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

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National Marine Fisheries Service
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Acronyms

ACOE	Army Corps of Engineers
CAA	Controlled Access Area
CeTAP	Cetacean and Turtle Abundance Program
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
FSF	Fisheries Survival Fund
FY	Fishing Year
GEN	General Category
GNS	Sink Gillnet
GSC	Great South Channel
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
NOAA	National Oceanic and Atmospheric Administration
NPA	Non-preferred Alternative
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
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. 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[1]. 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 October 2005, a total of 61 takes 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, and 8 in 2004. On August 31, 2004, the Northeast Fisheries Science Center (NEFSC) completed an assessment of sea turtle bycatch during the 2003 fishing year (March 2003-February 2004). A total of 630 loggerhead sea turtles were estimated to have been captured from June 1 through November 30 by vessels operating in the Mid-Atlantic sea scallop dredge fishery. This estimate was revised to 749 turtles in October 2004, based on additional data on sea scallop vessel trip locations (Murray 2004a). During the 2004 fishing year, a total of 180 loggerhead sea turtles were estimated to have been captured by sea scallop dredge gear in the Mid-Atlantic (Murray 2005). Given the recent 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, this action is proposed to reduce sea turtle mortality and injury in the sea scallop dredge fishery.

2.0 PURPOSE AND NEED FOR ACTION

This action would require the use of a chain mat-modified Atlantic sea scallop dredge(s) on vessels with a Federal Atlantic sea scallop fishery permit fishing south of 41º 9.0' N.

[1] 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.

latitude (lat.) from the shoreline to the outer boundary of the Exclusive Economic Zone (EEZ) from May 1 through November 30 each year. The chain mat would be hung forward of the sweep between the cutting bar and the sweep. The purpose of the action is to conserve sea turtles by reducing sea turtle mortality and injury in the Mid-Atlantic sea scallop dredge fishery through the issuance of regulations that would require gear modifications for dredges used in this fishery. This document will analyze the environmental impacts that would result from the issuance of such regulations.

This action is needed to reduce sea turtle mortality and injury as a result of capture in sea scallop dredge gear. Due to sea turtle prey and habitat preferences, in comparison to the distribution of sea scallop dredge gear within the Mid-Atlantic, these measures specifically target the conservation of hard-shelled sea turtles. This action is necessary to provide for the conservation of threatened loggerhead sea turtles, and will have ancillary benefits for endangered Kemp's ridley and green sea turtles, which have also been observed taken in the sea scallop fishery albeit to a lesser extent than loggerheads. The best available scientific data show that sea turtle interactions with the scallop dredge fishery occur in the Mid-Atlantic during the months of June through October and potentially may occur in May and November. The current management measures for the sea scallop fishery are not likely to substantially reduce the take of sea turtles and, as such, sea turtles continue to be subject to capture, leading to potential mortality.

A section 7 consultation under the ESA was completed on the Atlantic Sea Scallop Fishery Management Plan was completed in December 2004. National Marine Fisheries Service (NMFS) concluded that the continued operation of the sea scallop dredge fishery may adversely affect but is not likely to jeopardize the continued existence of loggerhead sea turtles. NMFS also determined that a number of Reasonable and Prudent Measures (RPMs) are necessary or appropriate to minimize the impacts of the incidental take of sea turtles. One of these measures was that NMFS must reduce the capture of sea turtles in the scallop dredge fishery by requiring modification of scallop dredge gear at times and in areas where sea turtle interactions are likely to occur. This action complies with this Reasonable and Prudent Measure.

2.1 Background

2.1.1 Sea Scallop Fishery

This Environmental Assessment (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, NEFMC 2003, NMFS 2004a), and the following will serve as a brief summary. The scallop fishery is one of the most valuable U.S. fisheries (NMFS 2003a). During the 2003 fishing year, U.S. landings exceeded 25,000 metric tons (mt) of meats; a new record. Preliminary data for 2004 indicates that landings continued to increase, exceeding 28,000 mt during the 2004 fishing year (NMFS Preliminary Fisheries Statistics). The 2003 U.S. ex-vessel sea scallop revenues were over $226 million making the sea scallop fishery the second most valuable in the northeastern

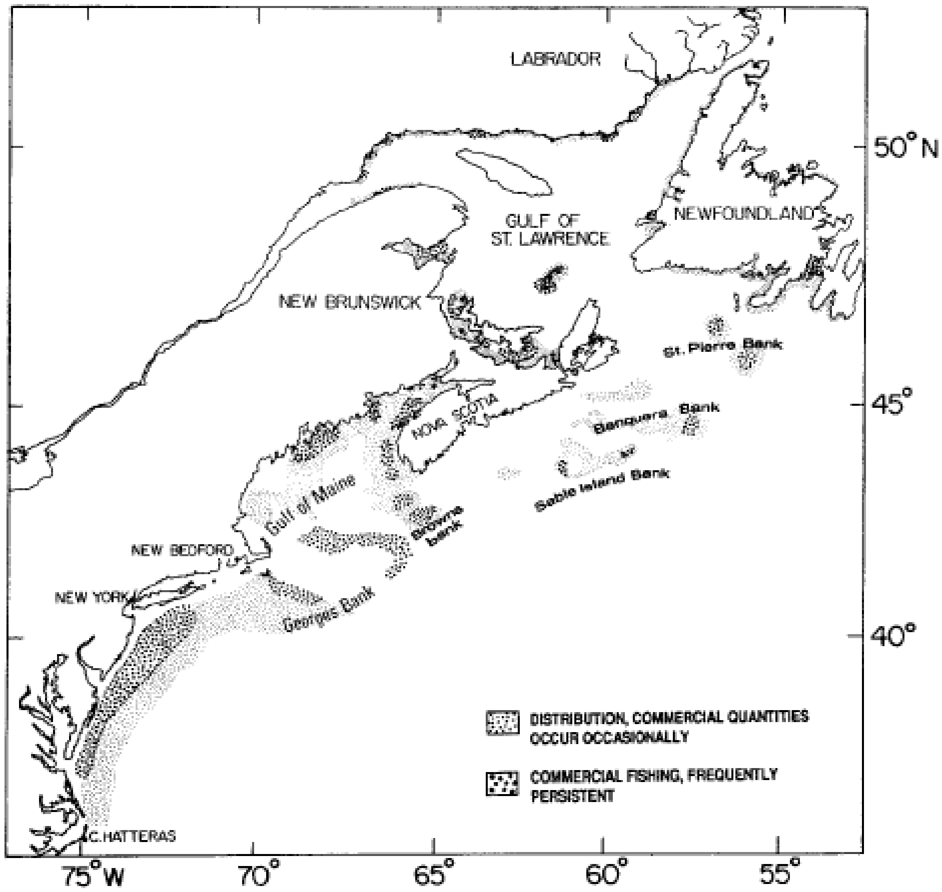
United States (NMFS 2004a). Sea scallop fishing occurs year round and the fishing year (FY) is defined as March 1 through February 28/29.

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; Packer *et al.* 1999, 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 (Serchuk *et al*. 1982, Naidu and Anderson, 1984, Hart and Chute 2004). In southern areas, scallops are primarily found at depths between 45 – 75 m, and are less common in shallower waters (25 – 45 m) due to high temperature (Bourne 1965, 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). On Georges Bank and in the Gulf of Maine, scallop beds occur as deep as 200 m (NEFSC memo from John Boreman to Patricia A. Kurkul, December 6, 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[2]. The bulk of the Gulf of Maine landings are from relatively shallow waters (< 40 m) near-shore (NMFS 2004a). Gulf of Maine landings account for a very small portion of the overall annual scallop landings. In 2003, Gulf of Maine scallop landings were only 254 mt — less than 1% of the total 2003 landings (NMFS 2004a). The scallop fishery over Georges Bank and in the Mid-Atlantic is a deeper water fishery in comparison to the Gulf of Maine with the Mid-Atlantic sea scallop fishery operating at depths of 35 – 75 m (NEFSC memo from John Boreman to Patricia A. Kurkul, December 6, 2004). Georges Bank and the Mid-Atlantic are also more productive in terms of scallop landings as compared to the Gulf of Maine. Landings from Georges Bank have averaged almost 5000 mt annually during 1999 – 2003 (NMFS 2004a). However, it has been the Mid-Atlantic that has seen the largest growth in scallop landings. This area has been experiencing an upward trend in both recruitment and landings since the mid-1980s. Landings during each of the 2000-2003 years set new records for the Mid-Atlantic region with landings of over 19,000 mt in 2003 (NMFS 2004a). Preliminary data for the 2004 fishing year indicates that landings from the Mid-Atlantic continue to increase (NMFS Preliminary Fisheries Statistics).

[2] "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.

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



Source: Hart and Chute (2004)

Many fishermen tend to 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 for the 2003 scallop fishing year (March 1, 2003 – February 29, 2004) and 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). During the 2004 fishing year, two of the eight areas were major production areas. These areas and their respective contribution to scallop landings were the New York Bight (36%) and Delmarva (45%) followed by Georges Bank North (8%) and South Channel (7%) (NMFS Preliminary Fisheries Statistics).

The commercial scallop fishery operates year round (Hart 2001). 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). The number of qualifiers for the scallop limited access fishery has declined from around 450 in 1994 to approximately 380[3] for the 2003 scallop fishing year (P. Christopher, NMFS, pers.comm.). There are eight different types of scallop limited access permits. Fishing effort for vessels that possess one of the eight types of limited access permits is managed through the use of crew size restrictions, gear restrictions, and Days at Sea (DAS) allocations. In terms of the latter, DAS allocations vary by which limited access permit is possessed by the vessel. DAS and trip allocations for special access areas are similarly 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) the vessel may not have more than one dredge on board or in use; and (3) the vessel may have no more than five people, including the operator, on board (NEFMC 2003).

Overwhelmingly, dredge gear is the primary gear type used in the scallop fishery. Ninety-five percent of the scallop landings for the 2003 scallop fishing year were attributed to scallop dredge gear. It is interesting to note, however, that while landings by trawl gear (approximately 5% of the total) were much lower than landings by dredge

[3] The number provided represents the 333 vessels that renewed their limited access scallop permit in the 2003 scallop fishing year as well as the 47 qualifiers who currently do not have a permit but are retaining their right to a permit in a Confirmation of Permit History.

gear, the Delmarva resource area accounted for 90% of the trawl landings (NMFS Preliminary Fisheries Statistics). Less than 2% of trawl landings were attributed to non-Mid-Atlantic resource areas (NMFS Preliminary Fisheries Statistics).

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. For example, vessels that have neither a limited access nor general category permit (except those that participate exclusively in the state waters) are allowed to possess and land up to 40 pounds of scallop meat or 5 bushels of shell stock per trip. Vessels that possess a general category permit for the fishery are allowed to retain or land up to 400 pounds of shucked scallops or 50 U.S. bushels of in-shell scallops per trip. The possession limit is the primary effort control mechanism for the general category vessels. A total of 2,554 general category permits were issued for the 2003 scallop fishing year. General category permit holders may fish with all gear types, including gillnet, pot/trap, and clam/quahog dredges. However, scallop dredge gear and bottom trawl gear are the most common (NEFMC 2003).

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 Mid-Atlantic from June through October. These interactions could occur when the dredge is dragged along the bottom or during haul back. 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 detailed information on interactions in the sea scallop fishery.

2.1.3 Summary of Sea Turtle Bycatch from 1996 through 2004

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. 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. During 1996 through October 2005, based on observer coverage, a total of 61 sea turtles 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, and 8 in 2004. Of the 61 takes of sea turtles, 44 were loggerhead sea turtles, 1 was a green sea turtle, and the remainder were hard-shelled sea turtles that could not be positively identified. During this period, 13 additional sea turtles were reported taken while the observer was off-watch (Table 2.1). One of these off-watch takes was verified to be a Kemp's ridley sea turtle, while the remaining takes were loggerhead or unidentified hard-shelled sea turtles. Interactions with sea turtles have been observed in the fishery from late June to late October, and the potential for interactions exists during May and November due to the overlap of sea turtles (Shoop and Kenney 1992; Braun-McNeill and Epperly 2004) 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 resources. Thus, the timing of these measures is based on Cape Hatteras as the lower boundary.

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, based on conversations with NEFSC staff. In 2005, the records maintained by the Fisheries Sampling Branch, NEFSC 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 turtle 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 2 additional turtles (one alive and one dead) while the observer was off-watch. Of the 11 observed takes in 2001, 6 were alive with no apparent injuries, 1 was alive and injured, 1 was fresh dead, and 3 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.

In the 2002 fishing year, sea turtles were again captured in this area, despite substantially reduced vessel participation, suggesting that the turtles captured in 2001 were not an anomaly. From May to December in 2001 and 2002, observers sampled approximately 11% of the commercial dredge effort in the Hudson Canyon CAA (Murray 2004b). Twenty-four turtles were captured in vessels operating in this area from July through October. Five of the takes occurred while the observer was off-watch. 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 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 22 takes (excludes the decomposed animals), 6 were alive with no apparent injuries, 5 were alive and injured, 9 were alive but their condition unknown, and

2 were fresh dead. Seventeen of the 22 turtles were identified as loggerheads, while the remaining animals were hard-shelled turtles that could not be positively identified.

In the 2003 scallop fishing year, a total of 30 turtles (excluding the experimental fishery) were reported captured in scallop dredge gear. However, 6 of these were severely decomposed upon retrieval of the dredge. Given the state of decomposition, it was surmised that the 6 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 additional takes occurred while the observer was off-watch. Sixteen of the 22 interactions that occurred while the observer was on-watch were observed in the CAA. The condition of the 24 turtles varied: 5 were alive with no apparent injuries, 1 was fresh dead, 14 were alive and injured, 1 was resuscitated, and 3 were alive yet condition unknown. The trips during which these interactions occurred were landed in July (18%), August (27%), September (9%), and October (46%) (Murray 2004a). Twenty of the 24 interactions were with loggerhead sea turtles, and 4 were with hard-shelled turtles that could not be positively identified.

In the 2004 fishing year, there were 8 observed turtle takes in the Mid-Atlantic sea scallop dredge fishery. Two of the turtles were reported as alive and uninjured, 5 were reported as alive and injured, and 1 was reported as fresh dead. All were identified as loggerhead sea turtles. An additional loggerhead turtle was captured during July while the observer was off-watch. 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 Observer Program, pers. comm.).

The capture of sea turtles in the scallop dredge fishery continues to be monitored by the NEFSC observer program. In 2005 (through October 31), there were three sea turtles captured in the sea scallop dredge fishery. In August 2005, a Kemp's ridley was taken on southern Georges Bank, and the animal was reported as alive with no apparent injuries. This take occurred while the observer was off-watch; however, the species identification was confirmed through photos. During October, there were two takes identified as loggerhead sea turtles. Both of these takes were while the observer was off-watch. One animal was identified as alive, condition unknown. The other was reported as alive and injured.

In summary, a total of 61 sea turtles were observed taken in the scallop dredge fishery from 1996 through October 2005 while an observer was on-watch (excluding the experimental fishery). Thirteen additional sea turtles were reported taken while the observer was off-watch. Eight turtle interactions (6 of which were observed by NMFS-approved observers) were reported during the course of the experimental fishery to test the chain mats (see below). Of the 61 observed takes, 44 were identified as loggerhead sea turtles, 1 was identified as a green sea turtle, and the remaining animals were hard-shelled sea turtles that could not be positively identified. Of the total 61 turtles, 4 were fresh dead upon retrieval or died on the vessel, 1 was alive but required resuscitation, 25 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.

Table 2.1 : Takes of sea turtles in the sea scallop dredge fishery (excluding the experimental fishery) * indicates the take occurred while the observer was off-watch.

Month/Year	Species	Condition
Jul-96	loggerhead	Alive, not injured
Sep-97	green	Alive, injured
Sep-99	unknown	Alive, injured
Jun-01	unknown	Alive, condition unknown
Jun-01	unknown	Alive, not injured
Jun-01	unknown	Alive,condition unknown
Jul-01	loggerhead	Dead, fresh
Jul-01	unknown	Alive, not injured
Jul-01	unknown	Alive, not injured
Jul-01	unknown	Alive, not injured
Aug-01	unknown	Alive, condition unknown
Sep-01	loggerhead	Alive, not injured
Sep-01	unknown*	Alive, condition unknown
Sep-01	unknown*	Dead
Oct-01	unknown	Alive, not injured
Oct-01	unknown	Alive, injured
Jul-02	loggerhead	Alive, not injured
Jul-02	loggerhead*	Alive, not injured
Jul-02	unknown*	Alive, condition unknown
Jul-02	unknown*	Alive, condition unknown
Jul-02	loggerhead	Alive when hauled but injured; died on vessel
Jul-02	unknown	Alive, not injured
Jul-02	loggerhead	Alive, injured
Jul-02	loggerhead	Alive, injured
Jul-02	loggerhead	Alive, injured
Jul-02	loggerhead	Alive, condition unknown
Jul-02	loggerhead	Alive, not injured
Aug-02	loggerhead	Alive, condition unknown
Aug-02	loggerhead	Alive, condition unknown
Aug-02	unknown	Alive, condition unknown
Sep-02	loggerhead	Alive, condition unknown
Sep-02	unknown*	Alive, condition unknown
Sep-02	loggerhead	Alive, injured
Sep-02	loggerhead*	Dead, fresh
Sep-02	loggerhead	Alive, not injured
Sep-02	loggerhead	Alive, condition unknown
Sep-02	loggerhead	Alive, injured
Oct-02	loggerhead	Alive, not injured

Table 2.1: Takes of sea turtles in the sea scallop dredge fishery (cont.)

Month/Year	Species	Condition
Jul-03	loggerhead	Alive, condition unknown
Jul-03	unknown	Alive, not injured
Jul-03	loggerhead	Alive, injured
Jul-03	loggerhead	Alive, injured
Aug-03	loggerhead	Alive, injured
Aug-03	loggerhead	Alive, resuscitated
Aug-03	unknown	Alive, not injured
Aug-03	unknown	Alive, not injured
Aug-03	loggerhead	Dead, fresh
Sep-03	loggerhead	Alive, injured
Sep-03	loggerhead	Alive, not injured
Oct-03	loggerhead	Alive, injured
Oct-03	loggerhead	Alive, injured
Oct-03	unknown	Alive, condition unknown
Oct-03	loggerhead	Alive, condition unknown
Oct-03	loggerhead	Alive, injured
Oct-03	loggerhead	Alive, injured
Oct-03	loggerhead	Alive, injured
Oct-03	loggerhead	Alive, injured
Oct-03	loggerhead	Alive, not injured
Oct-03	loggerhead	Alive, injured
Oct-03	loggerhead*	Alive, injured
Oct-03	loggerhead*	Alive, injured
Oct-03	loggerhead	Alive, injured
Jun-04	loggerhead	Alive, injured
Jun-04	loggerhead	Alive, not injured
Jul-04	loggerhead*	Alive, not injured
Aug-04	loggerhead	Alive, injured
Aug-04	loggerhead	Alive, injured
Aug-04	loggerhead	Dead, fresh
Sep-04	loggerhead	Alive, injured
Oct-04	loggerhead	Alive, injured
Oct-04	loggerhead	Alive, not injured
Aug-05	Kemp's ridley*	Alive, not injured
Oct-05	loggerhead*	Alive, condition unknown
Oct-05	loggerhead*	Alive, injured

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 2004. 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 differed 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 on August 31, 2004. This assessment estimated 630 loggerhead sea turtles (CV = 0.28) to have been captured in scallop dredge gear operating in the Mid-Atlantic from June 1 through November 30. This analysis was revised in 2004 to incorporate additional data on trip location. The revised assessment, completed in October 2004, estimated 749 (CV = 0.28) loggerhead sea turtle captured (an increase of 119 takes) 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). A Biological Opinion on the Scallop FMP, December 15, 2004, anticipated the take of up to 749 loggerhead sea turtles annually as a result of the continued operation of the scallop dredge fishery, with up to 479 of these takes resulting in injuries that would lead to death or an inability of the turtle to reproduce (NMFS 2004c).

