ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Action Agency: NOAA Fisheries, Northeast Regional Office

Activity: Endangered Species Act Section 7 Consultation on the Atlantic Sea Scallop Fishery Management Plan [Consultation No. F/NER/2004/01606]

Consulting Agency: NOAA Fisheries, Northeast Region, through its Protected Resources Division

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Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.) requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect species listed as threatened or endangered, that agency is required to consult with either the National Marine Fisheries Service (NOAA Fisheries) or the U.S. Fish and Wildlife Service (FWS), depending upon the species that may be affected. In instances where NOAA Fisheries or FWS are themselves proposing an action that may affect listed species, the agency must conduct intra-service consultation. Since the action described in this document is proposed to be authorized by NOAA Fisheries Northeast Region (NERO), this office has requested formal intra-service section 7 consultation.

NOAA Fisheries NERO has reinitiated formal intra-service consultation, in accordance with section 7(a)(2) of the ESA, and 50 CFR 402.16 given that new information on sea turtle takes reveals that the continued authorization of the Atlantic sea scallop fishery (scallop fishery) may affect listed species in a manner or to an extent not previously considered. This document represents NOAA Fisheries' biological opinion (Opinion) on the continued implementation of the Atlantic Sea Scallop FMP (Scallop FMP), and its effects on ESA-listed species under NOAA Fisheries jurisdiction in accordance with section 7 of the Endangered Species Act of 1973, as amended.

Formal intra-service section 7 consultation on the continued implementation of the Scallop FMP was reinitiated on September 3, 2004 [Consultation No. F/NER/2004/01606]. This Opinion is based on the information developed by NOAA Fisheries NERO and other sources of information.

1.0 CONSULTATION HISTORY

Cause for Reinitiating

As provided in 50 CFR 402.16, there are several circumstances that trigger reinitiation of formal consultation. These include where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and: (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, or (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the opinion.

The February 23, 2004, Opinion for the scallop fishery concluded that continued operation of the fishery was not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries' jurisdiction (NOAA Fisheries 2004a). However, takes of sea turtles were expected to occur. An Incidental Take Statement (ITS) was provided along with non-discretionary Reasonable and Prudent Measures (RPMs) to minimize the likelihood of take. As described in the ITS, up to 111 sea turtles (107 in scallop dredge gear and 4 in scallop trawl gear) were anticipated to be taken annually as a result of the continued implementation of the scallop fishery. NOAA Fisheries also stated in the Opinion that the Northeast Fisheries Science Center (NEFSC) expected to provide an estimate of the number of turtles captured in scallop dredge gear throughout the scallop fishery for the 2003 scallop fishing year (March 1, 2003 - February 29, 2004) once all of the 2003 data became available (*i.e.*, vessel trip reports, dealer data, and fishery observer data). NOAA Fisheries received the new estimate on August 31, 2004, and concluded that it did provide new information on the effects of the Scallop FMP on sea turtles that was not considered in the February 2004 Opinion. Therefore, in accordance with the regulations at 50 CFR 402.16, formal consultation was reinitiated on September 3, 2004, given that the new information revealed that the scallop fishery may affect ESA-listed sea turtles to an extent that was not previously considered[1].

Consultation History
The consultation history for the scallop fishery was reviewed in the previous formal consultation. Briefly, formal consultation on the scallop fishery was initiated December 21, 2001. The Opinion concluded on February 24, 2003, that the continued operation of scallop fishery 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 or any other ESA-listed species under NOAA Fisheries' jurisdiction (NOAA Fisheries 2003a). An ITS of 97 turtles was provided based on the estimated annual take of turtles in the scallop dredge and trawl fisheries. Reasonable and Prudent Measures were provided to minimize the likelihood of take.

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 and, second, the agency action was proposed to be modified by Amendment 10 in a manner that caused an effect to the listed species or critical habitat not considered in the previous opinion. NOAA Fisheries subsequently modified the proposed action when it initiated an emergency action for the scallop fishery on January 20, 2004. The consultations was, therefore, revised, to consider the effects to ESA-listed species from the modified proposed action. The Opinion concluded (on February 23, 2004) that the continued operation of the scallop fishery, including implementation of Amendment 10 and 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 or any other ESA-listed species under NOAA Fisheries' jurisdiction. As described above, an ITS was provided for these four turtle species along with RPM's to minimize the likelihood of take.

