles observed taken in the sea scallop dredge fishery. As such, to prevent the capture of sea turtles (leading to the potential subsequent injury or death of the turtle) in the scallop dredge bag, NMFS currently requires all vessels with a Federal Atlantic sea scallop fishery permit using Atlantic sea scallop dredge gear south of 41º 9.0' N. lat. from the shoreline to the outer boundary of the EEZ to employ chain mats from May 1 through November 30. Under this action, NMFS would clarify the regulatory text of the chain mat regulation as described above, add a transiting provision, and further correct the procedural error in the original rulemaking.

3.0 ALTERNATIVES

NMFS is considering six alternatives. The first three alternatives considered are within the scope of NMFS' authority, are technically feasible, and meet the purpose and need of this action. Thus, these alternatives are carried forward for further analysis. The remaining three alternatives (Alternatives 2 through 4) are rejected from further analysis for the reasons described below. NMFS utilized all available scientific data to develop the alternatives described below.

3.1 No Action Alternative - Current Regulatory Requirements

The no action alternative would leave in place the existing requirements related to use a chain mat-modified dredge in the Atlantic sea scallop dredge fishery. Specifically, during the time period of May 1 through November 30 each year, any vessel with a sea scallop dredge and required to have a Federal Atlantic sea scallop fishery permit, regardless of dredge size or vessel permit category, **present** in waters south of 41º 9.0' N. latitude, from the shoreline to the outer boundary of the Exclusive Economic Zone must have on each dredge a chain mat described as follows. The chain mat must be composed of horizontal ("tickler") chains and vertical chains that are configured such that the length of each side of the square or rectangle formed by the intersecting chains is less than or equal to 14 inches (35.5 cm). The chains must be connected to each other with a shackle or link at each intersection point. The measurement must be taken along the chain, with the chain held taut, and include one shackle or link at the intersection point and all links in the chain up to, but excluding, the shackle or link at the other intersection point. In addition, any vessel that **harvests** sea scallops in or from the waters described above and that is required to have a Federal Atlantic sea scallop fishery permit must have the chain mat configuration installed on all dredges for the duration of the trip

3.2 Preferred Alternative (PA) – Modification of Current Regulatory Requirements

The preferred alternative would re-propose the existing requirements related to using a chain-mat modified dredge in the Atlantic sea scallop dredge fishery with three changes to the current regulatory text. The first change to the regulatory language would modify the text in paragraph (d)(11)(i) that states "…that are configured such that the length of each side of the square or rectangle formed by the intersecting chains is less than or equal to 14 inches…" The intersection of the horizontal and vertical chains and the sweep may, in some cases, result in openings with three sides rather than four. To clarify that all sides of the openings, regardless of whether they are 3- or 4-sided, must be less than or equal to 14 inches, NMFS would modify this text to read "The chain mat must be composed of horizontal ("tickler") and vertical ("up-and-down") chains configured such that the opening created by the intersecting chains, including the sweep, has no more than 4 sides. Each side of the opening created by the intersecting chains must be less than or equal to 14 inches." The second change would modify the text in paragraph (d)(11)(ii) of 50 CFR 223.206 that reads, "Any **vessel that harvests sea scallops in or from** the waters..." to read, "Any **vessel that enters** the waters...." This revision would clarify that once a vessel has entered the waters described, it must comply with the requirement to have the chain mat affixed to the dredge for the duration of the trip regardless of whether the vessel is still in those waters. The third change would revise the text in paragraph (d)(11)(i) that reads, "…any vessel…**present in** waters…" to "…any vessel…**that enters** waters." This change would be made so that this subparagraph uses the same terminology as (d)(11)(ii). The regulations apply to all vessels required to have a Federal Atlantic sea scallop fishery permit and with sea scallop dredge gear entering waters south of 41° 9.0' N. latitude from May 1 through November 30 each year.

In addition to clarifying the regulatory text, this alternative would add a transiting provision to the regulations requiring the use of a chain-mat modified dredge in the Atlantic sea scallop dredge fishery. Vessels would be exempted from the requirements described under this alternative provided that the vessel has no scallops on-board and that the gear is stowed and not available for immediate use. Gear that is not available for immediate use is gear that is stowed in conformance with the methods described at 50 CFR 648.23(b)(2). For scallop dredges, the gear must conform to one of the following: (1) The towing wire is detached from the scallop dredge, the towing wire is completely reeled up onto the winch, the dredge is secured and the dredge or the winch is covered so that it is rendered unusable for fishing; or (2) The towing wire is detached from the dredge and attached to a bright-colored poly ball no less than 24 inches in diameter, with the towing wire left in its normal operating position (through the various blocks) and either is wound back to the first block (in the gallows) or is suspended at the end of the lifting block where its retrieval does not present a hazard to the crew and where it is readily visible from above.

3.3 Alternative 1 – No Chain Mat Requirement

This alternative would remove all existing requirements to use a chain-mat modified dredge in the Atlantic sea scallop dredge fishery. Atlantic sea scallop vessels would not be required to modify their gear as described in the current sea scallop conservation regulations. This alternative is necessary to provide a comparative analysis of the alternatives and is the same as the No Action alternative considered in the analysis completed for the original chain mat regulation.

3.4 Alternative Considered, but Rejected from Further Analysis

3.4.1 Alternative 2 – Reconsideration of the Alternatives Considered in the Original Rulemaking

The final rule to require chain mats in the Atlantic sea scallop dredge fishery published on August 25, 2006 and became effective on September 25, 2006. The EA/Regulatory Impact Review/Regulatory Flexibility Act Analysis (EA/RIR) "Sea Turtle Conservation Measures for the Mid-Atlantic Sea Scallop Dredge Fishery" that accompanied this rule considered five alternatives (NMFS 2006a). In the EA/RIR, NMFS analyzed the following: (1) requiring the chain mat modification on all scallop dredges in the Mid-Atlantic from May 1 through November 30 each year (preferred alternative), (2) requiring the chain mat modification on all scallop dredges in the Mid-Atlantic from May 1 through October 15 each year, (3) requiring the chain mat modification on all large scallop dredges in the Mid-Atlantic from May 1 through November 30 each year, (4) closure of the Mid-Atlantic to scallop dredge fishing from May 1 through November 30 each year, and (5) the no action alternative. The EA/RIR accompanied the proposed rule through its clearance process and was available to the public for its consideration. The EA/RIR also accompanied the final rule through each stage of the NMFS' review and clearance process.

NMFS considered including and re-evaluating these five alternatives in this EA, but rejected these from further analysis. As described in the August 2006 final rule, NMFS selected to require the chain-mat modification from May 1 through November 30 in a particular area because this alternative provided, with the exception of a seasonal closure, the most protection to sea turtles (71 FR 50361, August 25, 2006). In the original rulemaking, NMFS rejected the alternative with an October 15 end date because this option would have left sea turtles vulnerable to capture in the dredge bag from October 15 through November 30 (71 FR 50361, August 25, 2006), a period when sea turtle distribution (Shoop and Kenney 1992; Braun-McNeill and Epperly 2002) and sea scallop fishing overlap in the southern part of the fishery (NEFMC 2003, 2005). NMFS rejected the use of chain mats on all large sea scallop dredges south of 41º 9.0' N. latitude because this alternative would leave sea turtles vulnerable to capture in the dredge bag of smaller dredges operating in this area. Sea turtles have been documented taken in this smaller dredge gear (71 FR 50361, August 25, 2006). NMFS rejected the seasonal closure because of the uncertainty of the extent of the area in which interactions are occurring, the broad extent of the closure, and the potential displacement of effort to other fishing areas (71 FR 50361, August 25, 2006).

NMFS is not reconsidering all these alternatives at this time because they do not meet the purpose and need of this action. Reconsidering these alternatives would not clarify the current regulatory text. Reconsideration of all the alternatives is not necessary to address the procedural error as the FONSI is only relevant to the preferred alternative. The impacts resulting from the preferred alternative, the requirement to use chain mats in the Atlantic sea scallop fishery from May 1 through November 30, will be reconsidered in this action under the Preferred and No Action Alternatives.

3.4.2 Alternative 3 – Allow a second option for configuring the gear

Under this alternative, NMFS would provide fishermen with two options for configuring the gear. Under the first option, fishermen would be required to use a specified number of vertical and horizontal chains depending on the width of the dredge. The table that was included in the original chain mat regulation would be modified to ensure that openings of 14 inches or less per a side are achieved when configuring the gear according to a specified number of chains. The second option would require that the gear be configured such that no opening was greater than 14 inches (35.5 cm) on a side. NMFS investigated the feasibility of creating a table specifying the number of vertical and horizontal chains that would achieve the desired openings. The horizontal spacing that would be created between the vertical chains can be estimated from the dredge width and the width of the chains used in the chain-mat modified gear. The size of the opening would be affected by variations in the chain used, the fishing gear and the rigging of the chain mat. However, it is possible that the correct number of chains to achieve the desired opening could be specified for the vertical chains. NMFS does not have sufficient information on the distance between the cutting bar and the sweep to ensure that the vertical spacing between the horizontal chains would achieve the desired spacing for all dredges. NMFS has limited information on the distance between the cutting bar and the sweep. This distance between the cutting bar and the sweep is known to vary by up to 1.7 ft for certain dredge widths (NMFS 2007f). Given the level of variability in dredge sizes and the limited information available, NMFS does not believe that it is possible at this time to create a table that would ensure that the desired opening is achieved. Therefore, this alternative was rejected from further analysis.

3.4.3 Alternative 4 – Establish an eastern boundary between 70° W. long. and 71° 40' W long.

Under this alternative, NMFS would modify the spatial extent of the regulation. All other requirements would remain the same. This alternative would establish an eastern boundary at a given longitude line between 70° W. long. and 71° 40' W long. Currently, the eastern boundary is the EEZ. During the original chain mat rulemaking, NMFS specifically solicited comments on defining the eastern boundary of the regulation at 70° 20' W long., the western edge of the Nantucket Lightship Closed Area (70 FR 30666, May 27, 2005). Four comments were received. One commenter supported an eastern boundary at 70° 20' W. longitude, one supported keeping the spatial extent as proposed (i.e., the EEZ), one stated that the spatial extent was too broad, and one urged caution when choosing a longitude closer to shore. Additionally, this commenter felt that the northern boundary did not adequately assess the potential for interactions on Georges Bank and in the Gulf of Maine (71 FR 50361, August 25, 2006).

Sea turtle species that are found off the northeastern coast of the United States north of Cape Hatteras, North Carolina are, in order of frequency of occurrence, loggerhead, leatherback, Kemp's ridley, and green sea turtles (Shoop, 1980; Shoop and Kenney, 1992). The distributions of all four species overlap in part with the distribution of scallop dredge gear. Loggerhead, leatherback, Kemp's ridley, and green sea turtles occur seasonally in southern New England and mid-Atlantic continental shelf waters north of Hatteras. The occurrence of these species in these waters is temperature dependent (Keinath *et al.* 1987; Shoop and Kenney 1992; Musick and Limpus 1997; Morreale and Standora 1998, 2005; Braun-McNeill and Epperly 2002; James *et al.* 2005b). In general, turtles move up the coast from southern wintering areas as water temperatures warm in the spring. The trend is reversed in the fall as water temperatures cool. By December, turtles have passed Cape Hatteras, returning to more southern waters for the winter (Keinath *et al.* 1987; Shoop and Kenney 1992; Musick and Limpus 1997; Morreale and Standora 1998, 2005; Braun-McNeill and Epperly 2002; James *et al.* 2005b). Hard-shelled species are typically observed as far north as Cape Cod whereas the more cold-tolerant leatherbacks are observed in more northern Gulf of Maine waters in the summer and fall (Shoop and Kenney 1992; STSSN database). Extensive survey effort of the continental shelf from Cape Hatteras, North Carolina to Nova Scotia, Canada in the 1980s (CeTAP 1982) revealed that loggerheads were observed in waters from the beach to depths of up to 4481 m. However, they were, in general, more commonly found in waters from 22-49 m deep (Shoop and Kenney 1992). The overall depth range of leatherback sightings in the CeTAP study (1982) was comparable to loggerheads. Leatherbacks were sighted in water depths ranging from 1 – 4151 m (Shoop and Kenney 1992). However, leatherback depth distribution was broader than that of loggerheads with 84.4% of the sightings in waters less than 180 m (Shoop and Kenney 1992). By comparison, 84.5% of loggerhead sightings were in waters less than 80 m (Shoop and Kenney 1992). The CeTAP study did not include Kemp's ridley and green turtle sightings given the difficulty of sighting these smaller species.

As described above, 65 turtles have been observed taken in the sea scallop dredge fishery from 1996 through December 2007. Prior to 2005, no sea turtle takes had been observed in the sea scallop dredge fishery outside the mid-Atlantic region. In the 1999 and 2000 scallop fishing years, relatively high levels of observer coverage (22% - 51%) occurred in portions of the Georges Bank Multispecies Closed Areas that were conditionally opened to scallop fishing (memo from M. Sissenwine to P. Howard, November 1, 2000). Despite this high level of observer coverage and operation of scallop dredge vessels in the area during June - October, no sea turtles were observed captured in scallop dredge gear in these years. From 2001 through 2004, observer coverage was low in the Gulf of Maine (< 1 percent in 2001, 2002, and 2004) and Georges Bank regions (<1 percent in 2001, 2002, and 2003; < 2 percent from September through November 2004 with most of the coverage occurring in November) (Murray 2004a, 2005). In August 2005, a Kemp's ridley sea turtle was taken at approximately 40º 58' N. lat./67º 16' W. long. by a dredge vessel operating on the southern edge of Georges Bank demonstrating that takes in this area are possible. It should be noted that this take was south of the current northern boundary of the regulation. A second Kemp's ridley was observed captured in September 2007 just north of the line at approximately 41º 24' N. lat./68º 31' W. long.

The NEFSC FSB has documented interactions between sea turtles and other commercial fisheries operating in the Georges Bank region. NMFS examined the observer database for sea turtle-fishery interactions in statistical areas 521, 522, 525, 526, 561, and 562 (Appendix A). These areas overlap Georges Bank and are east of 70º W. long. From

1989 through 2006, the NEFSC FSB documented 166 sea turtles (excluding moderately and severely decomposed turtles) taken in these areas (memo from John Boreman to Patricia A. Kurkul, March 16, 2006). Of these, only one interaction was documented north of 41º 9.0'N lat. It should be noted that these numbers include all of the turtle data contained in the NEFSC observer database, even though fisheries and turtle bycatch information in the early years is not necessarily reflective of current conditions, nor necessarily analyzed by the NEFSC (such as pelagic longline data) (memo from John Boreman to Patricia A. Kurkul, March 16, 2006). This data does demonstrate that sea turtle are present on the southern portion of Georges Bank and would vulnerable to capture by sea scallop dredge gear operating in this area. Interactions north of 41º 9.0'N lat. are rare.

As described in section 2.1.4, the variables associated with sea turtle bycatch in the sea scallop dredge gear are inconclusive (Murray 2004a, 2004b, 2005). SST, depth, time-of-day, and tow time were identified as variables affecting observed bycatch rates of sea turtles with scallop dredge gear (Murray 2004a, 2004b, 2005). However, the variable(s) associated with the highest bycatch rates changed from one year to another (e.g., SST, depth) or could not be further analyzed (e.g., time-of-day and tow time) because the information is not collected for the entire fishery (Murray 2004a, 2004b, 2005). Therefore, a single variable has not yet been found for forecasting sea turtle bycatch in sea scallop dredge gear. Intense biological activity is usually associated with oceanographic fronts because they are areas where water masses of different densities converge (Robinson and Hamner; www.mbari.org/muse/Participants/Robinson-Hamner.html, posted February 18, 2004). A review of the data associated with the 11 sea turtles captured by the scallop dredge fishery in 2001 concluded that the turtles appeared to have been near the shelf/slope front (memo from David Mountain to Cheryl Ryder and Paul Rago, March 22, 2002). Such oceanographic features occurring in the same area as the operation of scallop dredge gear may increase the risk of interactions between scallop dredge gear and sea turtles.

While these geographic and oceanographic factors may increase the risk of sea turtle interactions with scallop gear, evidence for these is presently lacking. Interactions of sea turtles with scallop dredge gear are likely where sea turtle distribution overlaps with the fishery. Based on the known distribution of sea turtles and the observed take of sea turtles, NMFS expects the take of sea turtles by dredge vessels operating north of 41º 9.0' N lat. to be rare. However, it is known that sea turtles are present on southern Georges Bank and may be vulnerable to capture in sea scallop dredge gear in this area. The take of Kemp's ridley sea turtles in sea scallop dredge gear operating on southern Georges Bank indicates that takes in this area are possible. Therefore, NMFS rejected this alternative from further analysis.

4.0 AFFECTED ENVIRONMENT

The environment affected by the sea scallop fishery as a whole is described in section 7 of Amendment 10 to the Scallop FMP (NEFMC 2003). That description is incorporated herein by reference. The following text describes that portion of the overall affected environment that is associated with the proposed action. The geographic area affected by the alternatives is the area south of 41° 9.0' N. lat. from the shoreline to the outer boundary of the EEZ (Figure 4.1).

4.1 Physical Environment

The area affected by the proposed action is generally waters south of 41° 9.0' N. lat. from the shoreline to the outer boundary of the EEZ. More specifically, the area affected by the action is the area where the scallop dredge fishery operates within this broader area. Concentrations of scallops occur within a narrow depth band in the Mid-Atlantic, throughout the Hudson Canyon Access Area, and around the perimeter of Georges Bank, including the Great South Channel. South of Cape Cod and on Georges Bank, commercial concentrations of sea scallops generally occur between 30 and 100 m (NMFS 2007c). A comprehensive description of the affected area can be found in "The Effects of Fishing on Marine Habitats of the Northeastern United States" (NMFS 2001a). A summary is provided here.

The shelf and slope waters from Georges Bank south to Cape Hatteras and east to the Gulf Stream are known as the Mid-Atlantic Bight (Figure 4.2). This area is composed of a sandy, relatively flat, continental shelf that extends outward from the shore to between 100 and 200 km where it transforms to the slope (100-200 m water depth) at the shelf break. Numerous canyons incise the slope and some cut onto the shelf itself. The primary morphological features of the shelf include shoal massifs, scarps, sand ridges and swales, canyons and shelf valleys. Most of these structures are relic, except for some sand ridges and smaller sand related features.

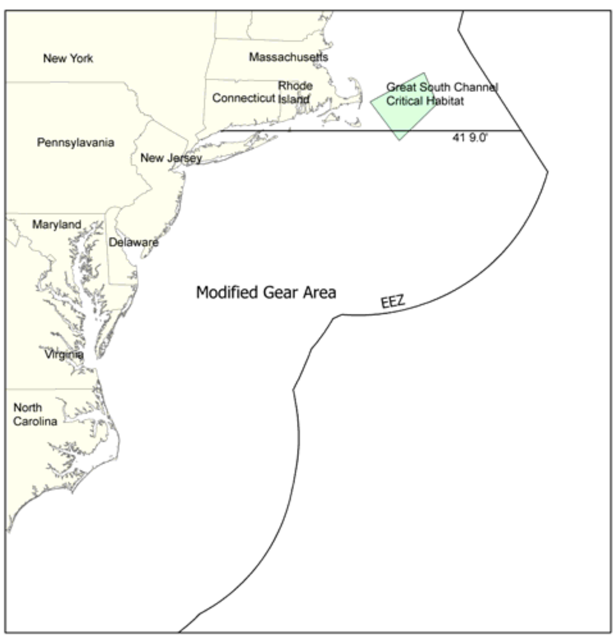
Sediments are fairly uniformly distributed over the shelf in the Mid-Atlantic Bight. A sheet of sand and gravel varying in thickness from 0 to 10 m covers most of the shelf. The sands are mostly medium to coarse grains, with finer sand in the Hudson Shelf Valley and on the outer shelf. Mud is rare over most of the shelf, but is common in the Hudson Valley. Fine sediment content increases rapidly at the shelf break, which is sometimes called the "mud line." Muddy sand and mud predominate on the slope. The mean bottom flow from the constant southwesterly current is not fast enough to move sand, so transport must be episodic.

Shelf and slope waters in this area have a slow southwestward flow that is occasionally interrupted by warm core rings or meanders from the Gulf Stream. The water moves parallel to the bathymetric isobars at 5 – 10 cm/second at the surface and 2 cm/second or less at the bottom. Tidal currents on the inner shelf have a flow rate of 20 cm/second that increases to 100 cm/second near inlets. Due to their proximity to the Gulf Stream, slope waters tend to be warmer than shelf waters. The shelf-slope front, the gradient where the two water masses meet, is located at the edge of the slope, touches bottom at approximately 75 – 100 m, and then slopes up eastward toward the surface which it reaches approximately 25 – 55 km farther off shore. The position of the front is highly variable, and its vertical structure can develop complex patterns.

The seasonal effects of warming and cooling are more pronounced in the shallow near-shore waters. Stratification of the water column occurs over the shelf and in the top layer of slope water during the spring-summer and is usually established by early June. Fall mixing results in homogenous shelf and upper shelf waters by October in most years. In slope waters, a permanent thermocline exists from 200 – 600 m. Temperatures decrease at a rate of approximately 0.02 °C per meter and remain relatively constant, except for occasional incursions from Gulf Stream eddies or meanders. Below 600 m, the temperature declines and averages about 2.2 °C at 4,000 m. A warm mixed layer, 40 m thick, resides above the permanent thermocline.

A "cold pool" stretches from the Gulf of Maine along the outer edge of Georges Bank and southwest to Cape Hatteras. It becomes identifiable with the onset of thermal stratification in the spring and lasts until normal seasonal mixing occurs in early fall. It usually exists along the bottom between the 40 and 100 m isobaths and extends up into the water column for about 35 m, to the bottom of the seasonal thermocline. This phenomenon represents about 30% of the shelf water volume. Minimum temperatures for the cold pool occur in early spring and summer and range from 1.1 °C to 4.7 °C.

Figure 4.1: Geographic area of the alternatives



Although the primary area affected by the alternatives is the Mid-Atlantic, the alternatives do overlap with southern Georges Bank. Georges Bank is a shallow (3 -150 m), elongate (100 miles wide by 200 miles long) extension of the continental shelf characterized by a broad, flat, gently sloping southern flank. It is separated from the rest of the continental shelf to the west by the Great South Channel. The seabed sediments vary widely, ranging from clay to gravel with gravel and gravelly-sand found in the southwestern corner. The gravel sand mixture is usually a transition zone between coarse gravel and finer sediments. Georges Bank is characterized by highly productive, well-mixed waters and strong currents.

Figure 4.2: U.S. Northeast shelf ecosystem

4.2 Biological Environment

4.2.1 Fishery Resources

The biological environment potentially affected by this action includes fishery resources. This section will focus on those fishery resources for which data are readily available, namely those targeted by commercial fisheries.

The management unit for the Scallop FMP consists of the sea scallop resource throughout its range in waters under the jurisdiction of the U.S. Generally recognized resource areas within the management unit include Delmarva, New York Bight, South Channel and southeast part of Georges Bank, Northeast peak and the northern part of Georges Bank, and the Gulf of Maine. The Delmarva area includes scallops as far south as North Carolina (NEFMC 2003).

The Atlantic sea scallop (*Placopecten magellanicus* (Gmelin)) is a bivalve mollusk distributed along the continental shelf, typically on sand and gravel bottoms, from North Carolina to the north coast of the Gulf of St. Lawrence (Packer *et al.* 1999, Hart and Chute 2004). Large concentrations of sea scallops are found on Georges Bank and the Mid-Atlantic shelf, while smaller concentrations are found along coastal Maine, in the Bay of Fundy (Digby grounds), in the Gulf of St. Lawrence, on St. Pierre Bank, and in Port au Port Bay, Newfoundland (NEFMC 2003). Sea scallops often occur in aggregations called beds. Beds may be sporadic (perhaps lasting for a few years) or essentially permanent (e.g., commercial beds supporting the Georges Bank fishery) (Figure 2.1; Hart and Chute 2004).

Sea scallops typically occur at depths ranging from 18 – 110 m, but may also occur in waters as shallow as 2 m in estuaries and embayments along the Maine coast and in Canada (Serchuck et al. 1982, Naidu and Anderson, 1984, Hart and Chute 2004), and some populations have been found as deep as 384 m (Merrill 1959, Hart and Chute, 2004). South of Cape Cod and on Georges Bank, commercial concentrations of sea scallops generally occur between 30 and 100 m (NMFS 2007c).

Sea scallop abundance and biomass in the Mid-Atlantic are currently at record-high levels (NMFS 2004a). For closed areas in the Mid-Atlantic, abundance and biomass indices showed notable increases after the closure. In areas of the Mid-Atlantic open to fishing, the biomass and abundance have increased since 1999, largely due to good recruitment over the last several years. In addition, increased yield-per-recruit due to effort reduction measures has contributed to high landings. During 2006, sea scallops in the U.S. EEZ were not overfished and overfishing was not occurring (NMFS 2007c).

Other commercial fisheries that operate in the geographic scope of the alternatives include gillnet, longline, trawl, seine, dredge, and trap fisheries. Federal FMP regulated fisheries include the bluefish, Atlantic herring, mackerel/squid/butterfish, highly migratory species, monkfish, Northeast multispecies, red crab, skate, spiny dogfish, summer flounder/scup/black sea bass, and tilefish fisheries. Other fisheries include the lobster fishery, nearshore gillnet fisheries in state waters from Connecticut to North Carolina, horseshoe crab, whelk, and Virginia pound net fisheries. The alternatives will not substantially impact the resources targeted by these fisheries; therefore, these resources are not described in detail.

4.2.2 Protected Species and Critical Habitat

Species listed under the ESA that are likely to be affected by this action are the leatherback, loggerhead, Kemp's ridley, and green sea turtle (Table 4.1). Sea turtles are listed under the ESA at the species level rather than as individual populations or recovery units. However due to the need for management from the perspective of different ocean basins, U.S. Fish and Wildlife Service (USFWS) and NMFS have developed separate recovery plans for the populations in the Atlantic and the Pacific. In addition, sea turtle populations in the Atlantic Ocean are geographically discrete from populations in the Pacific Ocean with limited genetic exchange (see NMFS and USFWS 1998a). Given the similar or greater threats faced by Pacific Ocean populations, the loss of sea turtle populations in the Atlantic Ocean would result in a significant gap and reduction in the abundance and distribution of the species, which makes these populations biologically significant. This document will focus on populations in the Atlantic Ocean.

A Biological Opinion completed March 2008 on the sea scallop fishery found that the continued operation of the Atlantic sea scallop fishery may adversely affect but is not likely to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, and green sea turtles (NMFS 2008). There have been no confirmed takes of leatherback sea turtles in scallop dredge gear and NMFS had previously concluded that leatherbacks were not likely to be caught in scallop dredge gear or struck by the gear given that their typical prey (i.e., cnidarians, tunicates, and salps) is found within the water column rather than on the bottom, and the large size of leatherbacks in relation to a dredge bag (NMFS 2003b, 2004b, 2004c). However, a vessel captain participating in the experimental fishery for the chain-mat modified scallop dredge gear reported the take of a leatherback sea turtle in the control (unmodified) dredge (DuPaul *et al.* 2004a). Neither the principal investigators for the experiment nor any NMFS trained observer was on board the vessel at the time of the take. The principal investigators did interview the captain and determined, based on the captain's description of the turtle, that it was likely to have been a leatherback. Thus, the turtle was reported as such in the final report of the experiment (DuPaul *et al.* 2004a). As described in section 2.1.5, the turtle could not be positively identified as a leatherback sea turtle in accordance with the NEFSC protocol. Based on information collected by the principal investigators from an interview with the vessel captain, the turtle was described as being very large (estimated by the captain as 5 – 5.5 feet in length, and requiring a rope sling to get the turtle over the rail of the boat and back into the water). Based on observations of live and apparently uninjured loggerhead turtles taken in dredge gear, NMFS believes some sea turtle interactions with scallop dredge gear occur within the water column. The interaction reported by the vessel captain participating in the experimental fishery suggests that even very large turtles can enter the dredge bag. Therefore, given the presence of leatherback sea turtles in areas where the sea scallop dredge fishery occurs, and the large size of the dredge, NMFS concluded that leatherback sea turtles may be captured in scallop dredge gear when the gear is being towed through the water column. Given the largely pelagic life history of leatherback sea turtles (Rebel 1974; CeTAP 1982; NMFS and USFWS 1992), and the more recent dive-depth information on leatherback use of western North Atlantic continental shelf waters (James *et al.* 2005a, 2005b), NMFS believes it is unlikely that a leatherback would occur on the bottom in the area in which the Atlantic sea scallop fishery operates. Therefore, NMFS does not believe that leatherback sea turtles would be struck by or captured in scallop dredge gear when the gear is being towed along the bottom (NMFS 2008).

Hawksbill sea turtles; Northern right, humpback, fin, blue, sei, and sperm whales; shortnose sturgeon; piping plover and roseate terns are listed under the ESA and are found in the general area south of Long Island, NY but are not likely to be affected by the proposed action. Species protected under the Marine Mammal Protection Act (MMPA) are also not likely to be affected (see section 4.2.2.4).

The geographic area includes the southern corner of the Great South Channel (GSC) critical habitat area for right whales (Figure 4.1). The GSC is a large funnel-shaped bathymetric feature at the southern extreme of the Gulf of Maine between Georges Bank and Cape Cod, MA. In late-winter/early spring, mixing of warmer shelf waters with the cold Gulf of Maine water funneled through the channel causes a dramatic increase in faunal productivity in the area. The zooplankton fauna found in these waters are typically dominated by copepods. Right whales have been characterized as "skim" feeders, subsisting primarily on dense swarms of copepods. In the GSC, right whales generally occur on a seasonal basis in the spring, with a peak in May (Kenney *et al.* 1995). This corresponds to the atypical copepod density maxima in the GSC and the southern Gulf of Maine described by Wishner *et al.* (1988) and Payne *et al.* (1990). It is likely that a significant proportion of the western North Atlantic right whale population uses the GSC as a feeding area each spring, aggregating to exploit exceptionally dense copepod patches. Due to the area's importance as a spring/summer foraging ground for this species, the GSC critical habitat area was designated for right whales in 1994.

Table 4-1: Species protected under the ESA or MMPA found in the geographic range of the proposed action

Potential	Category	Species	Status
Likely to be Affected	Turtle	Loggerhead sea turtle (*Caretta caretta*)	Threatened
		Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
		Green sea turtle (*Chelonia mydas*)	Threatened/Endangered
		Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Present, but Not Likely to be Affected	Turtle	Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
	Cetacean	Northern right whale (*Eubalaena glacialis*)	Endangered
		Humpback whale (*Megaptera novaeangliae*)	Endangered
		Fin whale (*Balaenoptera physalus*)	Endangered
		Blue whale (*Balaenoptera musculus*)	Endangered
		Sei whale (*Balaenoptera borealis*)	Endangered
		Sperm whale (*Physeter macrocephalus*)	Endangered
		Minke whale (*Balaenoptera acutorostrata*)	Protected
		Bryde's whale (*Balaenoptera brydei*)	Protected
		Cuvier's beaked whale (*Ziphius cavirostris*)	Protected
		Mesoplondont beaked whale (*Mesoplodon spp*.)	Protected
		Pilot whale (*Globicephala spp.*)	Protected
		Risso's dolphin (*Grampus griseus*)	Protected
		Bottlenose dolphin (*Tursiops truncatus*)	Protected
		Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected
		Common dolphin (*Delphinus delphis/capensis*)	Protected
		Stenella dolphin (*Stenella attenuata*)	Protected
		Harbor porpoise (*Phocoena phocoena*)	Protected
	Seal	Harbor seal (*Phoca vitulina*)	Protected
		Hooded seal (*Crystophora cristata*)	Protected
		Harp seal (*Pagophilus groenlandica*)	Protected
	Fish	Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
	Bird	Roseate tern (*Sterna dougallii dougallii*)	Endangered
		Piping plover (*Charadrius melodus*)	Endangered

4.2.2.1 Loggerhead Sea Turtle

Loggerhead sea turtles are a cosmopolitan species found in temperate and subtropical waters where they inhabit continental shelves, bays, estuaries, lagoons and pelagic waters. They are the most abundant species of sea turtle in U.S. waters. In the western Atlantic, loggerhead sea turtles commonly occur throughout the inner continental shelf from Florida through Cape Cod, Massachusetts although their presence varies with the seasons due to changes in water temperatures (Braun and Epperly 1996; Epperly *et al.* 1995a, 1995b; Shoop and Kenney 1992). Aerial surveys conducted north of Cape Hatteras indicate that the species is most common in depths between 22 and 49 m (Shoop and Kenney 1992) although survey and satellite tracking data support that they occur in waters from the beach to beyond the continental shelf (Shoop and Kenney 1992; Mitchell *et al.* 2003; Braun-McNeill and Epperly 2002; McClellan and Read 2007). Shoop and Kenney (1992) rarely documented loggerhead sea turtles north of 41° N. lat. (Figure 4.3). The presence of loggerhead turtles in the area is also influenced by water temperature. Loggerhead turtles have been observed in waters with surface temperatures of 7 – 30 °C, but temperatures of ≥11 °C are favorable (Shoop and Kenney 1992; Epperly *et al.* 1995a; Epperly and Braun-McNeill 2002).

Status of the loggerhead subpopulation

Ehrhart *et al.* (2003) provided a summary of the literature identifying known nesting habitat of Atlantic loggerhead sea turtles as well as known foraging areas within the Atlantic. Briefly, nesting occurs on island and mainland beaches on both sides of the Atlantic and both north and south of the Equator (Ehrhart *et al.* 2003). In the eastern and western Atlantic, waters as far north as 41° - 42° N are used by foraging by juveniles as well as adults (Shoop and Kenney 1992; Ehrhart *et al.* 2003, Mitchell *et al.* 2003).

The nesting loggerhead population of the U.S. Atlantic and Gulf coasts is one of only two or three major (>5,000 nests per year) assemblages in the world and is the only one in the Atlantic basin (Ehrhart *et al.* 2003). In the western Atlantic, most sea turtles nest from North Carolina to Florida and along the Gulf Coast of Florida. There are at least five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, approximately 29° N lat.; (2) a south Florida nesting subpopulation occurring from 29° N lat. on the east coast to Sarasota on the west coast; (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City; (4) a Yucatán nesting subpopulation occurring on the eastern Yucatán Peninsula, Mexico (TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas near Key West, Florida (NMFS SEFSC 2001). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. Genetic analyses conducted at these nesting sites indicate that these are five distinct subpopulations (TEWG 2000). Studies have confirmed the hypothesis that adult female loggerheads generally return to the area of their natal beach to lay their eggs and that this behavior provides the key mechanism that has established and maintained the mitochondrial DNA differences among nesting assemblages. Cohorts from three of these, the south Florida, Yucatán, and northern subpopulations, are known to occur within the action area (Rankin-Baransky *et al.* 2001; Bass *et al.* 2004) and there is genetic evidence that cohorts from the other two also likely occur within the action area (Bass *et al*. 2004). Mixed stock analysis using genetic data collected from 26 loggerhead sea turtles incidentally taken in the sea scallop fishery (dredge (23) and trawl (3)) indicates that 88-93% of the loggerheads are from the U.S. nesting populations, with the majority of turtles coming from the south Florida subpopulation (Haas *et al*., in review).