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 after waters warmed to 19 ºC in 2001 and 2002 after waters warmed to 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) found that there may be a minimal 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. Unlike 2003, the bycatch rate of sea turtles in the Mid-Atlantic sea scallop dredge fishery differed between the Hudson Canyon CAA and outside of this area. Both inside and outside the Hudson Canyon CAA, 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 previous years, SST was a significant predictor of turtle bycatch rates in the Mid-Atlantic (Murray 2004a). In 2004, area and depth were selected as the best fit. Interaction rates in 2004 may have been influenced by a combination of depth zones and SST. However, the small number of takes in 2004 relative to the number of dredge hours examined may have precluded the detection of significant effect. In addition, changes in fishing effort across SST and depth zones in 2004 relative to 2003 may have influenced whether an interaction occurred. The rare nature of turtle interaction in 2004 (~1 observed take:1,000 observed dredge hours) made it difficult to identify variables significantly affecting bycatch rates. Even area and depth, selected for a best fit, were not strong predictors. To date, the models developed to estimate bycatch fit well for individual years (Murray 2005).

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 consists 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 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). Evenly spaced on a normal sweep arrangement, this should give about a 12 to 13 inch square pattern.

The experimental fishery to test the chain mat gear was conducted from July 17, 2003 – October 9, 2004, with preliminary trials conducted in 2002. During the preliminary trials, 5 scallop vessels participated in an evaluation of the chain mats. NMFS-approved observers were not present during the preliminary 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 in the unmodified (control) dredge, and the other turtle was reported on the experimental chain mat, subsequently swimming away.

Twelve different vessels participated in the 2003 – 2004 field evaluations 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. The trials were performed with dredges measuring between 11 and 15 ft wide. In total, side-by-side testing was conducted on 22 trips (Table 2.2), encompassing 277 fishing days and 3,248 tows (of which 2,823 were observed). A total of 8 turtle interactions occurred (6 of which were observed by NMFS-approved observers), all with the unmodified scallop dredge. 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 2.3). 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. 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 these takes to be "unknown turtle species". With respect to the catch of sea scallops, the modified chain mat dredge caught 6.71% less scallops on average than the unmodified dredge. The study concluded that the chain mats can be effective in eliminating the incidence of sea turtle bycatch without substantial concomitant reductions in the capture of the target species. Ancillary activities by the Fisheries Survival Fund (FSF) and VIMS have included the production of two placards to instruct captains and crew about sea turtle interactions and the construction of the chain mats (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, the researchers from the VIMS performing field tests of chain mats used video to examine the behavior of sea turtles in association with sea scallop dredges. During the 2003-2004 field trials of the chain-mat modified dredge, one trip was designated as a research camera cruise where underwater video was made of the modified dredge during normal fishing operations (DuPaul *et al.* 2004a). No sea turtles were documented by video on this trip.

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, approximately 73 hours of video were collected over 2 trips, one in August and one in September. This video has been reviewed and no sea turtles were documented. Further video work may be conducted under the Sea Scallop Research Set Aside program.

Third, in 2005, 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. A standard New Bedford style dredge was used as a control, and both dredges were equipped with the chain mat configuration. The purpose of the study, however, was not to test the chain mat. The project used turtle carcasses and model turtles to simulate a worse case scenario of a dredge overtaking a sea turtle lying on the bottom. During the 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. During this tow, the model turtle was deflected over the bail of the modified dredge, 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. Research on a modified dredge to reduce mortality and the severity of injuries to sea turtles following an interaction on the sea floor is on-going.

Table 2.2: 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 2.3: 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

2.1.6 Regulatory Actions

The first Biological Opinion for the Scallop FMP was completed on February 24, 2003, in accordance with section 7(a)(2) of the ESA. 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. 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 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. The latest 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. An ITS has been provided for this fishery and anticipated that the continued implementation of the Scallop FMP may result in the annual taking of 749 loggerhead sea turtles for scallop dredge gear of which up to 479 will be lethal takes (includes serious injuries which will eventually lead to death or result in the failure to reproduce) and 3 loggerhead (lethal or non-lethal) and 1 leatherback (lethal or non-lethal) sea turtle for scallop trawl gear. On November 1, 2005, NMFS reinitiated section 7 consultation on the Scallop FMP.

Observer coverage of the Atlantic sea scallop fishery in the 2005 fishing year and a review of past observer records has revealed new information on the fishery in relation to its effects on ESA-listed sea turtles. This information includes the take of 5 loggerhead sea turtles in the sea scallop trawl fishery, the take of a Kemp's ridley on southern Georges Bank, and, as described above, confirmation from the NEFSC that a turtle observed taken in scallop dredge gear in 1997 should be considered a green sea turtle.

On June 17, 2004, the FSF and the Garden State Seafood Association 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, Nov. 2, 2004).

2.2 Conclusion

The best available scientific data show that sea turtle interactions with the scallop dredge fishery occur in the Mid-Atlantic during the months of June through October, potentially may occur in May and November, and that 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 on the life history of the loggerhead and the size of sea turtles observed taken in the sea scallop dredge fishery as described in section 5.1.2.2, this modification is expected to prevent most, if not all, captures of sea turtles in the dredge bag. NMFS recognizes that on rare occasions, sea turtles smaller than the opening in the chain mat may interact with the gear and that this interaction may result in the capture of the sea turtle in the bag. NMFS expects this to be a rare occurrence based on the life history of the loggerhead sea turtle, the size of sea turtles observed taken in the sea scallop dredge fishery, and the species identification of sea turtles taken in this fishery. As such, to prevent the capture of sea turtles (leading to the potential subsequent injury or death of the turtle) in scallop dredge gear, the action would require 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.

3.0 ALTERNATIVES

Several alternatives were considered to reduce the capture of sea turtles in sea scallop dredge gear in the Mid-Atlantic. The alternatives considered are within the scope of NMFS' authority and are technically feasible. NMFS utilized all available scientific data to develop the Preferred Alternative (PA) and the Non-Preferred Alternatives (NPAs) described below.

3.1 Preferred Alternative (PA) - Gear modification requirement on scallop dredges fishing in the Mid-Atlantic from May 1 through November 30

Under this alternative, NMFS would issue a rule that would require all vessels with a Federal Atlantic sea scallop fishery permit using Atlantic sea scallop dredge gear, regardless of dredge size or vessel permit category, to modify their dredge(s) when fishing south of 41º 9.0' N. lat. (Bridgeport, Connecticut) from the shoreline to the outer boundary of the EEZ, from May 1 through November 30 each year. All dredges used in the Mid-Atlantic sea scallop fishery must be modified with evenly spaced "tickler" (horizontal) chains and "vertical" (up-and-down) chains in the following configuration, which is dependent on the size of the dredge frame width:

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

If a vessel elects to use a different configuration, the length of each side of the squares formed by the chain must be less than or equal to 14 inches.

3.2 No Action Alternative

The No Action alternative would allow all Atlantic sea scallop dredges to be fished in the same manner as they are currently fished. As a result, this alternative would result in no additional measures to reduce potential sea turtle interactions in the scallop dredge fishery.

3.3 Non-Preferred Alternative 1 (NPA 1) – Gear modification requirement on scallop dredges fishing in the Mid-Atlantic from May 1 through October 15

This alternative is the same as the PA, with a modification of the effective dates. Under this alternative, NMFS would issue a rule that would require all vessels with a Federal Atlantic sea scallop fishery permit using Atlantic sea scallop dredge gear, regardless of dredge size or vessel permit category, to modify their dredge(s) when fishing south of 41º

9.0' N. lat. (Bridgeport, Connecticut) from the shoreline to the outer boundary of the EEZ, from May 1 through October 15 each year. All dredges used in the Mid-Atlantic sea scallop fishery must be modified with evenly spaced "tickler" (horizontal) chains and "vertical" (up-and-down) chains in the following configuration, which is dependent on the size of the dredge frame width:

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

If a vessel elects to use a different configuration, the length of each side of the squares formed by the chain must be less than or equal to 14 inches.

3.4 Non-Preferred Alternative 2 (NPA 2) - Gear modification requirement on large scallop dredges fishing in Mid-Atlantic from May 1 through November 30

This alternative is the same as the PA, with a variation in the dredge size affected by the gear modification requirement. Under this alternative, NMFS would issue a rule that would require a gear modification for all vessels with a Federal Atlantic sea scallop fishery permit using Atlantic sea scallop dredges greater than or equal to 11 ft when fishing south of 41º 9.0' N. lat. (Bridgeport, Connecticut) from the shoreline to the outer boundary of the EEZ, from May 1 through November 30 each year. All large dredges used in the Mid-Atlantic sea scallop fishery must be modified with evenly spaced "tickler" (horizontal) chains and "vertical" (up-and-down) chains in the following configuration, which is dependent on the size of the dredge frame width:

Frame width of dredge	Number of verticals	Number of ticklers
>13 ft	11	6
11 to 13 ft	9	5

If a vessel elects to use a different configuration, the length of each side of the squares formed by the chain must be less than or equal to 14 inches.

3.5 Non-Preferred Alternative 3 (NPA 3) – Closure of Mid-Atlantic waters to scallop dredge fishing from May 1 through November 30

Under this alternative, NMFS would issue a rule that would prohibit fishing with Atlantic sea scallop dredges, regardless of dredge size or vessel permit category, south of 41º 9.0' N. lat. (Bridgeport, Connecticut) from the shoreline to the outer boundary of the EEZ, from May 1 through November 30 each year.

3.6 Alternatives Considered, but Rejected from Further Analysis

3.6.1 Gear modification requirement on all scallop dredges from May 1 through November 30

Under this alternative, NMFS would issue a rule that would require all vessels with a Federal Atlantic sea scallop fishery permit using Atlantic sea scallop dredge gear, regardless of dredge size, vessel permit category, or area fished, to modify their dredge(s) from May 1 through November 30 each year. All dredges used for fishing must be modified with evenly spaced "tickler" (horizontal) chains and "vertical" (up-and-down) chains in the following configuration, which is dependent on the size of the dredge frame width:

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

If a vessel elects to use a different configuration, the length of each side of the squares formed by the chain must be less than or equal to 14 inches.

NMFS considered requiring the use of the chain mats on all vessels in the scallop fleet, but rejected this alternative early on in the process. The purpose of the action is to provide protection to sea turtles. Loggerhead, Kemp's ridley, and green sea turtles undergo temperature dependent seasonal migrations along the Mid-Atlantic coast (Morreale and Standora 1998, Plotkin and Spotila 2002). In general, these turtles occur in waters off North Carolina year round, in the inshore waters (*i.e.*, bays, estuaries, and other coastal waters) of Virgina from May through November, and in New York's inshore waters from June until October (NMFS 1994). All three species are known to occur in Massachusetts waters as far north as Cape Cod, but with the exception of rare sightings and strandings, are not known to occur in more northern New England waters. Mitchell *et al.* (2003) found that loggerhead sea turtles were the only hard-shelled sea turtle to occur regularly in the Gulf of Maine/Georges Bank region. Kemp's ridley and green sea turtles were rarely seen in the Gulf of Maine/Georges Bank region and are considered occasional visitors, not residents, to these areas (Mitchell *et al.* 2003). The broadest extent of the western Atlantic green sea turtle's range is from Massachusetts to Argentina, including the Gulf of Mexico and the Caribbean, however, they are considered rare north of Cape Hatteras (Wynne and Schwartz 1999). In the western Atlantic, Kemp's ridley sea turtles are found year-round in the Gulf of Mexico and many juveniles migrate north along the east coast in the summer (Wynne and Schwartz 1999). Off the northeastern U.S., Kemp's ridley sea turtles inhabit nearshore waters of southern New England, especially Cape Cod Bay and Long Island Sound (Mitchell *et al.* 2003, Morreale and Standora 2005), where the scallop fleet does not operate.

Off the northeastern U.S., loggerhead sea turtles are commonly sighted across the shelf from the shore to the shelf break as far north as Long Island, with the distribution becoming more infrequent to the north and east (CeTAP 1982, Shoop and Kenney 1992, Mitchell *et al.* 2003). During CeTAP surveys, loggerhead sea turtles, the most common sea turtle observed taken in the sea scallop dredge fishery, were rarely documented north of 41 ºN lat (Shoop and Kenney 1992). In an analysis of the occurrence of loggerhead sea turtles in the Gulf of Maine/Georges Bank region and offshore waters south of Georges Bank from 1978 to 2001, nearly all of the sightings were on the shelf and shelf break south of Cape Cod or further offshore. The few summer exceptions included a few sightings along the northern edge of Georges Bank, one over the middle of Georges Bank, one in Cape Cod Bay, one near the Maine coast, one fall exception in Wilkinson Basin, and one spring exception in the Great South Channel area (Mitchell *et al*. 2003).

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. 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 2004, 2005). Prior to 2005, no sea turtle takes had been observed in the sea scallop dredge fishery outside the Mid-Atlantic region. However, in August 2005, a Kemp's ridley sea turtle was observed taken at approximately 40º 58' N. lat./67º 16' W. long. by a dredge vessel operating on south Georges Bank. While on Georges Bank, the area where the turtle was taken was south of 41º 9.0' N lat. Based on known sea turtle distribution, sea scallop dredge effort distribution, and the observed take of sea turtles in this fishery, NMFS expects the take of sea turtles by dredge vessels in the New England sea scallop dredge fishery to be rare. The take of the Kemp's ridley sea turtle on southern Georges Bank is evidence that takes in this area are possible. However, NMFS expects interactions between sea turtles and sea scallop dredge gear outside of the Mid-Atlantic bight to be rare. This alternative was rejected as it is not expected to provide any substantial additional benefit to sea turtles.

3.6.2 Operational modification requirements for scallop dredge vessels fishing in Mid-Atlantic from May 1 through November 30

Under this alternative, NMFS would issue a rule that would require operational modifications to vessels with a Federal Atlantic sea scallop fishery permit using Atlantic sea scallop dredge gear fishing 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. Such operational modifications include the following: increasing vessel tow speed above 4.9 knots; stopping the dredge for 30 seconds at the 10 fathom mark before hauling the dredge back to the surface; avoiding setting dredges if sea turtles are sighted in the area; avoiding steaming or jogging[4] with the dredge frame in water; and observing for sea turtles in the

[4] Jogging is when a vessel maintains steerage, but is not fishing or steaming to another location. Vessels "jog" while they are "catching up" on shucking scallops, while they are riding out bad weather, etc.

dredge when hauled out of the water, and if sea turtles are observed in the bag, avoiding dumping the dredge or bag on deck.

The purpose of the action is to provide protection to sea turtles. Although this alternative could provide some benefit to sea turtles, the extent of these benefits is unclear. It would be difficult to ensure compliance and to assess the impact of these modifications on sea turtles. Due to this uncertainty, this alternative was rejected early in the process.

3.6.3 Seasonal geographic closures of Mid-Atlantic waters to scallop dredge fishing

Under this alternative, NMFS would issue a rule that would prohibit fishing with Atlantic sea scallop dredges, regardless of dredge size or vessel permit category, in certain areas of the Mid-Atlantic at various times of the year. Specifically, fishing with Atlantic sea scallop dredges would be prohibited south of 41º 9.0' N. lat. and north of 38º 0.0' N. lat. from the shoreline to the outer boundary of the EEZ, from May 1 through October 31 each year. Fishing with Atlantic sea scallop dredges would be prohibited south of 38º 0.0' N. lat., from the shoreline to the outer boundary of the EEZ, from May 1 through November 30 each year.

During 2001 – 2003, sea surface temperature was found to be a significant factor influencing sea turtle bycatch rates in the Mid-Atlantic sea scallop dredge fishery. In 2001 and 2002, a higher probability of turtle bycatch occurred after waters had warmed to 19 ºC and in 2003, higher probabilities occurred after waters warmed to 22 ºC. These differences may reflect inter-annual variations in sea surface temperature or turtle distributions, shifting patterns in the fishery, or the interaction between random samples and statistical models. Murray (2004a) found that there may be a minimal threshold above which turtle bycatch is likely to occur, although this minimal temperature threshold is likely to fluctuate from year to year. In the 2004 fishing year, sea surface temperature was not found to be a significant predictor of turtle bycatch rates in the Mid-Atlantic for the 2004 fishing year. The small number of takes in 2004 relative to the number of dredge hours examined may have precluded the detection of significant effects. Changes in fishing effort across SST and depth zones in 2004 relative to 2003 may have influenced whether a turtle interaction occurred (Murray 2005). Due to the influence of temperature in affecting turtle bycatch rates in 2001, 2002, and 2003, NMFS considered this alternative that would provide protection to sea turtles when sea surface temperatures reached a level at which elevated sea turtle bycatch rates were expected. This alternative was rejected because: 1) NMFS believes that the impacts of this alternative would essentially be the same as NPA 3. Under this alternative, vessels would be prohibited from fishing south of 41º 9.0' N. lat. and north of 38º 0.0' N. lat. from May 1 through October 31 and south of 38º 0.0' N. from May through November 30. The only difference between this alternative and NPA 3 is that vessels would be able to fish between 41º 9.0' N. lat. and 38º 0.0' N. lat. during November when sea turtles are not expected to be in the area. NMFS believes that this alternative would result in essentially the same impacts to sea turtles and the fishing industry as NPA 3. 2) Given the new information in the 2004 fishing year, the relationship between elevated levels of bycatch in the sea scallop dredge fishery and SST is not clear. Therefore, this alternative was rejected 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)

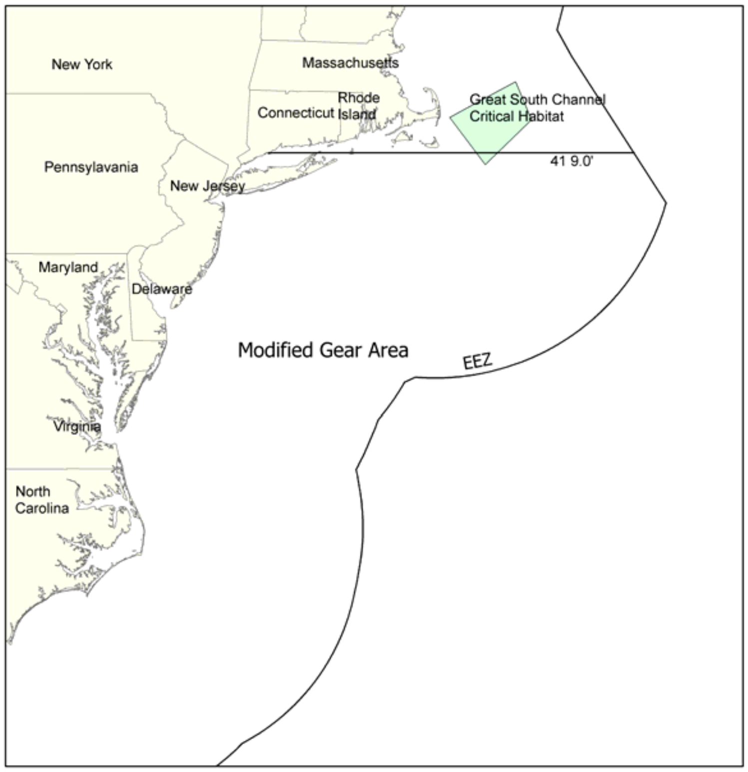
4.1 Physical Environment

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. As described above, 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. Murray (2004a) found that reported trips for the Mid-Atlantic during the period June – November 2003 occurred from approximately 75º 30’ W to approximately 71º W, far short of the eastern boundary of the EEZ. Most of the reported trips occurred in the vicinity of the 27 fathom line (approximately 49 m) (Murray 2004a). In the Mid-Atlantic, the scallop fishery operates within the Mid-Atlantic Bight at depths of 35 – 75 m (NEFSC memo from John Boreman to Patricia A. Kurkul, December 6, 2004). A comprehensive description of the affected area can be found in "The Effects of Fishing on Marine Habitats of the Northeastern United States" (NMFS 2001).

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.

Figure 4.1: Geographic area of the PA



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.

Although the primary area affected by the alternatives is the Mid-Atlantic, the alternatives do overlap slightly with the southwest corner of 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. The five resource areas generally recognized within the management unit are: (1) Delmarva; (2) New York Bight; (3) South Channel and southeast part of Georges Bank; (4) Northeast peak and the northern part of Georges Bank; and (5) 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). 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).

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 (Packer *et al.* 1999, 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). In southern areas, scallops are primarily found at depths between 45 – 75 m, and are less common in shallower waters (25 – 45 m) due to high temperature (Bourne 1965). 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).

