Draft 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
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
HMS	Highly Migratory Species
ITS	Incidental Take Statement
lat.	latitude
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
POTs	Pots, lobster, hagfish, whelk, monkfish
PUR	Purse Seine
RIR	Regulatory Impact Review
SEFSC	Southeast Fisheries Science Center

SPDT	Scallop Plan Development Team
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 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. 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 31, 2004, a total of 62 takes was attributed to 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 9 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 between 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 2004). 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 the take of sea turtles in the sea scallop dredge fishery.

2.0 PURPOSE AND NEED FOR ACTION

The proposed 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. lat. 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

[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.

proposed action is to conserve sea turtles by reducing sea turtle bycatch in the mid-Atlantic sea scallop dredge fishery through the issuance of regulations that would require gear modifications for dredges used in the Atlantic sea scallop fishery in waters south of 41º 9.0' N. latitude (lat.). This document will analyze the environmental impacts that would result from the issuance of such regulations.

This action is needed to reduce sea turtle take, including mortality, as a result of capture in sea scallop dredge gear. Due to sea turtle distribution, as well as 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 loggerhead sea turtles. 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 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, threatened sea turtles continue to be subject to capture in the mid-Atlantic, leading to potential mortality.

2.1 Background

2.1.1 Sea Scallop Fishery

This EA considers the proposed action within the context of the fishery as a whole. The sea scallop fishery has been previously described in various documents (SPDT 2000, NEFMC 2003, NMFS 2004c), and the following will serve as a brief summary. The scallop fishery is one of the most valuable U.S. fisheries (NMFS 2003a). U.S. landings during 2003 exceeded 25,000 metric tons (mt) of meats; a new record. 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 2004c).

In general, sea scallops are found in the Northwest Atlantic Ocean from North Carolina to Newfoundland along the continental shelf, typically on sand and gravel bottoms (Packer *et al.* 1999). 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 (<40m) near-shore (NMFS 2004c). 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 2004c). The scallop fishery over Georges Bank and in the Mid-Atlantic is a deeper water fishery in comparison to the Gulf of Maine. Concentrations of scallops occur within a narrow depth band in the Mid-Atlantic from about the 40 meter isobath to the 200 meter isobath, throughout the Hudson Canyon Access Area, around the perimeter of Georges Bank, including the Great South Channel (NEFMC 2001). Therefore, it is not surprising that

[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.

most scallops are harvested at depths between 30 and 100 meters in the Georges Bank and the Mid-Atlantic areas (NMFS 2004c). Each of these areas is 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 2004c). However, it has been the Mid-Atlantic that has seen the largest growth in scallop landings. This areas has been experiencing an upward trend in both recruitment and landings since the mid-1980s (NMFS 2004c). Landings during each of the last 4 years (2000-2003) set new records for the Mid-Atlantic region with landings of over 19,000 mt in 2003 (NMFS 2004c).

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 (NMFS Preliminary Fisheries Statistics). 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).

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 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[2] for the 2003 scallop fishing year (P. Christopher, NMFS,

[2] 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.

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 DAS allocations. In terms of the latter, DAS allocations vary by which limited access permit is possessed by the vessel. Days-at-Sea 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 any gear type (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 (~ 5% of the total) were much lower than landings by dredge 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 or 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 or 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. Anecdotal information is that the number of general category vessels and resulting effort is increasing dramatically, but recent information does not currently support that claim. Approximately 200 vessels with general category permits actually land scallops (NEFMC 2004). 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. Under the ESA and its implementing regulations, taking sea turtles, even

incidentally, is prohibited, with exceptions identified in 50 CFR 223.206. 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. The specific nature of these interactions remains unknown, as sea turtles could be taken when the dredge is being fished or during haulback. NOAA's National Marine Fisheries Service (NMFS) currently has information documenting the take of sea turtles in the dredge itself, as observed from on deck. See section 4.2.2.1 for more detailed information on the nature of 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. From 1996 through October 31, 2004, a total of 62 takes was attributed to the scallop dredge fishery in the mid-Atlantic based on observer coverage: 1 each in 1996, 1997, and 1999, 11 in 2001, 17 in 2002, 22 in 2003, and 9 in 2004 (Table 2.1). 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 and dredge fishing effort in the southern range of the fishery (Shoop and Kenney 1992; Braun-McNeill and Epperly 2004). Although the scallop management area extends south to the South Carolina border, 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 is based on Cape Hatteras as the lower boundary.

In 2001 and 2002, observers sampled approximately 11% of the commercial dredge effort in the Hudson Canyon CAA (2001 and 2002) and 16% of the effort in the Virginia Beach CAA (2001). No trips were observed in the Virginia Beach CAA during 2002 due to low fishing effort. Outside the CAAs, observer coverage in the mid-Atlantic was less than 1% during these years (Murray 2004). From June through October 2001, 11 observed turtle takes occurred in scallop dredge vessels fishing in the reopened CAAs. Furthermore, a scallop dredge vessel fishing in the Hudson Canyon CAA reported that they had captured 2 additional turtles (1 live and 1 dead), although no further information is available on these two interactions. Of the 11 observed takes attributed to scallop dredge vessels 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 the Hudson Canyon CAA, despite substantially reduced vessel participation, suggesting that the turtles captured in

2001 were not an anomaly. Twenty-four turtles were observed 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. Therefore, 17 of the interactions with sea turtles were attributed to the scallop fishery during this period. Of the 24 documented takes, 6 were alive with no apparent injuries, 5 were alive and injured, 6 were alive but their condition unknown, 2 were fresh dead, 3 were condition unknown, and 2, as described above, were decomposed. Seventeen of these turtles were identified as loggerheads, while the remaining animals were hard-shelled turtles that could not be positively identified.

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 (NMFS 2004a). Estimated bycatch in the Virginia Beach CAA was 5 turtles in 2001 and 0 in 2002 (NMFS 2004a). A total bycatch estimate outside of the closed areas in 2001 or 2002 was not extrapolated from observed takes within the closed areas due to scientific concerns that bycatch rates differed between closed and open areas based on environmental factors, fishing practices, or gear characteristics. In 2003, observer coverage in the mid-Atlantic was expanded to allow bycatch to be estimated throughout the area (Murray 2004).

From June 1 through November 30, 2003, observer coverage (% of dredge hours observed) was 2.7% in the entire mid-Atlantic sea scallop fishery. There was higher coverage (9.7%) in the Hudson Canyon CAA compared to outside the CAA (1.4%). Observers for the scallop fishery (excluding the experimental fishery) reported a total of 30 turtles observed captured in scallop dredge gear during the 2003 scallop fishing year. 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. Therefore, 22 interactions with sea turtles were attributed to the scallop fishery during this period. Sixteen of these interactions were observed in the CAA. The condition of the 22 turtles varied: alive with no apparent injuries (5), fresh dead (1), alive and injured (12), resuscitated (1), and alive yet condition unknown (3). The trips during which these interactions occurred were landed in July (18%), August (27%), September (9%), and October (46%) (Murray 2004). Eighteen of the observed interactions were with loggerhead sea turtles, and 4 were with hard-shelled turtles that could not be positively identified.

The capture of sea turtles in the scallop dredge fishery continues to be monitored by the NEFSC observer program. As of October 31, 2004, observers had reported 9 observed turtle takes in the 2004 mid-Atlantic sea scallop dredge fishery. Three 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. The 9 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.).

In summary, a total of 62 observed sea turtle takes has been attributed to the Atlantic sea scallop dredge fishery during normal fishery operations from March 1, 1996 through October 31, 2004. Of these, 43 were identified as loggerheads. The remaining animals were hard-shelled sea turtles that could not be positively identified. Of the total 62 turtles observed captured and attributed to the operation of the sea scallop dredge fishery, 4 were fresh dead upon retrieval or died on the vessel, 1 was alive but required resuscitation, 25 were alive but injured, 20 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 : Observed takes of sea turtles in the sea scallop dredge fishery (excluding the experimental fishery)

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

- indicates turtle take reported by vessel crew to observer who was off-watch at the time the take occurred. The take was not attributed to the sea scallop fishery.
- ** indicates that the turtle was decomposed. The take was not attributed to the scallop fishery.