Other than the February 24, 2003, and February 23, 2004, formal consultations, Section 7 consultations were conducted and completed informally for prior framework adjustments and amendments to the Scallop FMP. Each of these informal consultations concluded that the action might affect, but was not likely to adversely affect, species listed as threatened or endangered or designated critical habitat. NOAA Fisheries also completed an informal consultation on July 26,

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1 The Northeast Fisheries Science Center Reference Document [issued in August 2004; DOC. No. 04-11] that provided the sea turtle take estimate for the Mid-Atlantic sea scallop dredge fishery during the 2003 scallop fishing year was subsequently revised [and reissued in October 2004] using improved data about the location of scallop fishing trips to re-estimate the turtle takes. The new estimate did not, however, change the determination that reinitiation was warranted.

2004, to consider the effects to ESA-listed species from the proposed implementation of combined Framework Adjustment 16 to the Scallop FMP and Framework Adjustment 39 to the Northeast Multispecies FMP (Framework 16/39). Framework 16/39 establishes the first rotational access areas for the new management program proposed by Amendment 10 to the Scallop FMP. Specifically, Framework 16/39 allows scallop vessels to dredge for scallops in portions of the existing Georges Bank Multispecies closed areas (Nantucket Lightship Area, Closed Area I, and Closed Area II) and allocates additional Days-At-Sea (DAS) for fishing in these areas.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is NOAA Fisheries' continued authorization of the scallop fishery managed under the Scallop FMP. A summary of the characteristics of the fishery relevant to the analysis of its potential effects on threatened and endangered species is presented below.

2.1 Description of the Current Fishery for Sea Scallops

Management of the Fishery

The sea scallop (*Placopecten magellanicus*) fishery in the U.S. Exclusive Economic Zone (EEZ) is currently managed under the Scallop FMP. Substantive changes have been made to management of the resource in the past year as a result of implementation of Amendment 10 and Framework 16/39. These two actions retained the basic effort control measures to meet the management goals of the Scallop FMP and to control effort in the fishery. These measures include:

- limited access to the fishery;
- DAS allocations;
- minimum shell height for in-shell scallops that may be landed or possessed after landing;
- crew restrictions (number of crew members allowed based on permit type);
- gear restrictions(*e.g.*, maximum sweep of trawl nets, mesh size restrictions, maximum dredge width, minimum ring size, use of chafing gear, *etc.*);
- closed areas;
- open access permit restrictions;
- dealer permits and reporting;
- vessel trip reporting;
- possession and landing limits;
- restrictions on vessel upgrading; and,
- restrictions on the transfer, sale, voluntary relinquishment or abandonment of permits.

As mentioned above, however, implementation of Amendment 10 has made substantive changes in how the fishery is managed. As described in the summary section of the final rule that implemented the approved measures of Amendment 10 (69 FR 35194), Amendment 10 provides a long-term, comprehensive program to manage the sea scallop fishery through an area rotation management program to maximize scallop yield. This area rotation program is based entirely on changing conditions of the scallop resource (69 FR 35194), and encompasses three types of areas: Rotational Closed Areas; Sea Scallop Access Areas; and Open Areas.

Rotational Closed Areas are closed to all scallop harvest to protect large concentrations of fast-growing, small scallops. The areas will re-open for scallop fishing when the scallops are larger and more suitable for harvest, and after evaluation according to the criteria and procedures established in Amendment 10. Amendment 10 established one new Rotational Closed Area. The new closed area is called the "Elephant Trunk Area". It includes the lower portion of the previously existing Hudson Canyon Access Area, and an adjacent area. Fishing for scallops and possession of scallops, except for transiting, is prohibited in the Elephant Trunk Area through February 2007.