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 2003, sea scallops were not overfished, but overfishing was occurring (NMFS 2004a).

Other commercial fisheries which operate in the geographic scope of the PA and NPAs include gillnet, longline, trawl, seine, dredge, and trap fisheries. FMP regulated fisheries include the lobster, 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. Non-federally regulated fisheries include the nearshore gillnet fisheries in state waters from Connecticut to North Carolina, horseshoe crab, whelk, and Virginia pound net fisheries. The PA and NPAs are not expected to 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 the PA or the NPAs are the 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 1998). 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.

A Biological Opinion completed December 2004 on the sea scallop fishery found that the operation of the sea scallop fishery would not likely adversely affect Kemp's ridley or green sea turtles. As described above, NMFS re-examined observer recorders from 1996 and 1997 in 2005 and considers the 1997 take of a sea turtle in the sea scallop dredge fishery to be a green sea turtle based the written records and the observer's experience (memo from John Boreman to Patricia A. Kurkul, August 23, 2005). In 2005, a Kemp's ridley was observed taken. Although NMFS expects takes of Kemp's ridley and green sea turtles to be rare in the sea scallop dredge fishery, there is a potential for the take of these species based on this information. Therefore, these species are considered in the likely to be affected section of this document.

Hawksbill and leatherback 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. 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
		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
		Leatherback sea turtle (*Dermochelys coriacea*)	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, occurring throughout the inner continental shelf from Florida through Cape Cod, MA and as far north as Nova Scotia when oceanographic and prey conditions are favorable. Sea turtle presence varies with the seasons due to changes in water temperatures (Shoop and Kenney 1992; Epperly *et al.* 1995a; Epperly *et al.* 1995b; Braun and Epperly 1996). 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). Although loggerhead sea turtles range from the beach to waters beyond the continental shelf, 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). Loggerhead sea turtles were rarely documented north of 41 ° N. lat. during these surveys (Figure 4.3; Shoop and Kenney 1992).

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 (Bolten 2003).

Status of the loggerhead subpopulation

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. NMFS recognizes five nesting subpopulations of loggerhead sea turtles: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, approximately 29° N lat. (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation occurring from 29° N lat. on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City (approximately 1,200 nests in 1998); (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 (approximately 200 nests per year) (NMFS SEFSC 2001). Genetic analyses conducted at these nesting sites since the listing 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. This nesting beach fidelity will make recolonization of nesting beaches with sea turtles from other subpopulations unlikely. NMFS has concluded that the survival and recovery of each of these nesting subpopulations are critical to the survival and recovery of the species.

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

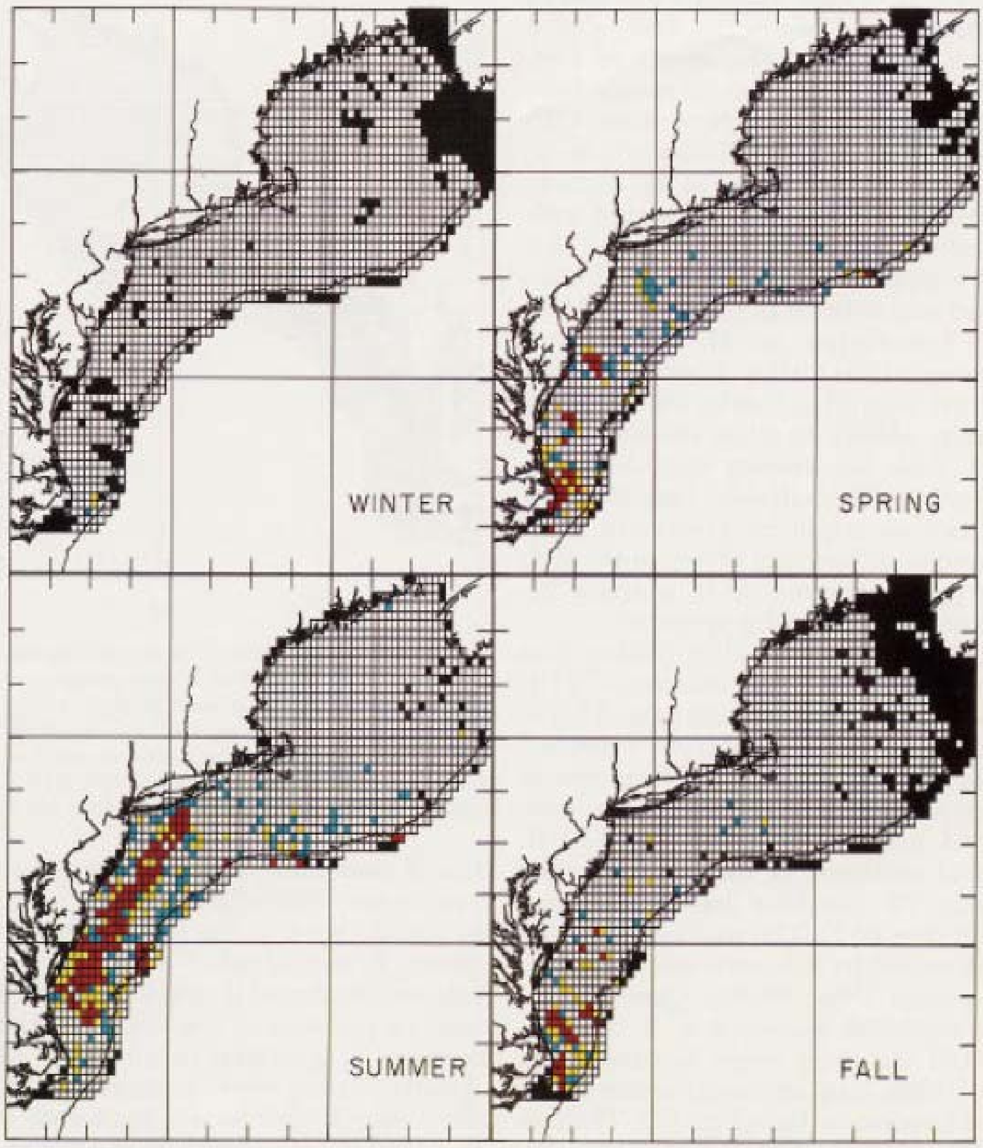


FIG. 10.—Seasonal patterns of loggerhead sea turtle relative density (TPUE) in 10-minute quadrats from CETAP aerial and shipboard surveys. High TPUE (red) was 46.5–590 turtles/1000 km, medium TPUE (yellow) was 15.1–46.4 turtles/1000 km, and low TPUE (blue) was 3.9–15.0 turtles/1000 km. Zero TPUE quadrats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

Source: Shoop and Kenney, 1992

Cohorts from each of the subpopulations are expected to occur in the action area. Genetic analysis of samples collected from benthic immature loggerhead sea turtles captured in pound nets in the Pamlico-Albemarle Estuarine Complex in North Carolina from September – December of 1995 – 1997 indicated that cohorts from all five western Atlantic subpopulations were present (Bass *et al*. 2004). In a separate study, genetic analysis of samples collected from loggerhead sea turtles from Massachusetts to Florida found that all five western Atlantic loggerhead subpopulations were represented (Bowen *et al.* 2004).

A number of stock assessments (TEWG 1998; TEWG 2000; NMFS SEFSC 2001; Heppell *et al.* 2003) have examined the status of loggerheads in the waters of the U.S. but have been unable to develop any reliable estimates of absolute population size. Due to the difficulty of conducting comprehensive population surveys away from nesting beaches, nesting beach survey data are used to index the status and trends of loggerheads (68 FR 53949, Sept. 15, 2003). Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually with a mean of 73,751 (TEWG 2000). The south Florida nesting subpopulation is the largest known loggerhead nesting population in the Atlantic and one of only two loggerhead nesting assemblages worldwide that has greater than 10,000 females nesting per year (68 FR 53949, Sept. 15, 2003; USFWS Fact Sheet 2004a). The annual number of nests for the south Florida subpopulation from 1989–1998 ranged from 48,531 to 83,442, and south Florida nests made up 90.7% of all loggerhead nests counted along the U.S. Atlantic and Gulf coasts during this period. The northern subpopulation is the second largest nesting assemblage within the U.S. but is much smaller than the south Florida nesting assemblage. Of the total number of nests counted along the U.S. Atlantic and Gulf coasts during the period of 1989–1998, 8.5% were attributed to the northern subpopulation. The number of nests in the northern subpopulation from 1989–1998 ranged from 4,370 to 7,887 for an average of approximately 1,524 nesting females per year (TEWG 2000, 68 FR 53949, Sept. 15, 2003). The three remaining subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations. Annual nesting totals for the Florida Panhandle subpopulation ranged from 113 to 1,285 nests for the period 1989–2002 (68 FR 53949, Sept. 15, 2003). The Yucatán subpopulation was reported to have had 1,052 nests in 1998 (TEWG 2000). Nest counts for the Dry Tortugas subpopulation ranged from 168 to 270 from 1995–2003 (68 FR 53949, Sept. 15, 2003).

While nesting beach data are useful for assessing sea turtle populations, the detection of nesting trends requires consistent data collection methods over long periods of time (68 FR 53949, Sept. 15, 2003). In 1989, a statewide sea turtle Index Nesting Beach Survey (INBS) program was developed and implemented in Florida. Similar standardized programs have been implemented in Georgia, South Carolina, and North Carolina. Although not part of the INBS program, nesting data are also available for the Yucatán Peninsula, Mexico. However, the currently available nesting data are still too limited to indicate statistically reliable trends for these loggerhead subpopulations. Analysis of data from the INBS program through 2003 indicates that there is no discernable trend for the south Florida, northern, or Florida Panhandle subpopulations (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide and Index Nesting Beach Survey Programs (68 FR 53949, Sept. 15, 2003)). Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida's statewide program. Survey effort has been relatively stable during the period from 1995 – 2003 (although the 2002 year was missed), but given the relatively short period of survey effort, no conclusion can be made at this time on the trend of this subpopulation (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data, 68 FR 53949, Sept. 15, 2003). Similarly, although Zurita *et al.* (2003) found significant increases in loggerhead nesting on 7 beaches at Quintana Roo, Mexico, nesting survey effort overall has been inconsistent among the Yucatán nesting beaches, and no trend can be determined for this subpopulation given the currently available data. More reliable nesting trend information is available from some south Florida and northern subpopulation nesting beaches that have been surveyed for longer periods. Using the information gathered from these select nesting beaches, the Turtle Expert Working Group (TEWG 2000) concluded that the south Florida population was increasing based on nesting data over the last couple of decades and that the northern subpopulation was stable or declining.

Sea turtle biologists are closely monitoring nest counts for the subpopulations. The counts appear to be down from 1999 through 2004. Loggerheads do exhibit a cyclical nesting pattern such that in some years nest counts are high while in others they are low (*e.g.,* not all mature females nest in a year). Natural events, such as the hurricanes of 2004, can also destroy many nests and affect nesting trends since a majority of the nests may be destroyed in any particular year. It is unknown at this time whether the nest counts over the 5 years represent an actual decline in the loggerhead subpopulations or not. In addition, since nest counts are a reflection of only one sex and age class in the subpopulation (adult females), using nesting trend data to make conclusions about the status of an entire subpopulation requires making certain assumptions. These are that the current impacts to mature females are experienced to the same degree amongst all age classes regardless of sex and/or that the impacts that led to the current abundance of nesting females are affecting the current immature females to the same extent. There is no current evidence to support or refute these assumptions.

One of the difficulties associated with using loggerhead nesting data as an indicator of subpopulation status is the late age to maturity for loggerhead sea turtles. Previous studies indicate an estimated age at maturity for loggerhead sea turtles of 21 – 35 years (Frazer and Ehrhart 1985, Frazer *et al.* 1994) with the benthic juvenile stage lasting at least 10–25 years. New data from tag returns, strandings, and nesting surveys suggest an estimated age of maturity ranging from 20 – 38 years and the neritic juvenile stage lasting from 14 – 32 years (NMFS SEFSC 2001). Caution must still be exercised when defining the benthic immature stage. It had previously been thought that after approximately 7 – 12 years in the pelagic environment, immature loggerheads entered the benthic environment and undertook seasonal migrations along the coast. However, the use of pelagic and benthic environments by loggerhead sea turtles is now suspected to be much more complex (see below).

NMFS SEFSC reviewed and updated the stock assessment for loggerhead sea turtles of the western North Atlantic in 2001. The assessment reviewed and updated information on nesting abundance and trends, estimation of vital rates, evaluation of genetic relationships between populations, and evaluation of available data on other anthropogenic effects on these populations since the TEWG reports (1998, 2000). In addition, the assessment looked at the impact of the U.S. pelagic longline fishery with and without the proposed changes in the Turtle Excluder Device (TED) regulations for the shrimp fishery using a modified population model from

Heppell *et al.* (2003)[5] to include new estimates of the duration of life stages and time at maturity and, unlike Heppell *et al.* (2003), also considered sex ratios other than 1:1 (NMFS SEFSC 2001). The latter is an important point since studies have suggested that the proportion of females produced by the south Florida population is 80%, while the proportion produced by the northern subpopulation is 35%. New results from nuclear DNA analyses indicate that males do not show the same degree of site fidelity as do females. It is possible that the high proportion of males produced in the northern subpopulation is an important source of males throughout the southeast U.S. (NMFS SEFSC 2001).

Three independent experts reviewed this stock assessment (NMFS 2004d). As a result, the stock assessment report, its reviews, and the body of scientific literature upon which these documents were derived represent the best available scientific and commercial information for Atlantic loggerhead sea turtles. Given the implementation of TED regulations to allow larger benthic immature and sexually mature loggerhead sea turtles to escape from shrimp trawl gear and given measures to increase pelagic immature survival by 10% have been implemented in the Highly Migratory Species fishery, loggerhead subpopulations in the western Atlantic should experience positive or at least stable growth as loggerheads in the various stage classes mature. These changes are unlikely to be evident in nesting beach censuses for many years given the late age at maturity for loggerhead sea turtles and the normal fluctuations in nesting.

In-water population studies to measure abundance have also been conducted. Maier *et al.* (2004) used fishery-independent trawl data to establish a useful regional index of abundance. The study was conducted along the southeast coast of the United States (Winyah Bay, South Carolina to St. Augustine, FL) from 2000 – 2003. The loggerhead sea turtle was the dominant turtle collected during the study. There was no significant difference for loggerheads in Catch per Unit Effort (CPUE) among the years sampled. However, the annual mean CPUE did increase over the study period. The minimum rate of annual population change could not be detected within the four-year sampling period of the project. During the four years of the study, a disturbing trend of reduced catch rates in the smaller size classes was noted. Growth could account for a shift to larger size classes, but the observed decline in the percentages of sea turtles in the smallest size classes may indicate a recruitment failure. The pattern warrants continued observation. This type of regional abundance may be useful examining long-term trends in overall turtle population status on a regional basis, but a number of inherent temporal, spatial, and, perhaps, environmental factors can affect catch rates and need to be recognized in developing a regional index of abundance. Maier *et al.* (2004) found that a comparison of loggerhead catch data from this study with historical values suggests 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. SEAMAP long-term data provides further support for the conclusion of increasing abundance of in-water loggerhead populations with catch rates increasing substantially since the early 1990s (Maier *et al.* 2004).

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[5] Although Heppell *et al.* is a later publication, NMFS SEFSC (2001) is actually a more up-to-date version of the modeling approach. Due to differences in publication times, Heppell *et al.* (2003) was published after NMFS SEFSC (2001).

Loggerhead life history

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. These routes may be affected by ocean currents, resulting in course adjustments, and postnesting females may swim against the prevailing current. Adult females exhibit strong fidelity to the foraging areas where they take up residence and have been observed to return to these areas over many breeding seasons (Schroeder *et al.* 2003). 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 purely speculative. 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).

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), 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). 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).

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. There is likely a period of transition, perhaps with changes in both behavior and morphology. Evidence for this stage, known as the juvenile transitional stage, includes the size-frequency distributions of populations that fall between the oceanic stage and the neritic juvenile stage. If the oceanic-neritic transition is not complete, loggerheads may return to the oceanic zone. Juvenile loggerheads may also make multiple loops in the Atlantic gyre system, rather than a single developmental loop, and this could result in movements between the oceanic and neritic zones (Bolten 2003).

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). For the most part, turtles in the summer foraging mode spend most of their time in slow moving or still waters, usually in bays and harbors and were most often associated with areas containing sandy substrates (Morreale and Standora 1994). 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 immatures 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 of 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; Epperly *et al*. 1995b; Epperly *et al*. 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; Epperly *et al*. 1995b; Epperly *et al*. 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. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. 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 lead 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 oceanic 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). 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.

Interactions between loggerhead sea turtles and sea scallop dredge gear have been documented in the Mid-Atlantic. These interactions could occur when the dredge is dragged along the bottom or during haul back. 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. One risk to sea turtles from capture in dredge gear is forced submergence. Sea turtles forcibly submerged in any type of restrictive gear would eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage *et al.* 1997). 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 turtles ability to function can occur within minutes of a 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, the story is quite different in forcibly submerged turtles where oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and 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).

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 be expected to suffer severe 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 as a result of the fall. After the bag is dumped, the dredge frame is often dropped on top of it with the cutting bar, located on the bottom aft part of the frame, also constituting a crushing weight. The dumping of the catch and the sudden lowering of the gear onto the deck are actions during which turtles could be injured. Finally, although scallop fishers 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 Green Sea Turtle

Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are uncommon north of Cape Hatteras. 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 (Ehrhart 1979). 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). Between 1989 and 2004, the annual number of green turtle nests at core index beaches ranged from 267 to 6981. Nesting on these beaches represented approximately 54% of green turtle nesting in the state of Florida in 2004. 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 reveals a significant upward nesting trend ($r = 0.77$) for these beaches (FWRI 2005). Recent population estimates for the western Atlantic area are not available.

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 turtles 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.

4.2.2.3 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle is primarily found in the Gulf of Mexico and the northwestern Atlantic Ocean and has only one major nesting beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963).

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. 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. 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). The methods of estimation have come into question. During the 1960s there were arribadas, a mass nesting emergence, 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. More than 3,600 nests were observed during the 1999 nesting season (USFWS 2004b), more than 6,200 nests during the 2000 nesting season (Márquez-M *et al*. 2001), more than 6,400 nests during the 2002 season, and 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. The current nest totals allow cautious optimism that the population is on its way to recovery (TEWG 2000).

Life history of the Kemp's ridley sea turtle

Kemp's ridley nesting occurs from April through July each year. 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 in the vicinity of the nesting beach. Hatchlings emerge after 45 – 58 days. 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). Between 1989 and 1993, 50 Kemp's ridleys captured at Sabine Pass and the entrance to Galveston Bay were tracked, using satellite and radio telemetry, to characterize their habitat and to identify migration patterns. Preliminary analysis of the data suggests that subadult Kemp's ridley sea turtles stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling temperatures force them offshore or south along the Florida coast (Renaud, NMFS Galveston Laboratory, pers. comm.). 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 suggests 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. 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, where the juvenile population of Kemp's ridley sea turtles is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridley's 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 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (R. Prescott, pers. comm.). 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. 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). A single take of a Kemp's ridley sea turtle has been documented in the sea scallop dredge fishery. 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 has 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.

4.2.2.4 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 December 2004 on the sea scallop fishery found that the operation of the sea scallop fishery would not likely adversely affect shortnose sturgeon; Kemp's ridley, green, and hawksbill sea turtles; North Atlantic right, humpback, fin, sei, blue, or sperm whales; all of which are listed as endangered under the ESA. As described above, the Kemp's ridley and green sea turtle are considered in the previous section due to new information on single takes of these species in the sea scallop dredge fishery.

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 are 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. No takes of hawksbill sea turtles have been recorded in northeast or Mid-Atlantic fisheries covered by the NEFSC observer program, including the scallop dredge fishery. 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.