Figure 4.3: Seasonal patterns of loggerhead sea turtle relative density (TPUE) in 10-minute quadrats from CeTAP aerial and shipboard surveys

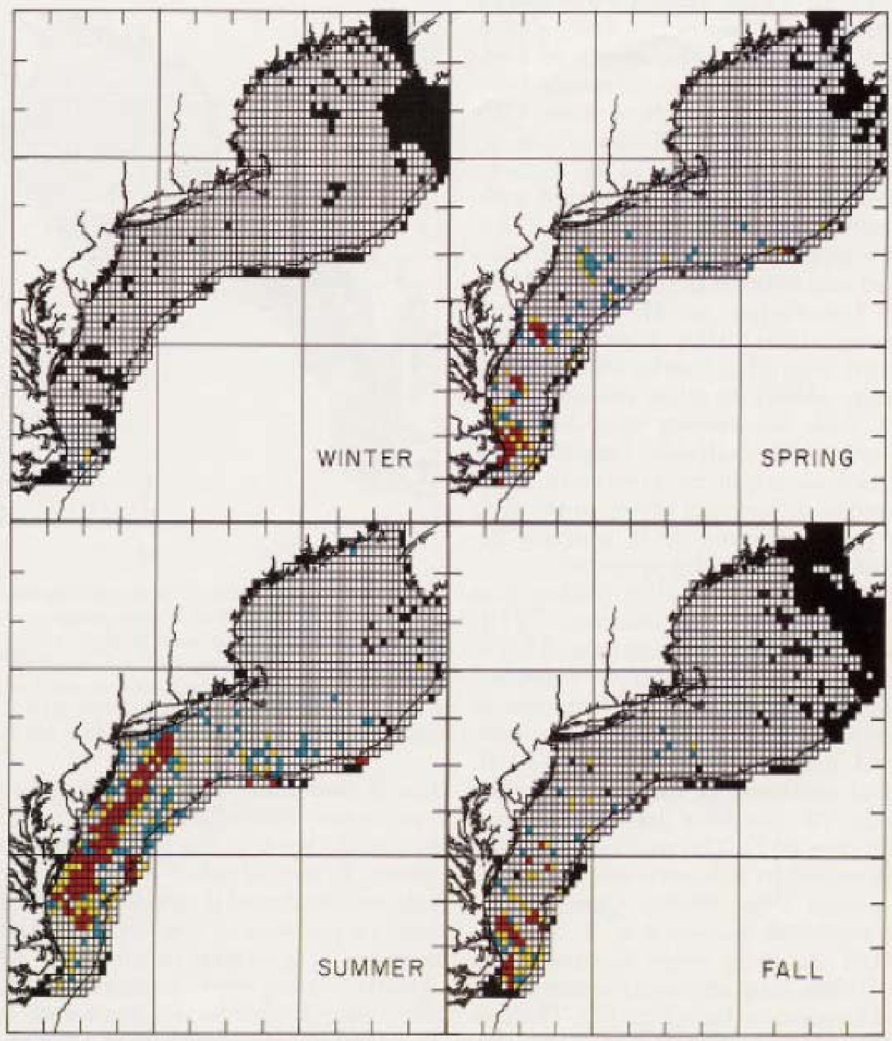


FIG. 10.—Seasonal patterns of loggerhead sea turtle relative density (TPUE) in 10-minute quadrats from CETAP aerial and shipboard surveys. High TPUE (red) was 46.5–590 turtles/1000 km, medium TPUE (yellow) was 15.1–46.4 turtles/1000 km, and low TPUE (blue) was 3.9–15.0 turtles/1000 km. Zero TPUE quadrats are blank, and unsampled quadrats are black.

Source: Shoop and Kenney, 1992

A number of stock assessments (TEWG 1998, 2000; NMFS SEFSC 2001; Heppell *et al.* 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. In the absence of comprehensive population surveys, nesting beach survey data has been used to index the status and trends of loggerhead subpopulations (TEWG 2000; USFWS and NMFS 2003). Nesting beach surveys count the number of loggerhead nests laid per season. From this, the number of reproductively mature females in the subpopulation is estimated based on the presumed remigration interval and the average number of nests laid by a female loggerhead sea turtle per season. The trend in the estimated number of reproductively mature females over time has been used in the past as an index of the status and trend of the loggerhead subpopulation, overall (TEWG 2000; USFWS and NMFS 2003). However, there are many caveats to using nest count data for indexing the status and trend of a turtle subpopulation or population. First, the detection of nesting trends (in the number of nests laid and the estimated number of reproductively mature females from those nest counts) requires consistent data collection methods over long periods of time (USFWS and NMFS 2003). In 1989, a statewide sea turtle Index Nesting Beach Survey (INBS) program was developed and implemented in Florida. There are currently 33 nesting beaches in the INBS program (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). As of 2006, 27 of the 33 beaches had reached the mandatory minimum of 10-years participation for their data to be included in trend evaluations (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). Nesting recorded by the INBS program on the 27 beaches represented an average of 65% of all annual nesting by loggerheads in the state for the period 2001-2005 (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006).

A second caveat for the use of nesting data is that the number of nests laid is a function of the number of reproductively mature females in the population. Therefore, the trend in the number of reproductively mature females in the subpopulation, based on annual nest counts, may not reflect the trend of mature males or of females and males that are not reproductively active (i.e., juveniles) (Ross 1996; Zurita *et al*. 2003; Hawkes *et al*. 2005). Without knowing the proportion of males to females and the age structure of the population, it is impossible to extrapolate the data from nesting beaches to the entire population (Meylan 1982; Zurita *et al*. 2003). Adding to the difficulties associated with using loggerhead nesting trend data as an indicator of subpopulation status is the late age to maturity for loggerhead sea turtles. Data from tag returns, strandings, and nesting surveys suggest estimated ages of maturity ranging from 20-38 years (NMFS SEFSC 2001). Given the late age to maturity, there is a greater risk that the factors affecting the survival of the loggerhead age classes have changed over the last couple of decades and the number of nesting females today is not a reflection of the number of juvenile females that are likely to reach maturity and nest in the future.

Nesting survey data is important, however, in that it provides information on the relative abundance of nesting, the estimated number of reproductively mature females in each subpopulation, and the contribution of each subpopulation to loggerhead nesting in the western Atlantic, overall. The 5-year status review for loggerhead sea turtles (NMFS and USFWS

2007a) compiled the available information on mean number of loggerhead nests per year and, where available, the approximated counts of nesting females for each of the five identified subpopulations in the western North Atlantic. These are: (1) a mean of 65,460 loggerhead nests per year with approximately 15,966 females nesting per year for the south Florida subpopulation; (2) a mean of 5,151 nests per year (no estimate of the number of nesting females provided) for the northern subpopulation; (3) a mean of 910 nests per year with approximately 222 females nesting per year for the Florida panhandle subpopulation; (4) a mean of 246 nests per year with approximately 60 females nesting per year for the Dry Tortugas subpopulation; and (5) a range of 903-2,231 nests per year from 1987-2001 (no estimate of the number of nesting females provided) for the Yucatán subpopulation. As is evident from this information, nests for the south Florida subpopulation make up the majority of all loggerhead nests counted along the U.S. Atlantic and Gulf coasts and represents the largest nesting group in the Atlantic (USFWS and NMFS 2003, NMFS and USFWS 2007a). The northern nesting group is the second largest loggerhead nesting assemblage in the United States. The Dry Tortugas, Florida Panhandle, and Yucatán nesting groups are much smaller nesting aggregations.

During the majority of the 1990s, the south Florida nesting subpopulation showed an increase in the number of nests of 3.6% annually from 1989-1998 (TEWG 2000). However, in 2006, information was presented at an international sea turtle symposium (Meylan *et al*. 2006) and in a letter to NMFS (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006) that the south Florida loggerhead subpopulation was experiencing a decline in nesting. A trend analysis of the nesting data collected for Florida's INBS program showed a decrease in nesting of 22.3% in the annual nest density of surveyed shoreline over the 17-year period and a 39.5% decline since 1998 (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). Data collected in Florida in 2007 reveal that the decline in nest numbers has continued as 2007 had the lowest nest count in any year during the period of 1989-2007 (FWRI 2007a). Between 1989 and 2007, the overall trend in loggerhead nesting is down approximately 37% (FWRI 2007a).

Standardized daily survey programs have been implemented in Georgia, South Carolina, and North Carolina as well (USFWS and NMFS 2003). Standardized ground surveys of 11 North Carolina, South Carolina and Georgia nesting beaches showed a significant declining trend of 1.9% annually in loggerhead nesting from 1983-2005 (NMFS and USFWS 2007a). In addition, standardized aerial nesting surveys in South Carolina have shown a significant annual decrease of 3.1% from 1980-2002 (NMFS and USFWS 2007a). The South Carolina data represents approximately 59% of the northern subpopulation nesting totals (Dodd 2003). A near complete census of the Dry Tortugas nesting beaches was conducted from 1995-2004 (excluding 2002). No surveys of the Dry Tortugas nesting subpopulation have been conducted since 2004. No trend was detected in the number of nests laid from 1995 to 2004; however, because of the annual variability in nest totals, a longer time series is needed to detect a trend (NMFS and USFWS 2007a). The Florida Panhandle subpopulation has shown a significant declining trend in loggerhead nesting of 6.8% annually from 1995-2005 (NMFS and USFWS 2007a). Nesting for the Yucatán ubpopulation is characterized as having declined since 2001 (NMFS and USFWS 2007a).

Unlike nesting beach data, in water studies of sea turtles typically sample both sexes and multiple age classes. As is the case with nesting data, there are caveats for using results from in water studies to assess sea turtles abundance and the trend of turtle populations, overall (Allen 2000). Nevertheless, these can be useful for gaining information on the species away from the nesting beach. As was described in a 1999 report of the IUCN/SSC Marine Turtle Specialist Group, although sea turtles spend at most 1% of their lives in or on nesting beaches, approximately 90% of the literature on sea turtle biology is based on nesting beach studies (Bjorndal 1999). In water studies have been conducted in some areas of the western Atlantic and provide some data by which to assess the relative abundance of loggerhead sea turtles and changes in abundance over time (Maier *et al*. 2004; Morreale *et al*. 2004a; Mansfield 2006; Epperly *et al.* 2007; Erhart *et al.* 2007). Maier *et al.* (2004) used fishery-independent trawl data to establish a regional index of loggerhead abundance for the southeast coast of the United States (Winyah Bay, South Carolina to St. Augustine, FL) during the period 2000 – 2003. A comparison of loggerhead catch data from this study with historical values suggested that in-water populations of loggerhead sea turtles along the southeastern United States appear to be larger, possibly an order of magnitude higher than they were 25 years ago Maier *et al.* 2004). However, reduced catch rates in the smaller size classes was also noted over the four year time period (Maier *et al*. 2004). A long-term, on-going study of loggerhead abundance in the Indian River Lagoon System of Florida found a significant increase in the relative abundance of loggerheads over the last 4 years of the study, but there was no discernable trend in abundance over the 24-year time period of the study (1982-2006) (Ehrhart *et al.* 2007). Epperly *et al.* (2007) sampled sea turtles incidentally captured in pound net gear in North Carolina from 1995-1997 and 2001-2003. A significant increase in the catch rate of loggerhead sea turtles and in the size of loggerhead sea turtles was observed.

In contrast to these studies, Morreale *et al*. (2004a) observed a decline in the incidental catch of loggerhead sea turtles in pound net gear fished around Long Island, NY during the period 2002-2004 in comparison to the period 1987-1992. No changes in size distribution were noted but only two loggerheads were captured from 2002-2004 and these were comparable in size to the larger turtles captured during the 1987-1992 period (Morreale *et al*. 2004a). Using aerial surveys, Mansfield (2006) also found a decline in the densities of loggerhead sea turtles in Chesapeake Bay over the period 2001-2004 compared to aerial survey data collected in the 1980s. Significantly fewer turtles ($p<0.05$) were observed in both the spring (May-June) and the summer (July-August) of 2001-2004 compared to aerial surveys in the 1980s (Mansfield 2006). A comparison of median densities from the 1980s to the 2000s suggested that there had been a 63.2% reduction in densities during the spring residency period and a 74.9% reduction in densities during the summer residency period (Mansfield 2006).

Based on its 5-year status review of the species, NMFS and the USFWS (2007a) determined that the threatened loggerhead sea turtle should not be delisted or reclassified, but that an analysis and review of the species should be conducted in the future to determine whether distinct population segments (DPS) should be identified for loggerhead sea turtles. NMFS is undertaking a number of initiatives to determine what can be said about the status of the species. In November 2007, NMFS initiated a review of the status of loggerhead sea turtles to determine whether a petitioned action to classify the North Pacific or Pacific loggerhead sea turtles as a DPS with endangered status is warranted, and whether any additional changes to the current threatened listing for the loggerhead sea turtle are warranted (72 FR 64585, November 16, 2007). NMFS also received a petition in November 2007 to designate the western North Atlantic subpopulation of loggerhead sea turtles as a DPS with endangered status and to designate critical habitat for this population. The petition also requested that if the western Atlantic loggerhead sea turtle is not determined to meet the DPS criteria that loggerheads throughout the Atlantic be designated as a DPS and listed as endangered and that critical habitat be designated for it (Petition from Oceana and The Center for Biological Diversity to Carlos M Gutierrez, Dr. William Hogarth, Dirk Kempthorne, and H. Dale Hall, November 15, 2007). On March 5, 2008, NMFS published a response to the petition (73 FR 11851). NMFS has initiated a review of the status of the species to determine whether the petitioned action is warranted and to determine whether any additional changes to the current listing of the loggerhead turtle are warranted (73 FR 11851, March 5, 2008). NMFS has convened other working groups which are evaluating the current information regarding the status of loggerhead sea turtles. The Recovery Plan for loggerhead sea turtles is currently being revised, and NMFS has convened a new loggerhead Turtle Expert Working Group (TEWG) to review all available information on Atlantic loggerheads in order to determine what can be said about the status of this species in the Atlantic. The TEWG is continuing to explore several hypotheses as to the decline in nests. The preliminary findings of the TEWG state that the nest count data may not reflect what is occurring in the population as a whole or even with the number of nesting females. The nest counts allow for an assessment of total production in a given year, but do not provide any information on the root cause(s) of any increase or decrease in nest number memo from Nancy Thompson to James Lecky, December 4, 2007). A final report from the TEWG is anticipated in 2008.

Loggerhead life history

The life history of loggerhead sea turtles involves a complex series of habitat shifts from neritic to oceanic zones. The neritic zone is the inshore marine environment (from the surface to the bottom) where depths do not exceed 200 m; while the oceanic zone is the open ocean with depths greater than 200 m. The loggerhead sea turtle's life cycle begins with oviposition on the nesting beach. The nesting beach is habitat for the egg, embryo, and early hatchling stage.

Schroeder *et al.* (2003) provides a review of nesting, reproductive migrations, and adult foraging areas. Satellite telemetry and flipper tag return data have provided insight into postnesting migratory behavior of loggerhead sea turtles worldwide. These female adults leave the nesting beach immediately (usually within 24 hours) after deposition of the last clutch and make a directed migration. This migratory route may be coastal or oceanic with oceanic routes being taken even when coastal routes are an option (Schroeder *et al.* 2003). These routes may be affected by ocean currents, resulting in course adjustments, and postnesting females may swim against the prevailing current (Schroeder *et al.* 2003). Recent studies lend support to the hypothesis that some juvenile and adult female loggerhead sea turtles exhibit homing behavior with respect to the foraging areas in the vicinity of their nesting beaches (Arendt *et al*. 2007; Bowen *et al.* 2004, 2005; Blumenthal *et al.* 2006; Broderick *et al.* 2007; Hawkes *et al* 2006; McClellan and Read 2007). Studies of reproductive migratory behavior of adult males in U.S. waters are rare. Differences in the seasonal abundance of adult males in the near-shore waters off central Florida have been documented in one study, with significantly higher numbers of males present in the months immediately preceding the onset of nesting season (Henwood 1987).

Mating takes place in late March to early June, and eggs are laid throughout the summer, with a mean clutch size of 100–126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2 – 3 years, but can vary from 1 – 7 years (Dodd 1988).

Like other sea turtles, loggerhead hatchlings enter the pelagic environment upon leaving the nesting beach. The hatchlings remain in the near-shore environment for a period of days and then enter the "swim frenzy" (Wyneken and Salmon 1992). This swim frenzy is thought to bring the hatchlings to the major offshore currents. The size distribution of stranded turtles along the U.S. coast suggests that there may be a small percentage of the population that never leaves the neritic zone. However, there is no direct evidence, and at this time, the existence of this phenomenon is speculative (Bolten 2003). The hatchling stage is nutritionally dependent on the remains of their yolk. The turtle enters the post-hatchling transitional stage when the turtle begins to feed, often while still in the neritic zone. This stage lasts days to months and ends when the turtle enters the oceanic zone. In the western Atlantic, this would be where the Gulf Stream-Azores current system leaves the shelf (Bolten 2003). Bolten (2003) provides a review of the oceanic juvenile stage in the Atlantic.

Sea turtle movements during the oceanic juvenile stage are both active and passive relative to surface and subsurface oceanic currents, winds, and bathymetric features. During this stage, loggerheads are epipelagic, spending 75% of their time in the top 5 m of the water column but occasionally diving to depths greater than 200 m (Bolten 2003). In the oceanic zone, loggerheads consume primarily coelenterates and salps but are known to ingest a wide range of other organisms (Bjorndal *et al.* 2003). They may become epibenthic/demersal by feeding or spending time on the bottom when in the vicinity of seamounts, ocean banks, and ridges (Bolten 2003).

In the Atlantic, sea turtles leave the oceanic zone over a wide size range (46 – 64 cm curved carapace length (CCL)), and the duration of the oceanic juvenile stage is thought to range from 6.5 to 11.5 years (Bjorndal *et al.* 2000). The reasons for the variation in the duration of this stage are not known but may depend on the location of the sea turtle in the oceanic zone and available currents, food resources, and other cues (Bolten 2003). The geographic areas where the transition from the oceanic to the neritic zone occurs may be in regions where oceanic currents approach or enter the neritic zone. Recent studies show that the shift from oceanic to neritic waters is complex and reversible (Witzell et al. 2002; Hawkes *et al.* 2006; McClellan and Read 2007). Some loggerhead sea turtles may remain in the pelagic environment for longer periods of time or move back and forth between the pelagic and benthic environment suggesting that the use of pelagic and benthic environments by loggerhead sea turtles is much more complex (Witzell 2002). Hawkes *et al.* (2006) tracked the movements of post-nesting females and found a difference in habitat use related to body size with larger turtles staying in coastal waters and smaller turtles traveling to oceanic waters. Large juvenile turtles captured, satellite tagged, and released in North Carolina estuaries exhibited two discreet behavioral patterns (McClellan and Read 2007). Thirteen of the 30 large juvenile turtles tagged remained in neritic waters with some traveling as far south as Florida while most remained off North Carolina. Ten of the turtles returned to oceanic waters after leaving the estuary. An additional seven turtles tracked for less than one month, and showing no clear destination after leaving the estuaries, were excluded from the analysis. McClellan and Read (2007) found no significant difference in the body size of sea turtles that remained in neritic waters versus oceanic waters.

Loggerhead turtles in both the neritic juvenile and adult foraging stages inhabit the neritic zone. The neritic juvenile-sized loggerheads are common in coastal inlets, sounds, bays, estuaries, and lagoons from Long Island south from spring through fall. They remain abundant through the winter in Florida (Ehrhart *et al.* 1996; Schroeder *et al.* 1998). During the warmer months in the northeast, juvenile sea turtles seem to spend much of their time foraging along the bottom in shallower embayments (Morreale and Standora 1994, 1998). Large immature and adult loggerheads are seldom found in these waters but are present in open shelf waters ranging out to hundreds of kilometers offshore (Hopkins-Murphy *et al*. 2003). In the neritic environment, loggerhead sea turtles primarily feed on slow moving or sessile invertebrates that have a hard exoskeleton but also continue to ingest coelenterates and salps when available (Bjorndal *et al.* 2003). Although neritic stage juvenile and adult loggerheads utilize the entire continental shelf along the U.S. eastern seaboard, they do not appear randomly mixed. In general, average size is smaller in the more northerly areas, whereas larger immature turtles are more common in the south. Adults tend to be found in deeper, more offshore areas (Hopkins-Murphy *et al*. 2003).

In general, loggerhead sea turtles move from offshore to inshore and/or from south to north in the spring and in the opposite direction in the fall. They inhabit offshore waters off North Carolina where the Gulf Stream influences the water temperature year round. As coastal water temperatures warm in the spring, loggerhead turtles begin to move to North Carolina inshore waters (e.g., Pamlico and Core Sounds) and up the coast (Epperly *et al*. 1995a, 1995b, 1995c) to Virginia foraging areas as early as April and to Massachusetts' waters in June. Principal resident foraging areas for postnesting loggerheads from U.S. nesting beaches include the Bahamas, Cuba, Mexico, Gulf of Mexico, and the southeast and mid-Atlantic U.S. coast (Schroeder *et al.* 2003). As water temperatures cool in the fall, the loggerhead sea turtle migrates southward. The large majority leave the Gulf of Maine by mid-September, but some may remain in Mid-Atlantic and northeast areas until late fall. During November and December, loggerhead sea turtles appear to concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters off North Carolina (Epperly *et al*. 1995a, 1995b, 1995c). Captures of sea turtles in the U.S. pelagic longline fishery have shown that large loggerhead sea turtles (mature and/or immature) routinely inhabit offshore habitats during non-winter months in the northwest North Atlantic Ocean. It has been suggested that some of these turtles might be associated with warm water fronts and eddies and might form offshore feeding aggregations in areas of high productivity (Witzell 1999, 2002).

Natural and Anthropogenic Impacts

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the neritic environment, and in the oceanic environment. A 5-year status review of loggerhead sea turtles recently completed by NMFS and USFWS provides a summary of natural and anthropogenic threats to sea turtles (NMFS and USFWS 2007a). Amongst those of natural origin, hurricanes are known to be destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton *et al.* 1994). Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that negatively impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (e.g., raccoons, armadillos, and opossums) that raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the western North Atlantic coast (in areas like Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of negative anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation; marine pollution; underwater explosions; hopper dredging; offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching, and fishery interactions.

In the marine environment in the Atlantic Ocean, loggerheads are exposed to a series of longline fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various fleets in the Mediterranean Sea (Bolten *et al.* 1994; Aguilar *et al.* 1995; Crouse 1999). Globally, the number of loggerhead sea turtles captured in pelagic longline fisheries is significant (Lewison *et al.* 2004, Lewison and Crowder 2007). The number of sea turtles impacted globally by trawl and gillnet fisheries is also significant and may have far higher mortality rates than the longline fisheries (Lewison and Crowder 2007).

In the neritic waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in federal and state waters including scallop dredge, trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries. The first estimate of loggerhead bycatch in U.S. mid-Atlantic bottom otter trawl gear was completed in September 2006 (Murray 2006). Further information of the effects of fisheries on loggerhead sea turtles is provided in the cumulative effects section of this document.

Interactions between loggerhead sea turtles and sea scallop dredge gear have been documented in the Mid-Atlantic and on southern Georges Bank. These interactions could occur when the dredge is dragged along the bottom or in the water column. NMFS currently has information documenting the take of sea turtles in sea scallop dredge gear, including takes in the dredge bag, as observed from on deck. There are two general risks to sea turtles as a result of interactions with scallop dredge gear. These are forced submergence and contact injuries. Sea turtles caught in scallop dredge gear often suffer injuries. The most commonly observed injury is damage to the carapace. The exact causes of these injuries are unknown, but the most likely appear to be from being struck by the dredge (during a tow or upon emptying of the dredge bag), crushed by debris (e.g., large rocks) that collects in the dredge bag, or as a result of a fall during hauling of the dredge. Given the size and weight of the dredge frame, a turtle would likely suffer injuries to the carapace if struck by the gear while the dredge was being towed along the bottom. Under typical fishing operations, the dredge is hauled to the surface, lifted above the deck of the vessel, and emptied by turning the bag over. Under such conditions, a turtle caught in the bag would fall many feet to the deck of the vessel and could suffer cracks to the carapace or other injuries as a result of the fall. After the bag is dumped, the dredge frame is often dropped on top of the catch with the cutting bar, located on the bottom aft part of the frame, also constituting a crushing weight. Dumping the catch and lowering the gear onto the deck are actions during which turtles could be injured. Finally, although scallop fishermen often use “rock chains” on the gear to minimize the collection of large boulders in the dredge bag, boulders can get picked up by the dredge and may cause injury to sea turtles similarly caught in the dredge bag. A fishery observer report of a sea turtle taken in 1999 indicated that there were large rocks in the bag along with the sea turtle, which had sustained a cracked carapace suggesting that the boulders may have caused the injury.

4.2.2.2 Leatherback Sea Turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtle species. Their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NMFS and USFWS 1995).

Status of the population

Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate, and tropical waters (NMFS and USFWS 1992). In 1980, the global population of adult female leatherbacks was estimated at approximately 115,000 (Pritchard 1982). By 1995, the global population of adult females was estimated to number 34,500 turtles (Spotila *et al.* 1996). However, the most recent population size estimate for the North Atlantic alone is a range of 34,000 – 94,000 adult leatherbacks (TEWG 2007).

A 1979 aerial survey of the outer continental shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in water depths ranging from 1 – 4151 m but 84.4% of the sightings were in waters less than 180 m (Shoop and Kenney 1992). Leatherbacks were sighted in waters within a sea surface temperature range similar to that observed for loggerheads, from 7-27.2 °C. However, leatherbacks appear to have a greater tolerance for colder waters in comparison to loggerhead sea turtles since more leatherbacks were found at lower temperatures as compared to loggerheads (Shoop and Kenney 1992). This survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina). However, the estimate was based on turtles visible at the surface and does not include those that were below the surface out of view. Therefore, it likely underestimates the leatherback population for the northeastern U.S. Estimates of leatherback abundance of 1,052 turtles (C.V. = 0.38) and 1,174 turtles (C.V. = 0.52) were obtained from surveys conducted from Virginia to the Gulf of St. Lawrence in 1995 and 1998, respectively (Palka 2000). However, since these estimates are also based on sightings of leatherbacks at the surface, the author considered the estimates to be negatively biased (Palka 2000). Studies of satellite tagged leatherbacks suggest that they spend 10% – 41% of their time at the surface, depending on the phase of their migratory cycle (James *et al.* 2005a). The greatest amount of surface time was recorded when leatherbacks occurred in continental shelf and slope waters north of 38º N. lat. (James *et al.* 2005a).

The Florida Statewide Nesting Beach Survey program has documented an increase in leatherback nesting numbers from 98 nests in 1988 to between 800 to 900 nests in the early 2000s (NMFS and USFWS 2007b). An analysis of Florida's INBS sites from 1989 – 2006 shows a substantial increase in leatherback nesting in Florida during this time with an annual growth rate of approximately 1.17 (TEWG 2007). The INBS nest counts represent approximately 34% of known leatherback nesting in Florida (FWRI 2007b). Leatherback nest counts continued to increase in 2007 with a record number of nests recorded in the 2007 season (FWRI 2007a).

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The largest leatherback rookery in the western Atlantic remains along the northern coast of South America in French Guiana and Suriname. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). Nest numbers in Suriname have shown an increase and the long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). The most recent TEWG report (2007), using nest numbers from 1967 – 2005, indicates a positive population growth rate was found over the 39-year period for French Guinea and Suriname, with a 95% probability that the population was growing.

Annual nest numbers have also increased at Northern Caribbean and Brazilian nesting beaches. Long term consistent data is lacking for West African beaches and the large fluctuations in nesting make it difficult to conduct any reliable analysis of trends for this region (NMFS and USFWS 2007b).

The TEWG (2007) identified seven leatherback populations or groups of populations in the Atlantic: Florida, North Caribbean, Western Caribbean, Southern Caribbean, West Africa, South Africa, and Brazil. The TEWG reports an increasing or stable trend for all of these populations with the exception of the Western Caribbean and West Africa.

Leatherback sea turtle life history

Leatherbacks are a long lived species (>30 years). The estimated age at sexual maturity is about 13-14 years for females with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NMFS SEFSC 2001). In the U.S. and the Caribbean, female leatherbacks nest from March through July. They nest frequently (up to seven nests per year) during a nesting season and nest about every two to three years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. As is the case with other sea turtle species, leatherback hatchlings enter the water soon after hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm CCL, Eckert (1999) found that leatherback juveniles remain in waters warmer than 26 °C until they exceed 100 cm CCL.

Leatherbacks are predominately a pelagic species and feed on jellyfish (i.e., *Stomolophus*, *Chryaora*, and *Aurelia* (Rebel 1974)), and tunicates (salps, pyrosomas). Leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. For example, leatherbacks occur annually in Cape Cod Bay and Vineyard and Nantucket Sounds during the summer and fall months.

Tag return and satellite telemetry data emphasize the link between the South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, VA. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN). Many other examples also exist. For example, leatherbacks tagged at nesting beaches in Costa Rica have been found in Texas, Florida, South Carolina, Delaware, and New York (STSSN database). Leatherback turtles tagged in Puerto Rico, Trinidad, and the Virgin Islands have also been subsequently found on U.S. beaches of southern, mid-Atlantic and northern states (STSSN database). Tagged and satellite tracked turtles from the Florida and North Caribbean assemblages have been re-sighted off North America, the Gulf of Mexico, and along the Atlantic coast. Post nesting movements of the Southern Caribbean/Guianas nesting population recorded positions along the continental shelf off North America and tag returns indicate that individuals from this population enter the Gulf of Mexico (TEWG 2007).

Natural and Anthropogenic Impacts

Threats to leatherbacks include fisheries interactions, marine debris ingestion, poaching, and boat strikes. Leatherbacks are susceptible to entanglement in multiple types of fishing gear, including longlines, gillnets, pot/trap gear, and trawl gear. Sea turtles entangled in fishing gear generally have a reduced ability to feed, dive, surface to breathe, or perform any other behavior essential to survival (Balazs 1985). They may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in tissue necrosis.

Poaching is not known to be a problem for nesting populations in the continental U.S, but is known to occur in other areas of the Atlantic (TEWG 2007). NMFS SEFSC (2001) noted that poaching of juveniles and adults was still occurring in the U.S. Virgin Islands. In all, four of the five strandings in St. Croix were the result of poaching (Boulon 2000). Poaching of eggs is known to occur on Caribbean and South American beaches (TEWG 2007).

Leatherback sea turtles may be more susceptible to marine debris ingestion than other species due to their pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding areas and migratory routes (Lutcavage *et al.* 1997; Shoop and Kenney 1992). Investigations into the stomach contents of leatherback sea turtles revealed that a substantial percentage (44% of the 16 cases examined) contained plastic (Mrosovsky 1981). Along the coast of Peru, intestinal contents of 19 of 140 (13%) leatherback carcasses were found to contain plastic bags and film (Fritts 1982). The presence of plastic debris in the digestive tract suggests that leatherback sea turtles might not be able to distinguish between prey items and plastic debris (Mrosovsky 1981). Balazs (1985) speculated that the object may resemble a food item by its shape, color, size, or event movement as it drifts about, and induce a feeding response in leatherbacks.

4.2.2.3 Green Sea Turtle

Green turtles are distributed circumglobally in tropical and subtropical waters (NMFS and USFWS 1998b). In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz 1999). Green turtle occurrences are infrequent north of Cape Hatteras, but they do occur seasonally in mid-Atlantic and northeast waters (e.g., documented in Long Island Sound (Morreale *et al.* 2004; Morreale and Standora 2005) and cold stunned in Cape Cod Bay, Massachusetts (NMFS Unpublished data)). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species.

Status of the population

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (NMFS and USFWS 2007c). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan *et al.* 1995). More recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows high biennial fluctuations in nest numbers, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan *et al.* 1995). This positive trend has continued. Between 1989 and 2007, the annual number of green turtle nests at core index beaches ranged from 267 to 9091 (FWRI 2007b). The INBS nest counts represent approximately 74% of known green turtle nesting (FWRI 2007b). It is useful to combine even and odd years in order to assess annual trends in the total population since green turtles commonly take a year off between migrations to Florida nesting beaches. A regression of log-transformed nesting in combined two-year cohorts between 1989 and 2004 reveals a significant upward nesting trend (r = 0.77) for these beaches (FWRI 2005) and the number of nests at core index beaches has continued to increase (FWRI 2007a, 2007b). In 2007, the number of green turtle nests on index beaches in Florida was the highest since the trend-monitoring program began (FWRI 2007a).

The global status and trend of green sea turtles is difficult to summarize, and current population estimates are unavailable. The most recent review of the green sea turtle (NMFS and USFWS 2007c) includes information on the population trends for 46 green turtle nesting rookeries located in 11 major oceanic areas. Of the 46 rookeries, 12 have an increasing population, 4 have a decreasing population (all in the Indian Ocean or Southeast Asia), 10 are stable, and the remaining rookeries have an unknown trend. This review includes 6 rookeries in the western Atlantic, with 4 of these rookeries showing a positive trend (including Florida) and 2 showing a stable population. Long term continuous data sets (with at least 20 years of data) are available for 9 sites, all of which are either increasing or stable. An estimated 108,761 to 150,521 females nest each year among the 46 sites (NMFS and USFWS 2007c). The sites evaluated in the 2007 report are not inclusive of all green sea turtle nesting in the Atlantic. However, other sites are not believed to support nesting levels high enough that it would change the overall status of the species (NMFS and USFWS 2007c). Recent population estimates for the western Atlantic area are not available.

There is cautious optimism that the green sea turtle population is increasing in the Atlantic. The 5-year review (NMFS and USFWS 2007c) indicates that the nesting populations are doing relatively well in the Pacific, Western Atlantic, and Central Atlantic Ocean and relatively poorly in Southeast Asia, Eastern Indian Ocean, and perhaps the Mediterranean. Based on long-term nesting data, the Florida and Mexico nesting populations appear to be increasing, however, these populations are thought to still be well below historic levels and continue to face numerous threats.

Green sea turtle life history

Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages (Bjorndal 1985). At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet but may also consume jellyfish, salps, and sponges (Bjorndal 1997). Some of the principal foraging grounds in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). In North Carolina, green turtles are known to occur in estuarine and oceanic waters and to nest in low numbers along the entire coast. The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of North Carolina sounds, Chesapeake Bay and Long Island Sound (Musick and Limpus 1997, Morreale and Standora 2005).