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, resucitated
Aug-03	unknown	Alive, not injured
Aug-03	unknown	Alive, not injured
Aug-03	loggerhead	Dead, fresh
Sep-03	unknown	Dead, severely decomposed**
Sep-03	unknown	Dead, severely decomposed**
Sep-03	unknown	Dead, severely decomposed**
Sep-03	unknown	Dead, severely decomposed**
Sep-03	unknown	Dead, severely decomposed**
Sep-03	loggerhead	Dead, severely decomposed**
Sep-03	loggerhead	Alive, injured
Sep-03	loggerhead	Alive, not injured
Oct-03	loggerhead	Alive, 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
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

2.1.4 Bycatch Estimate

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 takes (an increase of 119 takes) in scallop dredge gear operating in the mid-Atlantic from June 1 through November 30 (Murray 2004). Out of the 749 interactions, 16% was estimated to have occurred in the Hudson Canyon CAA and 84% outside of this area (Murray 2004). A Biological Opinion (Opinion) on the sea 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 2004b).

Sea surface temperature was found to be a significant factor influencing sea turtle bycatch rates 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. There may be a consistent minimal threshold above which turtle bycatch is likely to occur, although this minimal temperature threshold is likely to fluctuate from year to year (Murray 2004). Given the recent information regarding interactions between the sea scallop fishery and sea turtles, NMFS believes it is likely that the sea scallop dredge fishery will continue to result in takes of these listed species.

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. 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. 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 mats. 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, NMFS is considering the species identification to be "unknown turtle species". As far as NMFS 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, NMFS 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).

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	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 Opinion for the Atlantic Sea Scallop Fishery Management Plan (Scallop FMP) was completed on February 24, 2003, in accordance with Section 7(a)(2) of the ESA. The 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 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. This 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.

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, 2 Nov. 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 in May and November, and that modification of the scallop dredge with the addition of chain mats will sharply reduce the capture of sea turtles in the dredge itself, as well as any ensuing injuries as a result of being caught in the dredge (*e.g.*, drowning, crushing in the dredge bag, crushing on deck, etc.). 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 proposed 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. 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 Exclusive Economic Zone (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 preferred alternative, 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 preferred alternative, 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 proposed action is to provide protection to sea turtles. Although hard-shelled sea turtles do occur seasonally in New England waters (roughly June–October) turtles are generally observed in inshore waters (*i.e.*, bays and estuaries) where the scallop fishery does not operate. During surveys for the Cetacean and Turtle Assessment Program (CeTAP), loggerheads, the most abundant of these hard-shelled turtle species, were rarely observed north of 41° N lat. (Shoop and Kenney 1992). 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. Therefore, the NEFSC sea turtle bycatch estimate for the scallop dredge fishery in fishing year 2003 assumed that no turtle takes occur in the scallop fishery operating in the Georges Bank and Gulf of Maine regions (Murray 2004). This alternative was rejected since requiring chain mats on all vessels in the fleet rather than

only those operating in mid-Atlantic waters is not expected to provide any 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[3] with the dredge frame in water; and observing for sea turtles in the 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 proposed 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. There may be a consistent minimal threshold above which turtle bycatch is likely to occur, although this minimal temperature threshold is likely to fluctuate from year to year (Murray 2004). Due to the influence of temperature in affecting turtle bycatch rates, NMFS considered this alternative that would provide

[3] 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.

protection to sea turtles when sea surface temperatures reached a level at which elevated sea turtle bycatch rates were expected. 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. This alternative was rejected from further analysis as it is not expected that this alternative would result in any substantial differences.

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 Sea 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.

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 proposed 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 from about the 40 m isobath to the 200 m isobath, throughout the Hudson Canyon Access Area, and around the perimeter of Georges Bank, including the Great South Channel. Most scallops are harvested at depths between 30 and 100 m in the Georges Bank and mid-Atlantic areas (NEFMC 2001, NMFS 2004c). Murray (2004) found that reported trips for the mid-Atlantic during the period June – November 2003 occurred from approximately 76 30’ W to approximately 71 W, far short of the eastern boundary of the EEZ. Most of the reported trips occurred in the vicinity of the 27 fathom line (~49 m). In the mid-Atlantic, the scallop fishery operates within the Mid-Atlantic Bight. 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. This area is composed of a sandy, relatively flat, continental shelf that extends outward from the shore to between 100 and 200 km where it transforms to the slope (100-200 m water depth) at the shelf break. Numerous canyons incise the slope and some cut onto the shelf itself. The primary morphological features of the shelf include shoal massifs, scarps, sand ridges and swales, canyons and shelf valleys. Most of these structures are relic, except for some sand ridges and smaller sand related features.

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

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

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

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

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).

Atlantic sea scallops generally inhabit depths of 18–110 m but are most abundant on the continental shelf between 20 and 50 m. On occasion, they have been found at depths up to 384 m (NEFMC 2003). In the mid-Atlantic, concentrations occur within a narrow depth ban from about the 40 to the 200 m isobath, throughout the Hudson Canyon Area, and around the perimeter of Georges Bank, including the Great South Channel (NEFMC 2001). In mid-Atlantic waters, most scallops are harvested at depths of 30–100 m (NMFS 2004c).

Sea scallop abundance and biomass in the mid-Atlantic are currently at record-high levels (NMFS 2004c). 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 2004c).

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

The only species listed under the ESA that is likely to be affected by the PA or the NPAs is the loggerhead 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.

Kemp's ridley, green, 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 4.2.2.2).

Table 4.1: Species protected under the ESA or MMPA found in the geographic range of the proposed action

Potential Effect	Category	Species	Status
Likely to be Affected	Turtle	Loggerhead sea turtle (*Caretta caretta*)	Threatened
Present, but Not Likely to be Affected	Turtle	Green sea turtle (*Chelonia mydas*)	Endangered/Threatened
		Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
		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, Massachusetts 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).

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.

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, 15 Sept. 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, 15 Sept. 2003; USFWS Fact Sheet 2004). 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 (68 FR 53949, 15 Sept. 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, 15 Sept. 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, 15 Sept. 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, 15 Sept. 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, 15 Sept. 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). 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 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 for the past 5 years. 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 past 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 (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)[4] 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, 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. 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. 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 bears continued observation.

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

[4] 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).

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 (Schroeder *et al.* 2003). 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 the most northern foraging grounds in the Gulf of Maine in June. 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).

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 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 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. The specific nature of the interaction remains unknown as sea turtles could be taken when the dredge is fished on the bottom or during haulback. NMFS currently has information documenting the take of sea turtles in the dredge itself, 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 collect 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 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, or hawksbill sea turtles; North Atlantic right, humpback, fin, sei, blue, or sperm whales; all of which are listed as endangered under the ESA.

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

Past biological opinions for the scallop fishery have concluded that Kemp's ridley and green sea turtles may be adversely affected by operation of the scallop fishery as a result of capture in scallop dredge and trawl gear (NMFS 2003b, 2004a). Although there has never been a documented capture of a Kemp's ridley or green sea turtle in scallop dredge or trawl gear, NMFS took a precautionary approach given information available at that time and provided "benefit of the doubt" to the species by assuming such captures were possible. In recent years, there has been increased observer coverage for scallop dredge vessels operating in the mid-Atlantic from June through November. In 2001 and 2002, this coverage was within the CAAs and, in 2003, the coverage was expanded outside of the CAAs to better assess sea turtle bycatch throughout the mid-Atlantic. Even with this increased coverage and improved observer training for identifying and documenting turtle species, the only species positively identified by the NEFSC observer program to have been captured in sea scallop dredge gear is the loggerhead sea turtle. Because only loggerhead species have been positively identified in the mid-Atlantic sea scallop dredge fishery since a dedicated observer program began in 2001 and 4 out of 5 of unidentified observed takes took place in loggerhead territory, the NEFSC assumed in their estimate of bycatch for the 2003 fishing year that the unidentified species were loggerheads and provided an estimate for loggerheads only (Murray 2004). Based on this as well as information on the distribution of Kemp's ridley and green sea turtles, NMFS now believes it is unlikely that either of these species will be captured in scallop dredge gear. Kemp's ridley and green sea turtles are expected to occur predominantly in inshore waters (*i.e.*, bays and estuaries, and other coastal waters) where the scallop dredge fishery does not operate (Lutcavage and Musick 1985; Keinath *et al.* 1987; Morreale and Standora 1994; Spotila *et al.* 1998). In addition, while western Atlantic green turtles range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, they are considered less abundant north of Cape Hatteras (Wynne and Schwartz 1999). Given this information on the distribution of Kemp's ridley and green sea turtles in comparison to distribution of scallop gear within the mid-Atlantic and given observer identification of turtles captured in scallop dredge gear, NMFS considers it unlikely that Kemp's ridley or green sea turtles will be captured in scallop dredge gear. Fishing practices in the scallop dredge fishery are not expected to be changed by the proposed action in a way which would increase the likelihood of interaction with Kemp's ridley or green sea turtles.