Leatherback sea turtles are widely distributed throughout the oceans of the world; found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). They 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). They are predominantly 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. Since scallop dredge gear operates on the bottom, leatherbacks are less likely to encounter this gear as compared to loggerhead sea turtles. Leatherback turtles are found throughout the area of the proposed action but are unlikely to be affected. Given their size, prey ,and habitat preferences, leatherback sea turtles are not expected to be struck by the gear when it is operating on the bottom, and it is unlikely that they would be caught in sea scallop dredge gear. While the sea scallop dredge fishery overlaps with leatherback sea turtle distribution, NMFS has no confirmed report that this gear interacts with leatherbacks, either in the water column or on the bottom. The December 15, 2004 Biological Opinion found that the continued operation of the sea scallop fishery may adversely affect but will not jeopardize leatherback sea turtles. NMFS anticipated the take of up to 1 leatherback sea turtle in sea scallop trawl gear and no takes in sea scallop dredge gear.

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 of 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 inhabit deep water throughout their range, typically over the continental slope or in basins situated between banks (NMFS 1998b). Sperm and blue whales are also found in deep waters. 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. 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. 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. 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.

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 plovers species occurs along the shoreline and for terns in the top several meters of the water column. Bottom tending dredge gear used in the scallop fishery poses no threat to these species.

4.2.3 Habitat

The waters within the geographic scope of the PA and NPAs 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.*).

4.3

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, NEFMC 2003, NMFS 2004a), and the following will serve as a brief summary.

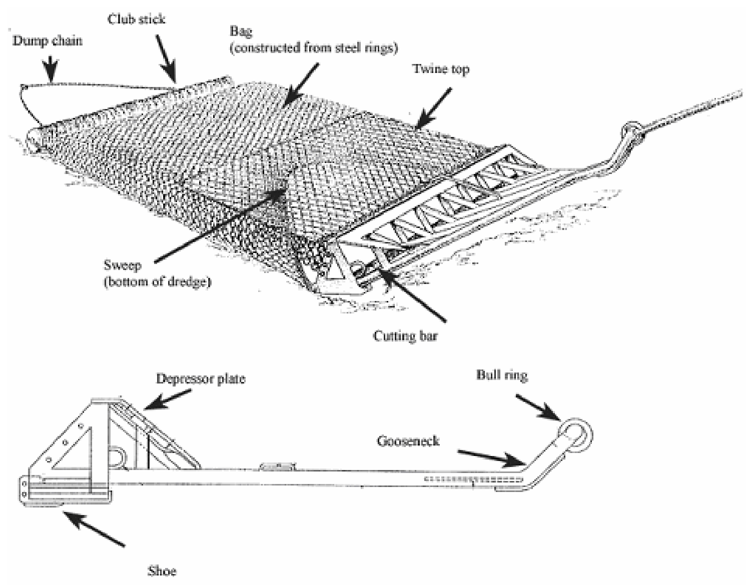
The sea scallop fishery in the U.S. EEZ is currently managed under the Scallop FMP. The commercial scallop fishery ranges from offshore waters near the Virginia-North Carolina border to the Gulf of Maine on the eastern portion of Georges Bank bounded by the U.S./Canadian territorial sea (NEFMC 2003). In the Georges Bank and Mid-Atlantic regions, scallops are harvested in water temperatures ranging from 1 – 19 ºC (NMFS 2000). The fishing year (FY) is March 1 through February 28/29. The scallop fishery over Georges Bank and in the Mid-Atlantic is a deeper water fishery in comparison to the Gulf of Maine with the Mid-Atlantic sea scallop fishery operating at depths of 35 – 75 m (NEFSC memo from John Boreman to Patricia A. Kurkul, December 6, 2004). 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. The five resource areas generally recognized within the management unit are: (1) Delmarva; (2) New York Bight; (3) South Channel and southeast part of Georges Bank; (4) Northeast peak and the northern part of Georges Bank; and (5) 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). The fishery is mainly conducted by about 300 vessels with limited access permits. 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 minimum ring size requirement is 4 inches unless otherwise required under a Sea Scallop Area Access Program. The twine top (10 inch mesh) is sewn into the top of the dredge. A standard 15 ft dredge frame weighs about 2500 lbs; the chain bag with chains and club stick weighs another 2000 lbs. Variations in materials may affect this weight by approximately ± 15%. 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). 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). 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



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). General category permits are available to any vessel owner who did not qualify for a limited access permit and allows the vessel to retain or land up to 400 pounds of shucked scallops or 50 U.S. bushels of in-shell scallops per trip. Of the limited access permits in the 2004 fishing year, there were 295 full-time permits, 28 part-time permits, and 7 occasional permits. Of the full-time permits, 236 were full-time dredge, 45 were full-time small dredge, and 14 were full-time trawl. Of the part-time permits, 4 were part-time dredge, 21 were part-time small dredge, and 3 were part-time trawl. Two of the occasional permits were for dredge vessels and 5 were for trawl vessels. There were 2,685 general category permits in FY2004, the majority of which were inactive.

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).

Two types of vessels may target sea scallops when not on a day-at-sea: vessels with general category permits and vessels with limited access permits that have declared out of the DAS program or have used up their scallop DAS allocation. These vessels may land up to 400 lbs. of scallop meat per trip or 24 hours. General Category scallop vessels contributed less than 5% of total scallop landings until recently. However in 2004, the share of the general category fleet in total scallop landings reached 5.8% (Haksever NEFMC, pers. comm.).

From 1994 – 2001, there were 426 unique vessels with limited access permits. Of these, 206 vessels retained the same category for the whole period, and 155 retained the same category but did not hold a permit every year. Of the vessels that changed permit category: 28 changed from net to dredge, 13 changed from dredge to net, 14 changed between DAS category within the dredge boats, 6 changed between DAS category within the net boats, and 4 changed from dredge to net back to dredge. By DAS category, 42 saw no change, 16 changed from part time to full time, 5 changed from full time to part time, and 2 were mixed (NEFMC 2003). In FY1999, there were also 55 limited access history permits. These permit-holders no longer have a vessel, but they retain their qualifying history, could purchase a vessel, and activate the history permit on it (NEFMC 2000a).

Other Federal Northeast Region permits held by permitted scallop vessels in 2003 include bluefish, dogfish, black sea bass, summer flounder, herring, lobster, monkfish, multispecies, ocean quahog, scup, surf clam, squid/mackerel/butterfish, and tilefish. These permits give an indication of the range of fishing activities these vessels may participate in given changing biological or regulatory conditions.

Sea scallop landings in the U.S. increased substantially after the mid-1940s with peaks around 1960, 1978, 1990 and 2001–2003. Until recently, the Mid-Atlantic area has been less productive than Georges Bank, with landings between 1962–1982 averaging less than 1,800 mt/year. However, an upward trend in both recruitment and landings is evident in the Mid-Atlantic since the mid-1980s. Unusually strong recruitment in the Mid-Atlantic Bight area has been one contributor to the overall landings. Recruitment from 1998–2003 was an order of magnitude greater than from 1979–1984. Increased yield-per-recruit due to effort reduction has also contributed to high landings. The mean weight of a landed scallop is currently over 20g compared to 14g a decade ago (NMFS 2004a).

The most recent stock assessment assessed sea scallop landings in four areas: Gulf of Maine, Georges Bank, southern New England, and the Mid-Atlantic Bight (Figure 4.2, Figure 4.6). Total landings of sea scallops in the Mid-Atlantic have increased, while landings in the other resource areas show no detectable trend (NMFS 2004a).

Scallop fishermen tend to repeatedly fish the same areas. Virtually all of the 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. 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).

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, New Jersey, Rhode Island, and New York. The ports of New Bedford, Cape May, and Norfolk have the greatest number of limited access permitted vessels, while New Bedford, Gloucester, Point Judith, Cape May, and Chatham have the greatest number of general category permitted vessels (NEFMC 2003).

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. 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. 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).

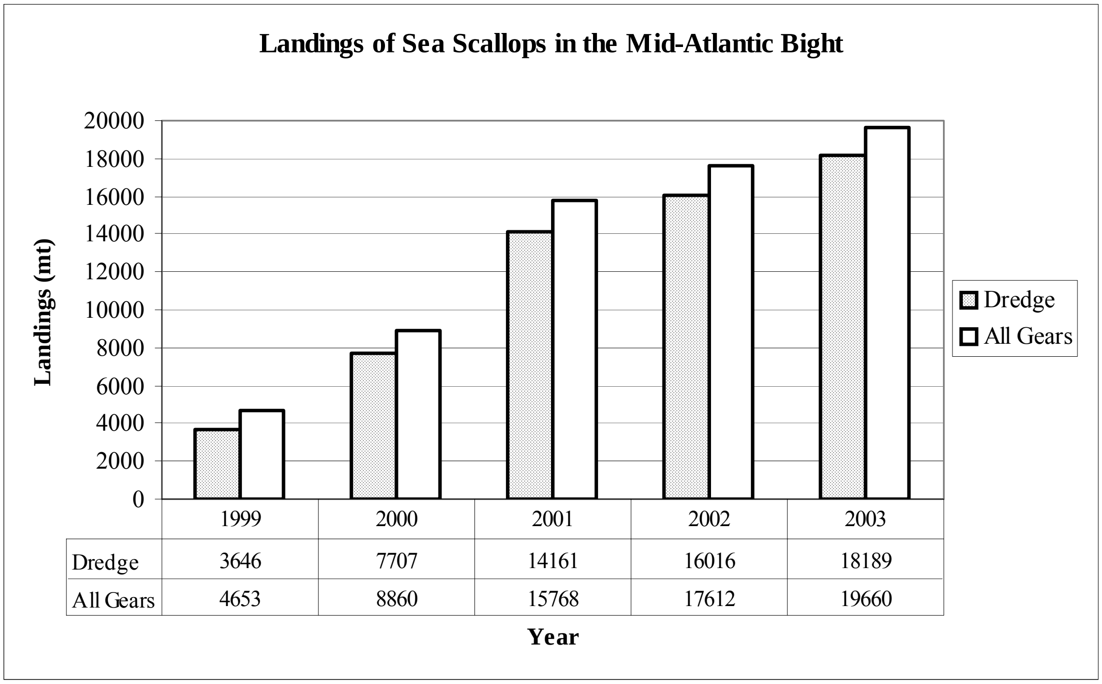
A slightly different picture emerges when evaluating ports the boats call their "home port." Again, New Bedford, and other larger landing ports dominate, but a number of ports in North Carolina also seem important. There is a close connection between home port and port of landing. Despite the significance 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).

Table 4.2: Permit categories under the Scallop FMP

Category	Permit Type	Permit Description	Number of Permits FY2004
1	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.	**2685**
2	Limited Access	**Full Time:** Vessel Monitoring System (VMS) required to be installed and in continuous operation onboard the vessel	**236**
3	Limited Access	**Part Time:** Vessel Monitoring System (VMS) required to be installed and in continuous operation onboard the vessel	**4**
4	Limited Access	**Occasional**	**2**
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.	**45**
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. Vessel Monitoring System (VMS) required to be installed and	**21**
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. Vessel Monitoring System (VMS) required to be installed and in continuous operation onboard the vessel	**14**
8	Limited Access	**Part Time - Authorized to Use Trawl Nets:** Vessel Monitoring System (VMS) required to be installed and in continuous operation onboard the vessel	**3**
9	Limited Access	**Occassional - Authorized to Use Trawl Nets**	**5**

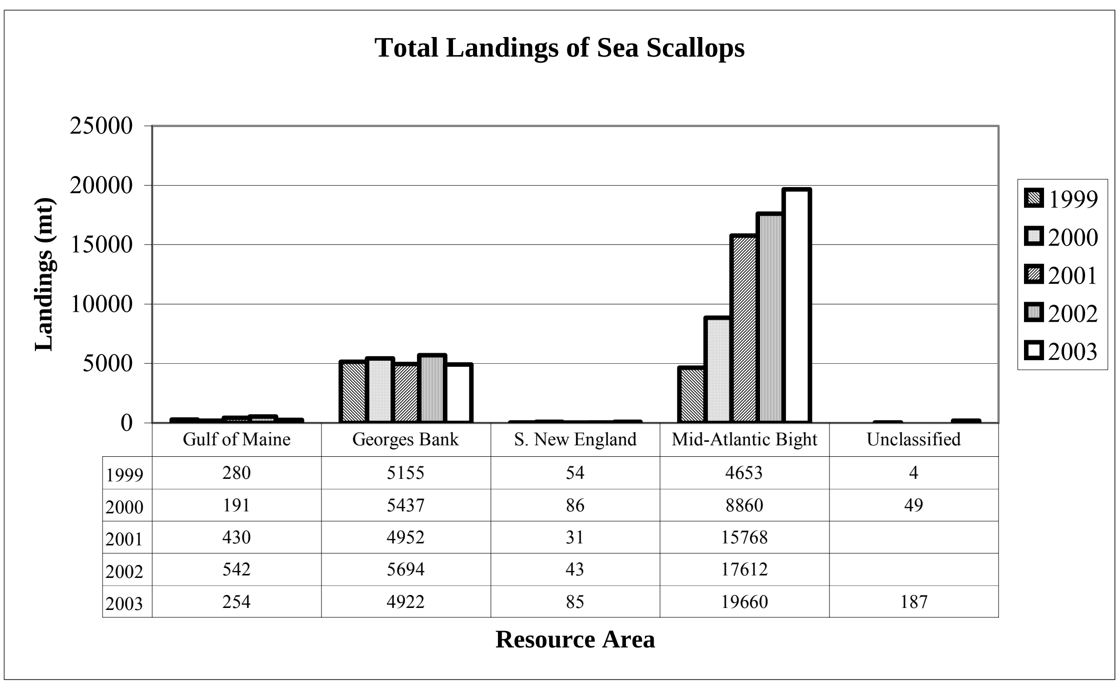
Figure 4.5: Landings of sea scallops by dredge and all gears in the Mid-Atlantic, Calendar Year (CY)1999-CY2003



	1999	2000	2001	2002	2003
Dredge	3646	7707	14161	16016	18189
All Gears	4653	8860	15768	17612	19660

Source: 39th SAW, NMFS 2004a

Figure 4.6: Total landings of sea scallops (mt) by all gears, CY1998-CY2003.



	Gulf of Maine	Georges Bank	S. New England	Mid-Atlantic Bight	Unclassified
1999	280	5155	54	4653	4
2000	191	5437	86	8860	49
2001	430	4952	31	15768	
2002	542	5694	43	17612	
2003	254	4922	85	19660	187

Source: 39th SAW NMFS 2004a

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 each alternative outlined in section 3.0. As described in section 4.0, the biological resources potentially affected by this action include fishery resources, threatened and endangered sea turtles and habitat. The purpose of the PA is to conserve sea turtles listed under the ESA by reducing serious injury and mortality of sea turtles otherwise captured in the scallop dredge bag. This action is expected to provide a net benefit to sea turtles (see section 5.1.2.2). The fishing industry directly impacted by the proposed 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 5.21.

In general, the alternatives either propose a required gear modification to the scallop dredge or a prohibition on fishing south of 41º 9.0' N lat. In the case where the scallop dredge must be modified, three potential behavior responses exist. 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 proposed gear modification is fairly inexpensive (section 5.1.3), our analysis assumes that for alternatives requiring a gear modification, vessels will convert their gear and continue fishing in the area.

5.1 <u>Gear modification requirement on scallop dredges fishing in Mid-Atlantic from May 1 through November 30 (PA)</u>

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 2001). 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 field studies of the modified dredge, scallop catch averaged 6.71% less than with the unmodified 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 unmodified dredge (DuPaul *et al.* 2004a). As discussed above, these impacts are expected to be minimal and temporary due to the rapid recovery times in this environment. The PA is not expected to substantially impact the physical environment of the Mid-Atlantic Bight.

5.1.2 Biological Impacts

5.1.2.1 Fishery Resources

Field trials of this 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 total weight (± 15%) of a 15 ft sea scallop dredge is approximately 2,500 lbs for the dredge frame and another 2,000 lbs for the chain bag with chains and club stick. The chain mat is estimated to weigh between 56 lbs for a 10 ft dredge to 147 lbs for a 15 ft dredge. The weight of the modified dredge is not considerably different than that of the unmodified dredge, and the use of the modified dredge is not expected to substantially affect the scallop resource in the Mid-Atlantic.

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 and Kemp's ridley sea turtles may also be impacted; however, NMFS expects interactions with these species to be rare given their distribution and the distribution of sea scallop dredge fishing effort. In the December 2004 Biological Opinion, NMFS concluded that the continued operation of the sea scallop dredge fishery may adversely affect but is not likely to jeopardize the continued existence of loggerhead sea turtles. NMFS also 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 PA was developed to reduce the capture hard-shelled 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, 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). 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).

A total of 61 sea turtles have been observed taken in the Atlantic sea scallop dredge fishery during normal fishery operations from 1996 through October 31, 2005. Of these, 44 were identified as loggerhead sea turtles, 1 was identified as a green sea turtle, and 15 were hard-shelled sea turtles that could not be positively identified. An additional 13 sea turtles were reported captured while the observer was off-watch. These include a Kemp's ridley sea turtle in the sea scallop dredge fishery in August 2005. Of the total 61 turtles observed captured, 4 were fresh dead upon retrieval or died on the vessel, 1 was alive but required resuscitation, 25 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.

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. 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 overlaps with some foraging areas. Potentially, this may expose the sea turtle to scallop dredge gear when it is foraging on or near the bottom. 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). They 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).

As described in sections 2.1.3 and 2.1.4, an assessment of sea turtle bycatch in the 2003 fishing year was completed by the NEFSC in November 2004. This report estimated 749 loggerhead sea turtles (CV = 0.28) captured in scallop dredge gear operating in the Mid-Atlantic from June 1 through November 30 (Murray 2004a). An estimated 180 loggerhead sea turtles (CV = 0.37) were captured in sea scallop dredge gear in the Mid-Atlantic during the 2004 fishing year

(Murray 2005). The most recent Biological Opinion on the Scallop FMP, December 15, 2004, anticipated the capture of up to 749 loggerhead sea turtles annually as a result of the continued operation of the scallop dredge fishery with up to 479 of these captures resulting in injuries that would lead to death or an inability of the turtle to reproduce (NMFS 2004c).

SST has been a significant predictor of sea turtle bycatch in the Mid-Atlantic CAAs (2001-2002) and in the Mid-Atlantic from New York to North Carolina (2003). A higher probability of sea turtle bycatch occurred after waters warmed to 19 ºC in 2001 and 2002 and after waters warmed to 22 ºC in 2003. These differences may reflect inter-annual variations in sea surface temperature or turtle distributions, shifting patterns in the fishery, or the interaction between random samples and statistical models (Murray 2004a). Murray (2004a) found that there may be a minimal threshold above which turtle bycatch is likely to occur, although this minimal temperature threshold is likely to fluctuate from year to year. In the 2004 fishing year, sea surface temperature was not found to be a significant predictor of turtle bycatch rates in the Mid-Atlantic for the 2004 fishing year. The small number of takes in 2004 relative to the number of dredge hours examined may have precluded the detection of significant effects. Changes in fishing effort across SST and depth zones in 2004 relative to 2003 may have influenced whether a turtle interaction occurred (Murray 2005).

Based on the available information, NMFS has determined that the use of a dredge modified with a chain mat will prevent most, if not all, 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 may reduce drowning following an interaction with sea scallop dredge gear on the seafloor (see below). Sea turtles observed captured in the scallop dredge fishery in 2003 ranged in size from 55 – 107 cm from notch to tip (curved carapace length). 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 in 2003 is 51-100 cm. NMFS reviewed size at stage data for Atlantic loggerheads. Depending on the dataset used, the cutoff between pelagic immature and benthic immature loggerhead sea turtles was 42-49 cm SCL, and the cutoff between benthic immature and sexually mature loggerhead sea turtles was described as 83 – 90 cm SCL (NMFS SEFSC 2001). Other authors define the benthic immature stage for loggerheads as 36 – 100 cm (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. Generally, these sea turtles would be larger then the opening in the chain mat and would be prevented from entering the dredge bag. NMFS recognizes that, on rare occasions, sea turtles that interact with the gear may be small enough to enter the dredge bag, 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 life history of loggerhead sea turtles and the observer measurements.

During the 2003 – 2004 field tests of this gear modification, a total of 8 turtles were taken in the control (unmodified) gear. No turtles were captured by the modified dredge, 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 haul of the dredge, from emptying the bag on deck, or from dropping the dredge on the catch. Under the PA, injuries due to these causes will be reduced as turtles are prevented from entering the bag. The use of the chain mats is expected to provide protection to sea turtles that would have been taken in the dredge bag.