Natural and Anthropogenic Impacts

Green turtles face many of the same natural threats as loggerhead sea turtles. In addition, green turtles appear to be susceptible to fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body. Juveniles are most commonly affected. The occurrence of fibropapilloma tumors may result in impaired foraging, breathing, or swimming ability, leading potentially to death. Stranding reports indicate that between 200 – 400 green turtles strand annually along the Eastern U.S. coast from a variety of causes most of which are unknown (STSSN database). As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality. Sea sampling coverage in the pelagic driftnet, pelagic longline, sea scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles.

4.2.2.4 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle is primarily found in the Gulf of Mexico and the northwestern Atlantic Ocean (USFWS and NMFS 1992) and has only one major nesting beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). There is a limited amount of nesting to the north and south of the primary nesting beach (NMFS and USFWS 2007d).

Status of the Kemp's ridley sea turtle

Estimates of the adult female nesting population of Kemp's ridley sea turtles reached a low of 300 in 1985 (TEWG 2000). Conservation efforts by Mexican and U.S. agencies have aided this species by eliminating egg harvest, protecting eggs and hatchlings, and reducing at-sea mortality through fishing regulations (TEWG 2000). Based on an amateur film by Andrés Herrara in 1947, Hildebrand and Carr estimated that over 40,000 females nested at Rancho Nuevo in a single day (Márquez-M *et al*. 1999). However, the methods of estimation have come into question. During the 1960s, there were arribadas, mass nesting emergences, that easily surpassed 2,000 nesting turtles (Márquez-M *et al*. 1999). In 1969, it was estimated that over 5,000 females nested at Rancho Nuevo (Márquez-M *et al*. 2001). This number declined through the next decades to an average of approximately 740 nests during the 1985 to 1987 nesting seasons (Marquez-M *et al*. 2001). As conservation measures continued, the number of nesting females on Mexican nesting beaches has begun to increase. The number of nests increased to more than 8,200 nests during the 2003 season (USFWS 2003). From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% (95% C.I. slope = 0.096-0.130) per year. Approximately 4,000 females are currently documented nesting annually (NMFS and USFWS 2007d). While this is a considerable increase over the number of nesting females in the mid-1980s, it is still well below the size of the population only 60 years ago. The most recent review of the Kemp's ridley population reports that the size of the population is believed to be increasing and that it is in the early stages of recovery (NMFS and USFWS 2007d). However, the species continues to face numerous threats and remains well below historic population levels.

Life history of the Kemp's ridley sea turtle

Kemp's ridley nesting occurs from April through July each year (USFWS and NMFS 1992). It is unique in that it nests during daylight hours in large assemblages known as arribadas. Little is known about mating but it is believed to occur at or before the nesting season near the nesting beach. Hatchlings emerge after 45 – 58 days (USFWS and NMFS 1992). Once they leave the beach, neonates presumably enter the Gulf of Mexico where they feed on available *Sargassum* and associated infauna or other epipelagic species (USFWS and NMFS 1992). The presence of juvenile turtles along both the Atlantic and Gulf of Mexico coasts of the U.S., where they are recruited to the coastal benthic environment, indicates that post-hatchlings are distributed in both the Gulf of Mexico and Atlantic Ocean (TEWG 2000). The location and size classes of dead turtles recovered by the STSSN suggest that benthic immature developmental areas occur in many areas along the U.S. coast and that these areas may change given resource quality and quantity (TEWG 2000).

During the summer months, juvenile Kemp's ridleys use northeastern and Mid-Atlantic coastal waters as primary developmental habitats with shallow coastal embayments serving as important foraging grounds. Foraging areas documented along the Atlantic coast include Pamlico Sound (NC), Chesapeake Bay, Long Island Sound, Charleston Harbor (SC), and Delaware Bay. Developmental habitats are defined by several characteristics including coastal areas sheltered from high winds and waves such as embayments and estuaries, and nearshore temperate waters shallower than 50 m (NMFS and USFWS 2007d). The suitability of these habitats depends on resource availability, with optimal environments providing rich sources of crabs and other invertebrates. A wide variety of substrates have been documented to provide good foraging habitats, including seagrass beds, oyster reefs, sandy and mud bottoms and rock outcroppings

(NMFS and USFWS 2007d). Adults are primarily found in near-shore waters of 37 m or less that are rich in crabs and have a sandy or muddy bottom (NMFS and USFWS 2007d).

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al.* 1987; Musick and Limpus 1997). In the Chesapeake Bay, ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridley sea turtles consume a variety of crab species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly *et al.* 1995a; Epperly *et al.* 1995b). Kemp's ridleys that do not migrate south before declines in water temperatures face the risk of cold stunning.

Natural and Anthropogenic Impacts

Kemp's ridleys face many of the same natural threats as loggerhead sea turtles including destruction of nesting habitat from storm events, natural predators, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999/2000, there was a major cold-stunning event where 216 Kemp's ridleys, 52 loggerheads, and 5 green turtles were found on Cape Cod beaches (STSSN database.). Annual cold stun events do not always occur at this magnitude. During the winter, 88 Kemp's ridleys were found on Cape Cod beaches in 2001/2002, 186 Kemp's ridleys were found during 2002/2003, and 32 Kemp's ridleys were found during the 2004/2005 season (STSSN database). The extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Although many cold-stun turtles can survive if found early enough, cold-stunning events can represent a significant cause of natural mortality.

Like other turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940s through the early 1960s, nests from Ranch Nuevo were heavily exploited (USFWS and NMFS 1992), but beach protection in 1966 helped to curtail this activity (USFWS and NMFS 1992). Following World War II, there was a substantial increase in the number of trawl vessels, particularly shrimp trawlers, in the Gulf of Mexico where the adult Kemp's ridley turtles occur. Information from fishers helped to demonstrate the high number of turtles taken in these shrimp trawls (USFWS and NMFS1992). Subsequently, NMFS has worked with the industry to reduce turtle takes in shrimp trawls and other trawl fisheries, including the development and use of TEDs.

Although changes in the use of shrimp trawls and other trawl gear have helped to reduce mortality of Kemp's ridleys, this species is also affected by other sources of anthropogenic impacts similar to those discussed above. For example, in the spring of 2000, a total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all of the carcasses washed ashore. Two takes of Kemp's ridley sea turtles have been documented in the sea scallop dredge fishery.

4.2.2.5 Species Not Likely to Be Affected

Many species listed as endangered or threatened under the ESA or protected under the MMPA are found in the geographical area of the action but are not likely to be affected. A Biological Opinion completed March 2008 on the sea scallop fishery found that the operation of the sea scallop fishery would not likely adversely affect shortnose sturgeon; hawksbill sea turtles; North Atlantic right, humpback, fin, sei, blue, or sperm whales; all of which are listed as endangered under the ESA.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. The species is estuarine anadromous (moving from the sea to freshwater to spawn) south of Chesapeake Bay, while some northern populations are freshwater amphidromous (adults spawn in freshwater, but regularly enter saltwater habitats; NMFS, 1998a). There have been no documented cases of takes of shortnose sturgeon in the scallop fishery or other fisheries that operate in similar locations or with similar gear. Since the scallop fishery does not operate in or near rivers where concentrations are most likely found, it is not likely that the proposed action will affect shortnose sturgeon.

The hawksbill sea turtle is uncommon in waters of the continental U.S., preferring coral reefs. There are accounts of hawksbills in south Florida, and a number encountered in Texas. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). However, many of these strandings were observed after hurricanes or offshore storms. Only one take of a hawksbill sea turtle has been recorded in northeast or Mid-Atlantic fisheries covered by the NEFSC observer program, including the scallop dredge fishery (NEFSC, FSB, Observer Database). This take was recorded in 1994. Given the range of hawksbill sea turtles and the lack of documented takes in fisheries that operate in or near the area of the proposed action, it is reasonable to conclude that the alternatives are unlikely to affect hawksbill sea turtles.

The only known interaction between a cetacean and scallop gear occurred in 1983 when a humpback whale became entangled in the cables of scallop dredge gear off Chatham, Massachusetts. The entanglement was reported and responded to by disentanglement personnel. Although this event shows that interactions between large cetaceans and scallop gear can occur, such interactions are reasonably expected to be extremely unlikely to occur given the size, speed and maneuverability of large cetaceans in comparison to scallop fishing gear (NMFS 2004c).

Cetaceans listed as endangered that are present within the geographic area of the proposed action include right, humpback, fin, sei, sperm, and blue whales. Right, humpback, and fin whales inhabit Mid-Atlantic waters over the continental shelf. Sei whales predominately inhabit deep water throughout their range, typically over the continental slope or in basins situated between banks (NMFS 1998b). During the CeTAP study, sperm whales were observed along the shelf edge, centered around the 1000 meter depth contour but extending seaward out to the 2000 meter depth contour (CeTAP 1982). Blue whales are occasionally seen in U.S. waters but are more commonly found in Canadian waters (Waring *et al.* 2000). A number of species protected under the MMPA are also present in the action area but are unlikely to be affected by the proposed action. Minke whales are common and widely distributed across the U.S. continental shelf, with numbers peaking in spring and summer (Waring *et al*. 2003). Little is known about the distribution of Bryde's whale in the northwestern North Atlantic, although strandings or sightings have been reported from Virginia south to Brazil (Kato, 2002). It is highly unlikely that any of these species would interact with scallop dredge gear given their size, speed, and maneuverability in comparison to the gear.

Risso's dolphins, pilot whales, Atlantic white-sided dolphins, and pelagic delphinids (common, spotted, striped, and offshore bottlenose dolphins) are found along the continental shelf within the geographic scope of the action. However, their pelagic feeding habitat and preferred prey species make it unlikely that they would interact with bottom tending gear used in the scallop fishery (NEFMC 2003). Sightings and strandings of beaked whales (*Ziphius cavirostris* and *Mesoplodon spp*.) are known to occur along the U.S. Atlantic from the Gulf of Mexico to Canada (Waring *et al*. 2003). Due to their pelagic habits and general lack of concentrated populations, the beaked whales are not likely to interact with the scallop dredge fishery. During fall and spring, harbor porpoises are widely dispersed from New Jersey to Maine, with lower densities north and south. During winter months, they can be found in waters off New Jersey to South Carolina. Harbor porpoises are not known to interact with bottom dredges or trawls (NEFMC 2003).

The coastal bottlenose dolphin ranges south from New Jersey, rarely extending beyond the 25 m depth contour north of Cape Hatteras. Harbor seals are found along the southern New England and New York coasts from September to late May and are occasionally seen as far south as the Carolinas. Coastal bottlenose dolphins and harbor seals are rarely found in the deeper cold water regions where the scallop fishery occurs and are unlikely to interact with the fishery. Harp and hooded seals are found throughout much of the North Atlantic and Arctic Oceans. In recent years, the number of sightings and strandings of harp seals off the east coast north of New Jersey has been increasing. These extralimital appearances usually occur January–May when the species is at its most southern point of migration (Waring *et al.* 2003). Hooded seals are found farther offshore than harp seals and may stray into U.S. waters as far south as Florida from December through March (Wynne and Schwartz 1999). Harp and hooded seals are not expected in the geographic area during the time of the proposed action.

The roseate tern and piping plover, listed under the ESA, inhabit coastal waters within the Northeast region. Foraging activity for these species occurs along the shoreline and for terns in the top several meters of the water column. Given their habitat preferences and foraging behavior, bottom tending gear used in the scallop fishery is unlikely to interact with these species.

4.2.3 Habitat

The waters within the geographic scope of the alternatives are considered Essential Fish Habitat (EFH) for various life stages of the following species under NMFS' jurisdiction pursuant to the MSFCMA: Atlantic cod, haddock, pollock, whiting, red hake, white hake, offshore hake, redfish, witch flounder, winter flounder, yellowtail flounder, windowpane flounder, American plaice, ocean pout, Atlantic halibut, Atlantic sea scallop, Atlantic sea herring, monkfish, bluefish, long finned squid, short finned squid, butterfish, mackerel, summer flounder, scup, black sea bass, surfclam, ocean quahog, spiny dogfish, tilefish, red drum, king mackerel, Spanish mackerel, cobia, dusky shark, sandbar shark, basking shark, tiger shark, blue shark, shortfin mako shark, sand tiger shark, common thresher shark, scalloped hammerhead shark, Atlantic angel shark, Atlantic sharpnose shark, white shark, yellowfin tuna, albacore tuna, bluefin tuna, skipjack tuna, swordfish, barndoor skate, clearnose skate, little skate, roseatte skate, thorny skate, winter skate, and golden crab. EFH refers to those waters and substrate necessary for fish to spawn breed, feed, or grow to maturity (MSFCMA, 16 U.S.C. 1801 *et seq.*).

4.2.4 Economic and Social Environment

The fishing industry that would be affected by the proposed action is the scallop dredge fishery south of 41º 9.0' N. lat. The scallop fishery has been previously described in various documents (NEFMC 2000a, 2003, 2004, 2005; NMFS 2004a, 2007c), and the following will serve as a brief summary. The fishing year (FY) is March 1 through February 28/29.

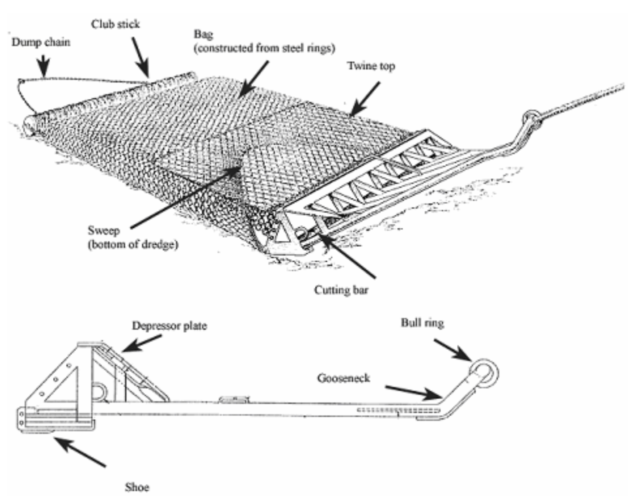
The sea scallop fishery in the U.S. EEZ is currently managed under the Scallop FMP. The commercial scallop fishery ranges from offshore waters near the Virginia-North Carolina border to the Gulf of Maine on the eastern portion of Georges Bank bounded by the U.S./Canadian territorial sea (NEFMC 2003). In the Georges Bank and Mid-Atlantic regions, scallops are harvested in water temperatures ranging from 1 – 19 ºC (NMFS 2000). The scallop fishery over Georges Bank and in the Mid-Atlantic is a deeper water fishery in comparison to the Gulf of Maine (NEFSC 2005). From FY2001-FY2003, the Mid-Atlantic scallop fishery generally operated in depths from 9.1–91.4 m with 40-50% of trips operating in depths shallower than 45.7 m (Murray 2004a).

The management unit for the Scallop FMP consists of the sea scallop resource throughout its range in waters under the jurisdiction of the U.S. Resource areas generally recognized within the management unit include Delmarva, New York Bight, South Channel and southeast part of Georges Bank, Northeast peak and the northern part of Georges Bank, and the Gulf of Maine (NEFMC 2003).

The sea scallop fishery is regulated as two directed fisheries — a limited access and open access (general category) fishery. Vessels in the limited access fishery are categorized as full-time, part-time, and occasional based on that vessel's scallop fishing activity from 1985 to 1990 (NEFMC 2003). Management measures for the fishery include: DAS allocations, minimum shell height requirements, crew restrictions, gear restrictions, vessel monitoring system requirements, permit requirements, closed areas, an area rotation program, possession and landing limits, vessel upgrading restrictions, and restrictions on the transfer, sale, voluntary relinquishments or abandonment of permits.

Scallop fishing is conducted by vessels using dredges or trawls. As this action will only impact sea scallop dredge vessels, dredge gear will be focused on here. Dredges are rake-like devices, equipped with bags to collect the catch. They are typically used to harvest molluscan shellfish from the seabed (DeAlteris 1998). In general, 80% to 90% of landings coastwide are made by vessels using two 15 ft dredges, composed of a bail, ring bag, club stick, and twine top (Figure 4.4). The bail forms the mouth and the towing apparatus, ending forward with an upturned nose and a roller. The frame includes a sloping pressure plate to keep the dredge on the bottom and a cutting bar that lifts the scallops from the bottom by hydraulic action. The dredge bag is made of steel rings and terminates in a rigid club stick used to dump the contents on board (NEFMC 2003). The twine top is sewn into the top of the dredge. The total weight of a sea scallop dredge with a width of 15 ft is approximately 4,500 pounds for the dredge frame, bag, and club stick (memo from Ellen Keane to The File, March 4, 2008). This weight will vary somewhat based on the dredge design and configuration. The dredges are towed at speeds of 4 to 5 knots (NMFS 2002a). Fishing occurs year round, with the unusual exception of bad weather (NEFMC 2003). Scallop vessel tow times vary, but are typically less than 1.5 hrs in duration with many less than 1 hr (NMFS 2003b).

Figure 4.4: Atlantic sea scallop dredge



Another 5% of the total landings come from smaller vessels with single dredges, limited by regulation to no more than 10.5 ft in total width (NEFMC 2003). The rest of the dredge is the same as described above. In FY2003, 15% of the dredge hauls accomplished by commercial vessels in the Mid-Atlantic used dredges less than or equal to 10 ft (Murray 2004a). The remaining 10% of landings come from vessels using scallop trawls, mainly in the Mid-Atlantic during the summer months (NEFMC 2003). In FY2003, 95% of scallop landings were attributed to scallop dredge gear, while 5% of landings were by trawl gear. It is interesting to note that while landings by trawl gear were much lower than landings by dredge gear, the Delmarva resource area accounted for 90% of the trawl landings (NMFS Preliminary Statistics).

The commercial Atlantic sea scallop fishery is a limited access fishery (meaning that no new entrants are allowed). Vessels participating in the fishery possess either one of the 8 limited access permits or a general category (open access) permit (Table 4.2). Two types of general category permits are available to any vessel owner who did not qualify for a limited access permit. As described in section 2.1.1, scallop possession and landing limits vary depending on which of these apply to the vessel. Of the 346 limited access permits in the 2006 fishing year, there were 312 full-time permits, 33 part-time permits, and 1 occasional permit (memo from Ryan Silva to Ellen Keane, September 24, 2007). Of the full-time permits, 249 were full-time dredge, 52 were full-time small dredge, and 11 were full-time trawl. Of the part-time permits, 3 were part-time dredge, 30 were part-time small dredge, and 0 were part-time trawl. The one occasional permit was for a dredge vessel. There were 3,011 general category permits in FY2006. Of these, 1,108 were General Category 1B (VMS general category permit) and 1,903 were General Category 1A (non-VMS general category) (memo from Ryan Silva to Ellen Keane September 24, 2007).

Limited access vessels are further limited to the number of days that they can fish based on their annual DAS allocations. The total available DAS for any given fishing year is divided into a fixed number of DAS in open areas plus a fixed number of trips and DAS in CAAs. These DAS are not interchangeable and are allocated and monitored separately. Vessels in each permit category are allocated a specific number of trips and DAS for use in Scallop Access Areas with a specified number of DAS charged for each area trip regardless of actual trip length (69 FR 63460, Nov. 2, 2004).

Typically, the number of vessels that fish under a general category scallop permit is a fraction of the number of vessels that possess a general category permit. In 2003 and 2004, less than 20% of the general category permits issued were actually used to land scallops (NEFMC 2005). Nevertheless, the number of general category permits issued, the number of general category permitted vessels landing scallops, and the total landings of scallops by vessels possessing a general category permit did increase in 2003 and 2004 as compared to previous years (NEFMC 2005). Landings and effort have increased in the general category fleet in recent years (NMFS 2007g).

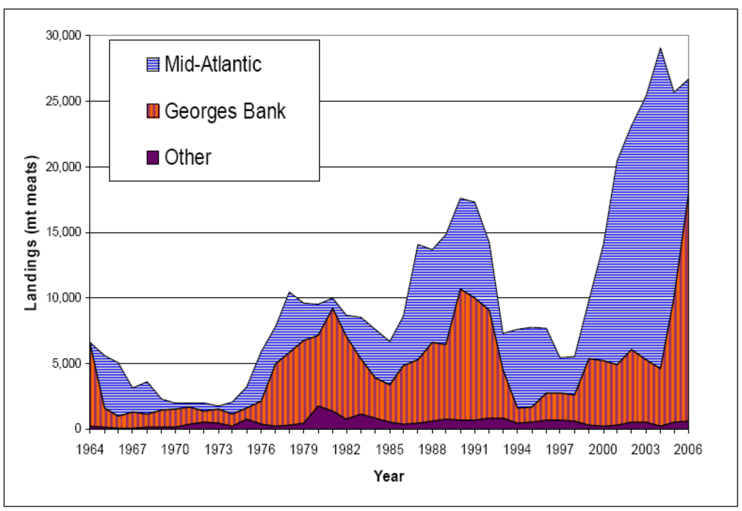
Other Federal Northeast Region permits often held by permitted scallop vessels include bluefish, dogfish, black sea bass, summer flounder, herring, lobster, monkfish, multispecies, ocean quahog, scup, surf clam, squid/mackerel/butterfish, and tilefish (NEFMC 2005). These permits give an indication of the range of fishing activities these vessels may participate in given changing biological or regulatory conditions.

Table 4-2: Permit categories under the Scallop FMP

Category	Permit Type	Permit Description	Number of Permits FY2006
1A	Open Access	**General:** Possess or land no more than 40 lbs of shucked scallops or 5 U.S. bushels of in-shell scallops per trip (one trip per calendar day).	**1903**
1B	Open Access	**General:** Possess or land no more than 400 lbs of shucked scallops or 50 U.S. bushels of in-shell scallops per trip (one trip per calendar day). Vessel Monitoring System (VMS) required.	**1108**
2	Limited Access	**Full Time** : VMS required	**249**
3	Limited Access	**Part Time:** VMS required	**3**
4	Limited Access	**Occasional**	**1**
5	Limited Access	**Full Time - Small Dredge** Category 3 (Part Time) vessel may elect this category for the entire year. May fish for scallops using one dredge no larger than 10.5 ft and a crew no larger than 5.	**52**
6	Limited Access	**Part Time - Small Dredge:** Category 4 (Occasional) vessel may elect this category for the entire year. May fish for scallops using one dredge no larger than 10.5 ft and a crew no larger than 5. VMS required.	**30**
7	Limited Access	**Full-Time - Authrorized to Use Trawl Nets:** Vessel Monitoring System (VMS) required to be installed and in continuous operation onboard the vessel. VMS required.	**11**
8	Limited Access	**Part Time - Authorized to Use Trawl Nets:** VMS required	**0**
9	Limited Access	**Occassional - Authorized to Use Trawl Nets**	**0**

Sea scallop landings in the U.S. increased substantially after the mid-1940s with peaks around 1960, 1978, 1990 and 2001–2006 (NMFS 2004a, 2007c). Landings increased from about 8,000 mt meats per year in the mid-1980s to over 17,000 mt meats per year during 1990-1991, declined during 1993-1998 to 5,000-8,000 mt meats per year, and then increased rapidly during 1999-2001 (NMFS 2007c). Landings reached historical peaks (averaging 26,000 mt meats per year) during 2002-2006 (NMFS 2007c). During 1997-2006, landings in the Gulf of Maine averaged 316 mt meats per year while landings in southern New England averaged 139 mt meats per year (NMFS 2007c). Georges Bank and the Mid-Atlantic are more productive in terms of scallop landings. During 1997-2006, landings from Georges Bank averaged 6032 mt per year; while landings from the Mid-Atlantic averaged 12,059 mt per year (NMFS 2007c). The Mid-Atlantic Bight accounted for three-quarters of total landings during 2000-2005. In contrast, Georges Bank accounted for two-thirds of total landings during 2006 (NMFS 2007c). The shift in 2006 was due to low landings in the Hudson Canyon access area in the Mid-Atlantic combined with high landings in the Georges Bank access areas (NMFS 2007c). The mean weight of a landed scallop is currently over 20g compared to 14g a decade ago (NMFS 2004a).

Figure 4.5: Total landings of sea scallops (mt meats)



Source: NMFS 2007c

Scallop fishermen tend to consistently fish the same areas (NEFMC 2003, 2005). Virtually all general category and at least half of the limited access vessels caught at least half of their annual scallop pounds in just one statistical area. They choose these areas for a number of social and economic reasons. For example, day vessels may fish close to shore because of a personal and social desire to return home every night (NEFMC 2003, 2005). When a particular area's contribution to the vessel's annual catch is examined, it becomes apparent that the areas along the coast of New England, and to a lesser extent the Mid-Atlantic, seem to be important in terms of annual catch dependence, though they are not necessarily the areas that bring home the "slammer" trips (NEFMC 2003, 2005).

While the scallop fleet is spread throughout the eastern seaboard, the majority of limited access vessels are found in Massachusetts, Virginia, New Jersey, and North Carolina. For general category permits, the majority of vessels operate out of Massachusetts, Maine, and New Jersey (NEFMC 2005). The ports of New Bedford, Cape May, Newport News, and Norfolk have the greatest number of limited access permitted vessels; while New Bedford, Gloucester, Cape May, Point Judith, and Chatham have the greatest number of general category permitted vessels (NEFMC 2005).

Vessels land their catch at different ports at different times of the year and at ports other than their home ports. The relationship between these different geographies is important to understanding the communities to which scallop fishermen belong, the influences between communities, and the impacts of management (NEFMC 2003, 2005). Amendment 10 of the Scallop FMP gauged the spatiality of economic activity and its changes over time in an attempt to ground the different places to which fishermen belong. The top ten ports for landing have stayed relatively consistent in recent years, with New Bedford dominating (NEFMC 2005). The majority of high-volume ports (New Bedford, Newport News, Cape May, Seaford, Hampton, Barnegat Light, and Point Pleasant) have predominately been limited access ports (≥ 85% of landed value from limited access vessels). Other ports (Hampton Bays, Sandwich, Wellfleet) have been open access ports, while still others have shifted between permit categories (NEFMC 2003, 2005). While the top ten landing ports have remained relatively constant, there have been some changes. Hampton, VA has seen an increasing smaller share of the total landings and other port areas – namely Cape Cod ports – have seen an increasing importance from scallops (NEFMC 2005).

A slightly different picture emerges when evaluating ports the boats call their "home port." Again, New Bedford, and other larger landing ports dominate, but a number of ports in North Carolina also seem important. There is a close connection between home port and port of landing. Despite the significance of landings from Closed Area II in 1999 and other reopened areas in 2000, overall the increase in landings came mainly from vessels home ported in the same county in which they landed their catch. There is a more variable relationship between home port and landing port at the port level (NEFMC 2003).

Any dealer processing scallops must hold a federal dealer permit. In 2000 and 2001, approximately half of the active licensed scallop dealers operated in Maine and Massachusetts. Approximately 25% of dealers depended almost exclusively (90–100%) on scallops for their business, while 50% of dealers had a relatively low (0–10%) dependence on scallops. There were 19 processors in the Northeast Region in 2000. Only 2 states had more than 3 firms, 6 in Massachusetts and 4 in Virginia. The average employment for a given processor in the region was 81, ranging from 4-262. The average monthly employment by state in the region was 193, varying from 4 to 799 (NEFMC 2003).

5.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

This section outlines the scientific and analytic basis for the comparisons among the alternatives, as well as describes the probable consequences of each alternative on selected environmental resources. The environmental consequences will be addressed for the three alternatives outlined in section 3.0. It should be noted that the configuration that would be required under the preferred and the no action alternatives is the same configuration that is required under the existing regulations. This section will re-evaluate the impacts, considered in the August 2006 rulemaking, that result from requiring dredges in the Atlantic sea scallop fishery to be configured with a chain mat in a particular area from May 1 through November 30 each year. No physical, biological, or socio-economic impacts will result from the modifications to the regulatory text. The changes are being made to clarify the existing requirements and will not result in any environmental consequences. In addition, the transiting provision will not result in any environmental consequences. Therefore, this section does not address these changes further.

Three potential behavior responses exist when a gear modification is required. The vessel can choose not to fish in the prohibited area (and not to fish at all), modify the gear and continue fishing in the area, or fish elsewhere. As the chain mat modification is fairly inexpensive (section 5.1.4), this analysis assumes that vessels will convert their gear and continue fishing in the area. The fishing industry directly impacted by this action is the sea scallop dredge fishery operating south of 41º 9.0' N lat. A summary of the impacts can be found in Table 5.13.

5.1 Preferred Alternative – Modification of Current Regulatory Requirements

5.1.1 Physical Impacts

In considering the effects of the proposed action on the physical environment, all of the following must be considered: gear-specific effects on the habitat type, frequency and geographic distribution of the bottom tows, and the physical characteristics of the seafloor. The direct effects of dredging include smoothing of sedimentary bedforms, creation of grooves, dispersal of shell aggregates, and resuspension of bottom sediments (Caddy 1973; Auster *et al.* 1996; Thrush *et al*. 1998; NMFS 2001a). A study on the effects of commercial dredging on sand and mud bottoms of the Mid-Atlantic shelf found that scallop dredges create less short-term disruption to sediments than hydraulic clam dredges (Murawski and Serchuk 1989). In the area of the proposed action, the sea scallop fishery generally occurs over areas of sand. In this type of environment, the degree of impact from scallop dredging can be large, but the duration of this impact is relatively short (days-months; NMFS 2002a).

Whenever the chain mat configuration is used, there will likely be an impact to the physical environment due to increased disturbance of bottom sediments as the chain mat comes into contact with the bottom. However, the area of the seafloor swept by the chain mat is the same area swept by the cutting bar and the dredge bag, and the impact is expected to be minimal and temporary because the sediment type in this area has a rapid recovery time. Vessels are expected to modify their gear and to continue to fish in the same area. During the experimental fishery to test modified dredge, scallop catches were highly variable from vessel to vessel and trip to trip, with differences ranging from -30.88% to 7.28%. On average, the scallops catch with the modified dredge was 6.71% less than with the unmodified dredge. The researchers assume that as the vessel captains become more familiar with the chain-mat modified gear, catch rates will be less variable and more consistent with the unmodified dredge (DuPaul *et al.* 2004a). Some vessels may tow longer to offset a loss of scallop catch. However, as described above, physical impacts are expected to be minimal and temporary due to the rapid recovery times in this environment. In addition, the differences in the catch of scallops between the modified and the unmodified gear are expected to decrease as fishermen become more experienced using the gear. These factors further limit the impacts to the physical environment. The PA is not expected to substantially impact the physical environment.

5.1.2 Biological Impacts

5.1.2.1 Fishery Resources

Field trials of the chain-mat modified dredge were conducted in 2003 – 2004 with 3,248 tows (of which 2,823 were observed). One of the vessel's two dredges was modified by the addition of the chain mat. During 982 of the observed tows, sea scallop catch between the modified and unmodified dredge was sampled. Catches were highly variable from vessel to vessel and trip to trip, with differences ranging from -30.88% to 7.28% (average -6.71%). The researchers concluded that this was not a substantial reduction in capture of the target species and assume that as the vessel captains become more familiar with rigging the chain mats, catch rates will be less variable and more consistent with the dredges without the modification (DuPaul *et al.* 2004a).

Studies of commercial scallop dredging on the Mid-Atlantic shelf show that less than 5% of the scallops observed in or near the dredge path were broken or mutilated (Murawski and Serchuk 1989). This is well below that observed in the Gulf of Saint Lawrence where rates of 13% – 17% have been reported, with greater incidence in rocky than in sandy areas (Caddy 1973). The higher levels may be due to both the crushing of scallops against rocks and the heavier dredges used in rocky areas (Murawski and Serchuk 1989). The area swept by the chain-mat modified dredge is the same as the area swept by an unmodified dredge. The total weight of a sea scallop dredge with a width of 15 ft is approximately 4,500 pounds for the dredge frame, bag, and club stick (memo from Ellen Keane to The File, March 4, 2008). This weight will vary somewhat based on the dredge design and configuration. The weight of the chain mat is estimated to be between 56 pounds for a 10-ft dredge and 147 pounds for a 15-ft dredge (email from Henry Milliken (NEFSC) to Richard Merrick (NEFSC), October 1, 2004). Assuming 20% additional chains and shackles would be required for some vessels to comply with the 14-inch requirement (a conservative overestimate) (memo from Ellen Keane, NMFS, to The File, October 3, 2007), the range of weights would increase by 11 lbs for a 10-ft dredge to 29 lbs for a 15-ft dredge. The weight of the modified dredge is not considerably different from that of the unmodified dredge, and the use of the modified dredge is not expected to substantially affect the scallop resource.

Bycatch species in the Mid-Atlantic scallop fishery frequently include, but are not limited to, flatfish, monkfish, and skates (NEFMC 2003). During the 2003–2004 field trial of the modified dredge, bycatch of invertebrates and finfish on 882 comparative tows was recorded (DuPaul *et al.* 2004). Finfish and invertebrate bycatch encountered during the testing of the chain mat are shown in Table 5.1.

Table 5-1 : Finfish and invertebrate bycatch (number of individuals) encountered during the testing of the chain mat configuration. Experimental indicates catch from a dredge equipped with the chain mat configuration. Totals were calculated from 882 comparative tows.

	Experimental	Control
Spiny Dogfish	16	11
Unclassified Skate	25111	24726
Clearnose Skate	91	95
Silver Hake	18	35
Red Hake	509	477
Spotted Hake	588	589
Summer Flounder	144	165
Fourspot Flounder	1210	1504
Blackback Flounder	57	44
Grey Sole	71	61
Windowpane Flounder	354	300
Black Sea Bass	30	22
Northern Searobin	12	12
Armored Searobin	157	183
Monkfish	3854	3341
Unclassified Crab	19	37

Source: DuPaul et al. 2004a

5.1.2.2 Endangered/Threatened Species and Critical Habitat

The PA will impact loggerhead sea turtles. Green, leatherback, and Kemp's ridley sea turtles may also be impacted; however, NMFS expects interactions with these species to be rare given their distribution, habitat preference, and the distribution of sea scallop dredge fishing effort. In the December 2004 Biological Opinion, NMFS determined that requiring modification of scallop dredge gear at times and in areas where sea turtles interactions are likely to occur was a Reasonable and Prudent Measure necessary or appropriate to minimize impacts of incidental take of sea turtles (NMFS 2004c). In the March 2008, Biological Opinion, NMFS anticipates the biennial take, for scallop dredge gear, of up to 929 loggerhead sea turtles of which up to 595 may be lethal takes (includes serious injuries). In addition, NMFS anticipates the annual take of up to 1 leatherback sea turtle (non-lethal), 2 Kemp's ridley sea turtles (lethal or non-lethal), and 2 green sea turtles (lethal or non-lethal) in scallop dredge gear (NMFS 2008).