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 (NMFS 2004b). 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 prey and habitat preferences, leatherback sea turtles are not expected to be caught in sea scallop dredge gear or struck by the gear when it is operating on the bottom. 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. NMFS concluded that leatherback sea turtles are not expected to be captured 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 unlikely to occur given the size, speed and maneuverability of large cetaceans in comparison to scallop fishing gear (NMFS 2004b).

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 mid-Atlantic 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 (SPDT 2000, NEFMC 2003, NMFS 2004c), and the following will serve as a brief summary.

The sea scallop fishery in the U.S. EEZ is currently managed under the Atlantic Sea 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 at depths of 40–200 m in water temperatures ranging from 1–19 ºC (NMFS 2000). The fishing year (FY) is March 1 through February 28/29. 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 2004).

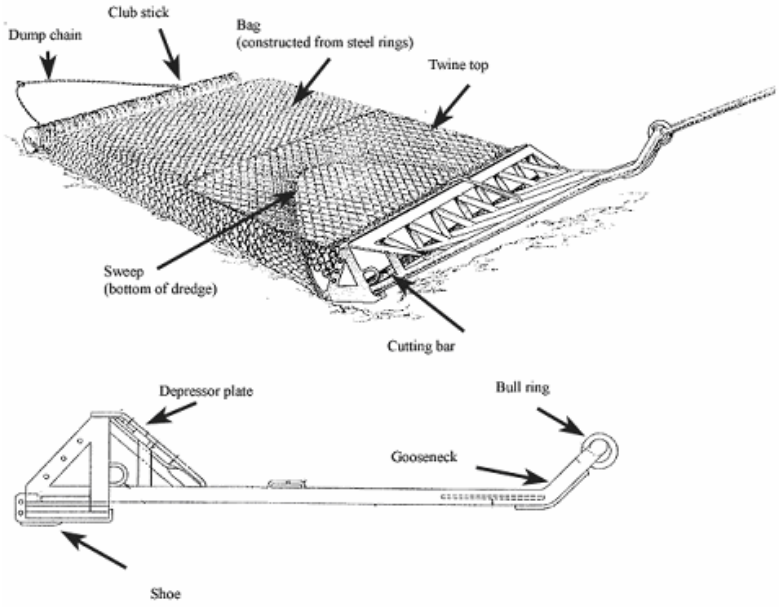
The management unit for the Scallop FMP consists of the sea scallop resource throughout its range in waters under the jurisdiction of the U.S. The five resource areas generally recognized within the management unit are: (1) Delmarva; (2) New York Bight; (3) South Channel and southeast part of Georges 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: Days-at-Sea (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. 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 4.1). 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 2002). Fishing occurs year round, with the unusual exception of bad weather. These vessels generally take extended trips of 12–20 days (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. The rest of the dredge is the same as described above, but with a 5.5 to 6 inch mesh (NEFMC 2003). 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 2004). 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 4.1: 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 2003 fishing year, there were 289 full-time permits, 34 part-time permits, and 10 occasional permits. Of the full-time permits, 236 were full-time dredge and 37 were full-time small dredge. Of the part-time permits, 10 were part-time dredge and 17 were part-time small dredge. Two of the occasional permits were for dredge vessels. There were 2,554 general category permits in FY2003, 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, 2 Nov. 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. The proportion of landings (1–2% of total landings) from this fishing activity has been small relative to the landings from trips on a DAS. However, there has been concern that the activity among general category vessels could rapidly increase (NEFMC 2003).

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 (SPDT 2000).

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 2004c).

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 4.3). Total landings of sea scallops in the mid-Atlantic have increased, while landings in the other resource areas show no detectable trend (NMFS 2004c).

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.

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 significant 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).

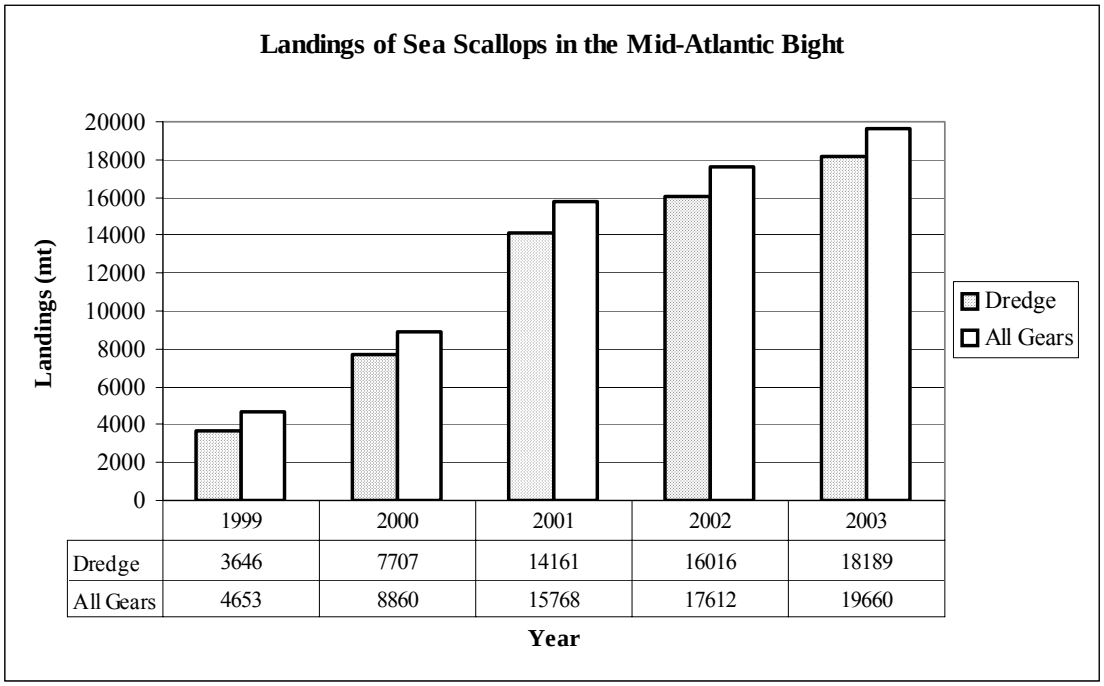
A slightly different picture emerges when evaluating ports the boats call their "home port. " Again, New Bedford, and other larger landing ports dominate, but a number of ports in North Carolina also seem significant. There is a close connection between home port and port of landing. Despite the significance 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 FY2003
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.	**2554**
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	**10**
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.	**37**
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	**17**
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	**16**
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	**7**
9	Limited Access	**Occassional - Authorized to Use Trawl Nets**	**8**

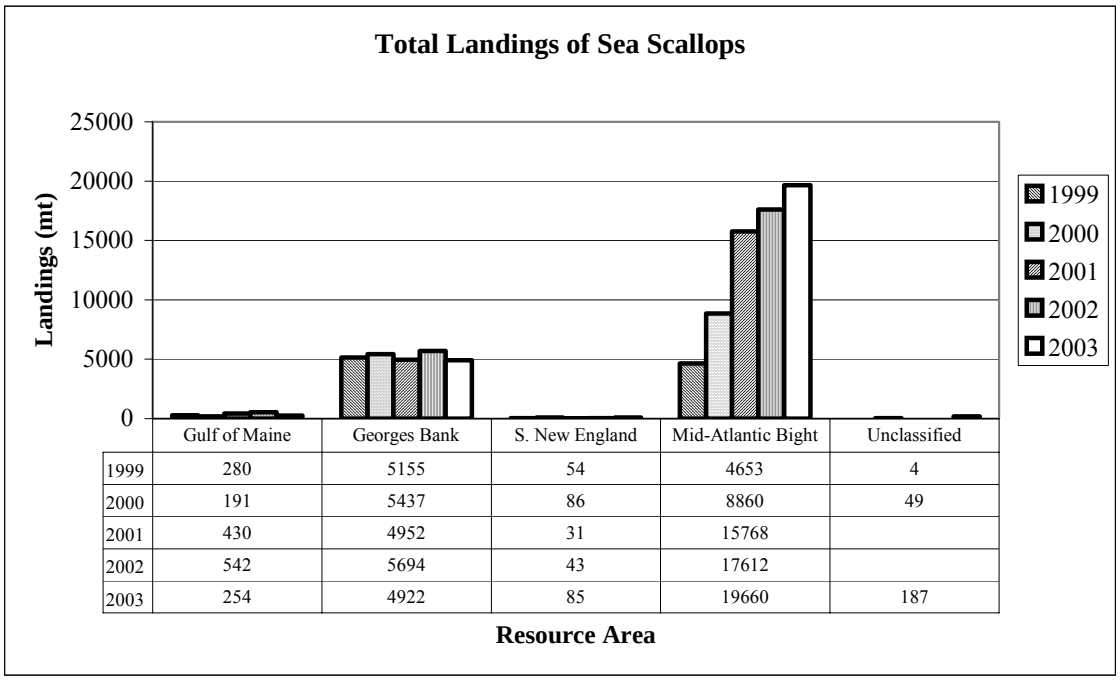
Figure 4.2: Landings of sea scallops by dredge and all gears in the mid-Atlantic, Calendar Year (CY)1999-CY2003