It is possible that the dredge could strike sea turtles as it is fished resulting in carapace injuries and that 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, and the recent research indicates the chain mat will prevent most, if not all, of the captures in the dredge bag. 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 (7 hours of video over 16 tows on a 3-day trip) by NMFS and the sea scallop industry 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). In 2005, NMFS worked with its research partners to conduct an additional 73 hours of video monitoring. This video has been reviewed and no sea turtles were documented.

This action 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. The NEFSC estimated that, in the 2003 fishing year, there were 749 sea turtles taken in the mid-Atlantic sea scallop fishery. According to the December 15, 2004 Biological Opinion, the agency anticipates that up to 749 sea turtles will be captured each year without the chain mat configuration in place, and up to 479 of these (approximately 64 percent) are expected to sustain injuries leading to death or failure to reproduce. The NEFSC's 2004 bycatch estimate (180) falls within the scope of this estimate. With the chain mat installed over the opening to the dredge bag, it is reasonable to assume that sea turtles which 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 749) 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 weighs about 2500 lbs; the dredge bag with chains and club stick weighs another 2000 lbs. Variations in materials may affect this weight by approximately ± 15%. 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 749) 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. 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 749 sea turtles will still interact with the chain mat-modified gear, and the estimate that up to 479 sea turtles will be seriously injured/killed and 270 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 479 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 then 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. In 2005, 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. A standard New Bedford style dredge was used as a control, and both dredges 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 worse case scenario of a dredge overtaking a sea turtle lying on the bottom. During the 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. During this tow, the model turtle was deflected over the bail of the modified dredge, 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. In addition, 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 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. 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 479 sea turtles would still experience serious injuries that lead to mortality or failure to reproduce with the chain mat in place as without it.

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 479 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. During the 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. NMFS has no indication that this type of interaction would result in serious injury. 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.

We also assume that the 270 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 270 interactions would result in contact with the chain mat, but this contact is not likely to result in serious injury.

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, we have 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).

The dates for the PA 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 of 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). Water temperatures of ≥ 11 ºC are most favorable to sea turtles, so sea turtles migrate south to warmer waters in the fall, 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, and the potential for interactions exists during May and November due to the distributional overlap of turtles (Shoop and Kenney 1992; Braun-McNeill and Epperly 2004) and fishing effort. A single take of a green sea turtle and a single take of a Kemp's ridley sea turtle have been documented in the sea scallop dredge fishery. As described above, NMFS expects takes of these species to be rare. NMFS does not anticipate any fishing south of Cape Hatteras, North Carolina due to a lack of scallop resources. Thus, the timing of these proposed measures are based on Cape Hatteras as the lower boundary. This alternative will provide protection to sea turtles against injuries and mortalities caused by capture in the dredge bag.

The magnitude of sea turtle protection provided by the alternatives can be ranked relative to each other. NPA 3 would provide the most protection to sea turtles since scallop dredge gear would be removed from the area completely when sea turtles are present. The PA would rank second in providing protection since it would require the gear modification during the time sea turtles are known to be present in the area. The relative ranking of impacts to sea turtles and the economic environment are provided in Table 7.1. Impacts to the physical environment, habitat, and fishery resources are expected to be minimal and are not included in the table.

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.

5.1.2.3 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 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 PA 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 proposed for use in the scallop dredge fishery does come 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).

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.

5.1.3 Economic Impacts

The methods and data presented in this section were used to analyze the economic impacts for each alternative. The results of these analyses are presented in the economic impacts/consequences section for each alternative.

As noted in sections 3.1 to 3.5, the following alternatives are evaluated in this document:

- The preferred alternative (PA) requires gear modifications of vessels fishing scallop dredge gear south of 41º 9.0' N. lat. from May 1 through November 30
- Non-preferred alternative 1 (NPA 1) is the same as the PA, except the gear modifications are only required from May 1 through October 15
- Non-preferred alternative 2 (NPA 2) is the same as the PA, except the gear modification is only required for vessels that have dredge frames greater than 11 ft wide

- Non-preferred alternative 3 (NPA 3) prohibits the use of all scallop dredge gear south of 41º 9.0' N. lat. from May 1 through November 30
- No-action (*i.e.*, status quo).

The magnitude of sea turtle protection provided by the alternatives can be ranked relative to each other. NPA 3 would provide the most protection to sea turtles since scallop dredge gear would be completely removed from the area where sea turtle interactions have been documented. The PA would rank second with respect to sea turtle protection since the gear modification is required of all vessels from May 1 through November 30. It is difficult to determine whether NPA 1 or NPA 2 provides the next best level of sea turtle protection. NMFS observer data show turtles have been taken as bycatch during the month of October, and there is the potential that takes could occur in the adjacent month of November in the scallop dredge fishery. Therefore under NPA 1, there is a chance turtles may be caught between October 15 and November 30. Under NPA 2, vessels with dredges less than 11 feet would be exempt from the proposed gear modification. However, these vessels have not been well sampled by observers. Specifically, less than 1% of fishing effort of vessels with dredges less than 11 ft was observed. With a lack of conclusive scientific data, we assume NPA 1 and NPA 2 provide the same level of sea turtle protection. As described in section 5.0, these alternatives are expected to result in fewer serious interactions than the status quo and, therefore, will provide more protection to sea turtles than the status quo. In summary, NPA 3 provides the most protection for sea turtles followed by the PA, followed by both NPA 1 and NPA2, and lastly the status quo.

Both consumer surplus and producer surplus for seafood products supplied by the scallop dredge fishery will be affected by the proposed sea turtle protection measures. Under the PA, NPA 1 and NPA 2, harvesters will incur additional 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 will be minimized by selecting the least costly regulatory alternative which provides a level of protection consistent with the purpose and need of this action.[6] The preferred alternative is expected to benefit sea turtles at relatively low cost.

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[6] We choose to minimize cost subject to a level of protection consistent with the purpose and need of this action versus maximizing protection subject to cost, because we can not measure marginal changes in protection between alternatives.

5.1.3.1 Methods

Section 3.0 provides a detailed description of the five alternatives considered in this analysis. In general, the alternatives require either a gear modification to the scallop dredge or prohibit fishing south of 41º 9.0' N. lat. In the case where scallop dredges must be modified, 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. The impacts of the first two behaviors on revenues, coupled with the costs of gear modifications, are combined to estimate the total and average cost of the proposed regulations. The last behavior is not modeled in this analysis.

If we had full information on the scallop dredge fishery, our goal would be to measure how each alternative 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 alternative 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. For each alternative, we evaluate the impact on the individual vessel and the entire industry. The results are then compared between alternatives.

Under the PA, a gear modification is required to the scallop dredge 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. An average 2003 dock-side price of $4.09 per landed pound of scallop meats was used throughout the analysis.[7]

5.1.3.1.1 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 up to 400 pounds of meat or 50 bushels of shell stock per trip.

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, a total of 340 vessels fished south of 41º 9.0' N. lat. (Mid-Atlantic region) 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

[7] 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. Under NPA 3, a closure, the relative reduction in revenue would not change with a higher scallop price as both the numerator and denominator would change proportionately. In summary, if more recent prices were used, the relative ranking of the results would not change.

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

5.1.3.1.2 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.

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

5.1.3.1.3 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 5.5: 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		

5.1.3.1.4 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 proposed gear 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 5.8).

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

Table 5.8: Total material and labor cost of the proposed gear modifications, by permit category and frame width of dredge

Frame width of dredge	Fixed Cost of Gear Modification			
	DAS		GEN	
	Number of Dredges		Number of Dredges	
	1	2	1	2
<10	-	-	$177.37	-
10 to <11	$240.67	-	$240.67	-
11 to <13	-	$685.44	$342.72	-
> 13	-	$778.44	-	-

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. 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 5.9), 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 5.9: 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%)	-

Under the proposed prohibition of the scallop dredge in areas south of 41º 9.0' N. lat. (NPA 3), we assume the vessel will not fish elsewhere. Under this scenario, all revenue would be lost from May 1 through November 30 period.

5.1.3.2 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 (Table 5.8) is fairly inexpensive relative to fishing revenues. Therefore, our analysis assumes all vessels will convert their gear and continue fishing in the area.

5.1.3.2.1 Individual Vessel

In 2003, annual revenues per vessel ranged between $46.7 (CV=120%) and $895.1 (CV=29%) thousand dollars (Table 5.5), prior to the proposed regulation. 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 (Table 5.8) 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 5.10), 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 5.11). 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.

5.1.3.2.2 Affected Industry

Annual industry revenues would be reduced by 4.3% (=$9.6M/$221.4M) under the PA (Table 5.12), 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 5.10: 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 5.11: 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 5.12: 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 Social Impacts

The economic analysis demonstrates that the sea scallop dredge fishing community may be impacted by the PA. The PA requires the use of a modified sea scallop dredge when fishing in the Mid-Atlantic 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. The fishing community, including dealers and processors, will be impacted by a 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 the proposed 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 others perspectives and goals.

5.2 No Action Alternative

5.2.1 Physical Impacts

The No Action alternative would allow the fishery to continue to operate under its current management regime, with no gear modifications required in the sea scallop dredge fishery for sea turtle conservation at this time in the Mid-Atlantic. Under the No Action alternative, fishing practices would not be further modified, and there would be no additional impacts to the physical environment under this alternative.

5.2.2 Biological Impacts

5.2.2.1 Fishery Resources

Several management measures have already been imposed on the scallop dredge fishery. Under the No Action alternative, fishing practices would not be further modified and there would be no additional impacts to the scallop resource beyond what has already been analyzed in the Scallop FMP.

5.2.2.2 Endangered/Threatened Species and Critical Habitat

The No Action alternative has the potential to impact threatened and endangered sea turtles. With this alternative, the scallop fishery will continue to fish subject to the requirements of the Scallop FMP. As described above, sea turtles takes have been documented in scallop dredge gear and the data presented under the PA apply to the No Action alternative as well. These data demonstrate that sea turtles are subject to takes, some of which are lethal, under the existing regulations. If the dredge fishery continues to be fished in the same manner in the area south of 41° 9.0' N. lat. May through November, sea turtle takes will result. The December 2004 Biological Opinion explained that with the implementation of Framework 16, fishing effort is expected to shift to areas with fewer turtles, away from the Mid-Atlantic; therefore, fewer takes would be expected compared to when more effort is expended in the mid-Atlantic where sea turtle abundance is higher. There would be no additional impacts to sea turtles due to the No Action alternative.

Under the No Action alternative, fishing practices would not be further modified and there would be no additional impacts to critical habitat beyond what has already been analyzed in the Scallop FMP.

5.2.2.3 Habitat

Several management measures have already been imposed on the scallop dredge fishery. Under the No Action alternative, fishing practices would not be further modified and there would be no additional impacts to the scallop resource beyond what has already been analyzed in the Scallop FMP.

5.2.3 Economic Impacts

Under the No Action alternative, fishing practices would not be restricted or modified; therefore, there is no economic impact on the individual or industry.

5.2.4 Social Impacts

Under the No Action alternative, fishing practices would not change. Therefore, there are not expected to be any additional impacts to the scallop fishermen, their families, and their community. If taking no action to reduce impacts on sea turtles results in the need to take more aggressive action at a later date, the consequences to employment, family, and community may be increased from those described under the PA.

There are also social impacts associated with taking no action if it results in an increased risk of extinction of 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 is necessary to promote recovery of sea turtles. The No Action alternative is unlikely to accomplish this goal.

5.3 Gear modification requirement on scallop dredges fishing in Mid-Atlantic from May 1 through October 15 (NPA 1)

5.3.1 Physical Impacts

The gear-specific effects on the physical environment described under the PA apply to this alternative as well. Whenever the chain mat configuration is used, there will likely be a minimal 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. The frequency and distribution of scallop dredge tows are not expected to differ from the PA as vessels are expected to continue to fish in the same area. Disturbances to the bottom are expected to be minimal and temporary in this environment.

NPA 1 is essentially the same as the PA, with the difference that under this alternative the chain mats would only be required on scallop dredges from May 1 through October 15. This period is 45 days shorter that the PA. As it is expected that vessels would remove the chains after October 15 for the remainder of the fishing year, the impact to the physical environment is expected to be less than under the PA. As with the PA, NPA 1 is not expected to substantially impact the physical environment. The difference in impacts to the physical environment between the PA and NPA 1 is negligible.

5.3.2 Biological Impacts

5.3.2.1 Fishery Resources

Information on the experimental fishery with the modified dredge and the impact of scallop dredging in the Mid-Atlantic is presented under the PA and applies to this alternative as well. NPA 1 is the same as the preferred alternative with a modification of the effective date. Under this alternative, chain mats would be required on scallop dredges fishing south of 41º 9.0' N. lat. from May 1 through October 15. This alternative requires the use of the modified dredge for 45 days less than the PA, and vessels are likely to remove the chain mats after October 15 to fish the remainder of the season. As such, any impact (adverse or beneficial) is expected to be less under this alternative than under the PA. As described above, the modified dredge is not likely to alter the damage done to scallops left in its path or to significantly alter the catch. Therefore, it is unlikely that the use of the chain mats would substantially impact the scallop resource in the Mid-Atlantic.

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.

5.3.2.2 Endangered/Threatened Species and Critical Habitat

NPA 1 will impact loggerhead sea turtles. Green and Kemp's ridley sea turtles may also be impacted, however, NMFS expects interactions with these species to be rare given their distribution and the distribution of sea scallop dredge fishing effort. The information presented in section 5.1.2.2 identifies sea turtle interactions in the scallop dredge fishery and applies to this alternative as well. NPA 1 imposes the same restrictions as the PA with the difference being that NPA 1 would only be in effect from May 1 through October 15, a period 45 days shorter than the PA. Sea turtle takes in the scallop dredge fishery have been documented June through late October. From May 1 through October 15, the benefit to sea turtles under this alternative would the same as in the PA. While no takes have been documented in November, the potential for takes exists as sea turtles are present in the area where the Mid-Atlantic scallop fleet operates during November. This alternative would leave sea turtles vulnerable to capture in sea scallop dredge gear from October 15 to November 30, therefore, it is expected to provide less of a benefit to turtles than the PA. It would not be as temporally conservative as the PA but would still reduce injuries and mortalities of sea turtle due to their capture in the dredge bag.

The geographic area includes the southern corner of the GSC critical habitat area for right whales. The description of the GSC critical habitat under the PA applies to this alternative as well. This area was designated as critical habitat for right whales due to the area's importance as a spring/summer foraging ground for this species. 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.

5.3.2.3 Habitat

The effects of dredging on habitat are described under the PA, and this description applies to NPA 1 as well. 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 proposed action has a rapid recovery time. In addition, the area of the seafloor swept by the chain mat is the same area swept by the cutting bar and the dredge bag. In this alternative, the chain mats would be required for 45 days less than in the PA. Therefore, any impacts that might result from the use of the chain mats would be less under this alternative. As

with the PA, NPA 1 is not expected to substantially increase or decrease the impacts of the scallop fishery to EFH beyond what has already been analyzed in the Scallop FMP.
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5.3.3 Economic Impacts

Under NPA 1, the economic impacts are slightly less than the PA. The material and labor costs to modify the gear are the same. However, a slight adjustment is made to the reduction in scallop revenues since this alternative would be effective 45 days less than the PA. For details of the analysis see section 5.1.3

5.3.3.1 Individual Vessel

Under NPA 1, two costs are imposed. The total impact of these two costs may reduce a vessel's annual revenues on average between 3.0% (CV=104%) and 7.6% (CV=124%) (Table 5.13). The economic impact is larger for vessels under the GEN category compared to a DAS vessel. The coefficient of variation also shows there is a greater variability among vessels in the GEN category. In general under the NPA 1, 49 vessels may have their annual revenue reduced between 5% and 10%, and 5 vessels may have reductions greater than 10% (Table 5.14). Of these 54 vessels, 12, 13, 8 and 11 vessels are registered to the state of Massachusetts, New Jersey, Virginia and North Carolina, respectively.

5.3.3.2 Industry

Annual industry revenues will be reduced by 3.7% (=$8.1M/$221.4M) under the NPA 1 (Table 5.15). Industry revenues for these 314 affected vessels are $221.4 million dollars, and the total cost to the industry for this gear modification is $8.1 million dollars.

Table 5.13: Reduction in annual revenues per vessel with the coefficient of variation (in parentheses) under the NPA 1 by permit category and frame width of dredge.

.Frame width Of dredge	Reduction in Annual Revenues DAS	GEN
<10		7.6% (CV=124%)
10 to <11	3.8% (CV=37%)	3.0% (CV=104%)
11 to <13	3.8% (CV=33%)	4.2% (CV=39%)
> 13	3.8% (CV=30%)	

Table 5.14: Number of vessels under the NPA 1 where annual revenues are reduced by 5% or less, between 5-10%, and 10% or greater and total number of vessels by permit category.

Permit Category	Annual Revenue Reductions of			Total Number of Vessels
	5% or Less	Between 5-10%	10% or Greater	
DAS	236	41	0	277
GEN	24	8	5	37
Total	260	49	5	314

Table 5.15: Total industry cost and industry revenues of the affected scallop dredge vessels under the NPA 1 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		41.3	41.3		840	840
10 to < 11	813.8	33.5	847.3	21,650	2,107	23,757
11 to < 13	2,655.2	23.7	2,678.9	71,534	807	72,341
> 13	4,533.4		4,533.4	124,420		124,420
Total			8,100.9			221,358

5.3.4 Social Impacts

The economic analysis demonstrates that the sea scallop dredge fishing community will be impacted by NPA 1. NPA 1 requires the same modification as the PA, but for a shorter time period. 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. The fishing community, including dealers and processors, may be impacted by the loss of catch as there may be less catch passing through the land-based facilities and available for purchase. The magnitude of these impacts is expected to be less than the PA due to the shorter duration of the gear modification each year. As with the PA, vessels registered in Massachusetts, New Jersey, Virginia, and North Carolina may have revenue reductions greater than 5%; 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 sea turtle recovery, 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 the proposed action. Social benefits are realized from the application of management practices that demonstrate that fishing practices and sea turtles can co-exist.

5.4 Gear modification requirement on large scallop dredges fishing in Mid-Atlantic from May 1 through November 30 (NPA 2)

5.4.1 Physical Impacts

The gear-specific effects on the habitat type and the physical characteristics of the seafloor described under the PA apply to this alternative as well. 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. The frequency and distribution of scallop dredge tows are not expected to differ from the PA as vessels are expected to continue to fish in the same area. Disturbances to the bottom are expected to be minimal and temporary in this environment.

NPA 2 is essentially the same as the PA, with the difference that under this alternative the chain mats would only be required on large scallop dredges from May 1 through November 30. In 2003, there were 80 vessels that fished in Mid-Atlantic waters from May to November with dredges less than 11 ft. From June through November 2003, approximately 15% of dredge hauls were accomplished by commercial vessels in the Mid-Atlantic using dredges ≤ 10 ft (Murray 2004a). Under this alternative, fewer vessels will be using the modified dredge and, as such, the impact to the physical environment of the Mid-Atlantic bight is expected to be less than under the PA. As with the PA, NPA 2 is not expected to substantially impact the physical environment, and the difference in impacts to the physical environment between the PA and NPA 2 is negligible.

5.4.2 Biological Impacts

5.4.2.1 Fishery Resources

Information on the impact of scallop dredging and the experimental fishery with the modified dredge is presented under the PA and applies to this alternative as well. NPA 2 is the same as the preferred alternative with a variation in the dredge size affected by the gear modification requirement. Under this alternative, chain mats would be required on large (≥ 11 ft) scallop dredges fishing south of 41º 9.0' N. lat. from May 1 through November 30. As described above, there were 80 vessels that fished Mid-Atlantic waters from May to November 2003 with dredges less than 11 ft. From June through November, approximately 15% of dredge hauls were accomplished by commercial vessels in the Mid-Atlantic using dredges ≤ 10 ft (Murray 2004a). Under this alternative, the total number of vessels that would be required to use the modified dredge is less under than under the PA. As such, any impact to the scallop resource is expected to be less than under the PA. As described in the PA, the modified dredge is not expected to alter the damage done to scallops left in its path or to significantly alter the catch rate. As with the PA, it is unlikely that the use of these chain mats would substantially impact the scallop resource in the Mid-Atlantic.

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.