Bycatch Estimates

As described in sections 2.1.3 and 2.1.4, several assessments of sea turtle bycatch in the mid-Atlantic sea scallop dredge fishery have been completed by the NEFSC. An estimated 749 loggerhead sea turtles (CV = 0.28) were captured in scallop dredge gear operating in the Mid-Atlantic during the 2003 fishing year (Murray 2004a). An estimated 180 loggerhead sea turtles

(CV = 0.37) were captured during the 2004 fishing year (Murray 2005), and 0 (CV = 0.19) during the 2005 fishing year (Murray 2007). It should be noted that while there were no takes observed during the 2005 fishing year, NMFS observers did document three takes while the observers were off-watch. The NEFSC has attempted to identify a variable for predicting sea turtle bycatch in the dredge component of the scallop fishery (Murray 2004a, 2004b, 2005). Using a modeling approach, sea surface temperature (SST), depth, time-of-day, and tow time were identified as variables affecting observed bycatch rates of sea turtles with scallop dredge gear (Murray 2004a, 2004b, 2005). However, the variable(s) associated with the highest bycatch rates changed from one year to another (e.g., SST, depth) or could not be further analyzed (e.g., time-of-day and tow time) because the information is not collected for the entire fishery (Murray 2004a, 2004b, 2005). Therefore, a set of variables has not yet been found for forecasting sea turtle bycatch with scallop dredge gear.

Sea turtle takes in the Atlantic sea scallop fishery

Sixty-five sea turtles were observed taken in the scallop dredge fishery from 1996 through December 2007 while an observer was on-watch (excluding the experimental fishery). Sixteen additional sea turtles were reported taken while the observer was off-watch or on unobserved hauls (NEFSC, FSB, Observer Database). Of the 65 observed takes, 46 were identified as loggerhead sea turtles, 1 was identified as a green sea turtle, 1 was identified as a Kemp's ridley sea turtle and the remaining animals were hard-shelled sea turtles that could not be positively identified. One of the off-watch/unobserved takes was a Kemp's ridley sea turtle; while the remainders were loggerhead or unidentified hard-shelled sea turtles. Of the total 65 turtles, 5 were fresh dead upon retrieval or died on the vessel, 1 was alive but required resuscitation, 28 were alive but injured, 19 were alive with no apparent injuries, and 12 were listed as alive but condition unknown because the observer did not have sufficient opportunity to examine the turtle.

As described in section 2.1.5, two interactions were reported during the pilot study and eight turtle interactions (six of which were observed by NMFS-approved observers) were reported during the course of the experimental fishery to test the chain mats (DuPaul *et al.* 2004a). Of the 8 sea turtles caught, 3 were alive with no apparent injuries, 3 were alive released with injuries, 1 was killed when the dredge frame fell on the turtle, and 1 was killed prior to coming aboard (Table 2.2). Research has also been conducted on a dredge designed with a modified bail to increase the likelihood that a turtle will pass over the dredge frame rather than under the cutting bar (see section 2.1.5 for more information). During sea scallop catch retention studies for this gear, one sea turtle was reported captured in the unmodified (control) dredge. The sea turtle was reported by a crew member wedged between two of the bail bars and as against the pressure plate. The turtle struck the side of the vessel as the gear was hauled, dropping from the gear before it was brought aboard (Smolowitz *et al.*,2008).

Since the requirement for the chain-mat modified gear became effective, the NEFSC FSB has documented five takes of sea turtles in the scallop dredge fishery. These takes occurred in June (1), August (1), September (2), and October (1). Four of the takes, all loggerhead sea turtles, occurred south of the 41° 9.0' N. latitude line (the northern boundary of the regulation); while one take, a Kemp's ridley, was documented north of this line. Chain mats were not required, nor were they used, on the trip that occurred north of 41° 9.0' N. latitude. Of the four takes south of the line, one of the turtles was reported by the crew on top of the dredge frame, swimming away before the dredge came on deck and two were reported in the dredge bag. The last turtle was reported by the captain on the outside of the chains, between the chains and the dredge. Chain mats were used on the four hauls south of 41° 9.0' N. latitude that interacted with sea turtles.

The turtle reported by the crew on the dredge frame, possibly held by water pressure, swam away before the gear came above the waterline. Turtles have been documented on the dredge frame previously and usually the turtle swims away as the gear nears/reaches the surface, indicating that the turtle may have been held by water pressure. As described below, the chain mat is designed to prevent the capture of sea turtles in the dredge bag. The chain mat is not designed to prevent this type of interaction and an interaction of this nature can occur regardless of whether a chain mat is used.

One turtle was reported by the vessel captain to be on the outside of the chain mat, caught between the dredge and the chains. However, it is unclear how and exactly where the turtle was caught/hung up on the dredge frame and/or the chains. This turtle was brought on-board. The captain reported that the turtle hit between the dredge and the vessel and then again while lowering the gear to deck. This type of interaction could result in injuries that occur during hauling and emptying of the gear. From the available information, it is unclear whether the chain mat contributed to the take or the nature of the injuries sustained by the turtle.

As described in detail below, the chain mat modified gear is expected to prevent most sea turtles from entering the dredge bag and injuries that result from such capture. However, two turtles were documented in the dredge bag in 2007 (NEFSC, FSB, Observer Database). NMFS investigated whether this may mean that the gear was not functioning as expected and as described below. For one of the interactions resulting in capture in the dredge bag, the openings in the chain mat were measured by the observer at the start of the trip and following the take. After the tow in which the turtle was observed some openings in the chain mat, particularly at the top of the bag and near the sweep, measured from 16 to 20 inches. The turtle captured on this trip measured 65.2 cm (25.7") curved carapace length from notch to tip and 61.5 cm (24.2") curved carapace width (NEFSC, FSB, Observer database). Using the formulas in Teas (1993) and Coles (1999), respectively, this is a straight carapace length of 60.4 cm (23.8") and a straight carapace width of 50.2 cm (19.8"). Given the observer measurements of the chain mat, a sea turtle of the size observed captured would be small enough to pass through the observed openings.

The second turtle reported captured in the dredge bag measured 89 cm (35.0") from notch to tip and 83 cm (32.7") curved carapace width (NEFSC, FSB, Observer database). Using the formulas in Teas (1993) and Coles (1999), respectively, this is a straight carapace length of 82.9 cm (32.6") and a straight carapace width of 66.2 cm (26.1"). No measurements were taken of the openings in the chain mat. However, the observer's comments indicate that there were breaks in, or problems with, the chain mat that allowed the turtle to be captured in the bag. There were several comments in the observer's log about chains/shackles being broken, but none specifically on the tow in which the turtle was taken. On tows prior to the one on which the turtle was taken, there were several instances of large (500 and 800 pounds) rocks being caught inside the dredge. The rocks were larger that the turtle that was taken, and too large to fit through a chain mat that was operating correctly. The observer also stated that the horizontal chain closest to the cutting bar may not have been attached to the vertical chain, so the grid was not fixed, which would allow for larger openings (memo from Pasquale Scida to The File, March 11, 2008). For both of these takes, the available information indicates that there were openings in the chain mat that were larger than 14 inches that allowed the sea turtle to be captured in the dredge bag. NMFS is developing a plan to collect information on the degree of stretch/breakage that is occurring in the chain mats. NMFS will also continue to use observer coverage to better understand the nature of interactions that occur outside of the dredge bag.

The requirement that the opening in the chain mat must be 14 inches or less will reduce the severity of sea turtle-gear interactions given the size of sea turtles observed taken in the fishery. Loggerhead sea turtles observed captured in the scallop dredge fishery ranged in carapace width (curved) from 45.0 to 99 cm (17.7 – 39 in; NEFSC, FSB, Observer Database). When converted to straight carapace width based on the formula from Coles (1999), the width of loggerheads observed captured in this fishery ranged from 37.9 – 78.1 cm (14.9 – 30.7 in). Loggerhead sea turtles observed captured ranged in length from 62.2 – 107 cm (24.5 – 42.1 in) from notch to tip (CCL) (NEFSC, FSB, Observer Database)[5]. When converted to straight carapace length (SCL) based on the formula for loggerheads provided in Teas (1993), the size range of the loggerhead sea turtles observed captured in the fishery is 57.5 -100 cm (22.6 – 39.4 in) SCL.

NMFS has reviewed data on the size of Atlantic loggerheads at various life stages. Depending on the dataset used, the cutoff between pelagic immature and benthic immature loggerhead sea turtles was 42 - 49 cm (16.5 – 19.3 in) SCL, and the cutoff between benthic immature and sexually mature loggerhead sea turtles was described as 83 – 90 cm (32.3 – 35.4 in) SCL (NMFS SEFSC 2001). Other authors define the benthic immature stage for loggerheads as 36 – 100 cm SCL (14.2 – 39.4 in; Bass *et al.* 2004). Based on these datasets and observer measurements of loggerhead sea turtles captured in the sea scallop dredge fishery, NMFS anticipates that both benthic immature and sexually mature loggerhead sea turtles are captured in this fishery (NMFS 2008), and that the chain mat with openings of 14" or less will prevent most sea turtles from entering the dredge bag.

Two Kemp's ridley sea turtles have been observed captured in scallop dredge gear to date. Measurements are only available for one of the turtles. This turtle measured 24.3 cm (9.6 in) from notch to tip (curved carapace length) and 26.0 cm (10.2 in) curved carapace width (NEFSC, FSB, Observer Database). Using the formula for Kemp's ridley sea turtles provided in Teas (1993), this is a SCL of 23 cm (9.1 in). When converted to straight carapace width based on the formula from Coles (1999), this is a straight width of 22.1 cm (8.7 in.). The post-hatchling stage for Kemp's ridley sea turtles was defined by the TEWG as 5-20 cm SCL; while turtles 20 – 60

[5] This range only includes those turtles that were measured by observers. Estimated values are not included here as the accuracy of these estimates is not known. A turtle observed taken in 2004 was estimated by the observer to be 170 cm (66.9 in) in length. Since the size of the turtle was estimated rather than measured, it is not included here.

cm SCL were considered benthic immature (TEWG 2000). The latter stage is described as turtles that have recruited to coastal benthic habitat. Therefore, for the purposes of the March 2008 Biological Opinion, NMFS considered the turtle simply as an immature Kemp's ridley sea turtle (NMFS 2008).

The single green sea turtle observed captured in scallop dredge gear was estimated by the observer to be about 70 cm (27.6 in) in length (NMFS 2006b). Hirth (1997) defined a juvenile green sea turtle as a post-hatchling up to 40 cm SCL. A subadult was defined as green sea turtles from 41 cm – the onset of sexual maturity (Hirth 1997). Sexual maturity was defined as green sea turtles greater than 70 – 100 cm SCL (Hirth 1997). It is difficult to determine which age class the green sea turtle observed taken in scallop dredge gear given that its size was estimated rather than measured.

Risks to sea turtles

The chain-mat modified dredge prevents sea turtles encountering the gear from entering the dredge bag, as well as any ensuing injuries as a result of being caught in the dredge bag (e.g., crushing in the dredge bag, crushing on deck, forced submergence). Risks to sea turtles from capture in the dredge bag include forced submergence and carapace injury as described in section 4.2.2.1. A study examining the relationship between tow time and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or comatose turtles rising from 0% for the first 50 minutes of capture to 70% after 90 minutes of capture (Henwood and Stuntz 1987). However, metabolic changes that can impair a sea turtle's ability to function can occur within minutes of forced submergence. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, oxygen stores in sea turtles forcibly submerged are rapidly consumed, anaerobic glycolysis is activated, and the acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz 1997). Forced submergence of Kemp's ridley sea turtles in shrimp trawls resulted in an acid-base imbalance after just a few minutes (times that were within the normal dive times for the species; Stabenau *et al.* 1991). Conversely, recovery times for acid-base levels to return to normal may be prolonged. Henwood and Stuntz (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles to return to normal after capture in shrimp trawls for less than 30 minutes. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. Physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles have been suggested to exacerbate the harmful effects of forced submergence from trawl capture (NRC 1990).

The data used by Henwood and Stuntz has been updated an re-analyzed following the recommendations of the National Research Council (NRC) to reexamine the association between tow times and sea turtle deaths (Epperly *et al.* 2002; Sasso and Epperly 2006). The findings were comparable to Henwood and Stuntz (1987) but with some modifications. In general, tows of short duration have little effect on the likelihood of mortality for sea turtles caught in the trawl gear (Epperly *et al.* 2002; Sasso and Epperly 2006). Intermediate tow times result in a rapid escalation to mortality, and eventually reach a plateau of high mortality, but will not equal 100%

as a turtle caught within the last hour of a long tow will likely survive (Epperly *et al.* 2002, Sasso and Epperly 2006). The stress of being captured in a trawl is greater in cold water than in warm water (Epperly *et al.* 2002; Sasso and Epperly 2006). Epperly *et al.* (2002) gave the example that a 40 minute tow in the summer time was predicted to have a 3% mortality rate whereas a 40 minute tow in the winter time was predicted to have a 5% mortality rate. To achieve a negligible mortality rate (defined by NRC as <1%), tow times for both seasons would have to be less than 10 minutes (Epperly *et al.* 2002; Sasso and Epperly 2006).

Scallop vessel tow times vary, but are typically less than 90 minutes in duration with many less than an hour in duration. The majority of hauls (84%) using scallop dredge gear that were observed to take turtles during the 1996–2002 fishing years were between 45–80 minutes in duration (NMFS 2004c). Assuming that the mortality rate for sea turtles from forced submergence in scallop gear is comparable to that measured for the shrimp fishery by Epperly *et al.* (2002) and Sasso and Epperly (2006), some turtles may die as a result of forced submergence in the gear used in the scallop fishery.

Factors contributing to interactions between sea turtles and scallop gear

Several factors have been suggested as contributing to the risk of turtle interactions with scallop dredge gear, including the turtle's reaction to the oncoming gear, attraction to scallop areas due to the presence of prey, geographical and/or oceanographic features, and certain scallop fishing practices. Studies on shipping channels show that turtles can be attracted to the slope features where scallopers sometimes focus their effort. Observations on shrimp trawl gear have found that turtles continue to swim in front of the gear until the turtle becomes fatigued and they are caught by the trawl or the trawl is hauled (NMFS 2002b). Sea turtles have also been observed to dive to the bottom and hunker down when alarmed by loud noise or gear (Steve Morreale, pers. comm. as cited in NMFS 2004c). The scallop fishery harvests common loggerhead sea turtle prey species such as horseshoe crabs and other crabs, suggesting that at least some part of the fishery may overlap with some foraging areas. Potentially, this may expose the sea turtle to scallop dredge gear when it is foraging on or near the bottom. Loggerheads are known to scavenge fish or fish parts or incidentally ingest fish in some circumstances (NMFS and USFWS 1991), and have been known to bite a baited hook (NMFS SEFSC 2001). This characteristic of loggerheads raises concerns that loggerhead turtles may be attracted to the area where scallop dredge vessels are operating by the discard of scallop waste from the vessel as the catch is shucked thus increasing the risk of interaction with a dredge. However, there is currently no evidence that scallop discards attract loggerhead sea turtles to scallop vessels.

Chain-mat modified gear

During the 2003 – 2004 field tests of this gear modification, a total of 8 turtles were taken in the control (unmodified) gear (DuPaul *et al.* 2004a). No turtles were captured by the modified dredge (DuPaul *et al.* 2004a), indicating that the gear is effective at preventing sea turtles from being captured. As described above, forced submergence, potentially leading to mortality, is a risk to sea turtles taken in mobile gear. Carapace injuries may occur due to debris in the bag, from a fall during the hauling of the dredge, from emptying the bag on deck, or from dropping the dredge on the catch. With the chain-mat modification, injuries due to these causes will be reduced as turtles are prevented from entering the bag. The use of the chain mats with openings of 14" or less is expected to provide protection to sea turtles that would have been captured in the dredge bag.

As described above, interactions have been reported where the sea turtle is caught on the dredge and struck between the vessel and the dredge as the gear is hauled back (Smolowitz *et al*., 2008; NEFSC FSB, Observer Database). In one case, the sea turtle was reported caught between two bail bars. The chain-mat modification would not have contributed to, nor is it designed to prevent, an interaction occurring in this area of the dredge. In another case, the sea turtle was reported by the captain as being between the dredge and the chains. However, it is unclear how and exactly where the turtle was caught/hung up on the dredge frame and/or the chains and whether the chain mat may have contributed to the take or the nature of the injuries sustained by the turtle. This interaction is discussed further below.

It is possible that the dredge could strike sea turtles as it is fished resulting in carapace injuries, and this interaction would remain unknown and undocumented. NMFS currently has information documenting the capture of sea turtles in the dredge bag, as observed from on deck. A turtle capture in dredge gear has never been observed from the moment that the turtle first came into contact with the gear since these interactions occur in the water. NMFS recognizes the uncertainty regarding whether sea turtles interact with dredges as the gear is dragged along the bottom, as the dredge is hauled back, or both. NMFS does not have evidence of how the modified gear interacts with live sea turtles on the bottom and in the water column. Video work conducted in 2004 and 2005 (~80 hours of usable video) to try to document sea turtle behavior and interactions with sea scallop dredges (section 2.1.5) did not document any interactions between sea turtles and sea scallop dredge gear, but was successful in devising a methodology to video in front of sea scallop dredges (Smolowitz *et al.* 2005; Smolowitz and Weeks 2006).

The chain-mat modification is an important step following the chain mat experiments in the process to reduce sea turtle bycatch and the effects of take in the Atlantic sea scallop fishery. In the Biological Opinion on the Scallop FMP, NMFS anticipated that up to 929 loggerhead sea turtles will be taken by scallop dredge gear biennially and up to 595 of those taken (approximately 64%) will be result in serious injury or mortality (NMFS 2008). With the chain mat installed over the opening to the dredge bag, it is reasonable to assume that sea turtles that would otherwise enter the dredge bag will come into contact with the chain mat (at least) and be prevented from entering the dredge bag. Installing a chain mat over the opening of the dredge bag will not increase takes in this fishery and is expected to reduce capture in the bag and associated subsequent injury and mortality. Data do not exist on the percentage of sea turtles interacting with the chain-mat modified gear that will be unharmed, sustain minor injuries, or sustain serious injuries that will result in death or failure to reproduce. However, there are several assumptions that can be made to help estimate the degree of interaction. The first assumption is that sea turtles likely interact with scallop dredge gear both on the sea floor as the gear is being fished and in the water column as the gear is hauled back to the vessel. This is a reasonable assumption, because sea turtles have been observed in the area in which scallop gear operates and they have been seen near scallop vessels when they are fishing or hauling gear. In addition, sea turtles generally are known to forage and rest on the sea floor as part of their normal behavior. The condition of sea turtles observed taken in the sea scallop dredge fishery ranges from alive with no apparent injuries to alive and injured to fresh dead. As described below, NMFS believes that interactions between sea turtles and sea scallop dredge gear that occur on the bottom are likely to result in serious injury to the sea turtle. Based on this assumption, NMFS believes that the unharmed/slightly injured turtles observed captured in the sea scallop dredge bag follow an interaction with sea scallop dredge gear in the water column.

The second assumption relates to the apportionment of the seriousness of the interaction between sea turtles and the modified gear. Taking one of two extremes, one could assume all of the sea turtles that would come in contact with the modified gear and the chain mat (up to 929 loggerheads biennially) would be unharmed. However, this assumption is not reasonable given that, in the case of a bottom interaction, the frame and cutting bar may pass over any sea turtles on the bottom, and the sea turtles would still be run over by the dredge bag since entry into the dredge bag would be prevented by the chain mat. A standard 15 ft dredge frame, bag, and club stick weighs about 4500 lbs. This weight may vary somewhat due to variations in materials and configurations (memo from Ellen Keane to The File, March 4, 2008). A sea turtle being run over by the gear would bear a significant amount of weight. At the other extreme, one could assume that all of the sea turtles that would come into contact with the modified gear and with the chain mat (up to 929 loggerheads biennially) would sustain serious injuries leading to death or failure to reproduce. This assumption is also unreasonable, given that some of the interactions are likely in the water column during haul back (or possibly during setting the gear). The haul back speed when the dredge is moving across the bottom ranges from 4 to 7 miles per hour. Once the dredge is off bottom and traveling up to the surface, the speed ranges from 1 to 4 miles per hour. As the gear is hauled through the water column, all turtles hitting the chain mat in this situation probably are not going to sustain serious injury leading to death or failure to reproduce because of the slow speed during haul back.

The proper apportionment of the seriousness of interactions between sea turtles and the modified gear falls in between these two extremes. To arrive at a reasonable apportionment, we start with the assumption that interactions with scallop gear occur both on the bottom and in the water column, the assumption that up to 929 loggerhead sea turtles will still interact with the chain-mat modified gear biennially, and the estimate that up to 595 loggerhead sea turtles will be seriously injured/killed and 334 will be unharmed/slightly injured without the chain mat. There are two scenarios in which sea turtles may sustain serious injuries that lead to death or the failure to reproduce – interactions on the sea floor or interactions in the water column.

As the dredge is fished on the bottom, sea turtles may be passed over with the dredge frame and cutting bar, which weigh thousands of pounds. Without the chain mat modification, the sea turtle could be swept into the dredge bag, forcibly submerged for the remainder of the tow, and at risk of further injury due to being tumbled around or hit by debris inside the bag or being crushed when the catch is dumped on the vessel's deck. Tows are often close to or over one hour in length, a duration known to cause physiological stress that may lead to drowning. While the mid-Atlantic scalloping areas consist more of sand substrates than New England's rougher bottom, gravel or larger rocks do enter the dredge bag even in the mid-Atlantic and may strike any turtles caught inside. Finally, as the dredge bag is hauled out of the water, it is suspended at a significant height above the deck and then its contents, including any turtles, are dumped on the vessel's deck. The gear is often dropped on the pile. Any sea turtles caught in the bag may be crushed by the contents of the bag as it is dumped or by the gear as it is dropped on top of the pile. Given the nature of the interaction on the bottom and during the tow once a turtle is caught in the bag, a conservative assumption is that no turtles taken from the sea floor are only seriously injured after they have entered the dredge bag. Therefore, a portion of the 595 sea turtles are conservatively assumed to sustain serious injuries leading to death or failure to reproduce due to bottom interactions with unmodified gear.

With the chain mat in place, it is reasonable to assume that the sea turtles on the sea floor would still interact with the gear, but that the nature of the interaction would be different. With the modified gear, the sea turtles may still be hit by the leading edge of the frame and cutting bar and would likely be forced down to the sea floor rather than swept into the dredge bag. The dredge rides on the sea floor on shoes, which are part of the frame. The cutting bar, a thin steel edge, rides off the bottom from just above the sea floor to approximately 8 inches. Since the turtles are not swept into the bag, they would be run over by the dredge bag and club stick. As described above, the dredge bag constitutes a substantial weight. Sea turtles that interact on the sea floor with the chain-mat modified dredge would probably fare just as poorly as those that interact with the unmodified dredge due to the substantial weight of the dredge frame and bag. Given the nature of the bottom interaction without the chain mat, NMFS believes that the same portion of the 595 sea turtles would still experience serious injuries that lead to mortality or failure to reproduce with the chain mat in place as without it following a bottom interaction.

In 2005 and 2006, NMFS worked with industry to test a dredge with a modified cutting bar and bail designed to minimize impacts to turtles that may be encountered on the bottom (NMFS 2005b, Milliken *et al.* 2007). Dredges used in the experiment were equipped with the chain mat configuration, although the purpose of the trials was not to test the chain mats. The project used turtle carcasses and model turtles to simulate a worst case scenario of a dredge overtaking a sea turtle lying motionless on the bottom. During the 2005 study, the turtle carcasses were observed lodged in front of the cutting bar and pushed along, eventually going under the cutting bar and getting caught on the chain mat. The model turtle was deployed on one tow with the modified dredge in 2005. During this tow, the model turtle was deflected over the bail of the modified dredge (NMFS 2005b). The dredge was further modified and additional trials were conducted in 2006. In 8 of the 12 successful trials, the carcasses went over the dredge (n=7) or were deflected to the side (n=1), indicating that the design may be effective in guiding turtles up and over the dredge frame (Milliken *et al.* 2007). No sea turtles passed under the dredge in the 2006 study (Milliken *et al.* 2007). Therefore, no sea turtles interacted with the chain mats. It is important to note that the project was limited in that behavioral responses of a live turtle encountering a dredge could not be assessed. The video from the study did show that it is possible that sea turtles encountering the dredge on the bottom may become caught on the chains after being hit by the leading edge of the dredge. However, this follows the turtle being struck and run over by the leading edge of the dredge during which it is likely to have sustained serious injury. NMFS is continuing to test this modification to assess whether the modification can reduce the severity of injuries to sea turtles interacting with sea scallop dredges on the bottom while maintaining sea scallop catch.

Any injuries to sea turtles taken in the water column are likely to be non-serious because sea turtles would hit the chain mat in the water column during haul back. Some of the 595 seriously injured sea turtles probably obtained those injuries after being caught in the water column by unmodified gear, because the turtle were captured in the dredge bag. The chain mat would prevent these serious injuries, since the turtles would not be able to get into the dredge bag and, therefore, would not be crushed by debris in the bag, dumped on the deck from height, or crushed by falling gear. Once off the bottom, the gear is hauled back through the water column at a slow speed (1 – 4 miles per hour). Any turtle hitting the chain mat in the water column would not be hit with great force and would likely be able to swim away.

We also assume that the 334 unharmed/slightly injured sea turtles are taken in the water column. These turtles would come into contact with the chain mat and would either swim away unharmed or with injuries that are not likely to result in death or failure to reproduce. As described above, the gear is hauled back to the vessel at a slow speed, so any turtle hitting the chain mat would not be hit with great force and would likely be able to swim away. Based on the analysis above, some of the 334 interactions would result in contact with the chain mat, but this contact is not likely to result in serious injury.

The chain mats have been noted in four reported interactions. During the 2002 preliminary trials of the chain main configuration, one of the turtles was observed "hanging onto" to the chain mat, perhaps held by water pressure, and subsequently swimming away (DuPaul *et al.* 2004a). Sea turtles have been documented on other parts of the dredge frame and, generally, as the gear nears/reaches the surface are able to swim away from the gear. NMFS believes that in this type of interaction, the animal is being held against the gear by water pressure as the gear moves through the water. Once the gear stops moving and the pressure is relieved, the animal would be able to swim away. NMFS has no indication that this type of interaction would result in serious injury. In 2007, two sea turtles were observed captured in the dredge bag despite the use of chain mats. As described above, the gear modification was improperly implemented, resulting in the capture in the dredge bag. These interactions do not indicate that the chain-mat modified gear, if implemented and maintained properly, does not function as expected. In 2007, a sea turtle was reported between the dredge and the chain mat, on the outside of the chain mat. This turtle was unable to swim away when the gear surfaced. It is unclear how and exactly where the turtle was caught/hung up on the dredge frame and/or the chains or whether the chains contributed to the interaction. The captain reported that the turtle was hit between the vessel and the dredge and again when lowering the gear. The video work conducted in 2005 did show that sea turtles may become caught on the chains following an interaction on the bottom. However, as explained above, this likely follows the turtle being struck and run over by the dredge during which it is likely to have become injured. It is not known whether the interaction in 2007 occurred in the water column or on the bottom. NMFS does not know of any other interactions of this nature and it is possible that this interaction was a unique event. NMFS will continue to monitor the sea scallop dredge fishery to determine whether this interaction was, in fact, a unique event.

To summarize, NMFS believes the chain mat will prevent serious injury leading to death or failure to reproduce caused by crushing from debris in the dredge bag, dumping of turtles on the vessel's deck, and crushing them by the falling gear following an interaction in the water column. The chain mat would also prevent serious injuries from debris in the dredge bag or dumping/crushing on deck of sea turtles following an interaction on the sea floor. However, NMFS has made the conservative assumption that a turtle in a bottom interaction sustains serious injuries on the bottom, so, under this conservative assumption, there would not be a benefit from the chain mat for bottom interactions. This assumption, however, may be too conservative in that it is possible (although not likely) that turtles in a bottom interaction only receive minor injuries. In the unlikely scenario of a turtle receiving only minor injuries following a bottom interaction, the chain mat modification would prevent serious injuries that result from capture in the dredge bag (i.e., injuries from debris in the bag, drowning from forced submergence, dropping on deck, or crushing by the dredge). NMFS believes that the serious injury and mortality rate of sea turtles interacting with scallop dredge gear will be less than that calculated for the Biological Opinion since fewer turtles will be subject to injuries occurring within the dredge bag or as a result of dumping the bag on deck. However, NMFS cannot quantify the reduction in mortality rate.

Based on the results of the experimental fishery to evaluate the chain-mat modified dredge, as well as the species identification and size of sea turtles taken in the Atlantic sea scallop fishery, NMFS has concluded that chain mats with openings measuring equal to or less than 14 inches per side will help conserve sea turtles by preventing them from entering the dredge bag and sustaining injuries from such capture. NMFS recognizes that sea turtles that interact with the gear may be small enough to pass between the chains, and that this interaction may result in the capture of the sea turtle in the bag. However, NMFS expects this to be a rare occurrence based on the observer measurements and the identification of species taken in this fishery.

Temporal and Spatial extent

The dates for the chain mat requirement were determined from known sea turtle distribution and abundance. Loggerhead sea turtles undergo temperature dependent seasonal migrations (Morreale and Standora 1998; Plotkin and Spotila 2002). In the area of the proposed action, loggerhead sea turtles occur year round in waters off North Carolina where water temperature is influenced by the Gulf Stream, in the inshore waters of Virginia from May through November, and in New York's inshore waters from June until October (NMFS 1994). As water temperatures cool in the fall, sea turtles migrate south to warmer waters, once again transiting the Mid-Atlantic (USFWS and NMFS 1992). Interactions between the sea scallop dredge fishery and hard-shelled sea turtles have been documented from late June to late October (NEFSC, FSB, Observer Database; letter from William DuPaul to Mary Colligan, August 21, 2007). The potential for interactions between sea turtles and sea scallop dredge gear exists from May through November due to the distributional overlap of turtles (Shoop and Kenney 1992; Braun-McNeill and Epperly 2002) and fishing effort. NMFS does not anticipate any fishing south of Cape Hatteras, North Carolina due to a lack of scallop resources. Thus, the timing of the chain mat requirements are based on Cape Hatteras as the lower boundary.

A single take of a sea turtle in sea scallop dredge gear has been documented north of 41° 9.0' N latitude. However, based on the known distribution of sea turtles and the observed take of sea turtles, NMFS expects the take of sea turtles by vessels operating north of 41º 9.0' N lat. to be rare. The spatial extent of the chain-mat requirements is based on the overlap of sea turtle distribution and sea scallop fishing effort (see section 3.4.3 for additional information).

Sea turtle species

A single take of a green sea turtle and two takes of a Kemp's ridley sea turtle have been documented in the sea scallop dredge fishery. In addition, an unconfirmed take of a leatherback sea turtle has been reported. The chain mat modification would benefit leatherback sea turtles interacting with the gear as these turtles, given their large size, would be prevented from entering the dredge bag. The chain mat modification will provide for the conservation of loggerhead sea turtles, and will have ancillary benefits for endangered Kemp's ridley and green sea turtles, which have been observed taken in the sea scallop fishery albeit to a lesser extent than loggerhead sea turtles, and for leatherback sea turtles. On occasion, sea turtles that interact with the gear may be small enough to pass between the chains, and this interaction may result in the capture of the sea turtle in the bag. However, NMFS expects this to be a rare occurrence based on the observer measurements and the identification of species taken in this fishery.

Critical habitat

The geographic area includes the southern corner of the GSC critical habitat area for right whales. The GSC is a large funnel-shaped bathymetric feature at the southern extreme of the Gulf of Maine between Georges Bank and Cape Cod, MA. In late-winter/early spring, mixing of warmer shelf waters with the cold Gulf of Maine water funneled through the channel causes a dramatic increase in faunal productivity in the area. The zooplankton fauna found in these waters are typically dominated by copepods. Right whales have been characterized as "skim" feeders, subsisting primarily on dense swarms of copepods. In the GSC, right whales generally occur on a seasonal basis in the spring, with a peak in May (Kenney *et al.* 1995). This corresponds to the atypical copepod density maxima in the GSC and the southern Gulf of Maine described by Wishner *et al*. (1988) and Payne *et al.* (1990). It is likely that a significant proportion of the western North Atlantic right whale population uses the GSC as a feeding area each spring, aggregating to exploit exceptionally dense copepod patches. Due to the area's importance as a spring/summer foraging ground for this species, the GSC critical habitat area was designated for right whales in 1994. There is no evidence to suggest that the addition of chain mats to sea scallop dredges will have any adverse effects on the physical and biological features that make this area a foraging ground and critical habitat for right whales.

5.1.3 Habitat

The potentially adverse effects to EFH from bottom tending mobile gear, and in particular the sea scallop dredge, have been detailed elsewhere (NEFMC 2003). A brief summary will be provided here.

There have been a number of studies on the effects of scallop dredging on habitats in the Northeast Region (Murawski and Serchuk 1989; Langton and Robinson 1990; Valentine and Lough 1991; Auster *et al.* 1996; Collie *et al.* 1997; DeAlteris *et al.* 1999; Collie *et al*. 2000). This research suggests that the effects on habitat and the significance of these effects vary by habitat type. There is only one study available that examined the impact of sea scallop dredging on the habitats of the Mid-Atlantic Bight (Murawski and Serchuk 1989). Murawski and Serchuk (1989) found no evidence that scallop dredges leave enough dead or injured biomass on the bottom to lead to hypoxia, found less short term disruption of sediments and benthic communities as compared to hydraulic clam dredges, and found that predation on discarded scallop viscera seemed to be an important pathway for energy transfer in demersal food webs. The study did not address the potential value of discarded scallop shell as habitat.

In a workshop (October 2001) to address the impact of fishing gear on EFH, the panelists found that the structure-forming biota present in sandy habitats are just as vulnerable to scallop dredging as in gravel habitats. However, the biological impacts on the emergent epifauna are less significant in high energy sand environments as the organisms are better adapted to sediment disturbance and recover more quickly from dredging. They also found that the sand habitats south of Cape Cod are less vulnerable to bottom mobile gear than hard bottom benthic habitats, because they support less diverse epifaunal communities and recovery times are shorter. The degree of impact to biological structure in a low energy sand environment is expected to be present and can be large, while in a high energy sand environment this impact is expected to be present, but rarely large. The range of recovery time for impacts to biological structure and physical structure in sand environments is months to years and days to months, respectively (NMFS 2002a).

The gear most comparable to the chain mats is the rock chain gear used in the sea scallop fishery. The chain mats are a modified rock chain arrangement constructed of lighter, but stronger, chain. Amendment 10 of the Scallop FMP found that the use of rock chains decreases the amount of damage caused by contact with high relief bottom and may prevent the displacement of boulders and rocks (NEFMC 2003), but these impacts are not comparable to the chain mats as these would be used in an area comprised of sand and mud while rock chains are intended for use in areas with rocks.