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

Source: 39th SAW, NMFS 2004c

Figure 4.3: 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 2004c

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 species (loggerhead sea turtles) and habitat. The purpose of the PA is to conserve sea turtles listed under the ESA by reducing the take of sea turtles in scallop dredge gear. Therefore, the general effect of this action on sea turtles is expected to be beneficial. The fishing industry directly impacted by the proposed action is the mid-Atlantic sea scallop dredge fishery.

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 Gear modification requirement on scallop dredges fishing in mid-Atlantic from May 1 through November 30 (PA)

5.1.1 Physical Impacts

In considering the effects of the proposed action on the physical environment of the Mid-Atlantic Bight, 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; NREFHSC 2001).

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). However, vessels that have a decreased catch when using the modified dredge may tow longer resulting in an increased disturbance of the bottom. 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 observed tows. 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). Vessels with a decreased catch may modify tow times to achieve the same catch.

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 turtle chains are shown in Table 5.1. No statistical analysis of the data has been provided at this time.

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 and Threatened Species

The PA will impact loggerhead sea turtles. Past biological opinions for the sea scallop fishery concluded that loggerhead, Kemp's ridley and green sea turtles may be adversely affected by operation of the scallop fishery as a result of capture in scallop dredge gear (NMFS 2003b, 2004a). However, as described in section 4.2.2.2, NMFS now considers it unlikely that Kemp's ridley or green sea turtles will be captured in scallop dredge gear. Hawksbill sea turtles are also unlikely to be taken in sea scallop dredge gear given their range and the lack of documented takes in fisheries that operate in or near the area of the proposed action. While the scallop dredge fishery overlaps with the distribution of leatherback sea turtles, NMFS has no confirmed report that this gear interacts with leatherback sea turtles. Therefore, the discussion of impacts on endangered and threatened species will be limited to impacts on loggerhead sea turtles. This PA was developed to reduce the capture of loggerhead sea turtles in the dredge itself, as well as any ensuing injuries as a result of being caught in the dredge (*e.g.* drowning, crushing in the dredge bag, crushing on deck).

Risks to sea turtles from capture in dredge gear 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 2004b).

A total of 62 observed sea turtle takes have been attributed to the Atlantic sea scallop dredge fishery during normal fishery operations from March 1, 1996 through October 31, 2004. Of these, 43 were identified as loggerheads; while the remaining animals were hard-shelled sea turtles that could not be positively identified. Of the total 62 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, 20 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 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. 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 2004b).

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. In this assessment, sea surface temperature was a significant factor affecting sea turtle bycatch. Highest probability of bycatch occurred in surface waters that were 22 ºC or warmer. 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 2004). A Biological Opinion on the sea 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 2004b).

Sea surface temperature 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. There may be a consistent minimal threshold above which turtle bycatch is likely to occur, although this minimal temperature threshold is likely to fluctuate from year to year (Murray 2004).

Based on the available information, NMFS has determined that the use of a dredge modified with a chain mat is likely to sharply reduce the capture of sea turtles in the dredge itself as well as any ensuing injuries as a result of being caught in the dredge (*e.g.,* drowning, crushing in the dredge bag, crushing on deck, etc.). During the 2003–2004 field tests of this gear modification, there were a total of 8 turtles taken. None of these turtles were taken by the modified dredge, indicating that the gear is effective at preventing sea turtles from being captured in the scallop dredge itself. As described above, forced submergence, potentially leading to mortality, is a risk to sea turtles taken in mobile gear. As the PA sharply reduces the capture of the sea turtle in the dredge itself, the risk of forced submergence is reduced. 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 if turtles are prevented from entering the bag. The use of the chain mats is expected to provide protection to sea turtles that are taken in the dredge itself.

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 take of sea turtles in the dredge itself, as observed from on deck, and the recent research indicates the chain mat sharply reduces these takes. NMFS recognizes that the specific nature of the interaction between sea scallop dredges and sea turtles remains unknown as sea turtles could be taken when the dredge is being fished on the bottom or during haulback. NMFS does not know how the modified gear interacts with sea turtles on the bottom and in the water column. Video work, which may provide more information on the nature of the interaction, is being conducted.

The proposed action is an important step following the gear experiments in the process to reduce sea turtle bycatch 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 taken 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. With the chain mat installed over the opening to the dredge bag, it is reasonable to

assume that up to 749 sea turtles, which would otherwise enter the dredge bag, will instead come into contact with the chain mat (at least). 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 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 (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 chain bag with chains and club stick weighs another 2000 lbs. Variations in materials may affect this weight by approximately ± 15%. Therefore, 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 (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 and 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 haulback.

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 will be swept into the dredge bag, forcibly submerged for the remainder of the tow, and will be 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. 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 and 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. Since the turtles are not swept into the bag, they would be run over by the aft portion of the dredge including the bag. As described above, the dredge bag constitutes a crushing weight. Sea turtles that interact on the sea floor with the modified dredge would probably fare just as poorly as those that interact with the unmodified dredge. Given the nature of the bottom interaction without the chain mat, it is reasonable to assume 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 due to an interaction with the chain-mat modified gear in the water column are likely to be non-serious because sea turtles would hit the chain mat during haul back. Some of the 479 seriously injured sea turtles are assumed to have obtained those injuries after being caught in the water column by unmodified gear. The chain mat would prevent these serious injuries, since the turtles would not be able to get into the dredge bag and; therefore, they would not be 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), so we assume that 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 interaction, or this type of interaction, would result in serious injury. NMFS' assumption about this type of interaction is that 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 we assume that 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, it is reasonable to assume that some of the 270 interactions would result in contact with the chain mat, but that this contact is not likely to result in serious injury.

To summarize, the chain mat can logically be assumed to prevent serious injury leading to death or failure to reproduce caused by the dumping of turtles on the vessel's deck and crushing them by the falling gear following an interaction in the water column. There is a possibility that the chain mat would also prevent serious injuries from 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 that turtles in a bottom interaction only receive minor injuries.

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). They are found in the most northern foraging grounds in the Gulf of Maine in June. Water temperatures of $\geq$ 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 loggerhead/unidentified 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 and fishing effort (Shoop and Kenney 1992; Braun-McNeill and Epperly 2004). Although the scallop management area extends south to the South Carolina border, 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 loggerhead sea turtles against injuries and mortalities caused by capture in the dredge bag.

The absolute magnitude of sea turtle protection provided by the alternatives can not be quantified but can be ranked. 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.

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 2002).

The gear most comparable to the chain mats is the rock chain gear used in the 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, and this may lead to vessels offsetting the catch with longer tows. 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. 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. 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 seafloor 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 are used to analyze the economic impacts for each alternative, and the results of these analyses are presented in the economic impacts/consequences section for each alternative. Under the PA, gear modifications are being required of vessels fishing scallop dredge gear south of 41º 9.0' N. lat. from May 1 through November 30 to protect sea turtles.

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

- The preferred alternative (PA) as described above
- Non-preferred alternative 1 (NPA 1) is exactly the same as the PA, however, the gear modifications are only required from May 1 through October 15
- Non-preferred alternative 2 (NPA 2) is exactly the same as the PA, however, 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 absolute magnitude of sea turtle protection provided by these alternatives can not be quantified, but it can be ranked. In ranking the alternatives, the third non-preferred alternative (NPA 3) would provide the most protection against sea turtle mortality since scallop dredge gear will be removed completely from the area where sea turtle interactions have been documented. The preferred alternative (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 non-preferred alternative 1 or alternative 2 (NPA 1 or NPA 2) provides the next lower level of sea turtle protection. NMFS observer data show turtles have been taken as bycatch during the month of October in the scallop dredge fishery (Murray 2004). Therefore under NPA 1, there is a chance turtles may be caught between October 15 and November 30. Under NPA 2, vessels that are being exempted from implementing the proposed gear modification were not sampled well by observers. Specifically, less than 1% of fishing effort of vessels with dredges less than 11 ft was observed. Therefore due to 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 5.1.2.2, 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 status quo.