In contrast to Rotational Closed Areas, Sea Scallop Access Areas are re-opened closed areas or areas needing area-specific effort or harvest controls. Amendment 10 limits scallop fishing in scallop access areas in order to prevent the rapid harvest of scallops in these areas. Limits on fishing include: area-specific DAS allocations; a minimum number of DAS to be charged for each closed area trip regardless of trip length; a limit on the number of trips (by permit category) that vessels are allowed to make into access areas; and a maximum sea scallop possession limit per trip. Unused access area DAS cannot be carried forward into the next fishing year. Only one access area was identified under Amendment 10; the Hudson Canyon Access Area which was defined similarly as in Frameworks 14 and 15 but with revised boundaries as described above for the "Elephant Trunk Area". Since the rulemaking to implement Amendment 10 was not completed prior to the start of the 2004 scallop fishing year (March 1, 2004 - February 28, 2005), emergency regulations were implemented on March 1, 2004 (69 FR 9970) that continued the Hudson Canyon Access Area for the 2004 fishing year with specific allocations of 48 DAS (4 trips), 12 DAS (1 trip), and 12 DAS (1 trip) for use by scallop vessels with limited access permits in the full-time, part-time, and occasional permit categories, respectively. Each vessel will be charged 12 DAS for each trip, regardless of actual trip length. There is also a trip possession limit of 18,000 lb (8,164.7 kg), consistent with a 1,500-lb (680-kg) per day catch rate. These trip allocations were maintained under Amendment 10 for the remainder of the 2004 fishing year and were intended to remain the same for the 2005 scallop fishing year. However, Framework 16/39 subsequently changed the trip allocations and possession limits for the 2005 scallop fishing year as follows:

- full-time vessels will be allowed up to 3 trips in the Hudson Canyon Access Area (instead of 4) but the DAS trip charge (12 DAS) and trip possession limit (18,000 lbs) will remain the same;
- part-time vessels will be allowed up to 2 trips that can be taken in any one of the three access areas (Hudson Canyon, Closed Area I, and Closed Area II) with a DAS trip charge of 12 DAS and 18,000 lb trip possession limit;
- occasional vessels will be allowed 1 trip that can be taken in any one of the 3 access areas with a DAS trip charge of 5 DAS and a 7,500 lb trip possession limit (69 FR 63460, November 2, 2004).

Open Areas are all areas within the sea scallop management unit other than rotational closed areas, scallop access areas, habitat closure areas, or areas otherwise closed to scallop fishing per regulatory measures developed under a separate FMP. The Amendment 10 measures include specific DAS allocations for open areas. These DAS can only be used in the open areas. The DAS allocations for scallop vessels with full-time, part-time, and occasional permit categories are 42, 17, and 4 DAS, respectively in the 2004 scallop fishing year, and 40, 16, and 3 DAS, respectively, in the 2005 scallop fishing year. The New England Fishery Management Council (Council) is scheduled to propose revised 2006 DAS allocations through a scheduled framework adjustment.

In addition to revising the management program for the sea scallop, Amendment 10 also provided new measures to make the management program more effective, efficient, and flexible (69 FR 35194). These include:

- adding new items to be included in the list of frameworkable measures, including measures to close areas as necessary to reduce interactions with protected species;
- establishing set asides to be used for sea sampling, cooperative industry surveys and scallop research;
- maintaining the status quo overfishing definition with clarifications on the minimum stock size threshold and status determinations based on the resource as a whole;
- setting new gear restrictions for ring size and twine top mesh size to reduce fish byctach and the catch of smaller scallops;
- allowing limited access vessel owners to exchange area access trips on a one-to-one basis when more than one Scallop Access Area is specified (*e.g.*, a vessel owner in the north with an allocated trip in a southern area may exchange a trip in a southern area for a trip in the northern area with a vessel owner in the south); and,
- establishing a procedure that would allow NOAA Fisheries to compensate vessel owners who terminated an access area trip prematurely due to, for example, emergencies, safety reasons, or other reasons deemed appropriate by the captain.