5.4.2.2 Endangered/Threatened Species and Critical Habitat

NPA 2 will impact loggerhead sea turtles. Green and Kemp's ridley sea turtles may also be impacted, however, NMFS expects interactions with these species to be rare given their distribution and the distribution of sea scallop dredge fishing effort. The information presented in section 5.1.2.2 identifies sea turtle interactions in the scallop dredge fishery and applies to this alternative as well. Under this alternative, chain mats would be required on large (≥ 11 ft) scallop dredges fishing south of 41º 9.0' N. lat. from May 1 through November 30. As described above, there were 80 vessels that fished Mid-Atlantic waters from May to November 2003 with dredges less than 11 ft. From June through November, approximately 15% of dredge hauls were accomplished by commercial vessels in the Mid-Atlantic using dredges ≤ 10 ft (Murray 2004a). Under this alternative, the total number of vessels that would be required to use the modified dredge is less than under the PA.

Sea turtles are vulnerable to capture in scallop dredges with smaller (<11 ft) frame widths. Prior to 2004, no takes of sea turtles by vessels using small dredges had been documented in the sea scallop dredge fishery. Historically, observer coverage in this sector of the fishery has been low (Murray 2004a). During the 2004 fishing year, there were 3 observed takes of sea turtles in dredge frames with a width of 10 ft (Murray 2005). Dredges with frames less than 11 ft are fished in a similar manner and in similar areas as the larger dredges. Thus, this alternative would provide less protection to sea turtles than the PA, but it would provide some protection by reducing injury and mortality following capture in the bag of large dredge gear in the sea scallop fishery.

The geographic area includes the southern corner of the GSC critical habitat area for right whales. The description of the GSC critical habitat under the PA applies to this alternative as well. This area was designated as critical habitat for right whales due to the area's importance as a spring/summer foraging ground for this species. 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.

5.4.2.3 Habitat

The effects of dredging on habitat are described under the PA and, this description applies to NPA 2 as well. The chain mat proposed for use in the scallop dredge fishery does come into contact with the bottom and an increase in disturbance to bottom sediments is expected whenever chain mats are used. This increase in bottom disturbance is expected to be minimal and temporary as the sediment type in the area of the proposed action has a rapid recovery time.

Under this alternative, chain mats would be required on large (≥ 11 ft) scallop dredges fishing south of 41º 9.0' N. lat. from May 1 through November 30. As described above, there were 80 vessels that fished Mid-Atlantic waters from May to November 2003 with dredges less than 11 ft. From June through November, approximately 15% of dredge hauls were accomplished by commercial vessels in the Mid-Atlantic using dredges ≤ 10 ft (Murray 2004a). The total number of vessels that would be required to use the modified dredge is less under this alternative than under the PA; therefore, any impacts that might result from the use of the chain mats would be less under this alternative. As with the PA, additional benthic disturbance caused by the gear modification is expected to have inconsequential effects in sandy habitats of the Mid-Atlantic.

5.4.3 Economic Impacts

NPA 2 is exactly the same as the PA, however, the gear modification is only required for vessels that have dredge frames ≥ 11 ft. Approximately 234 of the 314 vessels will be affected under this alternative. The majority of these 234 vessels operate under the DAS permit.

5.4.3.1 Individual Vessel

Under NPA 2, two costs are imposed. The total impact of these two costs may reduce a vessel's annual revenues on average around 4.4% (CV=30%) (Table 5.16). The CV also shows the variability among vessels in the DAS category. In general under NPA 2, 33 vessels may have their annual revenue reduced between 5% and 10% and 2 vessels may have reductions greater than 10% (Table 5.17). Of these 35 vessels, 11, 7, 6 and 5 vessels are registered to the state of Massachusetts, New Jersey, Virginia and North Carolina, respectively.

5.4.3.2 Industry

Annual industry revenues will be reduced by 3.9% (=$8.6M/$221.4M) under NPA 2 (Table 5.18). Industry revenues for the 314 vessels are $221.4 million dollars, and the total cost to the industry for this gear modification is $8.6 million dollars.

Table 5.16: Reduction in annual revenues per vessel with the coefficient of variation (in parentheses) under the NPA 2, by permit category (DAS or GEN) and frame width of dredge**.**

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

Table 5.17: Number of vessels under the NPA 2 where annual revenues are reduced by 5% or less, between 5-10%, and 10% or greater and total number of vessels by permit category.

Permit Category	Annual Revenue Reductions of			Total Number of Vessels
	5% or Less	Between 5-10%	10% or Greater	
DAS	244	33	0	277
GEN	35	0	2	37
Total	279	33	2	314

NA=not applicable

Table 5.18: Total industry cost and industry revenues of the affected scallop dredge vessels under the NPA 2, 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					840	840
10 to < 11				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			8,626.5			221,358

5.4.4 Social Impacts

The economic analysis demonstrates that the sea scallop dredge fishing community will be impacted by NPA 2. NPA 2 requires the same modification as the PA but only on vessels with dredge frame widths ≥ 11 ft. As the cost of the modification is relatively small, it is assumed that vessels will modify their dredges and continue to fish in the regulated waters. Dealers and processors may be impacted by a loss in catch passing through the land-based facilities and available for purchase. As this alternative impacts fewer vessels, it is expected that there will be less impact to the social environment than the PA. Under this alternative, vessels from Massachusetts, New Jersey, Virginia, and North Carolina may have annual revenue reductions greater than or equal to 5%. It is expected that these communities would experience the greatest social 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 sea turtle recovery, 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 the proposed action. Social benefits are realized from the application of management practices that demonstrate that fishing practices and sea turtles can co-exist.

5.5 Closure of Mid-Atlantic waters to scallop dredge fishing from May 1 through November 30 (NPA 3)

5.5.1 Physical Impacts

In considering the effects of the alternatives 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. Under this alternative, the frequency and geographic distribution of bottom tows in the Mid-Atlantic would be substantially decreased from May 1 through November 30 as scallop dredge vessels would not be fishing in this area.

At first, this seems to be a beneficial effect. However, in assessing the impact of a closure, not only must the impact to the closed area be considered, but also the impact to areas that remain open and the impact to the closed area when it is re-opened must be considered. Most dredge vessels participating in the scallop fishery do not have a lot of flexibility to shift to other fisheries. This, combined with the value of scallops, would likely result in a shift in fishing effort to areas open to scallop fishing, including Georges Bank, and an increase in effort in the Mid-Atlantic from December through April by vessels who do not want to or are unable to fish other resource areas.

It is difficult to quantify, and generalize, the impacts of a shift in fishing effort to the physical environments in the Northeast Region. The effects of scallop dredging and their significance vary by habitat type and under this alternative, effort would be shifted into a habitat with different physical characteristics than the Mid-Atlantic. The Gulf of Maine's bottom structure is a complex variety of sediments and topography including sand and gravel banks (gravel is defined to include gravel, pebbles, cobbles, and boulders), rocky outcrops, and patches of silt, sand, and clay. The sea bed sediments on Georges Bank vary widely from clay to gravel (NMFS 2001). Recovery times for impacts from scallop dredging to physical structure are expected to have a duration of months to years in this area. This is in contrast to sand environments in the Mid-Atlantic and elsewhere that have a duration of days to months. Recovery time for the physical environment on Georges Bank is expected to be longer than if the disturbance were to occur in the Mid-Atlantic. Disturbance of the seafloor in areas unregulated by this alternative would also increase. As boats relocate to Georges Bank, the frequency of tows in this area would increase. This would also affect the recovery of the area.

Under this alternative, the resulting spatial and temporal scale of the disturbance is unclear. Dredge effort in the Mid-Atlantic will be substantially reduced during the closure as scallop dredge vessels will not be fishing during this period. However, effort in the Mid-Atlantic from December through April is likely to increase as vessels unwilling or unable to fish other resource areas concentrate their fishing during the open period. This alternative would likely result in a shift in fishing effort to areas in which the impacts are greater and the recovery times are longer than those in the Mid-Atlantic Bight.

5.5.2 Biological Impacts

5.5.2.1 Fishery Resources

Historically, area closures have had a strong influence on sea scallop population dynamics. Since December 1994, approximately one-half of the productive scallop grounds on Georges Bank and Nantucket Shoals have been closed for most of the time. Scallop abundance and biomass have built up in these areas and currently over 80% of the sea scallop biomass in the U.S. portion of Georges Bank is in areas closed to fishing. Two areas in the Mid-Atlantic Bight were closed from 1998–2000 to allow small scallops in these areas to grow to a larger size before being harvested, and, in 2004, a rotation closure went into effect. Biomass and abundance indices for the Mid-Atlantic Bight showed notable increases after closure (NMFS 2004a). Although the closure would benefit the scallop resource in the Mid-Atlantic waters during the closure, there would likely be a negative impact on sea scallop resources in areas not regulated under this alternative. Most boats in the scallop fishery do not have much flexibility to switch fisheries. This, combined with the value of the scallop resource, would likely result in a shift in effort to the scallop resource areas farther north from May 1 through November 30 and may result in increased effort in the Mid-Atlantic from December through April. Although there would be beneficial impacts to the scallop resource in the Mid-Atlantic during the closure, the impact to the scallop resource across its entire range throughout the year can not be quantified. It is difficult to determine how much effort would increase on Georges Bank based on a closure in the mid-Atlantic, but if effort were to increase on Georges Bank, there could be an increase in the bycatch of groundfish in this area.

5.5.2.2 Endangered/Threatened Species and Critical Habitat

NPA 3 will impact loggerhead sea turtles. Green and Kemp's ridley sea turtles may also be impacted, however, NMFS expects interactions with these species to be rare given their distribution and the distribution of sea scallop dredge fishing effort. The information presented in section 5.1.2.2 identifies sea turtle interactions in the scallop dredge fishery and applies to this alternative as well. NPA 3 would close Mid-Atlantic waters to scallop dredge fishing from May 1 through November 30. Of the alternatives, this alternative would provide the greatest benefit to sea turtles as the scallop fleet would not overlap with sea turtles in the Mid-Atlantic. Under NPA 3, the scallop fleet would likely shift to New England waters. Loggerhead, Kemp's ridley, and green sea turtles undergo temperature dependent seasonal migrations along the Mid-Atlantic coast (Morreale and Standora 1998, Plotkin and Spotila 2002). In general, these turtles occur in waters off North Carolina year round, in the inshore waters (*i.e.,* bays, estuaries, and other coastal waters) of Virgina from May through November, and in New York's inshore waters from June until October (NMFS 1994). All three species are known to occur in Massachusetts waters as far north as Cape Cod, but with the exception of rare sightings and strandings, are not known to occur in more northern New England waters. During CeTAP surveys, loggerhead sea turtles, the most common sea turtle observed taken in the sea scallop dredge fishery, were rarely documented north of 41 ºN lat (Shoop and Kenney 1992). Although the broadest extent of the western Atlantic green sea turtle's range is from Massachusetts to Argentina, including the Gulf of Mexico and the Caribbean, they are considered rare north of Cape Hatteras (Wynne and

Schwartz 1999). In the western Atlantic, Kemp's ridley sea turtles are found year-round in the Gulf of Mexico and many juveniles migrate north along the east coast in the summer (Wynne and Schwartz 1999) where they inhabit inshore waters (Morreale and Standora 2005) where the scallop fleet does not operate.

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 in the 1999 and 2000 scallop fishing years. Despite this high level of observer coverage and operation of scallop dredge vessels in the area during June-October (NEFMC 2000b), no sea turtles were observed captured in scallop dredge gear. Historically, observer coverage in the Gulf of Main and Georges Bank has been low. 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). The NEFSC sea turtle bycatch estimate for the scallop dredge fishery in fishing year 2003 and 2005 assumed that no turtle takes occur in the scallop fishery operating in the Georges Bank and Gulf of Maine regions (Murray 2004a, 2005). Subsequent to the publication of this estimate and the proposed rule, a Kemp's ridley sea turtle was observed taken on southern Georges Bank in August 2005. This is the only documented observed interaction in sea scallop dredge gear for this area. While on Georges Bank, the area where the turtle was taken was south of 41° 9.0' N. lat. Based known sea turtle distribution, sea scallop dredge effort distribution, fairly high observer coverage in 1999 and 2000, and documented interactions between sea turtles and sea scallop dredge gear, NMFS expects that interactions between sea scallop dredge vessels operating in New England waters and sea turtles to be rare. This alternative is expected to provide the most protection to sea turtles.

Vessels that are unable or unwilling to fish these other resource areas may concentrate their effort in the Mid-Atlantic from December through April. During this period, sea turtles are not likely to overlap with sea scallop fishing effort in Mid-Atlantic waters, and an interaction would be unlikely. Whether effort is shifted temporally or spatially, this alternative would likely result in the scallop dredge fleet operating in areas and times that sea turtles are not known to be present; thus, minimizing the potential for an interaction between sea scallop dredges and sea turtles. This alternative would result in greater benefit to sea turtles than the PA as the Mid-Atlantic would be closed to sea scallop dredging during the period when sea turtles are known to be present.

The geographic area includes the GSC critical habitat area for right whales. The description of the GSC critical habitat under the PA applies to this alternative as well. This area was designated as critical habitat for right whales due to the area's importance as a spring/summer foraging ground for this species. There is no evidence to suggest that this alternative will have any adverse effects on the physical and biological features that make this area a foraging ground and critical habitat for right whales

5.5.2.3 Habitat

The effects of dredging on habitat are described under the PA, and this description applies to NPA 3 as well. NPA 3 would close the Mid-Atlantic waters to scallop fishing from May through November each year. 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). Most dredge vessels participating in the scallop fishery do not have a lot of flexibility to shift to other fisheries. As such, it is expected that under this alternative there will be a shift in fishing effort to scallop resource areas that are not regulated off New England, including Georges Bank, and there would likely be an increase in effort in the Mid-Atlantic from December through April by vessels who do not want to, or are unable to, fish these other areas. This concentration of effort in the winter and early spring would result in a decrease in the benefits to the seafloor community structure that would result from closing the Mid-Atlantic area in the late spring through fall. Although NPA 3 would likely have a beneficial impact on habitat during the closure period, there may be negative impacts during the months when this area is open to fishing

The effects of scallop dredging and their significance vary by habitat type. The Gulf of Maine's bottom structure is a complex variety of sediments and topography including sand and gravel banks (gravel is defined to include gravel, pebbles, cobbles, and boulders), rocky outcrops, and patches of silt, sand, and clay. The sea bed sediments on Georges Bank vary widely from clay to gravel (NMFS 2001). Gravel-sand sediments on Georges Bank have been noted as habitat for sea scallops. Recovery times for impacts from scallop dredging to biological structures in gravel environments are expected to last for several years, while impacts to physical structure and benthic prey are expected to have a duration of months to years. This is in contrast to sand environments in the Mid-Atlantic where the duration of impacts to biological structures is months to years and to physical structures is days to months. If there is a shift in effort to Georges Bank, the recovery times in this area are expected to be longer than the recovery times in the Mid-Atlantic under the PA. Under this alternative, the resulting spatial scale of the disturbance is unclear. Dredge effort in the Mid-Atlantic will be substantially reduced as scallop vessels would not be fishing in this area from May through November. However, scallop dredge effort would likely increase in New England waters from May through November and in Mid-Atlantic waters when these waters are not closed. The net impacts, and the magnitude of these impacts, to habitat under this alternative cannot be estimated at this time.

5.5.3 Economic Impacts

NPA 3 prohibits the use of all scallop dredge gear south of 41º 9.0 N lat. (Mid-Atlantic region) from May 1 through November 30. This alternative affects 314 vessels. NMFS chose to take the worst case scenario and assumes these vessels will choose to not fish in an alternative area, and therefore incur complete loss of revenue from the closed area from May 1 through November 30.

In theory, fishing vessels shift effort in both time and space to maximize profits. Such shifting could limit the revenue losses assumed in this analysis if vessels harvest scallops in the Mid-

Atlantic outside of the closed time period or on more northerly fishing grounds. However, there are limits to the movement in effort as a result of a number of factors including fishermen's knowledge of alternative areas, the ability of the vessels to travel further afield, and the ability of the stock to handle additional effort. In the absence of a complete bioeconomic model which includes the ability of vessels to move and the status of the stocks, a conservative approach assumes a complete loss of revenues from the closed area in the specified time period.

According to the 2003 VTR data, 208 of the 314 scallop dredge vessels considered in this analysis fish exclusively in the Mid-Atlantic region. The remaining 106 vessels fish in both regions, however, approximately 75% of their days absent were in the Mid-Atlantic. Under NPA 3, vessels could, in theory, shift their fishing effort to areas that are open to scallop dredge fishing. Vessels, especially the 106 that also fish outside the Mid-Atlantic, might consider shifting all their displaced effort to northern grounds. While this might decrease the economic impact of the closure on the industry as defined by the 314 vessels considered, it would shift some of the losses to the more northern scallop fishery.

Vessels in this fishery are allocated a combination of trip limits and a fixed number of DAS in closed and open areas, respectively; however, this allocation is based on the biomass of the stocks. The total allowed level of effort is not likely to increase, with an increase in vessels fishing within the area. Thus, if vessels shifted effort from the Mid-Atlantic to the area north of 41º 9.0 N, the available stock of scallops would be harvested by a larger number of vessels. This would reduce the average catch and revenue per vessel, including northern vessels unaffected by the proposed regulation. Therefore, vessels that fish exclusively in the north may now incur revenue losses due to an increase in the number of scallop vessels harvesting the same stock. To properly estimate the impact of fishing effort shifts on the scallop stock and the fishing industry as a result of a Mid-Atlantic closure, these types of interactions would be included in a behavioral bio-economic model.

Mid-Atlantic vessels would likely recover some of their lost revenues by fishing in northern grounds; however, how much they would recover is not known at this point. To more fully understand the impacts, the scallop stock biomass and current management would have to be included in an analysis of the economic impacts of a shift in effort. However, it seems reasonable that a substantial portion of the revenue generated by scallop dredge fishermen with the area and time proposed for closure would be lost due to biological, economic and/or regulatory limitations to vessel shifts in effort. A bio-economic model has not been developed at this time. Therefore, NMFS is taking a conservative approach and assuming that the vessels will not shift effort. By assuming all revenues generated by the area and time would be lost, NMFS is providing an estimate of the maximum potential impact of NPA 3.

5.5.3.1 Individual Vessel

With the assumption above, a vessel's annual revenue using scallop dredge gear, on average may be reduced between 31.8% (CV=82%) and 65.2% (CV=33%) under the NPA 3 (Table 5.19). Of the 314 vessels affected, 120, 64, 58 and 38 of these vessels are registered to the state of Massachusetts, New Jersey, Virginia and North Carolina, respectively.

5.5.3.2 Industry

Industry revenues would be reduced by 63.6% (=$140.9M/$221.4M) under the NPA 3 (Table 5.20). Industry revenues total $221.4 million dollars, and the total revenue losses to the industry are $140.9 million dollars.

Table 5.19: Reduction of annual revenues per vessel due to not fishing between May 1st and November 30th south of 41° 9.0 N lat., (coefficient of variation in parentheses) by permit category and frame width of dredge

Frame width of dredge	Reduction in Annual Revenues DAS	GEN
<10	-	58.5% (74%)
10 to <11	65.2% (33%)	31.8% (82%)
11 to <13	64.5% (30%)	64.9% (29%)
> 13	65.0% (29%)	-

Table 5.20: Total industry cost and industry revenues of the affected scallop dredge vessels under the NPA 3, by permit category and frame width of dredge

Frame width of dredge	Total Cost ($1000)			Industry Revenues ($1000)		
	DAS	GEN	Total	DAS	GEN	Total
< 10	-	338	338	-	840	840
10 to < 11	13,699	631	14,330	21,650	2,107	23,757
11 to < 13	45,371	500	45,871	71,534	807	72,341
> 13	80,399	-	80,399	124,420	-	124,420
Total			140,938			221,358

5.5.4 Social Impacts

The economic analysis demonstrates that NPA 3 would have the greatest impact on the sea scallop dredge fishing community. Under this alternative, vessels would be prohibited from fishing for sea scallops from May 1 through November 30 in the Mid-Atlantic. If vessels chose not to fish an alternative resource area, industry revenues will be reduced by 63.6%. This alternative would have the greatest impact of all the alternatives on scallop dealers and processors as there would be less catch passing through the land-based facilities and available for purchase.