Both consumer surplus and producer surplus for seafood products supplied by the scallop dredge fishery will be affected by these sea turtle protection measures. Under the PA, harvesters will

incur additional costs to modify their gear. Plus, a slight reduction in revenues may occur since the modified gear may reduce the scallop catch. In general, these sea turtle protection measures will result in revenue losses.

A large decrease in revenues and a large increase in cost to a harvester can result in a reduction of quantities of seafood supplied to seafood markets, which may result in higher prices to consumers. 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.[5] Depending on the success of the chain mat gear modification, the preferred alternative may provide a high level of sea turtle protection. Theoretically, if the gear modification eliminates both observed and unobserved interactions (at depth), the PA will approach the protection value of a complete closure (as in NPA 3) because the spatial and temporal extent of the gear modification (PA) and the complete closure (NPA 3) are the same.

5.1.3.1 Data

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 Days at Sea (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 Vessel Trip Reporting (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. 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 from May to November.

Of the *affected 314 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 (or 80 vessels) fish with dredge frames less than 11 ft wide (Table 5.3).

[5] 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.

Table 5.2 Number of 2003 VTR vessels fishing with scallop dredge gear by area and time of year.

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

Table 5.3: Number of affected vessels fishing with one or two dredges in the DAS and GEN Permit category by 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* earned approximately $221.4 million dollars in revenues 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 vessels also use other gear to land their catch, however, the majority of 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 conch (OTF, OTS and OTC), pots for lobster, hagfish, whelk and monkfish (POTs) and purse seine (PUR) gear.

Table 5.4: Total industry revenues and days absent (DA) earned by scallop dredge vessels by gear type and permit category

Gearcode	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
POTS	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

Under the PA, a gear modification is required to the scallop dredge to reduce the number of sea turtles captured in the dredge itself. Some vessels fish with 1 scallop dredge and some with 2 dredges. In general, the majority of the DAS vessels fish with 2 dredges and GEN vessels fish with 1 dredge. Given the cost of modifying the gear varies based on the width of the dredge frame and the number of dredges used, vessel revenues are stratified accordingly.

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). And vessels permitted in the GEN category earned 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 have the largest CV (=120%) and, therefore, the most variability in annual revenues.

Table 5.5: The number of vessels fishing with one or two scallop dredges according to the 2003 VTR data, and average annual vessel revenues with the coefficient of variation (in parentheses), by permit category (DAS or GEN) and frame width of dredge.

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 Total Cost of Gear Modification

Materials and labor are required to modify the gear. This is one component of the total cost. In addition, this gear modification may reduce the catch of scallops. Therefore, the total cost includes labor and materials 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 required varies by the frame width of the dredge. For vertical chains, grade 70 and a size 5/16 inches with a load limit of 4,700 pounds is recommended. This chain costs approximately $2.00 per foot. For horizontal chains, grade 70 and a size 3/8 inches with a load limit of 6,600 pounds is recommended. The chain for the horizontal ticklers costs approximately $3.00 per foot. One shackle costs 35 cents. The cost of materials (chain and shackles) for one dredge ranges between $130 and $342 (Table 5.6).

Two hours of welding are required to modify one scallop 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.

The total material and labor cost of modifying one scallop dredge ranges between $177.37 and $389.22 (Table 5.7).

Table 5.6: For one scallop dredge, the number of vertical and horizontal ticklers required, feet of chain to construct, material costs of chain, number of shackles and cost required and a grand total material cost by frame width of dredge.

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

Table 5.7: Total cost of materials and labor to modify one scallop dredge

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

Reduction in scallop catch

The final report of DuPaul *et al*. (2004a) 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. The worst case was assumed. That is, vessel captains will not increase their effort to offset the loss in catch and will incur a revenue loss due to the reduction in scallop catch. To estimate the reduction in revenues, we applied a 6.76% reduction in scallop catch to the 2003 VTR data from May 1 through November 30.

Revenue for a DAS category vessel may be reduced between a low of $18.8 (CV=53%) to a high of $38.7 (CV=38%) thousand dollars (Table 5.8). Similarly, a GEN category vessel may have revenue reductions between $1.3 (CV=182%) and $5.6 (CV=63%) thousand dollars.

Table 5.8: Total revenue reduction per vessel for a 6.76% reduction of scallop from May to November catch with the coefficient of variation (in parentheses) by frame width of dredge

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

5.1.3.2 Methods

Regulatory costs to the scallop dredge industry (south of 41º 9.0' N. lat.) are measured by estimating revenue losses due to not fishing and additional labor and material costs that may be incurred with gear modifications. These costs are measured per vessel. In a perfect world of information, our goal would be to measure how a particular alternative impacts a vessel's annual profits. We would calculate the ratio of the change in profits to profits before the alternative was imposed. In this analysis, it is sufficient to use changes in total revenue as our comparison point between alternatives. Specifically, we estimate the decrease in revenues and increase in cost as a 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. We then calculate the ratio of this decrease in revenues to total revenues prior to the alternative being imposed, and refer to it as the change in total revenues. We could just report the decrease in revenues and increase in costs, however, it is important to put these changes in perspective to total earnings since they vary among fisheries. To determine the regulatory cost of the entire industry, we multiply the 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.

The methods and data presented in this section are used to analyze the economic impacts for each alternative, and the results of these analyses are presented in the economic impacts/consequences section for each alternative (see the proceeding section 5.1.3 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. Using Table 5.7, 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.

A 6.76% reduction in the scallop catch has been estimated if this gear modification is implemented. Here, we assume the vessel will not increase their fishing effort to offset this loss

in catch, but they will incur this revenue loss. Again, we assume a worse case scenario. A 6.76% loss in scallop catch translates into a reduction in annual revenues between $1.3 (CV=182%) and $38.7 (CV=38%) thousand dollars per vessel (Table 5.8). We assume the vessel would minimize its 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. This is the worse case scenario.

Table 5.9: Total material and labor cost of the proposed gear modifications

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		

5.1.3.3 Results of the PA

According to the 2003 VTR logbook, there were 314 affected vessels fishing 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).

5.1.3.3.1 Individual Vessel

Annual vessel revenues per vessel range between $46.7 (CV=120%) and $895.1 (CV=29%) thousand dollars (Table 5.5). Under the PA, two costs are imposed. First there is a material and labor cost associated with modifying the gear. The cost of materials and labor to modify a scallop dredge range between $177.37 and $778.44 (Table 5.9). The second cost is associated with a potential loss of 6.76% in scallop catch between May 1 and November 30. Results indicate, a vessel's annual revenues will be reduced between a low of $1.3 (CV=182%) and $38.7 (CV=38%) thousand dollars due to the reduction in scallop catch.

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). The magnitude of a CV indicates variability in the estimate and it shows there is 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.

5.1.3.3.2 Industry

Annual industry revenues will be reduced by 4.3% (=$9.6M/$221.4M) under the PA (Table 5.12). Industry revenues for these 314 affected vessels are $221.4 million dollars and the total cost to the industry for this gear modification is $9.6 million dollars.

Table 5.10: Reduction in annual revenues per vessel with the coefficient of variation (in parentheses) under the PA, by per DAS and GEN permit category 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. It is expected that scallop fishermen may increase their tow times to compensate for the loss in revenue resulting from a decrease in catch when the modified dredge is used. However, if the loss is not offset, the fishing community, including dealers and processors, will be impacted. 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 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.

5.2 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 and Threatened Species

The No Action alternative has the potential to impact threatened 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 41º 9.0' N. lat. May through November, sea turtle takes will result. The December 15 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 the number estimated for 2003. There would be no additional impacts to sea turtles due to the No Action alternative.

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 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 loggerhead sea turtles are still listed as threatened under the ESA, as populations have not yet recovered. Minimizing take is necessary to promote recovery of loggerhead 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. 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). However, vessels that have a decreased catch when using the modified dredge may tow

longer, resulting in an increased disturbance of the bottom. 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 in the mid-Atlantic 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 of the Mid-Atlantic Bight is expected to be less than under the PA. As with the PA, NPA 1 is not expected to substantially impact the physical environment of the Mid-Atlantic Bight.