Amendment 10 also intended to allow scallop vessels to fish within portions of the existing Georges Bank Multispecies closed areas (Nantucket Lightship Area, Closed Area I, and Closed Area II), which were closed under the Northeast Multispecies FMP. Access to these areas by scallop vessels was intended to be part of the overall area rotation scheme under Amendment 10, providing access to three areas that have historically contained large concentrations of scallops. However, access to these areas was contingent upon action under the Northeast Multispecies FMP and further development of detailed management measures allowing access with adequate monitoring and controls of finfish bycatch. The Council therefore approved, and NOAA Fisheries implemented, Framework 16/39 which established the access program for the Georges Bank Multispecies closed areas. The Framework 16/39 measures will:

- establish access areas within each of the Georges Bank groundfish closed areas, to be cumulatively referred to as the Georges Bank access areas, for the purpose of allowing scallop fishing by scallop dredge gear;
- limit the access area for the Nantucket Lightship Area to the eastern portion, roughly defined as occurring between 40° 20' N to 40° 50' N and 69° 30' W to 69° 00' W (specific coordinates provided in the Framework);
- limit the access area for Closed Area I to the mid-portion, roughly defined as occurring from 40° 55' N to 41° 26' N and 69° 01' W to 68° 30' W (specific coordinates provided in the Framework);

- limit the access area for Closed Area II to the southern portion, roughly defined as 41° 00' N to 41° 30' N and 67° 20' W to 66° 24.8' W (specific coordinates provided in the Framework);
- rotate access to the Georges Bank controlled access areas, allowing access to two of three areas per scallop fishing year (Nantucket Lightship Area and Closed Area I in 2004, Closed Area I and Closed Area II in 2005, and Closed Area II and Nantucket Lightship Area in 2006);
- allow access to the Georges Bank controlled access areas on a seasonal basis from June 15-January 31;
- establish habitat closures over Georges Bank consistent with those described in Amendment 13 to the Multispecies FMP;
- restrict scallop vessels fishing in the Georges Bank controlled access areas to using dredge gear, only, in accordance with existing regulations (50 CFR 648.51 and 50 CFR 648.2);
- allow vessels with a scallop limited access permit for trawl gear to switch to dredge gear when fishing in the Georges Bank controlled access areas;
- fund observer coverage for vessels fishing in the controlled access areas with a 1% scallop TAC set-aside;
- establish a hard TAC for yellowtail flounder bycatch such that the Georges Bank controlled access areas would be closed to scallop fishing when the TAC was reached;
- allow scallop vessels to transfer unused Georges Bank controlled access trips to scallop open areas following closure of the controlled access area(s) due to meeting the yellowtail flounder TAC;
- establish a set-aside from the yellowtail flounder bycatch TAC for research purposes;
- establish certain possession limits for the retention of groundfish and monkfish that are taken as bycatch while fishing in the Georges Bank controlled access areas;
- require additional procedures for law enforcement purposes (*e.g.*, trip declaration and notification procedures, mandatory Vessel Monitoring System (VMS) requirement; increased polling of the VMS);
- adjust the scallop TAC for scallop limited access vessels and TAC set-asides as compared to those proposed by Amendment 10; and,
- adjust the scallop possession limits for scallop limited access vessels as compared to those proposed by Amendment 10.

The proposed Framework 16/39 measures do not directly affect operation of the multispecies fishery. Since the Georges Bank groundfish closed areas were established in accordance with the Multispecies FMP, the FMP must be modified by a framework action to allow scallop vessels to access the closed areas. Thus, Framework 16/39 only affects operation of the multispecies fishery to the extent that portions of the Georges Bank closed areas are conditionally reopened to allow fishing by scallop dredge vessels. The proposed Framework 16/39 measures are expected to affect operation of the scallop fishery throughout the scallop management area given that it will affect the number of DAS allocated to Federally permitted scallop vessels and will allow access to areas that have otherwise been closed to scallop vessels (NOAA Fisheries 2004c).