If under this alternative, vessels choose to relocate to fishing grounds not affected by this regulation, gear conflicts may result. As the number of scallop vessels fishing on these grounds increases, the vessels would be competing with other scallop vessels that have historically fished these grounds as well as each other. Other gear conflicts might include the lobster fishery and, to a lesser extent, the groundfish fishery.

Social benefits may be realized if the time/area closure is effective at reducing the risk to sea turtles. If this reduced risk increases the potential for sea turtle recovery, 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 the proposed action. This alternative provides the greatest benefit to sea turtles at the highest cost to the industry.

Table 5.21: Summary of the direct and indirect impacts of the alternatives on ecosystem components

Physical Impacts	Fishery Resources Impacts	Protected Species (sea turtles)	Habitat	Economic and Social Environment
Preferred Alternative: Chain mats from May 1- Nov 30; 41º 9.0' N. lat. to EEZ				
No significant impact: impacts minimal and temporary, rapid recovery time of physical environment	**No significant impact:** average reduction of catch = 6.71%	**Some protection**: up to 749 interactions with gear, but some portion of serious injury/death is prevented	**No significant impact:** impacts minimal and temporary, rapid recovery time of habitat	**No significant impact**: 314 affected vessels; cost≤ $400/dredge; industry revenues reduced by 4.3%
No Action				
No impact	**No impact**	**Least protection**: up to 749 interactions with gear; 479 of these result in death or inability to reproduce	**No impact**	**No impact**
NPA 1: Chain mats from May 1 – Oct. 15, 41º 9.0' N. lat. to EEZ				
No significant impact: impacts minimal and temporary, rapid recovery time of physical environment	**No significant impact:** less reduction in catch than PA	**Some protection, less than PA**: up to 749 interactions with gear, but some portion of serious injury/death is prevented	**No significant impact:** impacts minimal and temporary, rapid recovery time of habitat	**Less impact than PA**: 314 affected vessels; cost≤ $400/dredge; industry revenues reduced by 3.7%
NPA 2: Chain mats on vessels ≥ 11 ft May 1 – Oct. 15, 41º 9.0' N. lat. to EEZ				
No significant impact: impacts minimal and temporary, rapid recovery time of physical environment	**No significant impact:**: less reduction in catch than PA	**Some protection, less than PA**: up to 749 interactions with gear, but some portion of serious injury/death is prevented	**No significant impact:** impacts minimal and temporary, rapid recovery time of habitat	**Less impact than PA**: 234 affected vessels ; cost≤ $400/dredge; industry revenues reduced by 3.9%
NPA 3: Close Mid-Atlantic to scallop dredging from May 1- Nov 30				
Net impacts unclear: Benefits to Mid-Atlantic may be offset by fishing in more vulnerable/complex bottom areas and more concentrated fishing during open season	**Benefit to scallop resource**: relief from fishing pressure during closure, but shift in effort may offset benefit	**Most protection**: interaction with scallop dredge gear unlikely	**Some benefit to EFH**: minimal and temporary impacts will be reduced, but may be offset by fishing in other areas and times	**Most impact**: 314 affected vessels, lose revenue (up to 63.6% reduction in industry revenues) or travel to fish in other areas

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 .

Under the PA, NMFS would issue a rule that would require all vessels with a Northeast Federal fisheries permit using Atlantic sea scallop dredge gear, regardless of dredge size or vessel permit category, to modify their dredge(s) when fishing 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). This analysis is limited to the geographical area potentially subjected to the requirements of this proposed regulation. In all instances, the analysis attempts to take into account both present and reasonably foreseeable future actions in the next 5 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 proposed measure 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 <u>Physical Environment</u>

As described in section 5.1.1, the PA will likely impact the physical environment of the Mid-Atlantic due to increased disturbance of bottom sediments from the chain mats. However, this impact is expected to be minimal and temporary because the sediment type in this area 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 this action is unlikely to substantially affect the physical environment of the Mid-Atlantic bight, 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 Collisions and Operations

There is the potential for adverse effects from vessels operating in the geographic area of the proposed action. 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 have resulted 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, 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. No direct adverse effects on listed species resulting from fishing vessel fuel spills have been documented. Fuel spills may impact bottom habitat and benthic resources, but it is unknown to what extent. No direct adverse effects on marine resources in the geographical area or on critical habitat from fuel spills have been documented.

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 Federal Fisheries

Several commercial fisheries in the area of the proposed action use gear that is known to capture, injure, and kill sea turtles. Federally regulated fisheries that use gillnet, longline, trawl, seine, dredge, and trap gear have been documented as unintentionally capturing or entangling sea turtles. Formal section 7 consultations have been conducted on the American lobster, 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 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. There have been 3 loggerheads reported entangled in lobster gear and 1 reported entanglement documented in the 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.

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.

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.

Several types of 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*. 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. Entanglements or entrapment of sea turtles have 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.

The *Federal monkfish 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. A new ITS was provided for the take of sea turtles in the fishery. Consultation was reinitiated on the FMP in March 2002 to consider the effects of Framework Adjustment 1, which proposed to defer the measure to reduce monkfish DAS to zero for 1 year. NMFS determined that as a result of the proposed measure, sea turtles face additional adverse affects that were not considered in the 2001 consultation. A new ITS was provided for the anticipated take of sea turtles in Year 4 of the monkfish fishery and RPMs were provided. In February 2003, consultation was reinitiated to consider the effects of Framework Adjustment 2, which proposed to eliminate the Year 5 default measures that would have ended the directed monkfish fishery and to replace this measure with Total Allowable Catch, trip limits, and increased incidental catch levels. A revised ITS and RPMs to address the anticipated take of sea turtles were provided.

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. 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 new restrictions for the use of large mesh gillnets in federal waters off North Carolina and Virginia (section 6.2.5).

Multiple gear types are used in the *Northeast multispecies fishery*. However, the gear type of greatest concern is the sink gillnet which 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. 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. 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.

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.

The *skate fishery* is primarily a bottom trawl fishery with 94.5% of skate landings attributed to this gear type. Gillnet gear is the next most common gear type, accounting for 3.5% of skate landings. 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 new 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.

Primary gears in the *spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. 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.

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* occurs in a relatively small area in the Mid-Atlantic Bight. The fishery is primarily a federal fishery with at least 99% of commercial landings for the states from Maine through Virginia caught in the EEZ. The fishery seems to be focused on particular canyons including Atlantis, Alvin, Block, Hudson, and Veatch Canyons. The fishery takes place year round, but is most intense from October through June. This fishery is primarily a bottom longline fishery. Given the limited seasonal overlap of sea turtles with tilefish fishery effort, interactions between loggerhead and leatherback sea turtles with tilefish gear are expected to be uncommon.

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. Observation 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. A new Reasonable and Prudent Alternative was provided. NMFS anticipates the take of 1,981 leatherback 1,869 loggerhead, and 105 Kemp's ridley, green, hawksbill, or olive ridley (in any combination) sea turtles from 2004-2006. The total estimated mortality with (without) reasonable and prudent alternatives is estimated at 548 (662) leatherback, 438 (468) loggerhead, and 25 (25) Kemp's ridley, green, hawksbill, or olive ridley (in any combination) sea turtles for this time period.

The *shrimp fishery* has been documented to incidentally take sea turtles. A number of gears including otter trawl, cast nets, haul seines, stationary butterfly nets, wing nets, skimmer nets, traps, and beam trawls are used to harvest shrimp. The otter trawl is the dominant gear used in offshore waters. Panaeid shrimp constitute the majority of the shrimp harvest occurring from coastal, near-shore, and estuarine waters off of North Carolina through southeast Florida. On December 2, 2002, NMFS completed a Biological Opinion for shrimp trawling in the southeastern United States under proposed revisions to the TED regulations (68 FR 8456, February 21, 2003). The Biological Opinion determined that the shrimp trawl fishery under the revised TED regulations would not jeopardize the continued existence of any sea turtle species. An ITS was issued for this fishery.

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.

6.2.2.2 Non-Federally Regulated Fisheries

There is limited information on non-federally regulated fisheries occurring in the area of the proposed action. Non-federally regulated trap/pot, gilllnet, and trawl fisheries are known to occur in the area of the proposed action. 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 determined.

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 (both lethal and non-lethal) of loggerhead, leatherback, green, and Kemp's ridley sea turtles have been reported (W. Teas pers. comm.; J. Braun-McNeill pers. comm). The North Carolina inshore fall southern flounder gillnet fishery was identified as a source of large numbers of sea turtle mortalities, especially loggerheads, in 1999 and 2000. In 2001, NMFS issued an ESA section 10 permit to North Carolina with mitigative measures for this fishery. Subsequently, the sea turtle mortalities were drastically reduced.

The *black drum and sandbar shark fisheries*, 10-14 inch mesh gillnet fisheries, operate in Virginia state waters as does a small mesh gillnet fishery. 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 (J. Braun-McNeill, pers. comm.). No lethal takes have been reported (NMFS SEFSC 2001).

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 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. 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 occurring in waters within the action area 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.

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 anticipates the take of up to 505 (non-lethal) loggerhead, 101 (non-lethal) Kemp's ridley, and 1 (non-lethal) green sea turtle in the pound portion of the gear annually; the take of no more than 1 (lethal or non-lethal) loggerhead, 1 (lethal or non-lethal) Kemp's ridley, 1 (lethal or non-lethal) green, or 1 (lethal or non-lethal) leatherback sea turtle in the leader portion of the pound net from July 16 through May 5 each year; and the take of no more than 1 (lethal or non-lethal) loggerhead, 1 (lethal or non-lethal) Kemp's ridley, 1 (lethal or non-lethal) green, or 1 (lethal or non-lethal) leatherback sea turtle in pound net leaders with less than 12 inch stretched mesh from May 6 to July 15 each year.

Incidental captures of loggerhead sea turtles in fish traps set in Massachusetts, Rhode Island, New York, and Florida have been reported (W. Teas pers. comm.). 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.

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. 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 Virginia dredge operations, 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 loggerhead, 1 green, 1 Kemp's ridley, or 1 leatherback sea turtle for the 10 year duration of the permit. 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. Concluded in December 2003, NMFS anticipated the take of 4 loggerheads and 1 Kemp's ridley or green sea turtle during each cycle. 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 is anticipated to be taken during relocation trawling.

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 loggerhead, 4 Kemp's ridley, 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.

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

6.2.4 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.

6.2.5 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.

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. Federal waters north of Chincoteague, VA are not affected by these new restrictions although NMFS is looking at additional information to determine whether expansion of the restrictions are necessary to protect sea turtles as they move into northern Mid-Atlantic and New England waters. These measures are in addition to 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 72E 30'W longitude) from February 15-March 15, annually.

In May 2004, NMFS issued new regulations prohibiting the use of all pound net leaders, set with the inland end of the leader greater than 10 horizontal ft (3 m) from the mean low water line, from May 6 to July 15 each year in the Virginia waters of the mainstem Chesapeake Bay, south of 37º 19.0' N. lat. and west of 76º 13.0' W. long., and all waters south of 37º 13.0' N. lat. to the Chesapeake Bay Bridge Tunnel at the mouth of the Chesapeake Bay, and the James and York Rivers downstream of the first bridge in each tributary. 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, will apply from May 6 to July 15 each year. The regulation also provides an exception to the prohibition on incidental take of threatened sea turtles for those who comply with the rule (69 FR 24997, May 5, 2004).

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, Jul. 6, 2004).

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. In addition, 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.

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.

6.2.6 Anticipated 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 being fished on the bottom or during haul back. 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 others 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.

First, the researchers from the Virginia Institute of Marine Science performing field tests of chain mats used video to examine the behavior of sea turtles in association with sea scallop dredges. During the 2003-2004 field trials of the chain-mat modified dredge, one trip was designated as a research camera cruise where underwater video was made of the modified dredge during normal fishing operations (DuPaul *et al*. 2004a). No sea turtles were documented by video on this trip.

Second, in 2004 and 2005, the NEFSC worked with researchers and commercial fishermen to conduct approximately 80 hours of videotaping 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, the researchers were successful in developing video techniques and tools to document the behavior of sea turtles. No sea turtles were recorded during the 3-day trip (Smolowitz *et al.* 2005). In 2005, approximately 73 hours of video were collected over two trips, one in August and one in September. This video has been reviewed and no sea turtles were documented. Further video work may be conducted under the Sea Scallop Research Set Aside Program.

Third, in 2005, NMFS worked with industry to test a dredge with a modified cutting bar and bail designed to minimize the severity of impacts to turtles that may be encountered on the bottom. A standard New Bedford style dredge was used as a control, and both dredges were equipped with the chain mat configuration, although the purpose of the project was not to test the chain mat modification. The project used turtle carcasses and model turtles to simulate a worse case scenario of a dredge overtaking a sea turtle lying on the bottom. During the 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. During this tow, the model turtle was deflected over the bail of the modified dredge, indicating that this type of modification might be effective at reducing the severity of 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. The video 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 bar of the dredge. However, this follows the turtle being struck by the leading edge of the dredge during which it is likely to have already sustained serious injuries.

6.2.7 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 number of scallop dredge and sea turtle interactions. The cost of implementing this one time fixed gear modification may reduce industry revenues by 4.3% (Table 5.12). 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 crew members 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.

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. In addition, any impacts to the social environment would be localized. As this action is unlikely to substantially affect the social environment, significant cumulative 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

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

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 in the area. 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. 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, that 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 a 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 be reduced. In addition, the cost of modifying 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 and will have a very minor negative impact on human community.

Table 6.1: Summary of the cumulative impacts of the alternatives on ecosystem components

Physical Impacts	Fishery Resources Impacts	Protected Species (sea turtles)*	Habitat	Economic and Social Environment**
Preferred Alternative: Chain mats from May 1- Nov 30; 41º 9.0' N. lat. to EEZ				
Neutral: physical impacts from alternatives are not expected to be significant	**Neutral:** impacts to fisheries resources from alternatives are not expected to be significant	**Beneficial** PA	**Neutral:** habitat impacts from alternatives are not expected to be significant	**Adverse**: PA,
No Action				
Neutral	**Neutral**	**Adverse** Least protection to sea turtles	**Neutral**	**Neutral**
NPA 1: Chain mats from May 1- Oct 15; 41º 9.0' N. lat. to EEZ				
Neutral: physical impacts from alternatives are not expected to be significant	**Neutral:** impacts to fisheries resources from alternatives are not expected to be significant	**Beneficial** NPA 1 - less protection than PA	**Neutral:** habitat impacts from alternatives are not expected to be significant	**Adverse**: NPA 1 - less impact than PA
NPA 2: Chain mats on vessels ≥ 11 ft from May 1- Nov 30; 41º 9.0' N. lat. to EEZ				
Neutral: physical impacts from alternatives are not expected to be significant	**Neutral:** impacts to fisheries resources from alternatives are not expected to be significant	**Beneficial** NPA 2 - less protection than PA	**Neutral:** habitat impacts from alternatives are not expected to be significant	**Adverse**: NPA 2 - less impact than PA
NPA 3: Close Mid-Atlantic to scallop dredging from May 1- Nov 30				
Unclear: Benefits to Mid-Atlantic from NPA 3, be offset by fishing in more vulnerable/complex bottom areas and more concentrated fishing during open season.	**Unclear**: relief from fishing pressure during closure, but shift in effort may offset benefit	**Beneficial** NPA 3 - most protection to sea turtles,	**Unclear**: minimal and temporary impacts reduced, but may be offset but fishing in other areas and times	**Adverse**: NPA 3 - highest cost, loss of revenue or travel to other areas to fish

*Cumulative impacts from the following actions continue to provide benefits to sea turtles, although these benefits cannot be quantified at this time: conservation measures, STSSN, on-going sea scallop dredge gear research, seas turtle research. Cumulative impacts from the following actions continue to adversely affect sea turtles, although the impacts cannot be quantified at this time: fishery, vessel collision, and dredging takes, marine pollution, impaired water quality

** Cumulative impacts from the following actions continue to provide benefits to the economic and social environment, although these benefits cannot be quantified at this time: dredging and vessel operations, fisheries, conservation measures. Cumulative impacts from the following actions continue to adversely affect the human environment, although the impacts cannot be quantified at this time:. conservation measures, marine pollution.

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 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. 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. However, based on other information, NMFS has already reinitiated section 7 consultation on the Scallop FMP. The determination was made on November 1, 2005 because observer coverage of the Atlantic sea scallop fishery in the 2005 fishing year and a review of past observer records has revealed new information on the fishery in relation to its effects on ESA-listed sea turtles. This information includes the take of 5 loggerhead sea turtles in the sea scallop trawl fishery, the take of a Kemp's ridley on southern Georges Bank, and confirmation from the NEFSC that a turtle observed taken in scallop dredge gear in 1997 should be considered a green sea turtle. NMFS concluded on January 26, 2006 that allowing the Atlantic sea scallop fishery to continue under the FMP will not violate §7(a) of §7(d) of the ESA. This rule does not change the basis of that finding.

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 proposed action to require chain mats in scallop dredges in the Mid-Atlantic 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. On January 11, 2005, NMFS conducted an analysis of the impacts on EFH pursuant to 50 CFR 600.920(h). NMFS determined that adverse impacts from proposed action will not be substantial and that adverse impacts to EFH have been minimized to the maximum extent practicable.

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 biological, social, and economic impacts of the alternatives considered as required under the National Environmental Policy Act and Regulatory Flexibility Act for the preparation of a draft environmental impact statement/regulatory impact review. NMFS complied with all relevant statutory and regulatory requirements as well as NOAA 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 Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. Letters documenting NMFS' determination, along with the draft environmental assessment and proposed rule, were sent to the coastal zone management program offices of these states on May 24, 2005. Responses were received from six offices - New Jersey, Connecticut, North Carolina, Rhode Island, Virginia, and Delaware. These offices found the proposed regulation to be consistent, to the maximum extent practicable, with the coastal zone management program. A list of the 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 a 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 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 the status quo. 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 which decrease businesses revenues or increase their costs are likely to reduce producer surplus. When comparing a regulatory action to the status quo or “no action” alternative, it is the change in net National benefit that becomes the focal point of analysis. This analysis focuses primarily on the quantifying the changes in revenues and costs that would impact producer surplus, while changes in consumer surplus are qualitatively evaluated based on the ranking of protection to sea turtles provided by the alternatives.

Four alternatives are evaluated in this document, in addition to the “no action” alternative. The intent of all alternatives is to reduce the number of sea turtles captured in sea scallop dredge gear.

As noted in sections 3.1 to 3.5, the following alternatives are evaluated in this document:

- The preferred alternative (PA) requires gear modifications of vessels fishing scallop dredge gear south of 41º 9.0' N. lat. from May 1 through November 30
- Non-preferred alternative 1 (NPA 1) is the same as the PA, except the gear modifications are only required from May 1 through October 15
- Non-preferred alternative 2 (NPA 2) is the same as the PA, except the gear modification is only required for vessels that have dredge frames greater than 11 ft wide
- Non-preferred alternative 3 (NPA 3) prohibits the use of all scallop dredge gear south of 41º 9.0' N. lat. from May 1 through November 30
- No-action (*i.e.*, status quo).

The magnitude of sea turtle protection provided by the alternatives can be ranked relative to each other. The third non-preferred alternative (NPA 3) would provide the most protection to sea turtles since scallop dredge gear would be completely removed from the area where sea turtle interactions have been documented. The PA would rank second with respect to sea turtle protection since the gear modification is required of all vessels from May 1 through November 30. It is difficult to determine whether NPA 1 or NPA 2 provides the next best level of sea turtle protection. NMFS observer data show turtles have been taken as bycatch during the month of October, although there is always the potential that takes could occur in the adjacent month November in the scallop dredge fishery (Murray 2004a). Therefore under NPA 1, there is a chance turtles may be caught between October 15 and November 30. Under NPA 2, vessels with dredges less than 11 feet would be exempt from the proposed gear modification. However, these vessels have not been well sampled by observers. Specifically, less than 1% of fishing effort of vessels with dredges less than 11 ft was observed. With a lack of conclusive scientific data, we assume NPA 1 and NPA 2 provide the same level of sea turtle protection. As described in section 5.0, these alternatives are expected to result in fewer serious interactions than the status quo and, therefore, will provide more protection to sea turtles than the status quo. In summary, NPA 3 provides the most protection for sea turtles followed by the PA, followed by both NPA 1 and NPA 2, and lastly the status quo.