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 turtle chains are shown in Table 5.1. No statistical analysis of the data has been provided at this time.

5.3.2.2 Endangered and Threatened Species

NPA 1 will impact loggerhead sea turtles. Past biological opinions for the sea scallop fishery have concluded that loggerhead, Kemp's ridley and green sea turtles may be adversely affected by operation of the scallop fishery as a result of capture in scallop dredge and trawl gear (NMFS 2003b, 2004b). However, as described in section 4.2.2.2, NMFS now considers it unlikely that Kemp's ridley or green sea turtles will be captured in scallop dredge gear. Hawksbill sea turtles are also unlikely to be taken in sea scallop dredge gear given their range and the lack of documented takes in fisheries that operate in or near the area of the proposed action. While the scallop dredge fishery overlaps with leatherback sea turtle distribution, NMFS has no confirmed report that this gear interacts with leatherback sea turtles. Interactions between loggerhead sea

turtles and the sea scallop dredge fishery have been documented, and this alternative was developed to decrease the take of loggerhead sea turtles in scallop dredges.

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-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 the take of loggerhead sea turtles in the dredge.

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. The gear most comparable to the chain mats is the rock chain gear used in the 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). However, 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). However, vessels with decreased catches when using the chain mat configuration may tow for longer, resulting in increased disturbance to bottom sediment. 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 6.5 weeks 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. It is expected that scallop fishermen may increase their tow times to compensate for this loss in revenue resulting from a decrease in catch when the modified dredge is used. However, if the loss is not offset, the fishing community, including dealers and processors, will be impacted. There would 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. 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). However, vessels that have a decreased catch when using the modified dredge may tow longer, resulting in an increased disturbance of the bottom. 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 in the mid-Atlantic 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 2004). 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 of the mid-Atlantic bight.

5.4.2 Biological Impacts

5.4.2.1 Fishery Resources

Information on the impact of scallop dredging in the mid-Atlantic 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 2004). 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 turtle chains are shown in Table 5.1. No statistical analysis of the data has been provided at this time.

5.4.2.2 Endangered and Threatened Species

NPA 2 will impact loggerhead sea turtles. Past biological opinions for the sea scallop fishery have concluded that loggerhead, Kemp's ridley and green sea turtles may be adversely affected by operation of the scallop fishery as a result of capture in scallop dredge and trawl gear (NMFS 2003b, 2004b). However, as described in section 4.2.2.2, NMFS now considers it unlikely that Kemp's ridley or green sea turtles will be captured in scallop dredge gear. Hawksbill sea turtles are also unlikely to be taken in sea scallop dredge gear given their range and the lack of documented takes in fisheries that operate in or near the area of the proposed action. While the sea scallop dredge fishery overlaps with leatherback sea turtle distribution, NMFS has no confirmed report that this gear interacts with leatherback sea turtles. Interactions between loggerhead sea turtles and the sea scallop dredge fishery have been documented, and this alternative was developed to decrease the take of loggerhead sea turtles in scallop dredges.

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 2004). 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. There have been no observed takes with smaller dredge gear attributed to the scallop fishery. However, it is probable that sea turtles will be taken by smaller dredges not equipped with the chain mats under this alternative as the gear is 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 takes in large dredge gear in the sea scallop fishery.

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 gear most comparable to the chain mats is the rock chain gear used in the scallop fishery. The chain mat is 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). However, these impacts are not comparable to the chain mats as these would be used in an area comprised largely of sand and mud while rock chains are intended for use in areas with rocks.

In assessing the impacts of the proposed action 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 and an increase in disturbance to bottom sediments is expected whenever chain mats are used.

The area of the seafloor swept by the chain mat is the same area swept by the cutting bar and the dredge bag. 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). However, vessels with decreased catches when using the chain mat configuration may tow for longer, resulting in increased disturbance to bottom sediment. 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 2004). 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

Non-preferred alternative 2 (NPA 2) is exactly the same as the PA, however, the gear modification is only required for vessels that have dredge frames 11 ft wide or greater. 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 coefficient of variation 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 3 (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 per DAS and GEN permit category 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. It is expected that scallop fishermen may increase their tow times to compensate for any loss in revenue resulting from a decrease in catch when the modified dredge is used. However, if the loss is not offset, the fishing community, including dealers and processors, will be impacted as there would be less 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 if vessels did not offset the loss of catch.

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 of the Mid-Atlantic Bight, 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 this fishing 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 2004c). 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.

5.5.2.2 Endangered and Threatened Species

NPA 3 will impact loggerhead sea turtles. Past biological opinions for the sea scallop fishery have concluded that loggerhead, Kemp's ridley and green sea turtles may be adversely affected by operation of the scallop fishery as a result of capture in scallop dredge and trawl gear (NMFS 2003b, 2004b). However, as described in section 4.2.2.2, NMFS now considers it unlikely that Kemp's ridley or green sea turtles will be captured in scallop dredge gear. Hawksbill sea turtles are also unlikely to be taken in sea scallop dredge gear given their range and the lack of documented takes in fisheries that operate in or near the area of the proposed action. While the sea scallop dredge fishery overlaps with leatherback sea turtle distribution, NMFS has no confirmed report that this gear interacts with leatherback sea turtles. Interactions between loggerhead sea turtles and the sea scallop dredge fishery have been documented, and this alternative was developed to decrease the take of loggerhead sea turtles in scallop dredges.

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. and there would be no interaction. Under this alternative, the scallop fleet would likely shift to New England waters. Although hard-shelled sea turtles do occur seasonally in New England waters (roughly June-October), turtles are generally observed in inshore waters (*i.e.*, bays and estuaries) where the scallop fishery does not operate. During surveys for the Cetacean and Turtle Assessment Program (CeTAP), loggerheads, the most abundant of these hard-shelled turtle species, were rarely observed north of 41° N lat. (Shoop and Kenney 1992). 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. The NEFSC sea turtle bycatch estimate for the scallop dredge fishery in fishing year 2003 assumed that no turtle takes occur in the scallop fishery operating in the Georges Bank and Gulf of Maine regions (Murray 2004). Scallop vessels operating in New England waters are not expected to interact with 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 the maximum benefit to sea turtles.

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 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 are unclear at this time.

5.5.3 Economic Impacts

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. This alternative affects all 314 vessels. We assume the worse case scenario under this alternative. That is, a vessel will choose to not fish in an alternative area and, therefore, incur revenue losses.

5.5.3.1 Individual Vessel

A vessel's annual revenue on average, using scallop dredge gear, may be reduced between a low of 31.8% (CV=82%) and a high of 65.2% (CV=33%) under the NPA 3 (Table 5.19). Of these 314 vessels, 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 will 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, with the coefficient of variation (in parentheses) by permit category and frame width of dredge

Frame width of dredge	Reduction in Annual Revenues (Percent)	
	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. Social benefits are realized from the application of management practices that demonstrate that fishing practices and

sea turtles can co-exist. This alternative provides the greatest benefit to sea turtles at the highest cost to the industry.

6.0 POTENTIAL CUMULATIVE EFFECTS

This section identifies the cumulative effects that may result from implementing the PA. The PA would issue a rule that would require all vessels with a Northeast Federal 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. This analysis is limited to the geographical area potentially subjected to the requirements of this proposed regulation. In the mid-Atlantic region, the sea scallop dredge fishery operates in the Mid-Atlantic Bight. In all instances, the analysis attempts to take into account both present and reasonably forseeable future actions 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 listed sea turtles, the majority of the following discussion will focus on the cumulative impacts to those species. The scallop fishery, associated dealers and processors, their respective families, and their communities represent the human community of concern. A summary of the cumulative effects and the ecosystem components affected is presented in Table 6.1.

6.1 Physical Impacts

As described above, the PA will likely impact the physical environment of the Mid-Atlantic Bight 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.

6.2 Biological Impacts

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. 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 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 Reasonable and Prudent Measures (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 reinititated 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.

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 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 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 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. 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. In some cases, the turtles are harmed, injured, or killed as a result of the interaction. Cumulative impacts from fisheries operations have had a negative impact on sea turtle populations.