Effort shifts in the scallop fishery from less productive open areas to areas of high scallop abundance in the Georges Bank access areas are expected as a result of the Framework 16/39 measures. As a result, fishing effort could actually decrease since scallop vessels fishing in the controlled access areas are expected to catch a greater number of scallops in less time. For example, in 2003, the average scallop catch per day was about 1,250 lbs/day in the Georges Bank region (outside of the Georges Bank closed areas) and 1,800 lbs/day in the Mid-Atlantic region. To achieve these catch rates, it is estimated that the gear is fishing for 20-22 hours/day with each tow lasting approximately 90 minutes (NEFMC 2004). By comparison, the maximum landings for the Georges Bank controlled access areas are expected to be 2,400 lbs/day - 3,000 lbs/day. Given the abundance and size of scallops in the proposed access areas, the tow times should be reduced. In addition, the greater catch per tow will mean that the crew will need more time to shuck the catch before beginning another tow. It is, therefore, estimated that the actual fishing time per DAS will drop to 1-3 hours/day in the access areas (NEFMC 2004). Modeling was also used to estimate and compare the area swept by dredge gear in the Mid-Atlantic with access and without access to the Georges Bank access areas. The estimated area swept in the Mid-Atlantic region is expected to decline from 3,000 nm^2 in 2003 to 2,100 nm^2 in 2004. After 2004, the area swept in the Mid-Atlantic region is estimated to be 58-67% less with access to the Georges Bank access areas as compared to no access (NEFMC 2004). Although the exact relationship between the level of scallop fishing effort and the risk of interaction with ESA-listed sea turtles is unknown, NOAA Fisheries considers a reduction in scallop fishing effort to be of benefit to ESA-listed sea turtles. Given that the proposed Framework 16/39 is expected to result in an overall reduction in the number of scallop tows, a reduction in tow times, and a reduction in the overall area swept, the risk of interactions between scallop fishing gear and ESA-listed sea turtles are also likely to be reduced since there would be fewer opportunities for interactions. In addition, sea turtles should also benefit from the proposed action, which is intended to shift scallop fishing effort from the Mid-Atlantic to Georges Bank. All of the observed interactions between sea turtles and the scallop fishery have occurred in Mid-Atlantic waters where scallop fishing effort and sea turtle concentrations are higher as compared to New England waters (NOAA Fisheries 2004). In addition, because sea turtles are temperature dependent they occur in Mid-Atlantic waters north of the Virginia/North Carolina border from April through November but are typically found in New England waters only from June through October (Braun-McNeill and Epperly 2004). Within New England waters, the distribution of sea turtles also varies by area. Based on data collected by the Cetacean and Turtle Assessment Program (CeTAP), the number of ESA-listed sea turtles observed in the Georges Bank area was very low even during the summer months (CeTAP 1982; Shoop and Kenney 1992). This likely explains why no sea turtle takes were observed or reported for scallop vessels that were allowed access to the Georges Bank groundfish closed areas in 1999 and 2000 despite relatively high levels of observer coverage (22% - 51%) (Memo from M. Sissenwine, NEFSC to P. Howard, NEFMC, November 1, 2000) while sea turtle takes in scallop dredge gear operating in Mid-Atlantic waters have been observed with lower (<1% - 17%) observer coverage. Therefore, a shift in scallop fishing effort from Mid-Atlantic open areas to the Georges Bank access areas should be of benefit to sea turtles by reducing the amount of scallop fishing effort in areas where sea turtles are more likely to occur to areas where sea turtles are unlikely to occur. As a result, the likelihood of sea turtle interactions in the Mid-Atlantic are expected to decline.

As described above, Amendment 10 included a provision that would increase the 2004 scallop fishing year DAS for scallop limited access permit holders if a final rule to implement

Framework 16/39 was not published by September 15, 2004. Since the final rule to implement Framework 16/39 was not published until November 2, 2004, full-time, part-time, and occasional vessels were allocated 20, 8, and 1 additional DAS, respectively, on September 15, 2004. However, Amendment 10 also included a provision that if a permit holder used the additional DAS in the 2004 scallop fishing year, then he/she would not be allowed access to the Georges Bank access areas during that same fishing year once Framework 16/39 was implemented. Because of that provision, NOAA Fisheries expected that many vessels would not use the additional DAS. That expectation seems to have been reasonable given that, as of November 23, 2004, only approximately one-third of the 306 active scallop vessels with limited access permits have used the additional DAS (NOAA Fisheries DAS data).