In assessing the impacts of the alternatives on habitat, direct and indirect effects must be considered. Recovery times vary according to the intensity and frequency of the disturbance, the spatial scale of the disturbance, and the physical characteristics of the habitat (NRC 2002). The chain mat comes into contact with the bottom. As described above, scallop catch averaged 6.71% less during field trials of the modified dredge. The researchers assume that as the vessel captains become more familiar with rigging the chain mats, catch rates will be less variable and more consistent with the dredges without the modification (DuPaul *et al.* 2004a). While some vessels may tow longer to offset the loss of catch, this will be minimized as vessels become more familiar with operating the gear.

An increase in disturbance to bottom sediments is expected whenever chain mats are used. This increase, however, is expected to be minimal and temporary as the sediment type in the area of the PA has a rapid recovery time. Vessels are expected to modify their dredge(s) and to continue to fish the same areas. There have been no studies on the effect of the chain mats on mortality to the sea scallop resource or on changes to the seafloor community structure. However, the area of the sea floor swept by the chain mat is the same area swept by the cutting bar and the dredge bag. Additional benthic disturbance caused by the gear modification will have inconsequential effects in the sandy habitats of the Mid-Atlantic.

5.1.4 Economic Impacts

The methods and data presented in this section were used to analyze the economic impacts for the alternatives. Under the PA, NMFS would modify the regulatory text of the chain-mat requirements to clarify the requirements and to provide a transiting provision. These changes will not result in any economic impacts and will not be discussed further. The impacts resulting from requiring the chain-mat modification in the Atlantic sea scallop dredge fishery were evaluated in the original EA/RIR/IRFA for the August 2006 rulemaking and in the categorical exclusion (CE)/RIR for the November 2006 emergency rule. The results of these analyses are described below.

The August 2006 analysis was based on the number of chains specified in the table for the original chain mat regulation. As described above, the number of chains specified by dredge width was one of the options allowed for configuring the chain-mat modified gear in the original rulemaking. The other option required that all squares or rectangles created by the intersecting chains be equal to or less than 14 inches on each side. In a subsequent rulemaking, NMFS removed the option allowing the number of chains and required that all dredges be configured to meet the requirement for 14 inches on each side. This change in the configuration requirements may have resulted in minor economic impacts not considered in the original analysis presented below. These impacts will be described in section 5.1.4.3.

5.1.4.1 Methods

Both consumer surplus and producer surplus for seafood products supplied by the scallop dredge fishery will be affected by the requirement to use a chain-mat modified dredge. Under the PA and the No Action alternative, harvesters incur costs to modify their gear. In addition, assuming no change in prices, a reduction in revenues may occur since the modified gear may reduce the scallop catch, leading to a loss in revenue. A combination of increased costs and decreased revenues would result in a loss of producer surplus.

An increase in cost to a harvester, with no resultant increase in price for the product, can result in a reduction of quantities of seafood supplied to seafood markets. If consumers do not change their demand for the product, higher prices are necessary to ration the smaller supply, decreasing consumer surplus. The magnitude of these changes and how the surpluses will be redistributed between consumers and producers will depend on the slopes of the respective supply and demand functions. In any case, as long as demand functions are downward sloping and supply functions are upward sloping, there is always a loss in economic surplus when regulatory costs are imposed. However, this loss in economic surplus can be minimized by selecting the least costly regulatory alternative that provides a level of protection consistent with the purpose and need of the action. The requirement to modify sea scallop dredge gear is expected to benefit sea turtles at relatively low cost.

When a gear modification such as the modification of scallop dredges with chain mats occurs, three potential behavioral responses exist. The vessel can: i) choose not to fish in the prohibited area, and not move elsewhere, decreasing overall effort; ii) modify its gear and continue fishing in the area; or, iii) not modify its gear and fish elsewhere. This analysis assumes that the vessel will modify its gear and continue fishing in the area.

If we had full information on the scallop dredge fishery, our goal would be to measure how the chain mat requirement impacts a vessel's annual profits. The measure of interest would be the ratio of the change in profits with regulation to profits before the regulation was imposed. This would allow us to fully compare the economic impact of the alternatives. However, we do not have information on the profits for individual vessels; in particular, cost information is limited. As a result, in this analysis, we focus on the changes in observable net revenue under the alternatives. Specifically, we estimate the decrease in revenues and increase in cost as a direct result of an alternative being imposed. Essentially, an increase in cost has the same effect as a decrease in revenues; both actions will decrease profits, or net revenues.

Revenue losses to the scallop dredge industry (south of 41º 9.0' N. lat.) are measured as decreases in harvest, due either to a reduction in fishing effort in regulated areas or due to decreased catch per unit of effort due to gear modifications. Cost increases are measured as additional labor and material costs that may be incurred with gear modifications. Decreases in revenue and increases in costs are measured per vessel. As decreased revenue and increased costs combine to decrease net revenue, we calculate the ratio of this decrease to total revenues prior to the alternative being imposed, and refer to it as the change in total revenues.

While we could just report the decrease in revenues and increase in costs, it is important to put these changes in perspective to total earnings since they vary among fisheries. To determine the regulatory cost to the entire industry, we multiply the net revenue loss per vessel by the total number of vessels participating in the fishery.

Under the PA, a gear modification is required in the scallop dredge fishery to reduce the number of sea turtles captured in the dredge bag. In general, the number of dredges varies with the permit category of the vessel, with the majority of the DAS vessels using 2 dredges and GEN vessels fishing with 1 dredge. As well, the cost of modifying the gear varies with the width of the dredge frame and the number of dredges used, so vessel analysis is stratified by permit category, dredge width and dredge number.

Vessel Trip Reports (VTR) for the Northeast and Mid-Atlantic (south of 41º 9.0' N. lat.) sea scallop vessels operating in calendar year 2003 were used in this analysis. In addition, data from

DuPaul *et al*. (2004a) were used to estimate the reduction in scallop catch when chain mats were used in an experimental setting on commercial scallop dredge vessels. Data on the cost of rigging a scallop dredge vessel with chain mats were provided by the gear specialist of the Protected Species Branch at NEFSC (memo from Henry Milliken to Kathryn Bisack, October 1, 2004). An average 2003 dock-side price of $4.09 per landed pound of scallop meats was used throughout the analysis.[6]

5.1.4.1.1 Scallop Fleet

The limited access scallop permit was created under Amendment 4 of the Scallop FMP. Fulltime, part-time and occasional limited access vessels are regulated through DAS controls, while general (GEN) category vessels may land, depending on permit category, up to 400 pounds of meat or 50 bushels of shell stock per trip. Limited access vessels that have declared out of the DAS program may fish under regulations for the general category fishery.

According to the 2003 VTR logbooks, there were 439 vessels fishing with scallop dredges from Maine to North Carolina (Table 5.2). Of these vessels, 340 vessels fished south of 41º 9.0' N. lat. during some part of the year, of which 314 vessels fished from May 1 through November 30. This analysis focuses on the 314 vessels fishing in the designated area from May through November.

Of the 314 *affected vessels*, 277 and 37 vessels were permitted under DAS and GEN, respectively. Ninety eight percent of the DAS vessels were greater than 60 ft and 73% of the GEN vessels were less than 60 ft. In general, vessels less than 60 ft long fish with 1 dredge, and vessels greater than 60 ft fish with 2 dredges. Vessels in this analysis are categorized by their permit type, the frame width of their dredge, and how many dredges they fish. Twenty five percent of the vessels (80 vessels) fished with dredge frames less than 11 ft wide (Table 5.3).

Table 5-2 Number of vessels fishing with scallop dredge gear by area and time of year according to 2003 VTR records.

Area	All Year	May – Nov
Maine to North Carolina	439	428
South of 41^0 9.0 N lat.	340	314

[6] In 2004 and early 2005 the average dock-side price of scallop meats increased to $4.96 and $7.53, respectively. The use of these higher prices would not change the relative ranking of results, as revenue changes for all the alternatives use the same average price. If a higher price was used in the PA, where the material and labor costs of the gear modification would not change, the percentage reductions in revenues to the individual and industry would decrease slightly. That is, the economic burden of the PA would decrease slightly compared to what is reported here.

Table 5-3: Number of affected vessels (314) fishing with one or two dredges by permit category (DAS or GEN) and frame width of dredge.

Frame width of dredge (feet)	DAS Number of Dredge		GEN Number of Dredges	
	1	2	1	2
< 10	-	-	18	-
10 to < 11	49	-	13	-
11 to < 13	-	89	6	-
> 13	-	139	-	-
Total	49	228	37	0

5.1.4.1.2 Industry Revenues

In 2003, the 3*14 affected vessels* together earned approximately $221.4 million dollars in revenues from all species using a total of 40,888 days at sea (Table 5.4). The 277 vessels operating under DAS earned approximately 98% of the total industry revenues. These affected vessels also used other gear to land catch; however, the majority of the industry revenues (95%) were earned using scallop dredge gear (DRS). The remaining revenues were earned using sink gillnet (GNS), otter trawl for fish, scallops and shrimp (OTF, OTC and OTS), pots for lobster, hagfish, whelk and monkfish (PTs) and purse seine (PUR) gear.

5.1.4.1.3 Vessel Revenues

According to the 2003 VTR, vessels permitted in the DAS category earned, on average, between $441.8 (CV=48%) and $895.1 (CV=29%) thousand dollars per year (Table 5.5), depending on number of dredges and dredge frame width. Vessels permitted in the GEN category earned, on average, between $46.7 (CV=120%) and $162.0 (CV=60%) thousand dollars per year. The size of the coefficient of variation (CV) indicates the amount of variability within a class. Therefore, revenue estimates for vessels that are permitted in the GEN category fishing with a frame less than 10 ft which have the largest CV (=120%) have the most variability in annual revenues between vessels.

Table 5-4: Total industry revenues earned by scallop dredge vessels and days absent (DA) used, by gear type and permit category (DAS or GEN)

Gear Type	DAS Revenue ($1000)	DAS DA	GEN Revenue ($1000)	GEN DA	Total Revenue ($1000)	Total Days Absent
DRS	207,080	34,139	2,419	2,336	209,499	36,505
GNS	-	-	618	264	618	264
OTF	7,224	3,071	534	375	7,758	3,446
OTS	21	65	34	26	55	91
OTC	770	136	37	57	807	193
PTs	270	118	111	128	381	246
PUR	1,779	88			1,779	88
Other	460	54	1	1	461	55
Total	217,604	37,671	3,754	3,217	221,358	40,888

Table 5-5: Distribution of vessels fishing by number of scallop dredges, frame width of dredge and permit category (DAS or GEN) based on 2003 VTR data, with average annual vessel revenues (coefficient of variation in parentheses).

Frame width of Dredge	Number of Vessels				Annual Revenues Per Vessel ($1000)	
	DAS Number of Dredge		GEN Number of Dredges		DAS	GEN
	1	2	1	2		
<10	-	-	18	-	-	$46.7 (120%)
10 to <11	49	-	13	-	$441.8 (48%)	$162.0 (60%)
11 to <13	-	89	6	-	$803.8 (33%)	$134.5 (68%)
> 13	-	139	-	-	$895.1 (29%)	-
Total	49	228	37	0		

5.1.4.1.4 Cost of Gear Modification

The total cost of gear modification is composed of two parts. First, to modify the gear requires material and labor. In addition, the chain mat modification may reduce the catch of scallops. Therefore, the total cost of the gear modification includes labor and materials for actual physical changes, and potential revenue losses due to a reduction in scallop catch.

Material and labor for the gear modification

The number of verticals, ticklers and shackles that must be modified varies by the frame width of the dredge. For vertical chains, chain grade 70 and a size 5/16 inches with a load limit of 4,700 pounds is recommended, which costs approximately $2.00 per foot. For horizontal chains or ticklers, chain grade 70 and a size 3/8 inches with a load limit of 6,600 pounds is recommended, which costs approximately $3.00 per foot. Several shackles are required for each dredge; each of which costs 35 cents. The total cost of materials (chain and shackles) for one dredge ranges between $130 and $342 (Table 5.6), depending on frame width.

To modify the dredge requires approximately two hours of welding per dredge. According to the U.S. Bureau of Labor Statistics, a welder in New England earns on average $23.61 per hour. Therefore, two hours of labor cost a total of $47.22 per dredge.

The total material and labor cost of modifying one scallop dredge ranges between $177.37 and $389.22 (Table 5.7), depending on frame width. For two scallop dredges the cost ranges between $685.44 and $778.44.

Table 5-6: Number of verticals and horizontal ticklers required per dredge and modification requirements in feet of chain to construct, material costs of chain, number of shackles and cost and total material cost by frame width of dredge.

Frame width of dredge	Number of		Chain to construct (ft)		Chain Cost			Shackles		Total cost of materials
	Verticals	Ticklers	Verticals	Horizontals	Verticals	Horizontals	Total	Number	Cost	
<10	5	3	25.5	23.0	$51.00	$69.00	$120.00	29	$10.15	$130.15
10 to <11	7	4	34.5	36.0	$69.00	$108.00	$177.00	47	$16.45	$193.45
11 to 13	9	5	54.0	55.5	$108.00	$166.50	$274.50	60	$21.00	$295.50
>13	11	6	58.0	66.0	$116.00	$198.00	$314.00	80	$28.00	$342.00

Table 5-7: Total cost of materials and labor to modify one scallop dredge

Frame width of Dredge	Grand Total
<10	$177.37
10 to <11	$240.67
11 to 13	$342.72
>13	$389.22

Reduction in scallop catch

The final report of DuPaul *et al.* (2004a) on the proposed gear modification found that the scallop catch was reduced on average by 6.71%. This is slightly less than the draft final report in which a reduction of 6.76% was reported (DuPaul *et al.* 2004b). The reduction reported in the draft final report was used for the economic analysis. As a result, the analysis results in a slight overestimate of economic impacts. At the time of this analysis, there were no data available to estimate the reduction and variance by permit or number of dredge categories. Therefore, an average was applied to all vessels.

To calculate the reduction in revenues from decreased catch rates due to the gear modification, we assume that vessel captains will not increase their effort to offset the loss in catch. Thus, when using the modified gear within the designated area during the time period of interest, catch would be reduced by 6.76% with revenues decreasing accordingly, assuming prices do not change. To model this change, we applied a 6.76% reduction in scallop catch to the 2003 VTR data from May 1 through November 30.

The decreased catch due to gear modification is estimated to reduce revenue for a DAS category vessel between $18.8 (CV=53%) and $38.7 (CV=38%) thousand dollars (Table 5.8), depending on dredge frame width. Similarly, a GEN category vessel may have revenue reductions between $1.3 (CV=182%) and $5.6 (CV=63%) thousand dollars.

Table 5-8: Estimated revenue reduction per vessel from a 6.76% reduction of scallop catch from May to November south of 41º 9.0' N. lat. (coefficient of variation in parentheses) by frame width of dredge

Frame width of dredge	Revenues reduction ($1000)	
	DAS	GEN
<10	-	$1.3 (182%)
10 to <11	$18.8 (53%)	$3.2 (101%)
11 to <13	$34.1 (40%)	$5.6 (63%)
> 13	$38.7 (38%)	-

5.1.4.2 Results of the PA

According to the 2003 VTR logbook, 314 vessels fished with scallop dredge gear south of 41º 9.0' N. lat. between May 1 and November 30 (Table 5.2). Of these 314 vessels, 277 and 37 vessels are permitted under the DAS and GEN category, respectively (Table 5.3). The proposed gear modification at a cost of between $177.37 and $778.44 per vessel is fairly inexpensive relative to fishing revenues. Therefore, our analysis assumes all vessels will convert their gear and continue fishing in the area.

5.1.4.2.1 Individual Vessel

In 2003, annual revenues per vessel ranged between $46.7 (CV=120%) and $895.1 (CV=29%) thousand dollars (Table 5.5). Under the PA, two costs are imposed. First, there is a material and labor cost associated with modifying the gear. The dredge modification costs of materials and labor range between $177.37 and $778.44 per vessel. The second cost is associated with a 6.76% loss in scallop catch between May 1 and November 30 in the area south of 41º 9.0' N. lat. Here, we assume vessels will not increase their fishing effort to offset this loss in catch, but rather incur the revenue loss. Results indicate a vessel’s annual revenues would be reduced between $1.3 (CV=182%) and $38.7 (CV=38%) thousand dollars due to the reduction in scallop catch. However, given that this reduction in revenue is lower than that under the alternative of not fishing, we assume the vessel would minimize its loss by modifying the gear and continuing to fish.

The total impact of these two costs may reduce a vessel’s annual revenues on average between 3.0% (CV=108%) and 7.8% (CV=127%) (Table 5.9), depending on permit category and dredge frame width. The CV indicates the degree of variability around the estimate. The high CV for the GEN category illustrates the greater variability in catch and revenue between vessels in this category, compared to the DAS vessels.

Under the PA, 116 vessels may have their annual revenue reduced between 5 and 10%, and 5 vessels may have reductions greater than 10% (Table 5.10). Of these 121 vessels, 27, 29, 29 and 22 of these vessels are registered to the state of Massachusetts, New Jersey, Virginia and North Carolina, respectively. Reductions in annual revenue greater than 10% are restricted to vessels in the GEN permit category. For both permit categories, approximately 38% of the vessels may have annual revenue reductions of 5% or more, however there are more DAS vessels so this translates into a greater number of vessels for this category.

5.1.4.2.2 Affected Industry

Annual industry revenues would be reduced by 4.3% (=$9.6M/$221.4M) under the PA (Table 5.11), given the assumptions above. In 2003, the 314 affected vessels had revenues of $221.4 million dollars, while the total industry cost of this gear modification would be $9.6 million dollars. This includes costs of materials and labor to modify all dredge equipment and the decrease in catch associated with the modified gear.

Table 5-9: Reduction in annual revenues per vessel with the coefficient of variation (in parentheses) under the PA, by permit category (DAS or GEN) and frame width of dredge.

Frame width of dredge	Reduction in Annual Revenues	
	DAS	GEN
<10		7.8% (CV=127%)
10 to <11	4.5% (CV=32%)	3.0% (CV=108%)
11 to <13	4.4% (CV=30%)	4.5% (CV=40%)
> 13	4.5% (CV=28%)	

Table 5-10: Number of vessels under the PA where annual revenues are reduced by 5% or less, between 5-10%, and 10% or greater, by permit category.

Permit Category	Annual Revenue Reductions of			Total Number of Vessels
	5% or Less	Between 5-10%	10% or Greater	
DAS	170	107	0	277
GEN	23	9	5	37
Total	193	116	5	314

Table 5-11: Total industry cost and industry revenues of the affected scallop dredge vessels under the PA, by permit category and frame width of dredge

Frame width of dredge	Industry Cost ($1000)			Industry Revenues ($1000)		
	DAS	GEN	Total	DAS	GEN	Total
< 10		26.0	26.0		840	840
10 to < 11	934.6	44.5	979.1	21,650	2,107	23,757
11 to < 13	3,097.2	35.9	3,133.1	71,534	807	72,341
> 13	5,493.4	-	5,493.4	124,420	-	124,420
Total			9,631.6			221,358

5.1.4.3 Additional Economic Impacts

As described above, the analysis found that, according to the 2003 VTR logbooks, 314 vessels fished in the designated area from May through November. The cost of the gear modification is composed of the potential revenue loss due to a reduction in sea scallop dredge catch and the cost of the material and labor to configure the dredge. The potential reduction in catch was based on the results of the experimental fishery to test the chain mat modified gear. The experimental fishery used three dredge widths (11-, 14-, and 15-foot dredge widths). The information provided to NMFS during the original rulemakings was that the openings tested in the experimental fishery were less than 14 inches. During the pilot study in 2002, the chain mat was rigged so that a grid of 12-inch squares was formed (DuPaul and Smolowitz 2003) and the configuration used during the experimental fishery (2003-2004), spaced on a normal sweep arrangement, should result in approximately a 12- to13-inch square pattern (FSF/SeaGrant placard title “Rigging of turtle chains”). During the experimental fishery, an average reduction of approximately 6.7% was observed. This average loss was used to estimate the cost due to a reduction in scallop catch. As the analysis presented above was based on the openings tested in the experimental fishery and these openings are the same size as is required under this regulation (i.e., 14 inches or less per side), the requirement to configure the gear such that no opening is greater than 14 inches per side is not expected to result in any additional costs due to scallop catch reduction. Therefore, the economic impacts due to the reduction in catch described above are the costs that would be expected under this alternative.

The second cost is the cost to modify the gear, namely the costs required to purchase and install the chains. The requirement to use chain mats on dredges in the Atlantic sea scallop fishery is currently in place and requires that the gear be configured such that no side of the square or rectangle created by the intersecting chains is greater than 14 inches. As the existing configuration requirements are the same as the requirement considered under the PA, it is expected that most vessels have already configured their gear to meet these requirements. The analysis above analyzes the cost of the original requirements to use the chain mats in this fishery. The removal of one of the options for configuring the gear when the emergency rule was issued may have resulted in a slight additional cost that was not considered in analysis above. As described in Section 2.0, the emergency rule removed the option that allowed fishermen to configure the gear with a specified number of chains and required that the gear be configured such that the sides of each square or rectangle created by the intersecting chains be less than or equal to 14 inches. Therefore, there would be a cost to reconfigure the gear for vessels that configured the dredges according to the number of chains specified by dredge width if the configuration did not produce 14-inch openings. However, this cost is expected to be minimal. First, under the original requirements, vessels could choose one of two options for configuring the gear. Some vessels have chosen to configure the gear such that the sides of the openings formed by the intersecting chains are less than or equal to 14 inches on a side and, therefore, would not have to reconfigure the gear. Additionally, openings greater than 14 inches only result from using the specified number of chains in certain cases, depending on the dredge width and configuration. Therefore, some vessels following the specified number of chains also would not have to reconfigure their gear.

An unknown number of vessels would be required to reconfigure the gear. For these vessels, the cost is expected to be minimal. There are two costs in reconfiguring the gear, the cost of materials and the cost of labor. These vessels will have already purchased the majority of the chain needed to configure the chain mat. There will be a slight additional cost for the purchase of additional chain in order to achieve openings equal to or less than 14 inches. However, the amount of additional chain needed will be less than that already purchased. If you assume 20% additional chains and shackles would be required to comply with the 14-inch requirement (a conservative overestimate) (memo from Ellen Keane to The File, October 3, 2007), the additional costs for materials would be approximately $26 for a dredge less than 10 ft and $68 for a 15-ft dredge. This estimate uses the same costs for materials considered in the analysis above. The analysis above estimates a labor cost of approximately $50 per dredge if the vessel were to use a welder to attach the chain mat. Some additional welding would be required to reconfigure the gear to meet the 14-inch requirement. However, it is unlikely that this cost would exceed the cost of initially configuring the gear. That is, the cost for welding to reconfigure the gear would be less than the $50 estimated.

The cost to the industry of reconfiguring the gear to meet the 14-inch requirement cannot be quantified at this time as it is unknown how many vessels would need to reconfigure their gear. However, the costs of reconfiguring the gear are minimal and apply to a limited number of vessels. Therefore, there is not a substantial difference between the costs anticipated in the analysis above and the impacts resulting from the requirement for spacing of 14 inches or less.

There is also a cost associated with maintaining the gear. The cost of maintaining the gear depends on a number of factors. These include the type and grade of the chain utilized, the configuration and rigging of the gear, and the area fished. As the gear is fished, chains will stretch and wear. In addition, the shackles and links may break on occasion. This results in the chains needing to be readjusted and repaired in order to be in compliance with the requirements. Based on the use of a high quality chain, NMFS anticipates that over the course of a year, the chain mat will be replaced in its entirety. Therefore, the costs associated with configuring the gear are incurred on an annual basis. The longevity of the chain depends on a number of factors including the type of chain, the bottom type fished, and the configuration of the gear. Vessels that configure the opening to be closer to the 14-inch requirement may need to replace the gear more frequently than vessels that configure the opening less than 14 inches to allow for wear. All of these factors may affect the frequency with which the chains need to be replaced. In addition, some fishing time may be lost as the gear is readjusted/repaired. Vessels often repair sea scallop dredge gear and have the necessary repair gear on board. These repairs are usually relatively quick and will have a minimal impact on fishing time.

Other potential costs are those due to increased drag, weight, and tow times, as well as increased fuel consumption, which will result from adding chains to the dredge. As described above, a 15-ft dredge with frame, bag, and club stick weighs approximately 4500 pounds. The weight of the chain mat is estimated to be between 56 pounds for a 10-ft dredge and 147 pounds for a 15-ft dredge (email from Henry Milliken (NEFSC) to Richard Merrick (NEFSC), October 1, 2004). Assuming 20% additional chains and shackles would be required for some vessels to comply with the 14 inch requirement (a conservative overestimate) (memo from Ellen Keane, NMFS, to The File, October 3, 2007), the range of weights would increase by 11 lbs for a 10-ft dredge to 29 lbs for a 15-ft dredge. The weight of the chain-mat modified dredge is not considerably different from the unmodified dredge. The additional chain that some vessels may have added to comply with the requirement for a 14-inch opening is a fraction of the chain required for the chain mat as a whole, and the addition of this chain is not expected to substantially increase the weight of the gear. Therefore, NMFS does not anticipate that the additional chain will substantially impact the efficiency of the dredge and does not anticipate any significant costs resulting from extra weight on the gear.

There may also be a cost if it takes longer to dump a chain-mat modified dredge than an unmodified dredge. The final report for the experiment does not note the bag was more difficult to empty. Fishermen have begun to develop innovative ways to address this, including the use of carabiners to attach the chains to the cutting bar. In general, the chain-mat modified dredge with openings of 14 inches or less has been required in the Atlantic sea scallop dredge fishery for one fishing season with minimal reports of economic disruption.

5.1.5 Social Impacts

The economic analysis demonstrates that the sea scallop dredge fishing community may be impacted by the requirement to use chain-mat modified dredges during times when sea turtles may be present. As the cost of this modification is relatively small, it is assumed that vessels will modify their dredges and continue to fish in the regulated waters. If vessels do not increase effort to offset the loss in catch, the fishing community, including dealers and processors, will be impacted by the decrease in catch as there would be less catch passing through the land-based facilities and available for purchase. Of the 121 vessels that may have their revenue reduced by greater than 5%, 27, 29, 29, and 22 are registered to Massachusetts, New Jersey, Virginia, and North Carolina, respectively. Therefore, it is expected that these communities would experience the greatest impacts.

Social benefits may be realized if the gear modification is effective at reducing the risk to sea turtles. If this reduced risk increases the potential for recovery of sea turtles, then those in society who value biodiversity will benefit from preserving biodiversity. Those who do not value biodiversity will not experience a social benefit from this action. Social benefits are realized from the application of management practices that demonstrate that fishing practices and sea turtles can co-exist. Collaboration between scientists, industry, and NMFS managers on research projects can result in social benefits as industry, scientists, and managers better understand each other's perspectives and goals.

5.2 No Action Alternative – Current Regulatory Requirements

The No Action alternative would allow the fishery to continue to operate under the existing requirements. Current regulations require the use of the chain-mat modified dredge in waters south of 41° 09' N latitude from May 1 through November 30. The temporal and spatial extent of the chain-mat requirements are the same under this alternative and the PA. In addition, the configuration requirements are the same. Therefore, the impacts from this alternative would be the same as the impacts under the PA. The only difference between the PA and this alternative is the clarification to the regulatory text and the transiting provision that would be made under the PA. These differences in the regulatory language and the addition of the transiting provision would not result in any additional impacts to the physical, biological, or socio-economic environments. The impacts from the No Action alternative to the physical, biological, and socio-economic environments are the same as under the PA.

5.3 Alternative 1 – No chain mat requirement

5.3.1 Physical Impacts

As described above the use of the chain mat is likely impact the physical environment due to increased disturbance of bottom sediments as the chain mat comes into contact with the bottom. However, these impacts are expected to be minimal and temporary due to the rapid recovery times in the areas where chain mats are required. Under this alternative, vessels would be allowed to fish with an unmodified dredge. Removing the requirement to use a chain-mat modified dredge would eliminate impacts from the chain mats. However, as described above, there is not a substantial difference in physical impacts when the vessel uses a chain-mat modified dredge rather than an unmodified dredge. The area swept by the modified dredge is the same as with the unmodified dredge and impacts resulting from the modification are expected to be minimal and temporary. Since the impacts from the chain mat are minimal and temporary, impacts to the physical environment between the alternatives are not expected to be substantially different.

5.3.2 Biological Impacts

5.3.2.1 Fishery Resources

Field trials of the chain-mat modified dredge were conducted in 2003 – 2004 with 3,248 tows (of which 2,823 were observed). One of the vessel's two dredges was modified by the addition of the chain mat. During 982 of the observed tows, sea scallop catch between the modified and unmodified dredge was sampled. Catches were highly variable from vessel to vessel and trip to trip, with differences ranging from -30.88% to 7.28% (average -6.71%). The researchers concluded that this was not a substantial reduction in capture of the target species and assume that as the vessel captains become more familiar with rigging the chain mats, catch rates will be less variable and more consistent with the dredges without the modification (DuPaul *et al.* 2004a). Under this alternative, there would be no requirement to modify sea scallop dredge gear with a chain mat and any impacts to fishery resources resulting from its use would be eliminated.

5.3.2.2 Endangered/Threatened Species and Critical Habitat

Alternative 1 will impact threatened and endangered sea turtles. With this alternative, the scallop fishery would continue to fish subject to the requirements of the Scallop FMP. Vessels would not be required to use a chain-mat modified dredge south of 41º 9.0' N. lat. As described above, sea turtles takes have been documented in scallop dredge gear and the data presented under the PA applies to this alternative as well. These data demonstrate that sea turtles are subject to takes, some of which are lethal, in the Atlantic sea scallop dredge fishery. In the March 2008 Biological Opinion, NMFS anticipates the take of up to 929 loggerhead sea turtles biennially of which up to 595 will be lethal (includes serious injury) in the sea scallop dredge fishery (NMFS 2008). The chain-mat modification is expected to reduce the likelihood that a turtle interaction with scallop dredge gear will result in serious or mortality given that the use of chain mats on scallop dredge gear will: (1) reduce the likelihood that turtles that encounter the gear on the bottom will enter the dredge bag and be at further risk of injury and death, and (2) reduce the likelihood that turtles that encounter the gear in the water column will enter the dredge bag and be subsequently injured or killed. For these reasons, NMFS believes that the serious injury and mortality rate of sea turtles interacting with chain-mat modified gear will be less than that calculated for the Biological Opinion since fewer turtles will be subject to injuries occurring within the dredge bag or as a result of dumping the bag on deck. However, NMFS cannot quantify the reduction in mortality rate. Under this alternative, the requirement to use the chain-mat modified dredge would be removed. The chain mat prevents sea turtles from being captured in the dredge bag, and, therefore prevents serious injury leading to death or failure to reproduce caused by such capture. Removing the requirement for chain mats will leave sea turtles vulnerable to these types of injuries and mortalities and the reduction in serious injury and mortality would not be achieved. Under this alternative, up to 595 sea turtles would be subject to interactions resulting in serious injury and mortality biennially.

5.3.3 Habitat

The potentially adverse effects to EFH from bottom tending mobile gear and from the requirement to use chain-mat modified dredges is described under the PA and that information applies to this alternative as well.

As described above, an increase in disturbance to bottom sediments is expected whenever chain mats are used. Removing the requirement to use a chain-mat modified dredge would eliminate impacts from the chain mats. However, the increase in disturbance from the chain-mat modified gear is expected to be minimal and temporary as the sediment type in the area of the alternatives has a rapid recovery time. As described above, additional benthic disturbance caused by the gear modification will have inconsequential effects in the sandy habitats of the mid-Atlantic. Therefore, the impacts from using an unmodified dredge are not substantially different from using a modified dredge.

5.3.4 Economic Impacts

The analysis above considered the costs would be incurred from the requirement to modify dredges with a chain mat. These include the cost to configure and maintain the gear and the cost due to a loss of scallop catch. Under this alternative, the requirement to use chain-mat modified dredges would be removed. Vessels have been required to use chain-mat modified gear since September 25, 2006, and the requirement is currently in place from May through November 30 each year. It is expected that most vessels have already modified their gear to comply with this regulation. Therefore, they have already incurred the cost to configure their gear. The second cost is the cost associated with the loss of catch. Under the PA, a vessel's annual revenues would be reduced between $1.3 (CV=182%) and $38.7 (CV=38%) thousand dollars due to the reduction in scallop catch. Under this alternative, the loss of revenue due to the decrease in scallop catch resulting from the use of the chain-mat modified dredge would be eliminated, as would the maintenance costs.

5.3.5 Social Impacts

This alternative would eliminate the requirement for chain-mat modified dredges and would reduce the economic impacts that result from its use. The economic analysis demonstrates that the sea scallop dredge fishing community may be impacted by the requirement to use chain-mat modified dredges during times when sea turtles may be present. Social impacts described under the PA result, in part, from less catch passing through land-based facilities and being available for purchase. These impacts would be eliminated if the requirement to use chain mat modified dredges were removed.

There are social impacts associated with removing the chain mat requirement if it results in increased risks to endangered and threatened sea turtles. This would be a loss to that portion of society that places a value on the protection of all species for their intrinsic value as well as their contribution to biodiversity. All sea turtles in U.S. waters are listed as threatened or endangered under the ESA, as populations have not yet recovered. Minimizing take, and the serious injury/mortality associated with take, is necessary to help conserve and recover sea turtles. This alternative will not reduce the serious injury and mortality resulting from capture in the sea scallop dredge bag.

Table 5-12: Summary of the direct and indirect impacts of the alternatives on ecosystem components

Physical Impacts	Fishery Resources Impacts	Protected Species (sea turtles)	Habitat	Economic Environment	Social Environment
No Action: Current regulatory requirements					
Neutral: chain mat increases sea floor disturbance, but the impact is minimal and temporary with a rapid recovery time of sediment	**Neutral:** minor reduction scallop landings	**Positive:** up to 929 loggerhead sea turtle interactions with gear biennially, but some portion of serious injury/death is prevented; benefits to other sea turtle species; no impact to other protected species or critical habitat	**Neutral:** dredges with chain mats would have inconsequential additional impacts as compared to unmodified dredges	**Low negative:** 6.71% decrease in scallop catch[7]; cost to obtain and maintain chain mat; not significant	**Low positive/neutral:** support by fishing community; cooperative research and collaboration; protection of biodiversity; less catch passing through processors (not significant)
Preferred Alternative: Modification of current regulatory requirements					
Neutral: chain mat increases sea floor disturbance, but the impact is minimal and temporary with a rapid recovery time of sediment	**Neutral:** minor reduction scallop landings	**Positive**: up to 929 loggerhead sea turtle interactions with gear biennially, but some portion of serious injury/death is prevented; benefits to other sea turtle species; no impact to other protected species or critical habitat	**Neutral:** dredges with chain mats would have inconsequential additional impacts as compared to unmodified dredges	**Low negative:** 6.71% decrease in scallop catch[7]; cost to obtain and maintain chain mat; not significant	**Low positive:** support by fishing community; cooperative research and collaboration; protection of biodiversity; less catch passing through processors (not significant)
Alternative 1: No chain-mat requirement					
Neutral: removal of chain mat would decrease minor impacts to sea floor from the chains. The impacts are not substantially different with or without chain mat	**Neutral:** no reduction in scallop landings, but minor difference from PA	**Negative:** loss of protection to sea turtles captured in dredge bag, turtles may suffer serious injury and mortality resulting from such capture	**Neutral:** very minor difference in habitat impacts with or without chain mat	**Low positive:** no decrease in catch of scallop catch	**Low negative:** Does not foster cooperative research and collaboration, does not protect biodiversity

[7] The final report of DuPaul *et al*. (2004a) on the proposed gear modification found that the scallop catch was reduced on average by 6.71%. This is slightly less than the draft final report in which a reduction of 6.76% was reported (DuPaul *et al.* 2004b).