6.2.3 Dredging Operations

The construction and maintenance of federal navigation channels have been identified as sources of sea turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. 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, 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 no organized formal program for at-sea disentanglement of sea turtles. However, recommendations for such programs are being considered by NMFS pursuant to conservation recommendations issued with several recent Section 7 consultations. 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 2003, 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, 3 Dec. 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 72° 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 action, taken under the ESA, is necessary to conserve sea turtles listed as threatened or endangered. NMFS also provides an exception to the prohibition on incidental take of threatened sea turtles for those who comply with the rule (69 FR 24997, 5 May 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, 6 Jul 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, 21 Feb 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 the specific nature of the interaction between sea turtles and scallop dredge gear remains unknown. The scallop dredge may strike sea turtles as it is fished, and this interaction would remain undocumented. Sea turtles could be taken when the dredge is being fished on the bottom or during haulback. NMFS does not know how the modified gear interacts with sea turtles on the bottom and in the water column. In order to understand the interaction, video work is currently being conducted and is expected to continue. This work may provide more information on the interaction between sea turtles and scallop dredge gear in the water. This work is being conducted on vessels that would be fishing regardless of participation in the study; therefore, the work is not expected to alter fishing practices and will not likely impact the physical, biological, habitat, or human community components of the ecosystem.

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 Impacts

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 is not considered as a significant economic impact to the industry.

The long-term cumulative effects of past actions, including Amendment 4 and Amendment 7 to the Sea 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[6], 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.

6.4 Social Impacts

As described above, there may be social impacts to the fishing communities from the proposed action if vessels choose not to offset a loss of catch that 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. Therefore, social impacts from the proposed action, if any, are not expected to be substantial. In addition, any impacts to the social environment would be localized. It is expected that vessels will offset any loss of catch and social impacts will be minimized. As this action is unlikely to substantially affect the social environment, significant cumulative effects on this ecosystem component are not likely.

6.5 Summary

In 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 substantially affect the physical environment, habitat, or fishery resources. Therefore, there is no net beneficial or adverse effect on these ecosystem components.

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. Vessel and fishery operations and dredging have likely had a positive impact on the human community. These same activities will likely have the same impact on the same ecosystem components in the future.

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

Biological resources, in particular sea turtles, have been, are, and will continue to be negatively impacted by a variety of past, present, and future activities. These cumulative impacts may be impacting the recovery of the species, although the extent cannot be quantified. However, the scallop dredge modification required under the PA will protect sea turtles, benefiting the species. These positive impacts will reduce 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 the 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 nature of the interaction 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 negative impacts from the scallop dredge modification, some conservation measures, marine pollution, and impaired water quality. It is unknown if those impacts will outweigh the benefits experienced from the other past, present, and future activities.

Table 6.1: Summary of the cumulative impacts of the PA and the affected ecosystem components

	Sea Turtles	**Human Community (economic and social)**
Vessel operations	▼P, PR, F	▲P, PR, F
Fishing operations	▼P, PR, F	▲P, PR, F
Dredging operations	▼P, PR, F	▲P, PR, F
Marine pollution/water quality	▼P, PR, F	▼P, PR, F
Anticipated Scallop Dredge Research		
Conservation Measures	▲P, PR, F	▲▼P, PR, F*
Scallop Dredge Modification Requirements	▲P, PR, F	▼P, PR, F

P = Past, PR = Present, F = Anticipated future. The "up" and "down" arrows represent the cumulative impacts to that particular ecosystem component and the arrow in each cell refers to each of the past, present, and future impacts (▲= Cumulative positive impacts,▼= Cumulative negative impacts). A blank cell indicates that there have been, are, or will be no known impacts.

* ▲▼ indicates that both positive and negative cumulative impacts have been, are, and will be experienced by the human community from conservation measures.

7.0 APPLICABLE LAWS AND REGULATIONS

7.1 Endangered Species Act

NMFS is reviewing its compliance with Section 7 consultation under the Endangered Species Act in light of the proposed action.

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, roseatte 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 Data Quality Management Act

The Data 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, the proposed 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 proposed 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 provide informed comments on the alternatives considered; 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 the 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 this document, were sent to the coastal zone management program offices of these states. A list of the specific state contacts and a copy of the letters are available upon request.

7.8 EO 13132 Federalism

EO 13132, otherwise known as the Federalism EO, was signed by President Clinton on August 4, 1999, and published in the Federal Register on August 10, 1999 (64 FR 43255). This EO 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 Executive Order (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.

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. 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. The consumer surplus (non-consumptive use and non-use value) associated with improved sea turtle protection can be expected to be superior to that of the status quo. Further, regulatory alternatives that afford higher protection will yield higher benefits at the margin.

Four alternatives are evaluated in this document, in addition to the "no action" alternative. Under the PA, gear modifications are being required of vessels fishing scallop dredge gear south of 41° 9.0' N lat. from May 1 through November 30 in order to protect sea turtles. The intent 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) as described above
- Non-preferred alternative 1 (NPA 1) is exactly the same as the PA, however, the gear modifications are only required from May 1 through October 15
- Non-preferred alternative 2 (NPA 2) is exactly the same as the PA, however, the gear modification is only required for vessels that have a dredge frame 11 ft wide or greater
- Non-preferred alternative 3 (NPA 3) prohibits the use of all scallop dredge gear south of 41° 9.0' N lat. from May 1 through November 30.
- No-action (*i.e.* status quo).

The absolute magnitude of sea turtle protection provided by these alternatives can not be quantified, but they can be ranked. In ranking the alternatives, the third non-preferred alternative (NPA 3) would provide the most protection against sea turtle mortality since scallop dredge gear will be removed completely from the area where sea turtle interactions have been documented. The preferred alternative (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 non-preferred alternative 1 or alternative 2 (NPA 1 or NPA 2) provides the next lower level of sea turtle protection. NMFS observer data show turtles have been taken as bycatch during the month of October in the scallop dredge fishery (Murray 2004). Therefore under NPA 1, there is a chance turtles may be caught between October 15 and November 30. Under NPA 2, vessels that are being exempted from implementing the proposed gear modification were not sampled well by observers. Specifically, less than 1% of fishing effort of vessels with dredges less than 11 ft were observed. Therefore due to 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 5.1.2.2, 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 status quo.

Both consumer surplus and producer surplus for seafood products supplied by the scallop dredge fishery will be affected by these sea turtle protection measures. Under the PA, harvesters will incur additional costs to modify their gear. Plus a slight reduction in revenues may occur since the modified gear may reduce the scallop catch. In general, these sea turtle protection measures will result in revenue losses.

A large decrease in revenues and a large increase in cost to a harvester can result in a reduction of quantities of seafood supplied to seafood markets, which may result in higher prices to consumers. The magnitude of these changes and how the surpluses will be redistributed between consumers and producers will depend on the slopes of the respective supply and demand functions. In any case, as long as demand functions are downward sloping and supply functions are upward sloping, there is always a loss in economic surplus when regulatory costs are imposed. However, this loss in economic surplus will be minimized by selecting the least costly regulatory alternative that provides a level of protection consistent with the purpose and need of this action[1]. Depending on the success of the chain mat gear modification, the preferred alternative may provide a high level of sea turtle protection. Theoretically, if the gear modification eliminates both observed and unobserved interactions (at depth) the PA will approach the protection value of a complete closure (as in NPA 3) because the spatial and temporal extent of the gear modification (PA) and the complete closure (NPA 3) are the same.

7.9.1.2 Industry Impacts

[1] 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.

Industry revenues are $221.4M for the scallop dredge fishery operating south of 41^0 9.0 N lat. Under the PA, 314 vessels are affected, and industry revenues are reduced by 4.3% (=$9.6M/$221.4M) (Table 7.1). 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 followed by the PA, 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.[2]

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 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. However, the PA alternative provides more than just protection that meets the purpose and need of this action if the proposed gear modification is successful at eliminating both observed and unobserved scallop dredge sea turtle interactions (at depth).

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 30th	314/314	4.3%	2	2
NPA 1	All Dredges Modified May 1 – Oct. 15th	314/314	3.7%	3	3
NPA 2	Dredge > 11 ft. modified May 1 – Nov 30th	234/314	3.9%	4	3
NPA 3	Prohibit dredge south of 41^0 9.0N lat.	314/314	63.6%	1	1

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

7.9.1.3 Initial 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 description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed rule; 3) a description and where feasible, an estimate of the number of small entities to which the proposed rule applies; 4) a description of impacts of the proposed rule and alternatives; 5) a 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 requirements of the report or record; and 6) an identification, to the extent practical, of all relevant Federal rules which many duplicate, overlap, or conflict with the proposed rule.