Characteristics of the Fishery
The scallop fishery is one of the most valuable U.S. fisheries (NOAA Fisheries 2003b). 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 (NEFSC 2004).

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). Sea scallop typically occur at depths of 18 - 100m, but they may also occur in waters as shallow as 2m in estuaries and embayments along the Maine coast (Packer *et al.* 1999). In southern areas they are rarely found at depths less than 55m, primarily due to temperature variation with depth (Packer *et al.* 1999). Temperatures above 21° C as well as salinities above 16.5 parts per thousand (ppt) are lethal for adult scallops (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 (NEFSC 2004). 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 (NEFSC 2004). 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, throughout the Hudson Canyon Access Area, around the perimeter of Georges Bank, including the Great South Channel (NEFMC 2001). In general, scallops occur from about the 40-meter isobath to the 200-meter isobath (NEFMC 2001) but the depth range varies by area with the Mid-Atlantic scallop fishery operating at depths of 35-75 meters (NEFSC memo from John Boreman to Patricia A. Kurkul). Scallop beds occur as deep as 200 meters further north on Georges Bank (NEFSC memo from John Boreman to Patricia A. Kurkul). Overall, most scallops are harvested at depths between 30 and 100 meters in the Mid-Atlantic and the Georges Bank areas (NEFSC 2004). 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 (NEFSC 2004). However, it has been the

[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.

Mid-Atlantic that has seen the largest growth in scallop landings. This area has been experiencing an upward trend in both recruitment and landings since the mid-1980's (NEFSC 2004). 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 (NEFSC 2004).

Many fishermen tend to fish in the same areas and in areas close to their home and landing ports (NEFMC 2003). The location of scallop fishing effort is, therefore, often characterized based on area fished. Eight scallop resource areas have been identified. For simplicity, the resource areas are defined based on the broad statistical areas. This does not mean, however, that the commercial scallop fishery operates throughout the total area. As described above, 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. Most scallops are harvested at depths between 30 and 100 meters in the Georges Bank and the Mid-Atlantic areas (NEFSC 2004; NEFMC 2001). With this caveat in mind, the eight identified resource areas 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 1).

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 (NOAA Fisheries 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%) (NOAA Fisheries 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[3] for the 2003 scallop fishing year (P. Christopher, NOAA Fisheries, 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. For example, full-time limited access permit holders are currently allowed 42 DAS for use in open areas (excluding the additional 20 DAS allocated as of September 15, 2004, for the 2004 fishing year since Framework 16/39 was not implemented by that date) whereas part-time and occasional limited access permit holders are allowed 17 and 4 DAS, respectively, for scallop fishing in open areas. 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 (NOAA Fisheries Preliminary Fisheries Statistics). Less than 2% of trawl landings were attributed to non-Mid-Atlantic resource areas (NOAA Fisheries 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 but are far less than for limited access permit holders who have no possession limits when fishing in open areas, and limits of 18,000 - 7,500 pounds per trip (depending on permit type) when fishing in access areas. By comparison, vessels that have neither a limited access or general category permit (except those that participate exclusively in 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 2,537 general category permits were

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

issued for the 2003 scallop fishing year (P. Christopher, NOAA Fisheries pers. comm.). 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. During the period 1994 - 2001, the number of general category permits issued ranged from 1,992 - 2,343 (NEFMC 2003). However, only approximately 200 - 300 vessels with general category permits actually land scallops each year (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).

2.1.1 Summary of the Fishery

Substantive changes have been made to management of the scallop resource in the past year as a result of implementation of Amendment 10 and Framework 16/39. Amendment 10 established the program for rotational area management but did not establish any new access areas. New access areas were, however, subsequently proposed under Framework 16/39. These two actions retained the basic effort control measures to meet the management goals of the Scallop FMP and to control effort in the fishery. These include limiting access to the fishery, and establishing possession limits for vessels that did not qualify for a limited access permit. There are currently less than 400 limited access permit holders. Many vessels that did not qualify for a scallop limited access permit obtain a general category permit. However, relatively few actually use them. Only 274 of 2,343 general category permit holders in the 2001 scallop fishing year landed scallops (NEFMC 2003).