6.0 POTENTIAL CUMULATIVE EFFECTS

A cumulative effects analysis is required by the Council on Environmental Quality (CEQ) (40 CFR part 1508.7). The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed by evaluating each action individually. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful. This section analyzes the potential direct and indirect effects of the PA together with past, present, and reasonably foreseeable future actions as well as factors external to the sea scallop dredge fishery on environmental components for which a reasonable likelihood of impacts is expected. Specifically, the environmental components include: (1) physical environment; (2) fishery resources; (3) protected species; (4) habitat; and (5) economic and social environment. Although cumulative effects were considered on all of the alternatives (Table 6.1), the analysis will focus on the PA. Furthermore, direct and indirect impacts to most components of the environment were either non-existent or minor. Therefore, the analysis of cumulative affects will focus on sea turtles and the scallop fishery.

Under the PA, NMFS would clarify the regulatory text regarding the use of chain-mat modified gear in the Atlantic sea scallop dredge fishery and would add a transiting provision to these requirements. These regulations require any vessels with a sea scallop dredge and required to have a Federal Atlantic sea scallop permit, regardless of dredge size or vessel permit category, to modify their dredge(s) when south of 41º 9.0' N. lat. from the shoreline to the outer boundary of the EEZ, from May 1 through November 30 each year (Figure 4.1). The changes to the regulatory language and the transiting provision would not result in any physical, biological, or socio-economic impacts and, therefore, would not result in any cumulative effects. The second purpose of this action is to correct the procedural error in the rulemaking. To address this purpose, this section will re-evaluate the cumulative effects of the requiring a chain-mat modification in this fishery.

This analysis is limited to the geographical area subject to the requirements of the chain mat regulation. In all instances, the analysis attempts to take into account both present and reasonably foreseeable future actions in the next five years that could affect valuable physical, biological, or socioeconomic resources. The discussion of past actions and events reflects underlying differences in the availability of historical information as well as differences in the period of time that must be considered to provide adequate context for understanding the current circumstances. The analysis of impacts on sea turtles considers information primarily focusing on the last decade. Recovery plans for sea turtles were completed in the early 1990s; however, the collection of more detailed information did not begin until the mid-1990s with the establishment of the TEWG. The analysis of impacts of the sea scallop fishery, associated dealers and processors, and their communities also focuses on the past decade.

Several actions have impacted and will likely continue to impact the resources found within the geographic area of the PA, including vessel operations, hopper dredging, fisheries, and marine pollution/water quality. As the intent of the chain-mat regulation is to protect sea turtles, the majority of the following discussion will focus on the cumulative impacts to this species. The scallop fishery, associated dealers and processors, their respective families, and their communities represent the human community of concern. A summary of the cumulative effects and the ecosystem components affected is presented in Table 6.1.

6.1 Physical Environment

As described in section 5.1.1, the PA will likely impact the physical environment due to increased disturbance of bottom sediments from the chain mats as compared to unmodified dredges. However, this impact is expected to be minimal and temporary because the sediment type in geographic area of the action has a rapid recovery time. Additionally, the area of the seafloor swept by the chain mat is the same area swept by the cutting bar and the dredge bag. As the requirement for a chain-mat modified dredge is unlikely to substantially affect the physical environment, it will not contribute or result in cumulative effects on this ecosystem component. Since direct or indirect impacts are not expected to contribute to cumulative effects on this ecosystem component, it will not be discussed further.

6.2 Biological Environment

6.2.1 Vessel Operations

There is the potential for adverse effects from vessels operating in the geographic area south of 41º 9.0' N. lat. from the shoreline to the outer boundary of the EEZ. These include federal, private, and commercial vessels. Federal vessels include the U.S. Navy and U.S. Coast Guard, which maintain the largest federal fleet, the Environmental Protection Agency, NOAA, and the Army Corps of Engineers. Formal consultations pursuant to Section 7 of the ESA have been conducted with the Coast Guard, and the Navy and NMFS is currently in the early phases of consultation with other federal agencies on their vessel operations. These consultations have evaluated the impacts of vessel operations on listed species throughout the Atlantic. The operation of federal vessels in the area may result in collisions with sea turtles resulting in subsequent injury or mortality.

Private and commercial vessels also have the potential to interact with sea turtles. These activities may result in the lethal (through entanglement in anchor lines or boat strike) and non-lethal (through harassment) takes of listed species that could prevent or slow a species' recovery. The magnitude of these interactions is not currently known. The STSSN reports regular incidents of vessel interactions (propeller-like injuries and carapace damage) with sea turtles. It is not known how many of these injuries were pre- or post-mortem. It is likely that the interactions with commercial and recreational vessels result in a higher level of sea turtle mortality than what is documented as some animals may not strand. Minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so that it is more likely to become vulnerable to effects such as entanglements.

No collisions between commercial fishing vessels and sea turtles or adverse effects resulting from disturbance have been documented. However, the commercial fleet represents a significant portion of marine vessel activity. Due to differences in vessel speed, collisions during fishing activity are less likely than collisions during transit. As fishing vessels are smaller than large commercial tankers and container ships, collisions are less likely to result in mortality. Although entanglement in fishing vessel anchor lines has been documented by the Sea Turtle Disentanglement Network, no information is available on the prevalence of these entanglements.

Marine species may also be affected directly or indirectly by fuel oil spills. Fuel spills involving fishing vessels are common events. However, these spills are typically small amounts that are unlikely to affect listed species. Larger spills may result from accidents, although these events are rare and involve small areas. Fuel spills may impact bottom habitat and benthic resources, but it is unknown to what extent. Given the current lack of information on the prevalence or impacts of interactions, there is no basis to conclude that the level of interaction represented by the various vessel activities would be detrimental to the existence of biological resources considered with the proposed action.

It is not possible to predict whether additional impacts from these vessel activities will increase or decrease in the future. It seems likely that recreational vessel activity will increase as populations on the coast continue to grow and access to the ocean increases. Vessels (federal and private, commercial and recreational) will continue to operate in the area for the foreseeable future, and the impacts described above will likely persist.

6.2.2 Fishery Operations

Several commercial fisheries operating in the area use gear that is known to impact marine resources. For all fisheries for which there is an FMP or for which any federal action has been taken to manage the fishery, impacts have been evaluated through the ESA Section 7 process. However, there are fisheries in the area not subject to Section 7 consultation as they operate solely in state waters or have not been subject to a federal management action.

6.2.2.1 Fisheries with a Federal FMP

Several commercial fisheries in the geographic area use gear that is known to capture, injure, and kill sea turtles. Fisheries that use gillnet, longline, trawl, seine, dredge, and trap gear have been documented as unintentionally capturing or entangling sea turtles. The first estimate of loggerhead bycatch in U.S. mid-Atlantic bottom trawl otter gear was completed in September 2006. This estimate is for bottom otter trawl gear primarily designed to target fish and did not include bottom otter trawl gear is also used to harvest sea scallops (see below). During the period of 1994-2006, observers reported 66 loggerhead interactions with bottom otter trawl (fish) gear (Murray 2006). These interactions with loggerhead sea turtles were observed on bottom otter trawl vessels targeting summer flounder (50%), croaker (27%), weakfish (11%), long-finned squid (8%), groundfish (3%), and short-finned squid (1%). Based on observed interactions and fishing effort as reported on vessel trip reports, the average annual loggerhead sea turtle bycatch in the mid-Atlantic bottom otter trawl fisheries combined was 616 loggerhead sea turtles for each year of the period 1996-2004 (Murray 2006).

Formal Section 7 consultations have been conducted on the Atlantic bluefish, Atlantic herring, Atlantic mackerel/squid/Atlantic butterfish, highly migratory species (HMS), monkfish, northeast multispecies, red crab, skate, spiny dogfish, summer flounder/scup/black sea bass, shrimp, and tilefish fisheries. An incidental take statement (ITS) has been issued for the take of sea turtles in each of the fisheries (Appendix B). A brief summary of the fishery is provided here, but more detailed information can be found in the respective FMPs and the Biological Opinions.

The *Atlantic bluefish fishery* operates in state and EEZ waters using gillnets, otter trawls, fish pound nets, hand and troll lines, and haul seines, with gillnets being the primary gear. Bluefish are harvested commercially in state and EEZ waters. Given the time and location of the bluefish fishery, it is most likely to interact with Kemp's ridley and loggerhead sea turtles (NMFS 1999a).

The *Atlantic herring fishery* is primarily a mobile gear fishery. Midwater trawls, paired midwater trawls, and purse seines are the major gears fished, with some vessels alternating gear types. From December to March, the fishery operates in the coastal waters of southern New England and as spring approaches, the fishery moves north. The Atlantic herring fishery is most likely to overlap with sea turtle distribution in coastal waters of Massachusetts during the late summer through early fall when effort in the fishery is concentrated in these waters as well as the waters of Maine and New Hampshire. Generally, sea turtle distribution does not overlap with the herring fishery from January to May. The Biological Opinion that considered the effects to ESA-listed species from the implementation of the Herring FMP concluded that sea turtle takes in fishing gear used in the herring fishery were reasonably likely to occur even though none had been observed. An ITS was provided based on the observed capture of sea turtles in other fisheries using comparable gear (NMFS 1999b).

Several types of gear including gillnet, midwater and bottom trawl gear, pelagic longline/hook-and-line/handline, pot/trap, dredge, pound net, and bandit gear are used in the *Atlantic mackerel/squid/Atlantic butterfish fishery*. Trawl gear is the primary fishing gear for these fisheries. Observed takes in Atlantic mackerel/squid/butterfish gear include 1 lethal take of a loggerhead and 1 non-lethal take of a leatherback sea turtle in the foreign squid fishery in 1982, 3 non-lethal takes (2 loggerheads, 1 leatherback) in the foreign squid fishery in 1986, and 1 non-lethal take of a loggerhead sea turtle in the domestic mackerel trawl fishery in 1990. Sea turtle takes have also been observed in bottom otter trawls targeting *Loligo* and *Illex*. Entanglements or entrapment of sea turtles has been recorded in one or more of the gear types listed here. A formal Section 7 consultation concluded, on April 28, 1999, that the operation of the mackerel/squid/butterfish fishery as modified by Amendment 8 to the FMP may adversely affect loggerhead, leatherback, Kemp's ridley, and green sea turtles, but it was not likely to jeopardize the continued existence of these species (NMFS 1999c).

The Federal *monkfish fishery* occurs in all waters under federal jurisdiction from Maine through the North Carolina/South Carolina border. The current commercial fishery primarily operates in the deeper waters of the Gulf of Maine, Georges Bank, and southern New England and in the Mid-Atlantic. The fishery uses several gear types that may entangle protected species, including gillnet and trawl gear. In 1999, observers documented that turtles were taken in excess of the

ITS as a result of entanglements in monkfish gillnet gear. NMFS reinitiated consultation on the Monkfish FMP in May 2000, in part, to reevaluate the effects of the monkfish gillnet fishery on sea turtles. With respect to sea turtles, the Biological Opinion concluded that the continued implementation of the Monkfish FMP may adversely affect sea turtles and a new ITS was provided (NMFS 2003d).

The estimated capture of sea turtles in monkfish gillnet gear is relatively low; however, there is concern that much higher levels of interaction could occur (NMFS 2006b). In April and May of 2000, two unusually large stranding events occurred during which 275 loggerhead and 5 Kemp's ridley sea turtles washed ashore on ocean facing beaches in North Carolina. Although there was not enough information to specifically determine the cause of the deaths, there was information to suggest that the turtles died as a result of entanglement with large mesh gillnet gear. The monkfish fishery, which uses large mesh gillnet, was operating in waters off of North Carolina at the time that the sea turtles would have died. As a result, NMFS published, in 2002, new restrictions for the use of gillnets in Federal waters off of North Carolina and Virginia. The restrictions were modified in April 2006 (71 FR 24776, April 26, 2006).

Multiple gear types are used in the *Northeast multispecies fishery*. However, the gear type of greatest concern is the sink gillnet that can entangle sea turtles in the buoy lines and/or net panels. Data indicate that sink gillnet gear has seriously injured or killed loggerhead and leatherback sea turtles. Historically, the sink gillnet component of the fishery has occurred from the periphery of the Gulf of Maine to Rhode Island, but in recent years, more effort has occurred in the offshore waters and into the Mid-Atlantic. Sea turtle takes have also been observed in the trawl component of this fishery. Participation in this fishery has declined since extensive groundfish conservation measures have been implemented. The fishery operates year-round with peaks in spring and from October through February. Additional management measures (i.e., Framework Adjustment 42) are expected to further reduce and control effort in the multispecies fishery. NMFS reinitiated consultation on the Multispecies FMP on May 4, 2000 and concluded that the operation of the fishery may adversely affect loggerhead, Kemp's ridley, and green sea turtles, but it would not jeopardize the continued existence of these species (NMFS 2001b).

The *red crab fishery* is a pot/trap fishery that occurs in deep waters along the continental slope. There have been no recorded takes of ESA listed species in this fishery. However, given the type of gear used in the fishery, takes of sea turtles are considered possible based on the precautionary approach to give "benefit of the doubt" to the species, and an ITS has been provided for this fishery (NMFS 2002c).

The *skate fishery* is primarily a bottom trawl fishery. Gillnet gear is the second most common type of gear used in this fishery. The Northeast skate complex is comprised of seven different related skate species. There have been no recorded takes of ESA-listed species in the skate fishery. However, given that sea turtle interactions with trawl and gillnet gear have been observed in other fisheries, sea turtle takes in gear used in the skate fishery may be possible where the gear and sea turtle distribution overlap. Section 7 consultation on the Skate FMP was completed July 24, 2003, and concluded, based on a precautionary approach, that implementation of the Skate FMP may adversely affect ESA-listed sea turtles as a result of interactions with (capture in) gillnet and trawl gear, but would not jeopardize the continued existence of these species (NMFS 2003e).

Primary gears in the *spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear (NMFS 2003d). Spiny dogfish are landed in every state from Maine to North Carolina and in all months of the year. However, the distribution of those landings varies by area and season. Spiny dogfish are landed principally from Mid-Atlantic waters during fall and winter months and in northern waters from New York to Maine during the spring and summer. Sea turtles can be incidentally captured in all gear sectors of this fishery. Takes in 2000 included one dead and one live Kemp's ridley. Since the ITS issued with the August 13, 1999 Biological Opinion anticipated the take of only 1 Kemp's ridley, the incidental take level for the dogfish FMP was exceeded. Consultation was reinitiated in 2000, in part, to reevaluate the effect of the spiny dogfish fishery on sea turtles. The Biological Opinion concluded, on June 14, 2001, that the continued implementation of the Spiny Dogfish FMP may adversely affect loggerhead, leatherback, Kemp's ridley, green, and hawksbill sea turtles, but it is not likely to result in jeopardy to these species (NMFS 2001c).

Primary gears in the *summer flounder/scup/black sea bass fisheries* are trawl, pot/trap, and gillnet. These gear types are known to interact with sea turtles. The summer flounder trawl fishery has a known history of sea turtle entanglement. As a result, significant measures have been adopted to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl. These vessels are required to use TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, NC and seasonally for trawl vessels fishing from Oregon Inlet, NC to Cape Charles, VA. Based on the occurrence of gillnet entanglements in other fisheries, the gillnet sector of this fishery could entangle sea turtles as could the pot/trap sector. As a result of new information not considered in previous consultations, NMFS has reinitiated Section 7 consultation on this FMP.

The *golden tilefish fishery* have some unique habitat characteristics and are found in a warm water band along the upper slope of the continental shelf in the southern New England and mid-Atlantic areas at depths of 80 to 440 m (NMFS 2005c). Because of their restricted habitat and low biomass, the tilefish fishery in recent years has occurred in a relatively small area in the mid-Atlantic Bight, south of New England and west of New Jersey. Over 75% of tilefish landings have come from this area (statistical areas 537 and 616; Appendix A) since 1991 (NMFS 2005c). The directed tilefish fishery is a relatively small fishery in terms of the number of participants. Five vessels accounted for more than 49-93% of the landings during the period of 1995-2004 (NMFS 2005c). This fishery is primarily a bottom longline fishery. The fishery changed from using “J” hooks to circle hooks after 1979 (NEFSC 2005a). Anecdotal information suggests that loggerhead and leatherback sea turtles have been taken by hook gear in the tilefish fishery (MAFMC 2000). Consultation was concluded on March 13, 2001, with the issuance of a Biological Opinion that includes an ITS for loggerhead and leatherback sea turtles (NMFS 2001d).

The *HMS Atlantic pelagic fishery* occurs within the geographic area of this proposed action. Pelagic and bottom longline, pelagic driftnet, handgear, and purse seine gear have been used in this fishery. The swordfish driftnet portion of the fishery was prohibited in an emergency closure in 1996 that was subsequently extended. A permanent prohibition on the use of the driftnet gear in the swordfish fishery was published in 1999. In 2001, NMFS completed consultation on the HMS pelagic longline fishery. This fishery primarily targets swordfish, yellowfin tuna, or bigeye tuna in various areas and seasons and is comprised of five relatively distinct segments: Gulf of Mexico yellowfin tuna fishery; southern Atlantic (Florida East Coast to Cape Hatteras) swordfish fishery; Mid-Atlantic and New England swordfish and bigeye tuna fishery; U.S. Atlantic Distant Water swordfish fishery; and the Caribbean tuna and swordfish fishery. Observations of sea turtle bycatch in the pelagic longline component of the swordfish/tuna/shark fishery number in the thousands. In 2003, NMFS was notified that the total take levels specified in a June 2001 Biological Opinion on the fishery had been exceeded in 2002 for loggerheads and in 2001 and 2002 for leatherbacks. Based, in part, on this new information, consultation was reinitiated in 2003. The Biological Opinion concluded, on June 1, 2004, that the continued operation of the Atlantic pelagic longline fishery is not likely to jeopardize the continued existence of loggerhead sea turtles and is likely to jeopardize the continued existence of leatherback sea turtles (NMFS 2004d). A new Reasonable and Prudent Alternative was developed and implemented. Fairfield-Walsh and Garrison (2007) have estimated the take of loggerhead sea turtles in longline fisheries managed under the HMS FMP in 2006. An estimated 561 (range = 381-981) loggerhead sea turtles were taken. This number is higher than 2005 when 274 loggerhead sea turtles were estimated, but is lower than some previous years in the period of 1992-2006 (Fairfield-Walsh and Garrison 2007).

Sea turtle captures have also been documented in the *Atlantic sea scallop trawl fishery*. The NEFSC completed an estimate of loggerhead sea turtle bycatch in this component of the sea scallop fishery for 2004 and 2005 in the mid-Atlantic region. The analysis derived six different estimates using three different methods, including a ratio estimation, the application of a previously developed model for bottom otter trawl gear, and a newly developed model for scallop trawl gear. The six average annual estimates ranged from 81 to 191 turtles. CVs ranged from 0.32 to 0.50 (Murray 2007). The March 2008 Biological Opinion on the Atlantic sea scallop fishery anticipates the take of up to 154 loggerhead sea turtles annually in the Atlantic sea scallop trawl fishery (March 2008). In addition, NMFS anticipates the annual take of up to 1 leatherback (lethal or non-lethal), 1 Kemp’s ridley (lethal or non-lethal) and 1 green sea turtle (lethal or non-lethal) in scallop trawl gear (NMFS 2008)

6.2.2.2 Fisheries not managed under a Federal FMP

There are a number of fisheries in the action area that do not have a Federal FMP. For some of these, there is limited information available. Various fishing methods used in state fisheries are known to incidentally take listed species, including trawls, pot and trap, flynets, and gillnets (NMFS SEFSC 2001). At this time, the past and current effects of these fisheries on sea turtles cannot be quantified.

The primary gear used in the *American lobster fishery* is pot gear. There are inshore and offshore components to the fishery with the majority of fishing occurring in state waters. This fishery takes place year round, peaking in summer and early fall. It has been identified as a source of gear causing serious injury and mortality to endangered leatherback sea turtles. STSSN records show that loggerhead sea turtles have been incidentally taken in lobster gear (STSSN database). A formal Section 7 consultation concluded, on October 21, 2002, that the continued operation of the federal lobster fishery may adversely affect leatherback and loggerhead sea turtles, but it was not likely to jeopardize the continued existence of these species (NMFS 2002d). Consultation on this fishery has been reinitiated and is in progress.

Nearshore gillnet fisheries occur throughout the Mid-Atlantic from Connecticut through North Carolina and capture of sea turtles in these fisheries has been reported (NMFS SEFSC 2001). *Nearshore and inshore gillnet fisheries* of the Mid-Atlantic operating in Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina state and/or federal waters are of particular concern. Incidental captures of sea turtles in these fisheries have been reported (NMFS SEFSC 2001). The *black drum and sandbar shark fisheries*, 10-14 inch mesh gillnet fisheries, operate in Virginia state waters. These fisheries may take sea turtles given the gear type, but no interactions have been observed. Small mesh gillnet fisheries also occur in Virginia state waters and are suspected to take sea turtles but no interactions have been observed. During May – June 2001, NMFS observed 2% of the Atlantic croaker fishery and 12% of the dogfish fishery (which represent approximately 82% of Virginia's total small mesh gillnet landings from offshore and inshore waters during this time) and no turtle takes were observed. In North Carolina, a large mesh gillnet fishery for summer flounder operates in the southern portion of Pamlico Sound. An Incidental Take Permit was issued to the North Carolina Department of Fisheries for the take of sea turtles in the Pamlico Sound large mesh gillnet fishery. The fishery was closed when the take level for green sea turtles was met (NMFS SEFSC 2001). Long haul seines and channel nets are known to incidentally capture sea turtles in North Carolina sounds and inshore waters. No lethal takes have been reported (NMFS SEFSC 2001). As described in section 6.2.7, NMFS has taken regulatory action to address the potential for sea turtle interactions with gillnet gear with 7 inch or greater stretched mesh in North Carolina and Virginia state waters.

The North Carolina Observer Program documented 33 flynet trips from November through April of 1991-1994 and recorded no turtle takes. However, a NMFS observed vessel fishing for weakfish and Atlantic croaker with a flynet took 7 loggerheads in 9 flynet tows without a TED. On a previous trip, the same vessel took 12 loggerheads in 11 out of 13 observed tows targeting Atlantic croaker (NMFS 1997). From 1994-2004, there were 66 observed takes of loggerhead sea turtles in bottom otter trawl (fish) fisheries in the mid-Atlantic. At least 23 (35%) of these interactions occurred in flynets targeting either weakfish or croaker (Murray 2006). NMFS is evaluating TED designs that may be required in the *flynet fishery* in the future. Bottom trawl fisheries for *horseshoe crab* are suspected as taking sea turtles off of Delaware (Spotila *et al.* 1998), but NMFS has no evidence that sea turtles have been caught in horseshoe crab trawls.

A *whelk fishery* using pot/trap gear is known to occur in several parts of the action area, including Delaware and Virginia. Landings data suggests that the greatest effort in the whelk fishery in the waters off Delaware occurs in the months of July and October; times when sea turtles are present. Whelk pots, which unlike lobster pots are not fully enclosed, have been suggested as a potential source of entrapment for loggerhead sea turtles that may be enticed to enter the trap to get the bait or whelks caught in the trap (Mansfield and Musick 2001). Various *crab fisheries* using pot/trap gear also occur in federal and state waters such as horseshoe crab, green crab, and blue crab. Other fishery activities that use gear known to be an entanglement risk for protected species include a *slime eel pot/trap fishery* in Northeast waters (e.g., Massachusetts and Connecticut) and *finfish trap fisheries* (i.e., for tautog). Residents in some states (e.g., Connecticut and Massachusetts) may also obtain a personal use lobster license that allows individuals to set traps to obtain lobster for personal use. Entanglements have been documented in the endlines of whelk, crab, and lobster pot gear (NMFS STSSN/STDN Databases).

Sea turtles are also known to be taken in the *Virginia pound net fishery*. Pound nets with large mesh leaders set in the Chesapeake Bay have been observed to (lethally) take turtles as a result of entanglement in the leader. NMFS has taken regulatory action to address the take of sea turtles in this fishery (section 6.2.7). An ITS has been provided for this fishery (NMFS 2004e).

Incidental captures of loggerhead sea turtles in fish traps set in Massachusetts, Rhode Island, New York, and Florida have been reported (NMFS STSSN Database.). The lobster pot fishery in state waters is prosecuted from Maine through New Jersey. Although they are more likely to entangle leatherback sea turtles, lobster pots set in New York are also known to entangle loggerhead sea turtles.

Formal consultation has also been conducted for the issuance of an Exempted Fishing Permit (EFP) for *horseshoe crabs*. The EFP for the collection of horseshoe crabs includes an ITS for turtles. Horseshoe crabs collected under this permit are used for data collection on the species and to obtain blood for biomedical purposes. The Biological Opinion considered the issuance of an EFP for one year and was completed in September 2001 (NMFS 2001e).

Recreational fishermen may also impact sea turtles. Sea turtles have been caught on recreational hook and line gear. For example, from May 24 to June 21, 2003, 5 live Kemp's ridleys were reported as being taken by recreational fishermen on the Little Island Fishing Pier near the mouth of the Chesapeake Bay. There have also been anecdotal reports that several Kemp's ridleys were caught each week earlier in the spring of 2003. These animals were typically alive, and while the hooks should be removed whenever possible and it would not further injure the turtle, NMFS suspects that the turtles are probably often released with hooks remaining.

6.2.2.3 Summary

As described above, a wide range of commercial fisheries in the action area employ gear that has been known to capture, injure, and kill sea turtles. Due to the complex life history of sea turtles, these fisheries impact different life stages of sea turtle depending on the temporal and spatial extent of the fishery. In some cases, the turtles are harmed, injured, or killed as a result of the interaction. Several federally regulated fisheries that use gillnet, longline, trawl, seine, dredge, and pot and trap gear have been documented as unintentionally capturing or entangling sea turtles. For all fisheries for which there is an FMP or for which any federal action has been taken to manage the fishery, impacts have been evaluated through the ESA Section 7 process. The

ITSs associated with these consultations are summarized in Appendix B. Few estimates of sea turtle takes in these fisheries have been completed for the western Atlantic, although NMFS is taking steps to address this information gap. In addition to the estimates available for the Atlantic sea scallop dredge fishery (Murray 2004a, 2004b, 2005, 2007), estimates for the mid-Atlantic have been completed for bottom otter trawl (fish) gear (Murray 2006) and sea scallop otter trawl gear (Murray 2007). Based on observed interactions and fishing effort as reported on the VTRs, an average annual loggerhead bycatch in bottom otter trawl (fish) fisheries combined was estimated at 616 sea turtles for each year of the period 1996-2004 (Murray 2006). The analysis completed for the sea scallop trawl fishery derived six different estimates using three different methods, including a ratio estimation, the application of a previously developed model for bottom otter trawl gear, and a newly developed model for scallop trawl gear. The six average annual estimates ranged from 81 to 191 turtles (Murray 2007). Cumulative impacts from fisheries operations have had a negative impact on sea turtle populations in the past, present, and are likely to continue to impact sea turtles in the reasonably foreseeable future.

6.2.3 Dredging Operations

The construction and maintenance of federal navigation channels have been identified as sources of sea turtle mortality. Hopper dredges can entrain and kill sea turtles. Dredging may also alter foraging habitat and relocation trawling associated with the project may injure or kill sea turtles and displace the turtles out of their preferred habitat. Whole sea turtles and sea turtle parts have been taken in hopper dredging operations in Cape Henry, York Spit, and Thimble Shoals Channels. In dredge operations in Virginia, there have been takes of fresh dead turtles, most of which were loggerheads. There have also been several strandings with injuries consistent with dredge interactions. NMFS has completed Section 7 consultations on York Spit, Cape Henry, York River Entrance, and Rappahannock Shoal channels; Sandbridge Shoal; and the Navy's Dam Neck Annex projects.

A Section 7 consultation was completed for sand mining activities in Ambrose Channel, New Jersey in 2002. NMFS anticipates the take of 2 loggerheads, 1 green, 1 Kemp's ridley, or 1 leatherback sea turtle for the 10 year duration of the permit (NMFS 2002e). The Sandbridge Shoal is an approved Minerals Management Service borrow site approximately 3 miles off Virginia beach. This site has been used as part of the Navy's Dam Neck Annex beach renourishment project and the Sandbridge Beach Erosion and Hurricane Protection Project and is likely to be used for beach nourishment in the future. NMFS completed Section 7 consultation in April 1993 and anticipated the take of 8 loggerheads and 1 Kemp's ridley or green turtle. Actual dredging began in May 1998, and no sea turtle takes were observed during the dredge cycle. In June 2001, the Army Corps of Engineers (ACOE) consulted on the next dredge cycle to begin in summer of 2002. NMFS reduced the ITS to 5 loggerheads and 1 Kemp's ridley or green sea turtle.

A Section 7 consultation on the Navy's Dam Neck Annex beach nourishment project was completed in January 1996 and consultation was reinitiated in 2003 based on an accelerated dredge cycle (an 8 year rather than 12 year cycle), increased sand volume, and new information on loggerhead sea turtles. In a Biological Opinion concluded in December 2003, NMFS anticipated the take of 4 loggerheads and 1 Kemp's ridley or green sea turtle during each cycle (NMFS 2003f).

A Section 7 consultation on dredging in the Thimble Shoal Federal Navigation and Atlantic Ocean Channels was completed in April 2002. Maintenance dredging was expected to occur approximately every two years. If the amount of material to be dredged was the greatest estimated amount, NMFS anticipates the take of 18 loggerhead or 4 Kemp's ridley sea turtles annually. The incidental level of take is anticipated to be fresh dead. In addition, an unquantifiable number of live loggerhead or Kemp's ridley sea turtles are anticipated to be taken during relocation trawling (NMFS 2002f).

In July 2003, NMFS completed a Section 7 consultation with the ACOE for maintenance dredging in Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal channels. NMFS estimated the take of sea turtles for the greatest estimated amount of material to be dredged annually and for two other scenarios. If the amount of material to be dredged was the greatest estimated amount, NMFS anticipates the take of 18 loggerheads, 4 Kemp's ridleys, or 1 green sea turtle annually. The incidental level of take is anticipated to be fresh dead. NMFS also anticipates the take of up to 120 uninjured sea turtle (loggerhead, Kemp's ridley, leatherback or green sea turtles or combination thereof) and 1 (lethal) take of a loggerhead, Kemp's ridley, leatherback or green sea turtle (NMFS 2003g).

A Section 7 consultation on the ACOE Atlantic Coast Maryland Shoreline Protection Project was completed in November 2006. The proposed dredging project has the potential to directly affect loggerhead and Kemp’s ridley sea turtles. Over the life of the project (i.e., through 2044), NMFS anticipates that up to 24 sea turtles are likely to entrained and killed, with up to two of these being Kemp’s ridleys and the remainder being loggerheads (NMFS 2006c). NMFS has also completed a Section 7 consultation on the National Aeronautics and Space Administration’s Wallops Island Shoreline Restoration and Infrastructure Protection Program. A total of approximately 25 dredge cycles is currently planned over the 50 year duration of the project. An ITS has be provided for this project (NMFS 2007h)

A Section 7 consultation on the ACOE Siasconset Beach nourishment project was completed in October 2007. NMFS anticipates that no more than 2 loggerhead sea turtles will be entrained during the project (NMFS 2007i). A consultation was also completed for a project for nourishment of Winthrop Beach. In this consultation, NMFS anticipates that no more than 1 loggerhead sea turtle is likely to be injured or killed for approximately every 500,000 cy of material removed from the borrow areas, resulting in the take of up to 1 loggerhead sea turtle. Both of these Biological Opinions concluded that this level of take was likely to adversely affect but is not likely to jeopardize the continued existence of loggerhead sea turtles (NMFS 2007i, NMFS 2007j).

Dredging impacts to sea turtles are likely to continue in the foreseeable future.

6.2.4 Power Plants

Power plants can also pose a danger of injury and mortality for benthic loggerheads. In Florida, thousands of sea turtles have been entrained in the St. Lucie Nuclear Power Plant's intake canal over the past couple of decades (Bresette *et al*. 2003). From May 1976 - November 2001, 7,795 sea turtles were captured in the intake canal (Bresette *et al*. 2003). Approximately 57% of these were loggerheads (Bresette *et al*. 2003). Procedures are in place to capture the entrained turtles and release them. This has helped to keep mortality below 1% since 1990 (Bresette *et al*. 2003). The Oyster Creek Nuclear Generating Station in New Jersey is also known to capture sea turtles although the numbers are far less than those observed at St. Lucie, FL. As is the case at St. Lucie, procedures are in place for checking for the presence of sea turtles and rescuing sea turtles that are found within the intake canals. Based on past levels of impingement, the distribution of the species, and the operation of the facility, NMFS anticipates that no more than two loggerheads will be taken each year as a result of the operation of the Oyster Creek Nuclear Generating Station (NMFS 2005d).

6.2.5 Marine Pollution/Water Quality

Sources of pollutants within the geographic scope of the proposed action include atmospheric loading of pollutants such as polychlorinated biphenyls (PCBs), storm water runoff, runoff into rivers emptying into bays, groundwater discharges, sewage treatment effluent, and oil spills. Chemical contaminants may have an effect on marine species' reproduction and survival. It has been well established that organochlorine (OC) compounds, including PCBs and OC pesticides, bioaccumulate in animal tissues. A study of 48 loggerhead sea turtles collected in Core Sound, North Carolina, provides the first evidence that OC contaminants may be affecting sea turtle health. Significant correlations between OC levels and health parameters for a wide range of biological functions were found. This relationship is strictly correlative and further studies are required to determine precise causal relationships between the contaminants and health effects in sea turtles (Keller *et al.* 2004). While the effects of contaminants on sea turtles are relatively unclear at this time, pollution may also make sea turtles more susceptible to disease by weakening their immune system.

Marine debris (discarded fishing line, lines from boats, plastics) can entangle sea turtles and drown them. Turtles commonly ingest plastic or mistake debris as food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach content.

Excessive turbidity due to coastal development and/or construction could influence marine resources, including the sea turtle foraging ability. Turtles are not very easily directly affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, they might eventually tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

While dependent on environmental stewardship and clean up efforts, impacts from marine pollution, excessive turbidity, and chemical contamination on marine resources are expected to continue.