Description of the reasons why action by the agency is being considered: The need and purpose of the action are set forth in section 2.0 of this document and are included herein by reference.

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 41° 9.0' N lat. from May 1 through November 30. The Endangered Species Act provides the legal basis for this rule.

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 proposed rule. Of these 314 vessels, 277 vessels are permitted under DAS and 37 vessels are in the GEN category.

Description of impacts of the proposed rule and alternatives:
The 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 7.8.1.2. 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.

Identification of all relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule: No duplicative, overlapping, or conflicting Federal rules have been identified.

Substantial Number of Small Entities Criterion:
All commercial fishing operations that fish in the manner and location of the proposed action would be affected. All such operations, where they exist, are assumed to be small business

entities, given the information provided above and the standard that a fish harvesting business is considered a small business if it is independently owned and operated and not dominant in its field of operation, and if it has annual receipts not in excess of $3.5 million. The number of entities that engage in fishing in the manner that would be prohibited is considered few.

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

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

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities? The proposed regulation 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 significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities:
Four alternatives are evaluated here, in addition to the "no action" alternative (see the proceeding section 8.1 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.

A 6.71% reduction in the scallop catch has been estimated if this gear modification is implemented. This analysis assumes a 6.76% reduction as reported in the draft report on the field trials. Here we assume the vessel will not increase their fishing effort to offset this loss in catch, but they will incur this revenue loss. Again we assume a 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 5.8). 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. This is the worse 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). The 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 followed by the PA 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.[3]

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 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. However, the PA alternative provides more than just protection that meets the purpose and need of this action if the proposed gear modification is successful at eliminating both observed and unobserved scallop dredge sea turtle interactions (at depth).

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

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

7.10 National Environmental Policy Act

NMFS prepared this Environmental Assessment in accordance with the 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 Exclusive Economic Zone (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. This rule is necessary to protect loggerhead sea turtles listed as threatened under the Endangered Species Act of 1973 (ESA) from capture in scallop dredge gear.

Impacts to the human environment, beneficial, adverse, and cumulative, were evaluated in this document and are not significant.

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 sharply reducing the capture of sea turtles in the dredge itself, as well as any ensuing injuries as a result of being caught in the dredge (*e.g.*, drowning, crushing in the dredge bag, crushing on deck, etc.).

Public health and safety is not expected to be significantly 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 significant 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 unique characteristics of the geographic area impacted by the rule are the presence of Essential Fish Habitat (EFH) and the 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 unique characteristics of this area will not be significantly impacted by this action. The proposed action is not expected to cause substantial damage to the ocean and coastal habitats or to EFH as defined under the Magnuson-Stevens Act and identified in fishery management plans. In addition, the proposed action is not expected to have a substantial impact on biodiversity and ecosystem function within the geographic scope of the action.

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 that they use modified gear when fishing scallop dredge gear south of 41º 9.0' N. lat. The fishing industry, as described in this EA/RIR, has actually petitioned NMFS to require them 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 is in the midst of litigation 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.

The degree to which the effects of the proposed alternatives are highly uncertain or involve unique or unknown risks is small. NMFS recognizes that the specific nature of the interaction between sea scallop dredges and sea turtles remains unknown as sea turtles could be taken when the dredge is being fished on the bottom or during haul back. NMFS does not know how the modified gear interacts with sea turtles on the bottom and in the water column. Video work, which may provide more information on the nature of the interaction, is being conducted. While there is not perfect information available on the nature of the interaction between scallop dredge gear and sea turtles, NMFS has made reasonable assumptions in evaluating the risks and benefits of the proposed action. There is information, however, showing that the use of the chain mat will prevent sea turtles from being captured in the dredge bag, which will prevent them from sustaining injuries that are caused as a result of being caught in the dredge.

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 EIS, does not create a significant controversy over the implementation of the chain mat rule.

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 ESA. 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.

The cumulative impacts of the proposed gear modification have been analyzed with regard to both context and intensity. Given the duration and limited scope of possible cumulative impacts, such impacts are not expected to be significant.

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.

The basis for this action is to offer additional protection to threatened sea turtles. No critical habitat for endangered or threatened species under NMFS' jurisdiction has been designated in mid-Atlantic waters, so none will be affected by the proposed gear regulations.

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. 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.

The proposed action is not expected to jeopardize the sustainability of any target or non-target species that may be affected by the action.

In view of the analysis presented in this document, it is hereby determined that the implementation of the gear modification, as described in section 3.1 of this document, will not significantly affect the quality of the human environment with specific reference to the criteria contained in NAO 216-6 regarding compliance with the National Environmental Policy Act. Accordingly, the preparation of an Environmental Impact Statement for this proposed action is unnecessary.

_____ _____

William T. Hogarth Date
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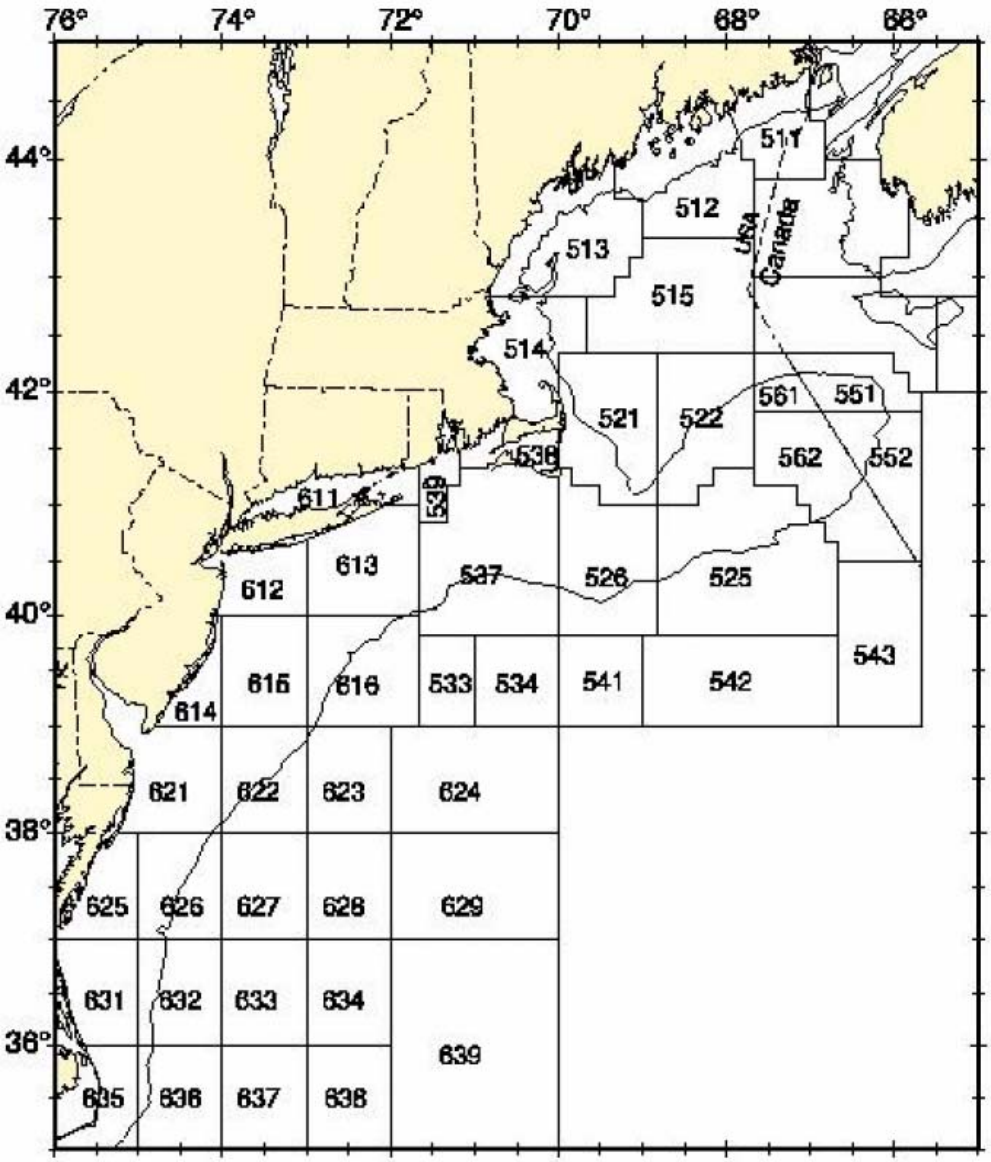
APPENDIX A:

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.