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. Most scallops are harvested at depths between 30 and 100 meters in the Georges Bank and the Mid-Atlantic areas (NEFSC 2004; NEFMC 2001). For simplicity, eight scallop resource areas have been identified based on statistical areas fished as reported on Vessel Trip Reports. Among the eight areas, the South Channel, New York Bight, and Delmarva resource areas accounted for 90% of the total scallop landings for the 2003 scallop fishing year (NOAA Fisheries Preliminary Fisheries Statistics).

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. Landings by trawl gear accounted for ~ 5% of the total annual scallop landings. The Delmarva resource area accounted for 90% of the trawl landings (NOAA Fisheries Preliminary Fisheries Statistics). Less than 2% of trawl landings were attributed to non-Mid-Atlantic resource areas (NOAA Fisheries Preliminary Fisheries Statistics).

2.2 Action Area

The management unit for the Scallop FMP is defined in the FMP as the range of the sea scallop resource along the U.S. Atlantic coast. In the Northwest Atlantic Ocean, scallops range from Newfoundland to North Carolina along the continental shelf of North America. NOAA Fisheries has determined that the only effects on listed species are the direct effects of interactions between sea turtles and scallop dredge and trawl gear. No indirect effects on ESA-listed species are expected. For the purposes of this Opinion, the area encompassing the effects of the scallop fishery on ESA-listed species (the action area) is the area in which the scallop fishery operates; broadly defined as all EEZ waters from Maine through the Virginia/North Carolina scallop stock area (35° N latitude, see Appendix 1), and the adjoining territorial sea that is affected through the regulation of activities of Federal scallop permit holders fishing in the territorial sea. However, it is important to note that scallop fishing is not distributed evenly throughout the action area. As described above, 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. Most scallops are harvested at depths between 30 and 100 meters in the Georges Bank and the Mid-Atlantic areas (NEFSC 2004; NEFMC 2001). In a review of Vessel Trip Reports for the sea turtle bycatch estimate, Murray (2004, 2nd ed.) 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 meters).

3.0 STATUS OF THE SPECIES

NOAA Fisheries has determined that the action being considered in the Opinion may adversely affect the following sea turtle species provided protection under the ESA:

Loggerhead sea turtle	(*Carretta carretta*)	Threatened
Leatherback sea turtle	(*Dermochelys coriacea*)	Endangered

NOAA Fisheries has determined that the action being considered in the Opinion is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum*), the Gulf of Maine distinct population segment (DPS) of Atlantic salmon (*Salmo salar*), hawksbill sea turtles (*Eretmochelys imbricata*), North Atlantic right whales (*Eubalaena glacialis*), humpback whales (*Megaptera novaengliae*), fin whales (*Balaenoptera physalus*), sei whales (*Balaenoptera borealis*), blue whales (*Balaenoptera musculus*), sperm whales (*Physeter macrocephalus*), Kemp's ridley sea turtles (*Lepidochelys kempii*), or green sea turtles (*Chelonia mydas*) all of which are listed as endangered species under the ESA. Thus, these species will not be considered further in this Opinion. The following discussion is NOAA Fisheries' rationale for these determinations.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. They can be found in rivers along the western Atlantic coast from St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (*i.e.*, south of Chesapeake Bay), while some northern populations are amphidromous (NOAA Fisheries 1998a). There have been no documented cases of shortnose sturgeon takes in the scallop fishery or other fisheries that operate in similar locations or with similar gear. Since operation of the scallop fishery does not occur in or near the rivers where concentrations of shortnose sturgeon are most likely found, it is highly unlikely that the scallop fishery will affect shortnose sturgeon.