6.2.6 Climate Change

Climate change, particularly due to global warming, has the potential to impact sea turtles. The global average surface temperature has warmed by approximately 0.74 ºC in the last century and, based on model simulations, will continue to rise at greater than the global average rate in the next 50 years (Solomon *et al.* 2007). One of the most certain consequences of climate change is a rise in sea level due to thermal expansion with rising ocean temperatures and loss of land ice (National Assessment Synthesis Team 2001; Solomon *et al.* 2007). The global average rate of sea level rise during 1993-2003 was 3.1 ± 0.7 mm per year; however, sea level rise has not been geographically uniform in the past and will not be in the future (Solomon *et al.* 2007). Therefore, sea level rise will affect various coastal regions differently (National Assessment Synthesis Team 2001). Other anticipated climate-related changes include more intense tropical and extra-tropical cyclones, generally larger extreme wave and storm surges, altered precipitation/runoff, and ocean acidification (Parry *et al.* 2007). These phenomena will vary considerably at regional and local scales (Parry *et al.* 2007).

One of the major effects of sea level rise is loss of beach habitat (National Assessment Synthesis Team 2001; Fish *et al.* 2005). The Atlantic and Gulf coastlines are especially vulnerable to sea level rise and to changes in the frequency and severity of storms and hurricanes (National Assessment Synthesis Team 2001; ACIA 2004). Sea level rise in the Southeast United States will have a range of physical impacts on the coastal areas including coastal flooding, salt-water intrusion, increased beach erosion, and coastal land loss (National Assessment Synthesis Team 2001). As described above, the southeastern U.S. is an important nesting habitat for sea turtles. Sea level rise may impact sea turtle nesting areas, particularly in areas with low-lying beaches as the sea may inundate nesting sites and decrease nesting habitat (Daniels *et al*. 1993; Fish *et al*. 2005; Baker *et al*. 2006). Human development and habitat alteration may hinder or prevent the natural migration of beaches, which may result in a loss of nesting habitat (Fish *et al*. 2005). Increased tropical storms and storm surge could impact sea turtles in areas where the sea turtle nesting period overlaps with the tropical storm season (Milton *et al.* 1994; Pike and Stiner 2007; van Houtan and Bass 2007). As described in section 4.2.2.1, sand accretion and rainfall that result from storms as well as wave action can appreciably reduce hatchling success.

Sea turtles exhibit temperature dependent sex determination with incubation temperatures near the upper end of the tolerable range producing only female hatchlings and incubation temperatures near the lower end of the tolerable range producing male hatchlings. Sediment temperatures prevailing during the middle third of the incubation period also determine the sex of hatchling sea turtles (Mrosovsky and Yntema 1980). The long-term survival of the species is dependent on a sufficient range of temperatures to ensure that both male and female hatchlings are produced (Hays *et al.* 2003). An increase in global temperature will increase sand temperature, potentially altering the natural sex ratios within the nest (Hays *et al.* 2003; Hawkes *et al*. 2007). Other potential impacts of climate change on sea turtles include earlier nesting (Weishampel *et al.* 2004), reduced internesting interval Hays *et al.* 2002), and shifts in species range and migration (McMahon and Hays 2006)

Impacts to marine ecosystems due to climate change are likely to continue in the foreseeable future, but the effects of these impacts on sea turtle populations are not known at this time.

6.2.7 Previous Conservation and Recovery Actions Impacting Marine Resources

A number of activities are in progress that ameliorate some of the negative impacts on marine resources, sea turtles in particular, posed by the activities summarized above. Education and outreach are considered one of the primary tools to reduce the risk of collision represented by the operation of federal, private, and commercial vessels.

NMFS' regulations require fishermen to handle sea turtles in such a manner as to prevent injury. Any sea turtle taken incidentally during fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to a series of procedures (50 CFR 223.206(d)(1)). NMFS has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. NMFS has also developed a recreational fishing brochure that outlines what to do should a sea turtle be hooked and includes recommended sea turtle conservation measures. These outreach efforts will continue in an attempt to increase the survival of protected species through education on proper release guidelines.

There is an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts. This network not only collects data on dead sea turtles but also rescues and rehabilitates live stranded turtles. Data collected are used to monitor stranding levels and identify areas where unusual or elevated mortality is occurring. The data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All states that participate in the STSSN are collecting tissue for genetic studies to better understand the population dynamics of the northern subpopulation of nesting loggerheads. These states also tag live turtles when encountered through the stranding network or in-water studies. Tagging studies help provide an understanding of sea turtle movements, longevity, and reproductive patterns, all of which contribute to our ability to reach recovery goals for the species.

There is an organized formal program for at-sea disentanglement of sea turtles. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen. NMFS has developed a wheelhouse card to educate fishermen and recreational boaters on the sea turtle disentanglement network and disentanglement guidelines. A final rule (70 FR 42508) published on July 25, 2005, allows any agent or employee of NMFS, the USFWS, the U.S. Coast Guard, or any other Federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife, when acting in the course of his or her official duties, to take endangered sea turtles encountered in the marine environment if such taking is necessary to aid a sick, injured, or entangled endangered sea turtle, or dispose of a dead entangled sea turtle, or salvage a dead endangered sea turtle for scientific or education purposes. NMFS affords the same protection to sea turtles listed as threatened under the ESA (50 CFR 223.206(b)).

NMFS issued a final rule (67 FR 56931), effective September 3, 2002, that closes the waters of Pamlico Sound, NC to fishing with gillnets with a mesh size larger than 4 1/4 inch (10.8 cm) stretched mesh ("large-mesh gillnet"), on a seasonal basis from September 1 through December 15 each year, to protect migrating sea turtles. The closed area includes all inshore waters of Pamlico Sound south of 35º 46.3' N. lat., north of 35º 00' N. lat., and east of 76º 30' W. long.

In December 2002, NMFS issued new regulations for the use of gillnets with larger than 8 inch stretched mesh in federal waters off of North Carolina and Virginia (67 FR 71895, Dec. 3, 2002). Gillnets with larger than 8 inch stretched mesh are not allowed in federal waters (3-200 nautical miles) north of the North Carolina/South Carolina border at the coast to Oregon Inlet at all times; north of Oregon Inlet to Currituck Beach Light, NC from March 16 through January 14; north of Currituck Beach Light, NC to Wachapreague Inlet, VA from April 1 through January 14; and, north of Wachapreague Inlet, VA to Chincoteague, VA from April 16 through January 14. On April 26, 2006, NMFS published a final rule (71 FR 24776) that included modifications to the large-mesh gillnet restrictions. Specifically, the new final rule revises the gillnet restrictions to apply to stretched mesh that is 7 inches or greater and extends the prohibition on the use of such gear to North Carolina and Virginia state waters. Federal and state waters north of Chincoteague, VA remain unaffected by the large-mesh gillnet restrictions. These measures are in addition to the Harbor Porpoise Take Reduction Plan measures that prohibit the use of large-mesh gillnets in southern mid-Atlantic waters (territorial and federal waters from Delaware through North Carolina out to 72° 30'W longitude) from February 15 – March 15, annually.

In July 2004, NMFS issued new sea turtle bycatch and bycatch mortality mitigation measures for all Atlantic vessels that have pelagic longline gear onboard and that have been issued, or are required to have, Federal HMS limited access permits, consistent with the requirements of the ESA, the MSFCMA, and other domestic laws. These measures include mandatory circle hook and bait requirements, and mandatory possession and use of sea turtle release equipment to reduce bycatch mortality. This final rule also allows vessels with pelagic longline gear onboard that have been issued, or are required to have, Federal HMS limited access permits to fish in the Northeast Distant Closed Area, if they possess and/or use certain circle hooks and baits, sea turtle release equipment, and comply with specified sea turtle handling and release protocols (69 FR 40733, July 6, 2004).

In June 2006, NMFS issued regulations requiring that any offshore pound net leader in the Virginia waters of the mainstem Chesapeake south of 37º 19.0' N lat. and west of 76 º 13.0' W long., and all waters south of 37 º 13.0' N. lat. to the Chesapeake Bay Bridge Tunnel, and the James and York Rivers downstream of the first bridge in each tributary, meet the definition of a modified pound net leader. Outside this area, the prohibition of leaders with greater than or equal to 12 inches (30.5 cm) stretched mesh and leaders with stringers, as established by the June 17, 2002 interim final rule, applies from May 6 to July 15 each year. An exception is provided if the leader meets the definition of a modified pound net leader. The modified pound net leader must meet requirements for maximum allowed mesh size, placement of the leader in relation to the sea floor, the height of the mesh from the sea floor in relation to the depth at mean lower low water, and the use of vertical lines to hold the mesh in place. This regulation was necessary to conserve sea turtle listed under the ESA (71 FR 36024, June 23, 2006).

In February 2003, NMFS issued a final rule to amend regulations protecting sea turtles to enhance their effectiveness in reducing sea turtle mortality resulting from shrimp trawling in the Atlantic and Gulf areas of the southeastern U.S. TEDs have proven to be effective at excluding sea turtles from shrimp trawls; however, NMFS has determined that modifications to the design of TEDS needed to be made to exclude leatherbacks and large and mature loggerhead and green sea turtles. In addition, several approved TED designs did not function properly under normal fishing conditions. NMFS disallowed these TEDs. Finally, the rule requires modification to the try net and bait shrimp exemptions to the TED requirements to decrease mortality of sea turtles (68 FR 8456, Feb. 21, 2003).

Significant measures have been taken to reduce sea turtle takes in summer flounder trawls and trawls that meet the definition of summer flounder trawls, which would include fisheries for species like scup and black sea bass, by requiring TEDs in trawl nets fished in the area of greatest turtle bycatch off the North Carolina and part of the Virginia coast from the North Carolina/South Carolina border to Cape Charles, VA. These measures are attributed to significantly reducing turtle deaths in the area. The TED requirements for the summer flounder fishery do not, however, require the use of larger TEDs that are used in the shrimp trawl fishery to exclude leatherbacks as well as large benthic immature and sexually mature loggerhead and green sea turtles.

On February 15, 2007, NMFS published an Advance Notice of Proposed (ANPR) rulemaking (72 FR 7382). In the ANPR, NMFS announced that it is considering amendments to the regulatory requirements for turtle excluder devices (TEDs) in the flynet, whelk, calico scallop, and Atlantic sea scallop fisheries. In addition, NMFS is considering moving the current northern boundary of the Summer Flounder Fishery-Sea Turtle Protection Area to a point further north. The purpose of these measures would be to help conserve and recover sea turtles.

Other recent actions taken to protect sea turtles include a Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico Fisheries (Sea Turtle Strategy), released by NMFS in June 2001, to address the incidental capture of sea turtle species in state and federal fisheries in the Atlantic and Gulf of Mexico. The major elements to the strategic plan include: continuing and improving stock assessments; improving and refining estimation techniques for the takes of sea turtles to ensure that ESA criteria for recovery are being met; continuing and improving the estimation or categorization of sea turtle bycatch by gear type and fishery; evaluating the significance of incidental takes by gear type; convening specialist groups to prepare take reduction plans for gear types with significant takes; and promulgating ESA and MSFCMA regulations implementing plans developed for take reduction by gear type. Actions taken under the Sea Turtle Strategy are expected to provide a net benefit to sea turtles.

6.2.8 Research

NMFS recognizes that there is uncertainty regarding sea turtle interactions with sea scallop dredges as sea turtles could be captured when the dredge is in the water column or being fished on the bottom. NMFS does not have evidence of how the modified gear interacts with live sea turtles on the bottom and in the water column. Collaboration between industry, scientists, and NMFS managers on research projects can result in social benefits as industry, scientists, and managers better understand each other's perspective and goals. There have been three recent projects that have used video to try to document sea turtle behavior around sea scallop dredges and interactions with the dredges. These projects are described in section 2.1.5.

In 2005 and 2006, NMFS worked with industry to test a dredge with a modified cutting bar and bail designed to minimize impacts to turtles that may be encountered on the bottom (NMFS 2005b, Milliken *et al.* 2007). The project used turtle carcasses and model turtles to simulate a worst case scenario of a dredge overtaking a sea turtle lying on the bottom. During the 2005 study, the turtle carcasses were observed lodged in front of the cutting bar and pushed along, eventually going under the cutting bar and getting caught on the chain mat. The model turtle was deployed on one tow with the modified dredge in 2005. During this tow, the model turtle was deflected over the bail of the modified dredge (NMFS 2005b). The dredge was further modified and additional trials were conducted in 2006. In 8 of the 12 successful trials, the carcasses went over the dredge (n=7) or were deflected to the side (n=1), indicating that the design may be effective in guiding turtles up and over the dredge (Milliken *et al.* 2007). It is important to note that the project was limited in that behavioral responses of a live turtle encountering a dredge could not be assessed. NMFS is continuing to research this modification to assess whether the modification can reduce the severity of injuries to sea turtles interacting with sea scallop dredges on the bottom.

NMFS has also partnered with industry to develop and test TEDs for trawl fisheries in the mid-Atlantic. Research is on-going in the flynet, whelk, summer flounder, and Atlantic sea scallop trawl fisheries.

6.2.9 Habitat

As described above, there is expected to be an increased disturbance to bottom sediments whenever the chain mats are used. This increase, however, is expected to be minimal. Additionally, the area of the seafloor swept by the chain mat is the same area swept by the cutting bar and the dredge bag. The disturbance is expected to be temporary as the sediment type in the area of the PA has a rapid recovery time. Since any direct or indirect impacts to habitat under the PA are expected to be minimal and temporary, significant cumulative effects on this ecosystem component are not likely.

6.3 Economic Environment

The proposed action requires a gear modification to scallop dredge vessels fishing south of 41º 9.0' N lat. The intent of this modification is to reduce the severity of injuries to sea turtles following an interaction with sea scallop dredge gear in the water column. The cost of implementing this gear modification may reduce industry revenues by approximately 4.3%. This proposed action and possible reduction in revenues are not considered to be a significant economic impact to the industry. See section 5.0 for detailed economic analysis of the proposed action and alternatives.

The long-term cumulative effects of past actions, including Amendment 4 and Amendment 7 to the Scallop FMP, were positive for the scallop fleet and infrastructure (suppliers, maintenance, facilities, and processors). Amendment 4 instituted a limited access program and established a fishing effort reduction schedule in order to lower scallop fishing mortality and increase yield. Amendment 7 revised the DAS-reduction schedule in order to meet the mandates of the Sustainable Fisheries Act of 1996. In addition to these actions, the Nantucket Lightship Area, CAI, and CAII were closed to scallop fishing beginning in 1994, first by emergency action, and later by Amendment 7 to the Multispecies FMP. These actions were successful in lowering fishing effort and mortality in the scallop fishery.

According to Framework Adjustment 16[8], which proposed a rotation schedule, scallop landings were at their lowest level in 1998 with only about 12.5 million lbs and fleet revenues of $76 million. However, in 1999, 2000 and 2001, fleet revenues increased to $120 million, $160 million, and $173 million, respectively. The yield per day-at-sea improved from about 450 lbs. per day-at-sea in 1994 to more than 1,200 lbs. per-day-at-sea in the 2001 fishing year, lowering the operation costs (such as fuel, oil, water, ice and food) per pound of scallops. As a result, profits of scallop vessels and incomes of the crewmembers continued to increase significantly after 1998. After Frameworks 14 and 15, landings reached record levels of 52 million lbs in 2002, and fleet revenues increased to $202 million. In conclusion, the cumulative impacts of the past and present actions were positive for the scallop fleet and for related sectors including dealers, processors, and primary suppliers to the vessels, and the positive economic impacts are expected to continue in the future.

Although landings by the general category permitted vessels are still represent a small portion of the overall scallop landings (5.35% for the 2004 scallop fishing year), the increase in active general category permits and the increase in landings by general category permitted vessels has prompted the initiation of Amendment 11 to the Scallop FMP. If approved, Amendment 11 is expected to create a limited access program for the general category sector in order to constrain effort in this sector of the fishery (NEFMC 2006). This amendment is currently under development.

6.4 Social Environment

As described in section 5.1.4, there may be social impacts to the fishing communities from the proposed action in that a loss of catch may result in fishing with the modified dredge. The magnitude of these impacts in relation to the overall positive impacts from amendments and frameworks implemented under the Scallop FMP as described above cannot be quantified at this time. The economic analysis found that the proposed action is not considered as a significant economic impact to the industry. Social impacts, that relate closely to the economic impacts, from the proposed action, if any, are therefore not expected to be substantial (see section 5.1.4). In addition, any impacts to the social environment would be localized in specific communities. As this action is unlikely to substantially affect the social environment, significant cumulative

[8] For details of Framework Adjustment 16 see: http://www.nefmc.org/scallops/index.html.

effects on this ecosystem component are not likely. Furthermore, any negative impacts, however minor, that may result from the PA may be mitigated by the social benefits that are likely to continue to result from scientists, industry, and NMFS managers collaborating on research projects to address protection of protected species.

6.5 Summary

Sea turtles, fishery resources, habitat, and the human community (Table 6.1) have been impacted by past and present actions in the area and are likely to continue to be impacted by these actions in the future. The measures implemented under the PA are not expected to result in substantial direct or indirect impacts to the physical environment, habitat, or fishery resources and, are not, consequently, expected to contribute to cumulative effects on these ecosystem components. Therefore, there is no net beneficial or adverse effect on these ecosystem components.

Biological resources, in particular sea turtles, have been, are, and will continue to be negatively impacted by a variety of past, present, and future activities. These cumulative impacts may be impacting the recovery of the species, although the extent cannot be quantified. Vessel and fishing operations, dredging activities, marine pollution and impaired water quality have had a net negative impact to the biological resources found in the area and are likely to continue to impact these ecosystem components in the future. The scallop dredge modification required under the PA will protect sea turtles, benefiting the species. These positive impacts are expected to mitigate to a certain extent the negative cumulative impacts to sea turtle populations. The other activities that are negatively impacting sea turtles should continue to be addressed to ensure sea turtles are protected. One of the goals under NMFS' Sea Turtle Strategy is to develop and implement plans to reduce the take of sea turtles in Atlantic Ocean and Gulf of Mexico fisheries. Implementation of these plans will have a net beneficial impact to sea turtles. NMFS also intends to continue outreach efforts to educate fishermen regarding sea turtles to help conserve and recover sea turtles. The future anticipated research will likely further our knowledge on the details of the interactions between sea turtles and sea scallop dredge gear, potentially leading to the implementation of different measures impacting the sea scallop fishery and having a beneficial impact to sea turtles. The Sea Turtle Strategy, outreach efforts, and anticipated research all address activities that negatively impact sea turtles and are expected to have a beneficial impact on sea turtles.

The human community will likely experience very minor negative impacts from the scallop dredge modification, which will result in a negligible incremental impact when considered together with some conservation measures, marine pollution, and impaired water quality. It is unlikely that the minor negative impact will outweigh the benefits experienced from the other past, present, and future activities. Vessel and fishery operations and dredging have likely had a positive impact on the human community. These same activities will likely to continue to impact these ecosystem components in the future. While the PA will result in some loss of revenue for the sea scallop dredge fishery due to a decrease in catch and the cost of modifying the dredge, this loss is not expected to be substantial. As fishermen become more experienced with the gear, the difference between the catch with unmodified and modified gear is expected to be reduced. In addition, the cost of modifying and maintaining the gear is low. Therefore, it is not expected that the additive effects of this action will contribute to or result in substantial cumulative impacts on the human community.

In conclusion, the cumulative effects of this action are not likely to have a substantial impact on any of the ecosystem components associated with the sea scallop dredge fishery. The PA is expected to provide some benefit to sea turtles without a significant impact on the human community.

Table 6-1: Summary of the cumulative impacts of the alternatives on ecosystem components

	Direct and Indirect Impacts of Alternative	**Past and Present Actions, Including Other Federal and Non-Federal Actions**	**Reasonably Foreseeable Future Actions, Including Other Federal Actions and Non-Federal Actions**	**Cumulative Effects Associated with the Chain-mat Modified Sea Scallop Dredge**
VEC[9]: Impacts on Protected Species and Critical Habitat				
PA – Chain mat requirement; transiting provision	**Positive**	• **Vessel Operations**: Impacts from vessel operations have had a negative effect on sea turtles. • **Fishery Operations**: Sea turtles are subject to capture in a variety of fishing gears, resulting in a negative effect. • **Dredging and Power Plant Operations**: Negative effects also result from dredging and power plant operations. • **Marine Pollution/Water Quality**: Marine pollution result in negative effects on sea turtles. • **Outreach**: Education increases awareness of issues affecting sea turtles and enhances compliance with measures taken to protect sea turtles resulting in positive impacts • **Regulations to conserve and recover sea turtles**: Positive impacts have resulted from the implementation of measures to protect sea turtles in various fisheries. • **STSSN/STDN**: The STSSN and STDN have resulted in	• **Vessel Collisions and Operation**: Same as past and present actions. Vessel activity likely to increase in the future. • **Fishery Operations**: Same as past and present actions • **Dredging and Power Plant Operations**: Same as past and present actions • **Marine Pollution/Water Quality**: Same as past and present action • **STSSN/STDN**: Same as past and present action • **Research**: Same as past and present action • **Outreach**: Same as past and present action • **Regulations to conserve and recover sea turtles**: Future measures to conserve and protect sea turtles would result in positive effects on sea turtle populations. • **Research**: May result in additional measures to mitigate sea turtle bycatch in fisheries, resulting in positive impacts to sea turtles • **Fishery Management Actions**: Same as past and present actions	**Positive cumulative effect**: The PA would require the use of chain mat modified dredges in the Atlantic sea scallop fishery to reduce injury and mortality to sea turtles, which are listed under the ESA.
No Action – No Action/Status Quo	**Positive**			**Positive cumulative effect**: The No Action Alternative would require the use of chain mat modified dredges in the Atlantic sea scallop fishery to reduce injury and mortality to sea turtles which are listed under the ESA.
Alternative 1 – No chain mat	**Negative**			**Negative cumulative effect**: Alternative 1 would remove the requirements to use chain mat modified dredges in the Atlantic sea scallop fishery. Sea turtles would be vulnerable to injury and mortality due to capture in the dredge bag.

9 Direct and indirect impacts on fisheries resources, physical environment, and habitat are minor. Therefore, cumulative effects on these ecosystem components are not likely to be significant and are not included in the table.

		positive effect s on sea turtles resulting from disentanglement, rehabilitation, and from the information gathered through these resources. • **Fishery Management Plan Actions**: Positive effects have resulted from the implementation of various management actions for fisheries that interact with sea turtles. Reductions in interactions have indirectly resulted from measures such as effort reductions; closures; and days-at-sea and trip limitations.		
VEC: Economic Environment				
PA – transiting provision	**Low Negative**	• **Vessel Operations**: supports commerce and recreation; positive economic effects. • **Fishery Operations**: supports commerce and recreation; positive economic effects. • **Dredging and Power Plant Operations**: potential loss of fishing opportunities; support commerce by maintaining waterways; beach renourishment projects enhance beaches • **Marine Pollution/Water Quality**: potential loss of fishing opportunities; positive and negative impacts on the economic environment. • **Regulations to conserve and recover sea turtles**: Regulatory requirements may result in negative economic impacts	• **Vessel Operations**: Same as past and present actions • **Fishery Operations**: Same as past and present actions • **Dredging and Power Plant Operations**: Same as past and present actions • **Marine Pollution/Water Quality**: Same as past and present actions • **Regulations to conserve and recover sea turtles**: Regulatory requirements may result in negative economic impacts • **Fishery Management Plan Actions**: Same as past and present actions	**Low negative cumulative effect**: The PA would require the use of chain mat modified dredges in the Atlantic sea scallop fishery resulting in economic impacts to scallop dredge vessels. These impacts are not expected to be significant.
No Action – No Action/Status Quo	**Low Negative**			**Low negative cumulative effect**: The PA would require the use of chain mat modified dredges in the Atlantic sea scallop fishery resulting in economic impacts to scallop dredge vessels. These impacts are not expected to be significant.
Alternative 1 – No chain mat	**Low Positive**			**Low positive cumulative effect**: The economic impacts of Alternative 1 are less than those of the PA or the No Action Alternative.

		• **Fishery Management Plan Actions**: Measures implemented under the FMPs are designed to improve fishery resource stocks, but may result in short-term economic impacts		
VEC: Social Environment				
PA – transiting provision	**Low Positive**	• **Vessel Operations**: support commerce and recreation; positive economic effects. • **Fishery Operations**: support commerce; positive economic effects. • **Dredging and Power Plant Operations**: potential loss of fishing opportunities; support commerce • **Marine Pollution/Water Quality**: potential loss of fishing opportunities; positive and negative impacts on the economic environment. • **Regulations to conserve and recover sea turtles**: Regulatory requirements may result in negative economic impacts • **Fishery Management Plan Actions**: Measures implemented under the FMPs are designed to improve fishery stocks • **Research**: Positive impacts, fosters collaboration	• **Vessel Operations**: Same as past and present actions • **Fishery Operations**: Same as past and present actions • **Dredging and Power Plant Operations**: Same as past and present actions • **Marine Pollution/Water Quality**: Same as past and present actions • **Regulations to conserve and recover sea turtles**: Regulatory requirements may result in negative economic impacts • **Fishery Management Plan Actions**: Same as past and present actions	**Neutral:** The PA would require the use of chain mat modified dredges in the Atlantic sea scallop fishery resulting in social impacts in localized communities. These impacts are not expected to be significant. Sea turtle conservation will benefit those who value biodiversity.
No Action – No Action/Status Quo	**Low Positive**			**Neutral:** The PA would require the use of chain mat modified dredges in the Atlantic sea scallop fishery resulting in social impacts in localized communities. These impacts are not expected to be significant. Sea turtle conservation will benefit those who value biodiversity.
Alternative 1 – No chain mat	**Low Negative**			**Neutral:** Alternative 1 would remove the requirement to use chain mat modified dredges in the Atlantic sea scallop fishery. Therefore, social impacts resulting in localized communities from its use will be reduced.

7.0 APPLICABLE LAWS AND REGULATIONS

7.1 Endangered Species Act

NMFS has reviewed its compliance with Section 7 consultation under the Endangered Species Act in light of this action. In the December 2004 Biological Opinion, NMFS determined that requiring modification of Atlantic sea scallop dredge gear at times and in areas where sea turtles are likely to occur was a Reasonable and Prudent Measure (RPM) necessary or appropriate to minimize impact of the incidental take of sea turtles. This action is intended to comply with that RPM. NMFS has concluded that this action would not trigger the need to reinitiate consultation on the authorization of the Atlantic sea scallop fishery (memo from Patricia A. Kurkul to The Record, November 2, 2007). However, based on other information, NMFS reinitiated consultation on the continued implementation of the Atlantic Sea Scallop Fishery Management Plan on April 3, 2007. This consultation was completed in March 2008 and found that the continued operation of the Atlantic sea scallop fishery may adversely affect but is not likely to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, and green sea turtles (NMFS 2008)

7.2 Marine Mammal Protection Act

Under the MMPA, Federal responsibility for protecting and conserving marine mammals is vested with the Departments of Commerce (NMFS) and Interior (USFWS). The primary management objective of the MMPA is to maintain the health and stability of the marine ecosystem, with a goal of obtaining an optimum sustainable population of marine mammals within the carrying capacity of the habitat. The MMPA is intended to work in cooperation with the applicable provisions of the ESA. The requirement to use chain mats on scallop dredges in the Atlantic sea scallop fishery will not adversely affect marine mammals. Interactions between scallop dredge gear and marine mammals are reasonably expected to be unlikely to occur given the size, speed and maneuverability of the species present within the geographic scope of the proposed action in comparison to scallop fishing gear.

7.3 Paperwork Reduction Act

This action includes no new collection of information and further analysis is not required. The proposed action would require no additional reporting burdens by scallop permit holders, dealers, or other entities in the Atlantic sea scallop industry.

7.4 Magnuson-Stevens Fishery Conservation and Management Act including Essential Fish Habitat

The area affected by the proposed action has been identified as EFH for the following species: Atlantic cod, haddock, pollock, whiting, red hake, white hake, offshore hake, redfish, witch flounder, winter flounder, yellowtail flounder, windowpane flounder, American plaice, ocean pout, Atlantic halibut, Atlantic sea scallop, Atlantic sea herring, monkfish, bluefish, long finned squid, short finned squid, butterfish, mackerel, summer flounder, scup, black sea bass, surfclam, ocean quahog, spiny dogfish, tilefish, red drum, king mackerel, Spanish mackerel, cobia, dusky shark, sandbar shark, basking shark, tiger shark, blue shark, shortfin mako shark, sand tiger shark, common thresher shark, scalloped hammerhead shark, Atlantic angel shark, Atlantic sharpnose shark, white shark, yellowfin tuna, albacore tuna, bluefin tuna, skipjack tuna, swordfish, barndoor skate, clearnose skate, little skate, roseate skate, thorny skate, winter skate, and golden crab. An Essential Fish Habitat (EFH) consultation was concluded for the chain mat regulation on January 11, 2005 and found that adverse impacts to EFH from the action would not be substantial and had been minimized to the maximum extent practicable. Additional benthic disturbance caused by the gear modification will have inconsequential effects in sandy habitats of the mid-Atlantic. As described above, NMFS believed that the both options for the chain mat configuration under the August 2006 rulemaking would result in openings less than or equal to 14 inches and this is what was consulted on in January 2005. Therefore, the preferred alternative and its impacts were evaluated in the original consultation and further EFH consultation is not required. The conclusions of the original EFH consultation are still applicable and are on file at the Northeast Regional Office.

7.5 Information Quality Act

The Information Quality Act directed the Office of Management and Budget to issue government wide guidelines that "provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies." Under the NOAA guidelines, this action is considered a Natural Resource Plan. It is a composite of several types of information from a variety of sources. Compliance of this document with NOAA guidelines is evaluated below.

- **Utility:** The information disseminated is intended to describe a management action and the impacts of that action. The information is intended to be useful to: 1) industry participants, conservation groups, and other interested parties so they can understand the management action, its effects, and its justification; and 2) managers and policy makers so they can choose an alternative for implementation.

- **Integrity:** Information and data, including statistics that may be considered as confidential, were used in the analysis of impacts associated with this document. This information was necessary to assess the impacts of the alternatives considered as required under the National Environmental Policy Act and Regulatory Flexibility Act for the preparation of a final environmental assessment/regulatory flexibility act analysis/regulatory impact review. NMFS complied with all relevant statutory and regulatory requirements as well as NOAA's policy regarding confidentiality of data. In addition, confidential data are safeguarded to prevent improper disclosure or unauthorized use. Finally, the information to be made available to the public was done so in aggregate, summary, or other such form that does not disclose the identity or business of any person.

- **Objectivity:** The NOAA Information Quality Guidelines standards for Natural Resource Plans state that plans be presented in an accurate, clear, complete, and unbiased manner. NMFS strives to draft and present proposed management measures in a clear and easily understandable manner with detailed descriptions that explain the decision making process and the implications of management measures on marine resources and the public. Although the alternatives considered in this document rely upon scientific information, analyses, and conclusions, clear distinctions are drawn between policy choices and the supporting science. In addition, the scientific information relied upon in the development, drafting, and publication of this EA was properly cited, and a list of references was provided. Finally, this document was reviewed by a variety of biologists, policy analysts, economists, and attorneys from NMFS' Northeast Region and Northeast Fisheries Science Center.

7.6 Administrative Procedure Act

The Federal Administrative Procedure Act (APA) establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of the APA is to ensure public access to the Federal rulemaking process and to give the public notice and an opportunity to comment before the agency promulgates new regulations. NMFS is not requesting a waiver from the requirements of the APA for notice and comment rulemaking.

7.7 Coastal Zone Management Act

Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 requires that all Federal activities that affect the any land or water use or natural resource of the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. NMFS has determined that this action is consistent to the maximum extent practicable with the enforceable policies of approved Coastal Zone Management Programs of Connecticut, Delaware, Maryland, New Jersey, New York, North Carolina, Rhode Island, and Virginia. Letters documenting NMFS' determination, along with the draft EA and proposed rule, were sent to the coastal zone management program offices of these states. Responses were received from six offices – Connecticut, Delaware, New Jersey, North Carolina, Rhode Island, and Virginia. These offices found the proposed regulations to be consistent, to the maximum extent practicable, with their coastal zone management program. A list of specific state contacts and a copy of the letters are available upon request.

7.8 Executive Order (E.O.) 13132 Federalism

E.O. 13132, otherwise known as the Federalism E.O., was signed by President Clinton on August 4, 1999, and published in the Federal Register on August 10, 1999 (64 FR 43255). This E.O. is intended to guide Federal agencies in the formulation and implementation of "policies that have federal implications." Such policies are regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. EO 13132 requires Federal agencies to have a process to ensure meaningful and timely input by state and local officials in the development of regulatory policies that have federalism implications. A Federal summary impact statement is also required for rules that have federalism implications. Given the distribution of the sea scallop dredge fishery, the proposed action is not expected to have substantial effects on states or to have federalism implications. The proposed rule would apply to Federal permit holders in the sea scallop fishery, which operates primarily in federal waters.

7.9 E.O. 12866 Regulatory Planning and Review

7.9.1 Regulatory Impact Review

7.9.1.1 E.O. 12866

The Regulatory Impact Review (RIR) is intended to assist NMFS decision making by selecting the regulatory action that maximizes net benefits to the Nation.

Framework for Analysis

Net National benefit is measured through economic surpluses, consumer and producer surplus. In this case, consumer surplus is associated with the value of sea turtles and the seafood products supplied by the scallop dredge industry. The value associated with sea turtles is called a non-consumptive value, which is comprised of a use and non-use value. Definitions are:

> •Use values are associated with activities such as viewing sea turtles at an aquarium or on board whale watching boats. Option and bequest values are also a type of non-consumptive use value. Option values represent values people place on having the option to enjoy viewing sea turtles in the future, while bequest values are the values people place on knowing that future generations will have the option of viewing sea turtles in the future.
>
> •Non-use values, also referred to as "passive use" or *existence values,* are not associated with actual use (or viewing in this case) but represent the value people place on simply knowing sea turtles exist, even if they will never see one.

The consumer surplus (non-consumptive use and non-use values) for sea turtles associated with improved protection can be expected to be superior to that of Alternative 1, no chain mat requirement. Regulatory alternatives that afford higher protection will yield higher benefits at the margin. In contrast, a decrease in consumer surplus would be anticipated in the seafood or scallop market from any action that decreases seafood availability.

Producer surplus is associated with the economic profit earned by businesses engaged in scallop dredge fisheries as well as profits earned by aquariums, which provide individuals an opportunity to view sea turtles. Actions that decrease businesses revenues or increase their costs are likely to reduce producer surplus. When comparing alternatives, it is the change in net National benefit that becomes the focal point of analysis. This analysis focuses primarily on quantifying the changes in revenues and costs that would impact producer surplus, while changes in consumer surplus are qualitatively evaluated based on the protection to sea turtles provided by the alternatives.