Producer surplus for the scallop dredge fishery will be affected by the proposed sea turtle protection measures. Under the PA, NPA1 and NPA2 harvesters will incur additional costs to modify their gear. As well, 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 will be minimized by selecting the least costly regulatory alternative which provides a level of protection consistent with the purpose and need of this action.[9] The preferred alternative is expected to benefit sea turtles at relatively low cost.

7.9.1.2 Industry Impacts

In 2003, industry revenues were $221.4M for the scallop dredge fishery operating south of 41° 9.0' N. lat. Under the PA, 314 vessels are affected, and industry revenues are reduced by 4.3% (=$9.6M/$221.4M) (Table 5.12). Under the NPA 1 and NPA 3, all 314 vessels are also affected, and industry revenues are reduced by 3.7% (=$8.1M/$221.4M), and 63.6% (=$140.9M/$221.4M), respectively. Under NPA 2, 234 vessels are affected and industry revenues are reduced by 3.9% (=$8.6/$221.4M).

Alternatives can now be ranked by forgone industry revenues and turtle protection. Ranking does not inform us about the marginal change in protection between alternatives. That is, how much more protection do we gain when we move between alternatives. Ideally, we want to choose the alternative that provides the most protection for the least cost to the scallop dredge fishery. Since we cannot estimate marginal increases in protection, we then choose the alternative that minimizes industry costs and provides a level of protection consistent with the purpose and needs of this action. As stated earlier, NPA 3 provides the most protection for sea turtles, the PA ranks second in protection, and lastly both NPA 1 and NPA 2 rank third in protection (Table 7.1). In terms of industry cost, NPA 3 has the highest cost followed by the PA, NPA 1 and NPA 2.[10]

In summary, NPA 3 provides the most protection for sea turtles at the highest cost to the industry (Table 7.1). The PA ranks second in sea turtle protection and industry cost. In fact, the PA does

[9] We choose to minimize cost subject to a level of protection consistent with the purpose and need of this action versus maximizing protection subject to cost, because we can not measure marginal changes in protection between alternatives.
[10] The differential in the industry cost between the PA, NPA 1 and NPA 2, is so small that they could be assumed equal.

satisfy the objective of minimizing cost for a level of protection consistent with the purpose and needs of this action at the individual and industry level.

Table 7.1: Proposed management actions in scallop dredge fishery, ratio of the number of vessels affected by the alternative to the total affected number of vessels, and total industry revenue reductions (%), with industry revenue reductions (total cost) and sea turtle protection ranked [high to low] by alternative.

Alt	Management actions	Total Industry		Rank [High to Low]	
		No. Vessels Affected	Revenue Reduction (%)	Industry Cost	Sea Turtle Protection
PA	All Dredges Modified May 1 – Nov 30$^{th;}$ south of 41º 9.0' N lat., from the shoreline to outer boundary of the EEZ	314/314	4.3%	2	2
NPA 1	All Dredges Modified May 1 – Oct. 15$^{th;}$ south of 41º 9.0' N lat., from the shoreline to outer boundary of the EEZ	314/314	3.7%	4	3
NPA 2	Dredge > 11 ft. modified May 1 – Nov 30$^{th;}$ south of 41º 9.0' N lat., from the shoreline to outer boundary of the EEZ^{h}	234/314	3.9%	3	3
NPA 3	Prohibit dredge south of 410 9.0N lat.; south of 41º 9.0' N lat., from the shoreline to outer boundary of the EEZ	314/314	63.6%	1	1

7.9.1.3 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.

Statement of the objectives of, and legal basis for, the proposed rule: The specific objective of the action is to prevent injuries or mortalities of sea turtles captured in scallop dredge gear fishing south of latitude 41º 9.0' N lat., from the shoreline to the outer boundary of the EEZ from May 1 through November 30. Section 4(d) of the Endangered Species Act provides the legal basis for this rule.

Summary of the significant issues raised by the public comments in response to the IRFA: During the public comment period on the proposed rule, NMFS received one comment on the economic analysis for NPA 3. The commenter stated that the economic analysis for this alternative was grossly irrational, that it did not take into account an effort shift, and that it did not discuss or attempt to quantify the economic cost, if any to the industry of this effort shift. Under NPA 3, NMFS assumed the worst case scenario. The conservative approach is to overestimate, rather than underestimate, the total industry loss due to a regulation. That is, NMFS assumed that vessels would not shift their effort to other areas, but would stop fishing in the case of a closure. Of the 314 scallop dredge vessels considered in the analysis, 208 vessels fished exclusively in the mid-Atlantic and 106 vessels fished in both regions. In addition, these 106 vessels fished approximately 75% of their days absent in the Mid-Atlantic.

NMFS recognizes that some portion of these vessels would shift their effort further north under NPA 3, but an economic behavioral model to estimate the potential shifts in effort has not been developed. For more details see section 5.5.3. No changes in the rule were made as a result of this comment.

Description and estimate of the number of small entities to which the proposed rule will apply: According to the 2003 VTR data, there are 314 vessels fishing scallop dredge gear that will be affected by this rule. 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 all 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 5.1.3 (PA), 5.2.3 (No Action), 5.3.3 (NPA 1), 5.4.3 (NPA 2), 5.5.3 (NPA 3) and 7.9.1.2. 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. All 314 scallop dredge vessels are considered small entities since individually they all earn annual revenues less than $3.5M.

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. We estimate 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 5.11). 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 5.2). Therefore, 28% (=121/439) of the entire fleet permitted or 39% (=121/314) of the affected vessels can expect revenue reductions greater than 5%.

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: Four alternatives are evaluated here, in addition to the "no action" alternative (see the proceeding section 7.9 for a detailed list). In general, the alternatives either require a gear modification to the scallop dredge or a prohibition of fishing south of 41º 9.0' N lat.

In the case where scallop dredges must be modified, three potential behavioral responses exist. The vessel can choose not to fish in the prohibited area (and not fish at all), modify the gear (and continue fishing in the area), or fish elsewhere. Under the PA, the proposed gear modification is fairly inexpensive (between $177.37 and $778.44 per vessel (Table 5.9)). Therefore, our analysis assumes a vessel will convert their gear and continue fishing in the area.

This analysis assumes a 6.76% reduction in scallop catch as reported in the draft report on the field trials of the proposed gear modification[11]. Here we assume the vessels will not increase their fishing effort to offset this loss in catch, but they will incur this revenue loss, the worst case scenario. A 6.76% loss in scallop catch translates into a reduction in annual revenues between $1,300 (CV=182%) and $38,700 (CV=38%) per vessel (Table 5.9).[12] We assume the vessel would minimize his or her loss by modifying the gear and continuing to fish with a decrease in scallop catch, versus choosing to not fish at all.

In the case of the scallop dredge being prohibited in areas south of 41º 9.0' N lat., we assume the vessel will not fish elsewhere and therefore incur the revenue loss from May 1 through November 30. Again we assume the worst case scenario.

In summary, we can expect a reduction in annual revenues per vessel to range between a low of 3.0%-7.8% (PA, NPA 1 and NPA 2) and a high of 31.8%-65.2% (under NPA 3) (Table 7.2). NPA 3 has the greatest economic impact and all 314 affected vessels can expect revenue reductions greater than 5%. The PA has the next lower economic impact (121 vessels), followed by NPA 1 (54 vessels), and NPA 2 lowest economic impact (35 vessels). The PA, NPA 1 and NPA 2 could be considered to have similar economic impacts since the differential is so small.

Ideally, we want to choose the alternative that provides the most protection for the least cost to the scallop dredge industry. Since we cannot estimate marginal increases in protection, we then choose the alternative that minimizes industry costs and provides a level of protection consistent with the purpose and needs of this action.

As stated earlier, NPA 3 provides the most protection for sea turtles, the PA ranks second and lastly both NPA 1 and NPA 2 rank third in protection (Table 7.1). In terms of industry cost, NPA 3 has the highest cost followed by the PA, NPA 1 and NPA 2.[13] NPA 3 provides the most protection for sea turtles at the highest cost to the industry (Table 7.1). The PA ranks second in sea turtle protection and industry cost. In fact, the PA does satisfy the objective of minimizing cost for a level of protection consistent with the purpose and needs of this action at the individual and industry level.

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[11] The final report estimated a 6.71% reduction in the scallop catch with the implementation of the gear modification.

[12] 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.

[13] The differential in the industry cost between the PA, NPA 1 and NPA 2, is so small that they could be assumed equal.

Table 7.2: The ratio of the number of vessels affected by the alternative to total number of affected vessels, the range of annual revenue reductions per vessel and the number of vessels where annual revenues are reduced by more than 5%, by alternative.

Alternative	Ratio of No. Harvesters	Average Revenue Reductions	Number of vessels with annual revenue reductions >5%
PA	314/314	3.0% to 7.8%	121
NPA 1	314/314	3.0% to 7.6%	54
NPA 2	234/314	4.4% to 4.5%	35
NPA 3	314/314	31.8% to 65.2%	314

NMFS selected the preferred alternative in the final rule (required the use of chain mats on all sea scallop dredges in the Mid-Atlantic from May through November 30) because this alternative would provide, with the exception of NPA 3, the most protection to sea turtles. At this time, NMFS does not have sufficient information to further refine NPA 3 to limit the extent of the closure and rejected NPA 3, in part, because of the uncertainty regarding the extent of the area in which interactions between sea turtles and sea scallop dredge gear are occurring. NMFS rejected NPA1 (required the use of chain mats on all sea scallop dredges in the Mid-Atlantic from May 1 through October 15) because this alternative would leave sea turtles vulnerable to capture in the dredge bag from October 15 through November 30, a period when sea turtle distribution and sea scallop fishing overlap in the southern part of the fishery. NMFS rejected NPA 2 (required the use of chain mats on all large sea scallop dredges in the Mid-Atlantic from May through November 30) 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. NMFS rejected NPA 3 (prohibit sea scallop dredge fishing south of 41º 9.0' N. lat. from May 1 through November 30) 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.

7.10 National Environmental Policy Act

7.10.1 Finding of No Significant Impact

Under the preferred alternative, NMFS would issue a rule that would require all vessels using Atlantic sea scallop dredge gear, regardless of dredge size or vessel permit category, to modify their dredge(s) when fishing 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. All Mid-Atlantic sea scallop dredges used for fishing must be modified with evenly spaced “tickler” chains and “vertical” (up-and-down) chains in the following configuration, which are dependent on the size of the dredge frame width:

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

If a vessel elects to use a different configuration, the length of each side of the squares formed by the chain must be less than or equal to 14 inches. The purpose of this rule is to conserve loggerhead sea turtles listed as threatened under the Endangered Species Act of 1973, as amended, by protecting them from capture in sea scallop dredge bag. This rule will also benefit endangered sea turtles by protecting them from capture in the dredge bag.

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: Vessels are expected to continue to modify their gear and continue to fish in the same areas at the same times. This modification does not result in a substantial reduction in capture of the target species and the weight of the modified dredge is not considerably different than that of the unmodified dredge. The use of the modified dredge is not expected to substantially affect the scallop resource in the geographic area of the action. 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 preferred alternative 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 addition of a chain mat hanging 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 rule 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 preferred alternative 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 implementation of these modifications. 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 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 for this action is to offer additional protection to endangered and threatened sea turtles. 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 and green sea turtles. However, interactions between sea scallop dredge gear and these species are expected to be rare given the distribution of these turtles and the distribution of the fishery. The best available information shows that the use of the chain mat will prevent hard-shelled 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 smaller than the opening in the chain mat may interact with the gear and that this interaction may result in the capture of the sea turtle in the bag. As described below, NMFS expects this to be a rare occurrence. 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.

As described in the Purpose and Need and Section 5.0, NMFS concluded in the December 2004 Biological Opinion that the continued operation of the sea scallop dredge fishery may adversely affect but is not likely to jeopardize the continued existence of loggerhead sea turtles. NMFS anticipates that up to 749 sea turtles will be taken each year without the chain mat configuration in place, and up to 479 of these (approximately

64%) are expected to sustain injuries leading to death or failure to reproduce. 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 this 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.

NMFS will continue to use observer information, fishing effort data, and other data, as available, to monitor 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 in the mid-Atlantic and the possible effects that changes in effort may have on sea turtles. In 2004, NMFS conducted video research to document the nature of the interaction between sea turtles and sea scallop dredge gear, but no interaction was recorded. An additional 73 hours of video work conducted in 2005 was reviewed, and no sea turtles were documented. Further video work may be conducted under the Sea Scallop Research Set Aside program. NMFS is also investigating 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. Section 6.0 contains 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 preferred alternative, 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 EA, 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 affected environment is described in section 4.0 and the environmental consequences are discussed in section 5.0.

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 preferred alternative is not expected to have a substantial impact on biodiversity and/or ecosystem function within the action area. Benthic disturbance from the preferred alternative 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. 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, if not all, 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. 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 gear modification 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 41º 9.0' N. lat from the shoreline to the outer boundary of the EEZ. The fishing industry, as described in this EA/RIR, support this action as demonstrated by petitioning NMFS to implement this gear modification (albeit over a shorter time period each year). 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 rule 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 will result in substantial 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 preferred alternative 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 and is being reviewed. Approximately 80 hours of video were collected and reviewed, and no sea turtles were documented. Further video work may be conducted under the Sea Scallop Research Set Aside Program. While there is not perfect information available on the nature of the interaction between scallop dredge gear and sea turtles, NMFS has made logical, reasonable assumptions in evaluating the risks and benefits of the preferred alternative (Section 5.0). There is information showing that the use of the chain mat will prevent most, if not all, 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 gear modification. 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 under the Sea Scallop Research Set Aside Program, 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 gear modification 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 this modification 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 gear modifications in the Mid-Atlantic scallop dredge fishery is likely to result in violation of a federal, state, or local law for environmental protection. In fact, 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, in the mid-Atlantic 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 of 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 effect 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 Mid-Atlantic Sea Scallop Dredge Fishery", it is hereby determined that the implementation of the gear modification, as described in section 3.1 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.

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William T. Hogarth Date
Assistant Administrator for Fisheries
National Oceanic and Atmospheric Administration

8.0 CONTACT INFORMATION

Prepared by:

Ellen Keane
Protected Resources Division
NMFS Northeast Region
One Blackburn Drive
Gloucester, MA 01930
(978)-281-9328

Kathryn Bisack
Protected Species Branch
NMFS NEFSC
166 Water Street
Woods Hole, MA 02543

Individuals and/or agencies consulted:

A number of individuals at NMFS' Northeast Fisheries Science Center were consulted including:

Heather Haas, Protected Species Branch
Kimberly Murray, Protected Species Branch
Henry Milliken, Protected Species Branch
Dvora Hart, Population Dynamics Branch

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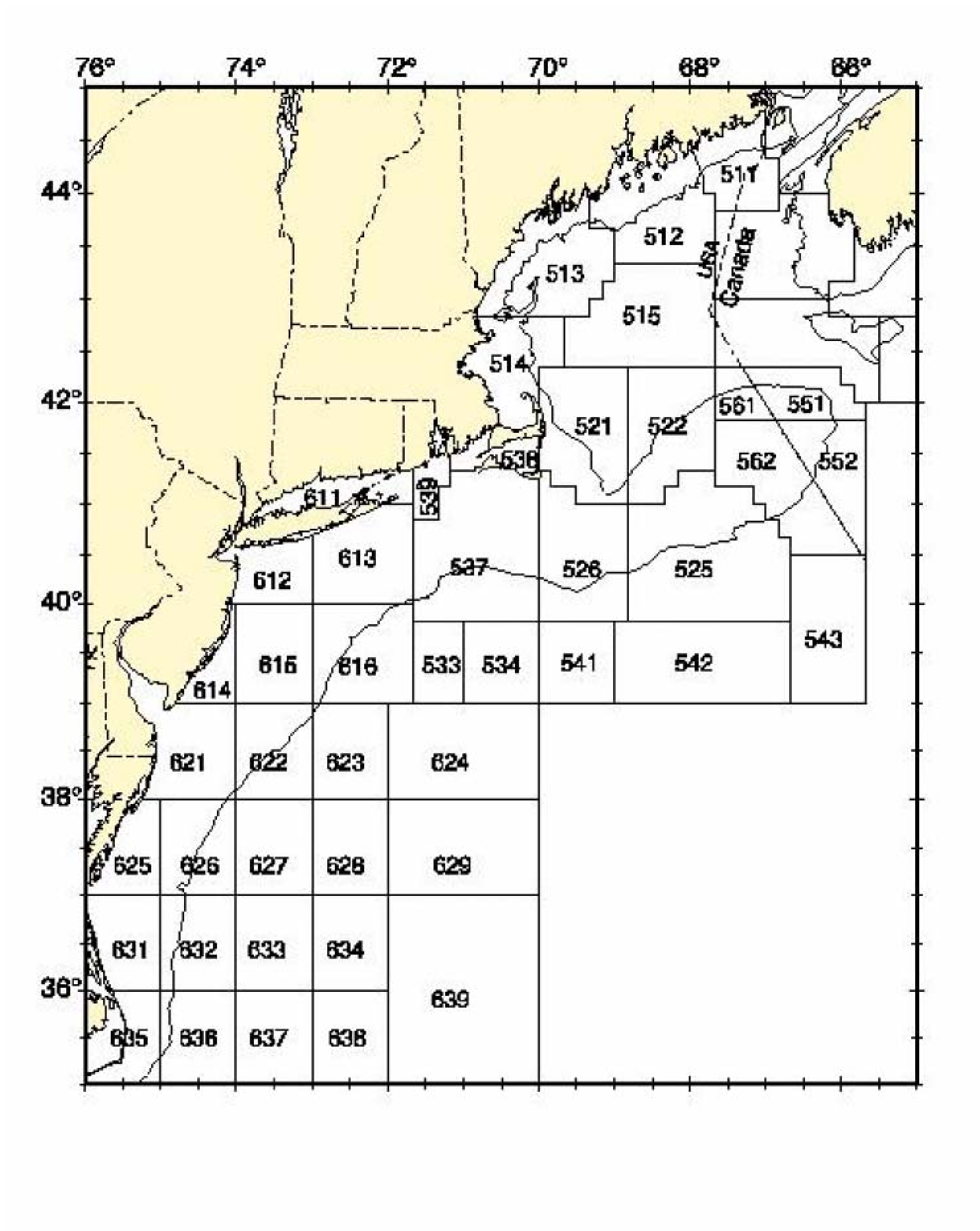
APPENDIX A:

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 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, the Exempted Fishery Permits for horseshoe crab and Jonah crab, and hopper dredging projects of the ACOE and USN operating off of Virginia. Takes are anticipated annual take unless otherwise noted.

Fishery	**Sea Turtle Species**		
	Loggerhead	**Leatherback**	**Kemp's Ridley**
Atlantic Sea Scallop	Dredge: 749 - no more than 479 lethal Trawl: 3 lethal or non-lethal	Trawl: 1 lethal or non-lethal	None
Bluefish	6-no more than 3 lethal	None	6 lethal or non-lethal
Herring	6-no more than 3 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	4 lethal or non-lethal	None
Mackerel/Squid/Butterfish	6-no more than 3 lethal	1 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
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
Summer Flounder/Scup/Black Sea Bass	19-no more than 5 lethal (total - either loggerheads or Kemp's ridley)	None	see loggerhead entry
Shrimp[1]	163,160 (3,948 lethal)	3,090 (80 lethal)	155,503 (4,208 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
Horseshoe Crab EFP	43 - non-lethal only	1 (either leatherback, green or Kemp's ridley) - non-lethal only	
Jonah Crab EFP	None	6 lethal or non-lethal over a 3-year period	None
(ACOE) Sandbridge Protection Project	5	None	1 Kemp's ridley or green
(USN) Dam Neck Nourishment Project	4 per dredge cycle	None	1 Kemp's ridley or green per dredge

[1]Hawksbill mortalities in the shrimp fishery were anticipated at up to 640 annually. However, actual mortalities are expected to be much lower than this number. The number represents the estimated total of mortalities of hawksbill turtles from all sources in areas where shrimp fishing occurs. No estimate of the total number of interactions is available.