Three alternatives are evaluated in this document. The intent of the action is to clarify the regulatory text regarding sea turtle conservation measures in the Atlantic sea scallop dredge fishery, to add a transiting provision to these regulations and to further correct a procedural error in the original rulemaking. The PA would require the same modification in the same areas and times as the existing requirements. The minor changes to the regulatory text to clarify the requirements and the transiting provision will not result in any economic impacts. The economic impacts resulting from requiring the chain-mat modification in the Atlantic sea scallop dredge fishery were evaluated in the original EA/RIR /IRFA for the August 2006 rulemaking and in the Categorical Exclusion (CE)/RIR for the November 2006 emergency rule. The results of the analyses are described below. As noted in section 3.0, the following alternatives are evaluated in this document:

- The No Action Alternative would maintain the current regulatory requirements.
- The Preferred Alternative (PA) would modify the current regulatory requirements by clarifying the regulatory text and adding a transiting provision.
- Alternative 1 would remove the requirement to use chain mats in the mid-Atlantic sea scallop dredge fishery.

The No Action and PA would provide the same level of protection to sea turtles as the use of the chain-mat modification is required in the same areas and times under both of these alternatives. The chain mat prevents sea turtles from entering the dredge bag, and any serious injuries and mortality that result from such capture. Alternative 1 would provide the least protection to sea turtles as sea turtles would be subject to capture in the dredge bag and injuries that result from such capture. The impacts to sea turtles from the alternatives are evaluated in section 5.0

Producer surplus for the scallop dredge fishery is affected by the requirement to use chain mats in the Atlantic sea scallop dredge fishery. The costs associated with configuring and maintaining the gear with chain mats, as described in section 5.0, is considered in the assessment of impacts to revenue described below. As the existing regulations require the same modification that is proposed in this action, it is expected that vessels have already incurred the cost associated with modifying the gear. Therefore, there is no difference in the cost to modify the gear between the alternatives. A second cost, also discussed in section 5.0, is the cost due to a loss of catch. Assuming no change in prices, a reduction in revenues may occur since the modified gear may reduce scallop catch, leading to a loss in revenue. A combination of increased costs and decreased revenues would result in a loss of producer surplus. There would be no difference in the loss of catch experienced under the PA and the No Action Alternative as the only difference between these two alternatives is the clarification of the regulatory text and the transiting provision. Under Alternative 1, vessels would no longer be required to modify their gear with a chain mat and would no longer incur costs associated with the use of the chain-mat modified gear. Therefore, the loss of producer surplus under Alternative 1 would be less than under the PA or the No Action Alternative.

An increase in cost to a harvester, with no resultant increase in price for the product, can result in a reduction of quantities of seafood supplied to seafood markets. If consumers do not change their demand for the product, higher prices are necessary to ration the smaller supply, decreasing consumer surplus. The magnitude of these changes and how the surpluses will be redistributed between consumers and producers will depend on the slopes of the respective supply and demand functions. In any case, as long as demand functions are downward sloping and supply functions are upward sloping, there is always a loss in economic surplus when regulatory costs are imposed. However, this loss in economic surplus will be minimized by selecting the least costly regulatory alternative that provides a level of protection consistent with the purpose and need of this action. The PA and No Action alternatives are expected to benefit sea turtles at relatively low costs.

In 2003, industry revenues were $221.4M for the scallop dredge fishery operating south of 41° 9.0' N. lat. As described in section 5.0, 314 vessels are affected, and industry revenues are reduced by 4.3% under the PA and the No Action Alternative. The economic analysis was based on gear configured with a specified number of chains based on dredge width. This current action, as with the existing regulations, would require that the gear be configured such that each side of the opening created by the intersecting chains be less than or equal to 14 inches. This may result in a slight additional cost to vessels that need to reconfigure the gear. However, as described in the section 5.0, this cost is expected to be minimal and does not substantially change the results of the economic analysis. As described in Section 5.0, there are also costs associated with dredge efficiency and maintaining the gear. Costs associated with the increased weight of the gear are also not expected to be substantial and, therefore, impacts to dredge efficiency are not expected to be substantial. It is expected that, based on the use of a high quality chain, the chain mat in its entirety will need to be replaced over the course of a fishing season. Therefore, the costs associated with configuring the gear are incurred on an annual basis. However, these costs are not significant. Under Alternative 1, all 314 vessels would also be affected. It is likely that these vessels have already incurred the cost of modifying the gear as chain mats are currently required in the Atlantic sea scallop dredge fishery in the areas and times proposed under the PA. However, these vessels would not incur further costs attributed to the use of the modified gear (i.e., loss of catch, maintenance costs, etc.), as the vessels would be able to fish with unmodified gear. Therefore, the economic impacts under this alternative would be less than the impacts from the PA or the No Action Alternative.

The alternatives can be ranked by industry revenues and turtle protection. The PA and the No Action Alternative provide equivalent protection to sea turtles at the same cost. The costs under these alternatives are higher than the costs under Alternative 1. Alternative 1 does not provide protection to sea turtles as turtles would be vulnerable to capture in the dredge bag. Alternative 1 does not meet the purpose of the chain-mat requirement to conserve sea turtles by reducing sea turtle injury and mortality in the Atlantic sea scallop dredge fishery.

7.9.1.2 Final Regulatory Flexibility Analysis

The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. This analysis is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities". In addition to analyses conducted for the RIR, the regulatory flexibility analysis provides: 1) a succinct statement of the need for; and objectives of, the rule; 2) a summary of the significant issues raised by the public comments in response to the Initial Regulatory Flexibility Analysis (IRFA), a summary of the response to the assessment of the agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments; 3) a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available; 4) a description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and 5) a description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternatives adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency, which affect small entities, was rejected.

<u>Statement of the need for, and objectives of, the rule:</u> This action has three specific objectives. First, this action would further correct a procedural error in the original chain mat rulemaking. Second, this action would clarify the regulatory requirements. Third, this action would add a transiting provision to the regulations related to the use of chain-mat modified gear in the sea scallop dredge fishery. The chain-mat modified dredge gear will prevent injury and mortality to sea turtles resulting from capture in the dredge bag. Sections 4 and 11 of the Endangered Species Act provide the legal basis for this rule.

<u>Summary of significant issues raised by public comments in response to the IRFA:</u> During the public comment period for the proposed rule, NMFS received comments on the economic analysis from one commenter. According to the commenter, vessels are rigging their gear at 11 to 12 inches per side in order to avoid being found in violation if the chains stretch due to wear. As a result, they believe that the economic impacts will greatly exceed the loss in revenues analyzed in the proposed rule due to greater loss of scallops, increased fuel consumption due to the weight and drag created by the additional chains, lost fishing time as it will take longer to empty the bag, and more frequent stretching and breaking.

The requirement included in the proposed, and in this final, rule is that the openings created by the intersecting chains not exceed 14 inches. As the gear is fished, the chains will wear ("stretch") and become longer. The degree of stretch will vary depending on a number of factors including bottom habitat fished and the type and quality of chain used. Some vessels may choose to rig the gear smaller than the 14 inches in order to account for this stretch; while other vessels may choose to rig the gear closer to 14 inches and re-adjust the gear more frequently to comply with the requirements. It is not known whether most fishermen are rigging the gear smaller to account for the stretch or are re-adjusting the gear more frequently. The economic analysis is based on the openings tested in the experimental fishery to test the modified gear (ranging from 11 to 14 inches) and is applicable to the openings required under the regulation (i.e., 14 inches or less). As described in Section 5.0, the weight of a 15 ft sea scallop dredge (frame, bag, and club stick) is approximately 4,500 lbs for the dredge frame. The weight of the chain mat configured according to the table included in the original rule is estimated to be between 56 pounds for a 10-ft dredge and 147 pounds for a 15-ft dredge (email from Henry Milliken (NEFSC) to Richard Merrick (NEFSC), October 1, 2004). Assuming 20% additional chains and shackles would be required for some vessels to comply with the 14-inch requirement (a conservative overestimate) (memo from Ellen Keane, NMFS, to The File, October 3, 2007), the range of weights would increase by 11 lbs for a 10-ft dredge to 29 lbs for a 15-ft dredge. The weight of the chain-mat modified dredge is not considerably different from the unmodified dredge. The additional chain that some vessels may have added to comply with the requirement for a 14-inch opening is a fraction of the chain required for the chain mat as a whole, and the addition of this chain is not expected to substantially increase the weight of the gear. Therefore, NMFS does not anticipate that the additional chain will substantially impact the efficiency of the dredge and does not anticipate any significant costs resulting from extra weight on the gear nor are the additional chains expected to significantly increase stretching and breaking of the chains.

The information provided to NMFS during the rulemakings to require the chain-mat modified gear indicates that the openings tested during the experimental fishery were 14 inches or less. During the experimental fishery to test modified dredge, scallop catches were highly variable from vessel to vessel and trip to trip, with differences ranging from -30.88% to 7.28%, with an average of -6..71%. The researchers assume that as the vessel captains become more familiar with the chain-mat modified gear, catch rates will be less variable and more consistent with the unmodified dredge (DuPaul *et al.* 2004a). As the openings under this requirement are those tested in the experimental fishery, the loss of scallops observed during the experimental fishery is the loss that would be expected with the size openings that are required under the chain-mat regulations. The final report on the fishery does not note a significant increase in the time required to empty the dredge bag. If vessels choose to rig the gear significant smaller than that which was tested in the experimental fishery, the loss of scallops may be greater. However, the loss that was assessed is for the configuration that is required. No changes have been made to the proposed requirements as a result of these comments.

<u>Description and estimate of the number of small entities to which the proposed rule will apply:</u>
According to the 2003 VTR data, there are 314 vessels fishing scallop dredge gear that will be affected by this rule. Of these 314 vessels, 277 vessels are permitted under DAS and 37 vessels are in the GEN category. By definition, small entities have annual receipts less than $3.5M. This analysis assumed that all 314 vessels are independently owned and operated. All, 314 scallop dredge vessels are considered small entities since individually they earn annual revenues less than $3.5M.

Description of impacts of the proposed rule and alternatives: The economic impact of the proposed rule and alternatives is analyzed and described in sections 5.1.4 (PA), 5.2 (No Action), 5.3.4 (Alternative 1) and 6.3. These sections are incorporated by reference herein.

Description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records: The proposed action would not impose any additional reporting, record-keeping, or compliance requirements. Thus, no new skills would be required for compliance.

Substantial Number of Small Entities Criterion: All commercial fishing operations that fish in the manner and location of the proposed action would be affected. All such operations, where they exist, are assumed to be small business entities, given the information provided above and the standard that a fish harvesting business is considered a small business if it is independently owned and operated and not dominant in its field of operation, and if it has annual receipts not in excess of $3.5 million. The number of entities that engage in fishing in the manner that would be prohibited is considered few.

Significant Economic Impact Criterion:
The outcome of "significant economic impact" can be ascertained by examining two issues: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities? All business entities participating in the scallop dredge fisheries are considered small business entities, so the issue of disproportionality does not arise.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities? The PA affects 314 vessels using scallop dredge gear that fish south of 41º 9.0' N lat. from May 1 through November 30. In the August 2006 rulemaking, we estimated a vessel's annual revenues may be reduced between a low of 3.0% (CV=108%) and a high of 7.8% (CV=127%). The coefficient of variation also shows there is a greater variability among vessels in the GEN category. In general, under the PA, 116 vessels may have their annual revenue reduced between 5 and 10%, and 5 vessels may have reductions greater than 10% (Table 5.10). Of these 121 vessels, 27, 29, 29 and 22 of these vessels are registered to the state of Massachusetts, New Jersey, Virginia and North Carolina, respectively. The number of permitted scallop dredge vessels fishing from Maine to North Carolina is 439, where 314 of these vessels will be affected under the proposed regulation (Table 5.1). Therefore, 28% (=121/439) of the entire fleet permitted or 39% (=121/314) of the affected vessels can expect revenue reductions greater than 5%. As described in Section 5.0, additional costs associated with configuring and maintaining the gear to meet the requirement of openings that are 14 inches or less per side do not significantly change these results. The change to the regulatory text and the transiting provision would not result in any economic impacts.

Description of the steps the agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternatives adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency, which affect small entities, as rejected: Three alternatives, including the no action alternative, are evaluated here. The PA and the No Action alternative both require vessels to use chain-mat modified gear while fishing south of 41° 9.0' N latitude. Alternative 1 would remove the requirements to use the modified gear. The difference between the PA and the No Action alternative is that the PA would modify the regulatory text to clarify the requirements and add a transiting provision to the regulations.

In the case of a gear modification, three potential behavioral responses exist. The vessel can choose not to fish in the regulated area (and not fish at all), modify the gear (and continue to fish in the area), or fish elsewhere. Under the PA and the No Action Alternative, the proposed gear modification is fairly inexpensive (Table 5.9). Therefore, our analysis assumes a vessel will convert their gear and continue fishing in the area. Under the PA and the No Action Alternative, NMFS estimates a reduction in annual revenues per vessel between 3.0%-7.8% (Table 5.10). Annual industry revenues would be reduced by 4.3%. The economic impacts on some vessels that would have been required, under the November 2006 rulemaking, to reconfigure their gear to meet the requirement to have openings no greater than 14 inches per side does no significantly change these results. As described in Section 5.0, additional costs associated with configuring and maintaining the gear to meet the requirement of openings that are 14 inches or less per side do not significantly change these results. The change to the regulatory text and the transiting provision would not result in any economic impacts. Under Alternative 1, vessels would not be required to use the chain-mat modification and, therefore, would not incur a loss of revenue due to a reduction in catch.

Ideally, we want to choose the alternative that provides the most protection to sea turtles for the least cost to the scallop dredge industry. As described in section 5.0 of the EA, Alternative 1 provides the least protection for sea turtles, while the PA and No Action alternative provide equivalent protection. In terms of industry cost, the PA and the No Action alternative have the highest cost, while Alternative 1 has the lowest cost. The gear modification is limited in geographic area and time to when sea turtles and sea scallop dredge fishing overlap. These factors limit the effects on the human environment.

NMFS selected the PA in this final rule (modification of the existing requirements) because this alternative would provide the same level of protection to sea turtles at the same cost as the No Action Alternative and would meet the purpose and needs of this action. This alternative would clarify the existing requirements. In addition, it would add a transiting provision to the existing requirements, allowing vessels to transit the regulated area with unmodified gear provided the gear was stowed and there are no scallops on board. This provision will provide increased flexibility to fishermen fishing north of the regulated areas. NMFS rejected the No Action alternative. Although the No Action requirement would provide the same protection to sea turtles, it would not clarify the regulatory text. NMFS rejected Alternative 1 (removing the chain mat requirements) as this alternative would leave sea turtles vulnerable to capture in the sea scallop dredge bag and to injuries that may result from such capture. The chain-mat requirements are designed to help conserve and recover sea turtles. This alternative would not achieve that goal.

7.10 National Environmental Policy Act

7.10.1 Finding of No Significant Impact

Under the preferred alternative (PA), NMFS would further correct the procedural error in the original rulemaking, would clarify the regulatory text related to using a chain mat in the Atlantic sea scallop dredge fishery, and would add a transiting provision. The chain mat regulation requires any vessel with a sea scallop dredge and required to have a Federal Atlantic sea scallop fishery permit, regardless of dredge size or vessel permit category, present in waters south of 41º 9.0' N. lat. from the shoreline to the outer boundary of the EEZ to modify their dredge(s) from May 1 through November 30 each year. The dredges must be modified with horizontal ("tickler") and vertical chains in the following configuration. The chain mat must be composed of horizontal chains and vertical chains that are configured such that the length of each side of the square or rectangle formed by the intersecting chains is less than or equal to 14 inches (35.5 cm). The chains must be connected to each other with a shackle or link at each intersection point. The measurement must be taken along the chain, with the chain held taut, and include one shackle or link at the intersection point and all links in the chain up to, but excluding, the shackle or link at the other intersection point. In addition, under the current regulation, any vessel that harvests sea scallops in or from the waters described above and that is required to have a Federal Atlantic sea scallop fishery permit must have the chain mat configuration installed on all dredges for the duration of the trip.

The PA would make three modifications to the regulatory text to clarify the requirements. The first change to the regulatory language would modify the text in paragraph (d)(11)(i) that states "…that are configured such that the length of each side of the square or rectangle formed by the intersecting chains is less than or equal to 14 inches…" The intersection of the horizontal and vertical chains and the sweep may, in some cases, result in openings with three sides rather than four. To clarify that all sides of the openings, regardless of whether they are 3- or 4-sided, must be less than or equal to 14 inches, NMFS would modify this text to read "The chain mat must be composed of horizontal ("tickler") and vertical chains configured such that the opening created by the intersecting chains, including the sweep, has no more than 4 sides. Each side of the opening created by the intersecting chains must be less than or equal to 14 inches." The second change would modify the text in paragraph (d)(11)(ii) of 50 CFR 223.206 that reads, "Any **vessel that harvests sea scallops in or from** the waters..." to read, "Any **vessel that enters** the waters...." This revision would clarify that once a vessel has entered the waters described, it must comply with the requirement to have the chain mat affixed to the dredge for the duration of the trip regardless of whether the vessel is still in those waters. The text in (d)(11)(i) that reads, "…any vessel…**present in waters**…" would be revised to "…any vessel…**that enters waters**." This technical change would be made so that this subparagraph uses the same terminology as (d)(11)(ii). This alternative also adds a transiting provision exempting vessels from the requirements provided that the sea scallop dredge gear is stowed and no scallops are on-board. This alternative addresses the procedural error by re-evaluating the impacts of the chain mat requirements, and ensuring that all NEPA requirements are followed in the proper sequence.

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

1. Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?

> Response: Under the proposed chain mat regulation, vessels are expected to modify their gear and to continue to fish for scallops in the same areas at the same times. The chain-mat modification does not result in a substantial reduction in capture of the target species, the area swept is the same as with an unmodified dredge, and the weight of the modified dredge is not considerably different than that of the unmodified dredge. Therefore, the use of the modified dredge is not expected to substantially affect the scallop resource in the geographic area of the action. The change to the regulatory text clarifies the requirements and would not result in any impacts to the target species. The transiting provision would not result in impacts to the target species. Environmental consequences of the alternatives are discussed in section 5.0.

2) Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

> Response: The PA is not expected to jeopardize the sustainability of any non-target species that may be affected by the action. Vessels are expected to continue to fish in the same areas and times with the chain mat hung over the opening of the dredge. Environmental consequences of the alternatives are discussed in section 5.0.

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

> Response: The area impacted by the PA contains EFH and an abundance of life forms of commercial and non-commercial value. The value of this area was considered in the EFH consultation process and is described in this document. The characteristics of this area will not be significantly impacted by this action. The PA is not expected to cause substantial damage to the ocean and coastal habitats or to EFH as defined under the Magnuson-Stevens Fishery Conservation and Management Act and identified in fishery management plans. In addition, this alternative is not expected to have a substantial

impact on biodiversity and ecosystem function within the geographic scope of the action. Environmental consequences of the alternatives are discussed in section 5.0.

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

Response: Public health and safety is not expected to be affected by the PA. Sea scallop vessels currently use rock chains in certain areas. The chain mat configuration is essentially a rock chain arrangement that consists of lighter chain. The current use of rock chains does not create a public health and safety concern, and it is not expected that the use of the chain mats would impose any additional public health and safety issues. The chain mats do not change the way the gear is fished, the general operation of the gear nor would they result in a change in the behavior of the fishermen that would result in an adverse impact to public health and safety.

5) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

Response: The basis of the chain-mat modification is to offer additional protection to endangered and threatened sea turtles; it would not adversely affect any of these species. Loggerhead sea turtles, listed under the Endangered Species Act, are likely to be affected by the action. The action may also benefit Kemp's ridley, green, and leatherback sea turtles. However, interactions between sea scallop dredge gear and these species are expected to be rare given the distribution of these turtles, their habitat preference, and the distribution of the fishery as well as the species identification of sea turtles observed taken in the sea scallop fishery. The best available information shows that the use of the chain mat will prevent sea turtles from being captured in the dredge bag, which will prevent them from sustaining injuries that are caused as a result of being captured in the dredge bag. NMFS recognizes that on rare occasions, sea turtles of a small enough size to pass between the chains may interact with the gear and that this interaction may result in the capture of the sea turtle in the bag. NMFS recognizes that there is uncertainty regarding sea turtle interactions with sea scallop dredges as sea turtles could be captured when the dredge is being fished on the bottom or during haul back.

This action will not increase the number of interactions between sea turtles and sea scallop dredge gear and is expected to prevent injury and mortality resulting from capture in the dredge bag. In the December 2004 Biological Opinion, NMFS determined that requiring modification of scallop dredge gear at times and in areas where sea turtles interactions are likely to occur was a Reasonable and Prudent Measure necessary or appropriate to minimize impacts of incidental take of sea turtles. This action complies with this Reasonable and Prudent Measure. Environmental consequences of the alternatives are discussed in section 5.0.

In the Biological Opinion (March 2008) on the Atlantic Sea Scallop Fishery Management Plan, NMFS concluded that the continued authorization of the Scallop FMP (including the effect of the fishery on sea turtles in the presence of a requirement for the seasonal use of chain-mat modified scallop dredge gear), and the cumulative effects, may adversely affect but is not likely to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, and green sea turtles. An ITS has been provided for this fishery.

NMFS will continue to use observer information, fishing effort data, and other data, as available, to evaluate the fishery and its possible effects on sea turtles. Observer coverage may provide more information on the effectiveness of the chain mats as well as document any takes in other parts of the gear. In addition, NMFS will monitor scallop fishing effort for significant increases or decreases in effort and the possible effects that changes in effort may have on sea turtles. In 2004 and 2005, NMFS conducted video research to document the nature of the interaction between sea turtles and sea scallop dredge gear, but no interactions were recorded. NMFS will continue to use video work in conjunction with other projects in an effort to gain a better understanding of interactions between sea turtles and sea scallop dredge gear. NMFS is also investigating a modification to the dredge frame that may reduce the severity of injury and mortality resulting from a sea turtle being struck by the frame as the gear is fished on the bottom. Sections 5.0 and 6.0 contain information on on-going and anticipated research on the interactions between sea turtles and sea scallop dredge gear.

A number of species listed under the Endangered Species Act and the Marine Mammal Protection Act are found in the area of the PA, but are not likely to be affected, as described in this document, due to their habitat and/or prey preference, seasonal distribution, and/or size, speed, and maneuverability. As described in the Environmental Assessment, the Great South Channel was designated as critical habitat for right whales in 1994 due to its importance as a foraging ground. There is no evidence to suggest that the addition of chain mats to sea scallop dredges will have any adverse effects on the physical and biological features that make this area a foraging ground and critical habitat for right whales.

The clarification to the regulatory text and the transiting provision will not impact any of the species found in the geographic area of the alternatives. The affected environment is described in section 4.0 and the environmental consequences are discussed in section 5.0 of the EA.

6) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

<u>Response</u>: The PA is not expected to have a substantial impact on biodiversity and/or ecosystem function within the action area. Benthic disturbance from the PA in this area is expected to be minimal and temporary as described in the Environmental Assessment. In addition, the area swept by the chain mat modified dredge is the same as the area swept by the unmodified dredge. Therefore, the area impacted is the same with or

without the modification to the gear. The change to the regulatory text clarifies the intent of the original chain mat regulation and will not impact biodiversity or ecosystem function. Environmental consequences of the alternatives are discussed in section 5.0.

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

Response: Impacts to the human environment, beneficial, adverse, and cumulative, were evaluated in this document and are not significant. There are no significant social or economic impacts. Implementation of gear modifications, as described in this document, is expected to have a short-term negative economic impact on the sea scallop fishery. The modification is expected to have positive effects on threatened sea turtles by preventing most captures of sea turtles in the dredge bag, as well as any ensuing injuries as a result of being caught in the dredge (e.g., crushing in the dredge bag, crushing on deck, etc.). In addition, it is possible that this action will reduce drowning following an interaction on the seafloor. The change to the regulatory text will not result in any social or economic impacts. Environmental consequences of the alternatives are discussed in section 5.0.

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

Response: The effects of the PA on the human environment are not likely to be highly controversial. These gear modifications are limited in geographic area and time period and are implemented in an effort to facilitate the coexistence of fishing activity and sea turtles. In addition, the gear modification does not prohibit vessels from fishing, but rather requires that vessels use modified gear when fishing scallop dredge gear south of 41° 9.0' N. lat from the shoreline to the outer boundary of the EEZ. The fishing industry, as described in this EA/RIR, support the requirement for chain mats as demonstrated by petitioning NMFS to implement this gear modification (albeit over a shorter time period each year, slightly different geographic area, and as a specified number of chains). These factors restrict the scope of the effects on the human environment. NMFS has been sued regarding the issue of turtle takes in the scallop dredge fishery. Regardless of this litigation, the fact that the PA is designed to benefit sea turtles and would have a relatively small economic impact on the fishing industry, and that the industry has petitioned us for a similar action, makes this action not highly controversial in the broad public sense.

Some would prefer that the scallop fishery be closed, and thus are opposed to continuing the fishery, with the chain mat regulation or without. The opposition to the fishery, for which the Agency has completed an Environmental Impact Statement, does not create a significant controversy over the implementation of the chain mat rule.

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

Response: There is no evidence that the implementation of the gear modification or the change to the regulatory text will result in impacts to unique areas. No unique characteristics of the geographic area were identified.

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

Response: The degree to which the effects of the PA are highly uncertain or involve unique or unknown risks is small. NMFS recognizes that there is uncertainty regarding sea turtle interactions with sea scallop dredges as sea turtles could be captured when the dredge is being fished on the bottom or during haul back. NMFS has not observed how the modified gear interacts with live sea turtles on the bottom and in the water column. Video work to document the behavior or sea turtles around sea scallop dredge gear and to document the nature of the interaction has been conducted. Approximately 80 hours of video were collected and reviewed, and no sea turtles were documented. Further video work may be conducted in conjunction with other projects. While there is not perfect information available on the nature of the interaction between sea scallop dredge gear and sea turtles, NMFS has made logical, reasonable assumptions in evaluating the risks and benefits of the PA (Section 5.0). There is information showing that the use of the chain mat will prevent sea turtles from being captured in the dredge bag, which will prevent them from sustaining injuries that are caused as a result of being caught in the dredge bag.

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

Response: The cumulative impacts of the gear modification on ecosystem components found to be affected by this action in conjunction with other past, present, and reasonably foreseeable future actions have been analyzed with regard to both context and intensity. The past, present, and reasonably foreseeable future actions considered were not found to result in significant cumulative impacts when analyzed together with the PA. Given the duration and limited scope of possible cumulative impacts, such impacts are not expected to be significant. Additional research is being conducted to address sea turtle bycatch in the sea scallop dredge gear. Further video work may be conducted, and the use of a sea scallop dredge with a modified cutting bar and bail is being investigated. This gear being tested is designed to reduce serious injury and mortality resulting from an interaction between sea turtles and sea scallop dredge gear on the sea floor. Cumulative impacts on the ecosystem components in the geographic area of the PA are analyzed in section 6.0.

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

Response: There is no evidence that the implementation of the PA will adversely affect entities listed in or eligible for listing in the National Register of Historic Places or will cause loss or destruction of significant scientific, cultural, or historic resources.

13) Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: The implementation of the PA would not result in any actions that would be expected to result in the introduction or spread of a nonindigenous species.

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

Response: The implementation of gear modifications (in this case a chain mat) to reduce the risk of capture of sea turtles is a commonly used management tool and, as such, does not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration. The use of gear modifications as a management tool has been determined to be important in order for the agency to meet objectives under the Endangered Species Act. It is an independent action being implemented to achieve a specific objective given area-specific conditions and issues and is therefore not expected to establish a precedent for future actions.

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

Response: There is no evidence that implementation of these gear modifications in the Atlantic sea scallop dredge fishery is likely to result in violation of a federal, state, or local law for environmental protection. In fact, the gear modifications would be expected to support federal, state, and local laws for environmental protection.

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

Response: As described in section 5.0, the PA is not expected to substantially affect the scallop resource, the target species, as the weight of the modified dredge is not considerably different than that of the unmodified dredge and the area swept by the modified dredge is the same as the unmodified dredge. As such, there are no direct or indirect impact of the gear modification on the scallop resource that, when considered with other past, present or reasonably foreseeable future actions, would result in cumulative adverse impacts. The PA is also not expected to substantially affect non-target species as vessels are expected to continue to fish in the same time and areas as with the unmodified dredge. As described in section 6.0, the PA is not expected to substantially affect target or non-target species; therefore, it will not contribute to cumulative adverse effects on these species.

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment prepared for "Sea Turtle Conservation Measures in the Atlantic Sea Scallop Dredge Fishery", it is hereby determined that the implementation of the proposed action, as described in section 3.2 of this document, will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the action have been addressed to reach the conclusion of no significant impacts. Accordingly, the preparation of an Environmental Impact Statement for this proposed action is unnecessary.

Pat A Kurkul

Patricia A. Kurkul
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MAR 18 2008

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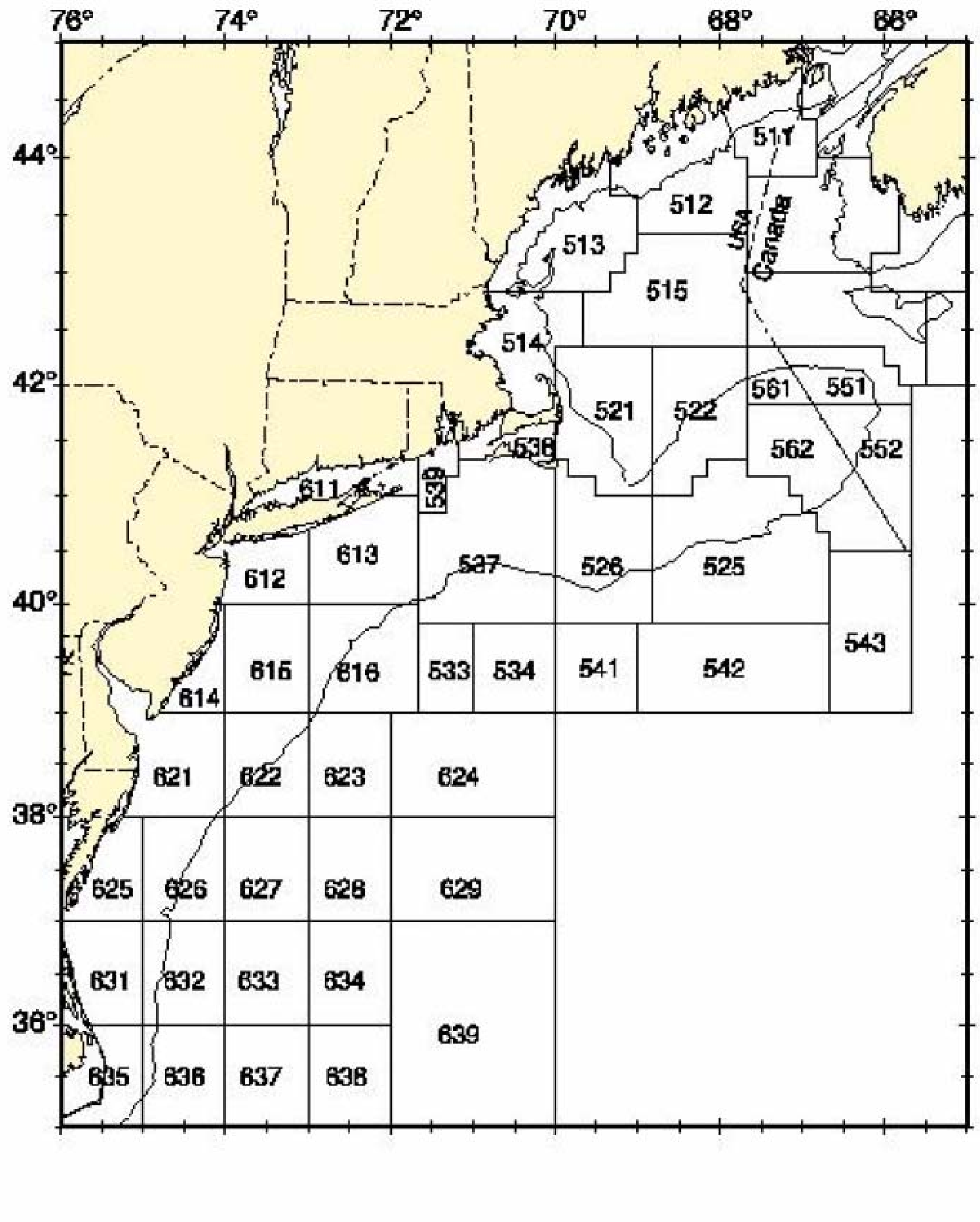
APPENDIX A:

Statistical areas of the northeast and Mid-Atlantic waters



APPENDIX B

The anticipated Incidental Take of loggerhead, leatherback, Kemp's ridley and green sea turtles as currently determined in the most recent Biological Opinion's for NMFS implementation of the Atlantic Sea Scallop, Bluefish, Herring, Multispecies, Mackerel/Squid/Butterfish, Red Crab, Monkfish, Skate, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, Tilefish, and Highly Migratory Species fishery management plans as well as for the American Lobster fishery operating in Federal waters. Takes are anticipated annual take unless otherwise noted.

Fishery	Sea Turtle Species			
	Loggerhead	**Leatherback**	**Kemp's Ridley**	**Green**
Atlantic Sea Scallop (dredge)	929 biennially - no more than 575 lethal	1 non-lethal	2 lethal or non-lethal	2 lethal or non-lethal
Atlantic Sea Scallop (trawl)	154 annually - no more than 20 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Bluefish	6-no more than 3 lethal	None	6 lethal or non-lethal	None
Herring	6-no more than 3 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
HMS	1869 for 2004-2006 and 1905 for each subsequent 3-year period	1981 for 2004-2006 and 1764 for each subsequent 3-year period	105 total for each 3-year period beginning 2004-2006 (Kemp's ridleys, green, olive ridley or hawksbill in combination)	
Lobster	2 lethal or non-lethal	9 lethal or non-lethal biennially	None	None
Multispecies	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Mackerel/Squid/Butterfish	6-no more than 3 lethal	1 lethal or non-lethal	2 lethal or non-lethal	2 lethal or non-lethal
Monkfish (gillnet)	3	1 leatherback, Kemp's ridley or green		
Monkfish (trawl)	1 loggerhead, leatherback, Kemp's ridley or green			
Red Crab	1 lethal or non-lethal	1 lethal or non-lethal	None	None
Skate	1 (either a loggerhead, leatherback, Kemp's ridley or green) - lethal or non-lethal			
Spiny Dogfish	3-no more than 2 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Summer Flounder/Scup/Black Sea Bass	19-no more than 5 lethal (total - either loggerheads or Kemp's ridley)	None	see loggerhead entry	2 lethal or non-lethal
Tilefish	6 -no more than 3 lethal or having ingested the hook	1 lethal or non-lethal take (includes having ingested the hook)	None	None