The wild populations of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.- Canada border are listed as endangered under the ESA. These populations include those in the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers and Cove Brook. Juvenile salmon in New England rivers typically migrate to sea in May after a two to three year period of development in freshwater streams, and remain at sea for two winters before returning to their U.S. natal rivers to spawn. In 2001, a commercial fishing vessel engaged in fishing operations captured an adult salmon. Although this was subsequently determined to be an escaped aquaculture fish, it does show the potential for take of ESA-listed salmon in commercial fishing gear. In addition, results from a 2001 post-smolt trawl survey in Penobscot Bay and the nearshore waters of the Gulf of Maine indicate that Atlantic salmon post-smolts are prevalent in the upper water column throughout this area in mid to late May. Therefore, commercial fisheries deploying small mesh active gear (pelagic trawls and purse seines within 10-m of the surface) may have the potential to incidentally take smolts. Nevertheless, NOAA Fisheries believes that the proposed action is unlikely to affect ESA-listed Atlantic salmon since operation of the scallop fishery does not occur in or near the rivers where concentrations of Atlantic salmon are most likely to be found, scallop gear operates in the ocean at or near the bottom rather than near the surface, and there have been no recorded takes of Atlantic salmon in scallop gear. It is, therefore, highly unlikely that the action being considered in this Opinion will affect the Gulf of Maine DPS of Atlantic salmon. Thus, this species will not be considered further in this Opinion.

The hawksbill turtle is uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. 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 (Sea Turtle Stranding and Salvage Network (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 which include: sink gillnet, bottom coastal gillnet, drift coastal gillnet, scallop dredge, lobster pot, purse seine and pelagic longline fisheries. Although observer coverage in many of these fisheries has typically been low, given the best available information regarding the range of hawksbill sea turtles and based on the lack of documented takes of hawksbill sea turtles in fisheries that operate in and near the action area, it is reasonable to conclude that the proposed action is unlikely to affect hawksbill sea turtles.

Right whales, humpback whales, and fin whales occur in Mid-Atlantic and New England waters over the continental shelf. Sei whales typically occur over the continental slope or in basins situated between banks (NOAA Fisheries 1998b). During the CeTAP study, sperm whales were observed along the shelf edge, centered around the 1000 meter depth contour but extending seaward out to the 2000 meter depth contour (CeTAP 1982). Although blue whales are occasionally seen in U.S. waters, they are more commonly found in Canadian waters (Waring *et al.* 2000). 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, nevertheless such interactions are expected to be unlikely to occur given that these whale species are larger than a scallop dredge or trawl opening, and have the speed and maneuverability to get out of the way of oncoming of scallop fishing gear. Therefore, these species will not be considered further in this Opinion.

Critical habitat for right whales has been designated for Cape Cod Bay (CCB), Great South Channel (GSC), and coastal Florida and Georgia (outside of the action area for this Opinion). Two other areas under Canadian jurisdiction have been identified as critical to the continued existence of the species. CCB and GSC were designated critical habitat for right whales due to their importance as spring/summer foraging grounds for this species. There is no evidence to suggest that operation of the Federal scallop fishery has any adverse effects on the value of critical habitat designated for the right whale. Right whale critical habitat will, therefore, not be considered further in this Opinion.

Previous Opinions for the scallop fishery 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 (NOAA Fisheries 2003a; 2004a). Although there has never been a documented capture of a Kemp's ridley or green sea turtle in scallop dredge or trawl gear, NOAA Fisheries 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. The increased observer coverage for scallop dredge vessels operating in the Mid-Atlantic (from Long Island, NY to Cape Hatteras, NC) in the 2003 and 2004 (through October 31, 2004) scallop fishing years provided improved information on the species identification of sea turtles captured in the scallop dredge fishery. To date, loggerheads are the only hard-shelled turtle species that has been identified as captured in the scallop dredge fishery despite increased observer coverage throughout the fishery and improved observer training for identifying and documenting turtle species caught in the fishery. Based on this new information as well as information on the distribution of Kemp's ridley and green sea turtles, NOAA Fisheries now believes it is unlikely that either of these species will be captured in scallop dredge gear. Unlike loggerheads which are known to be widely distributed across the continental shelf in the Mid-Atlantic (CeTAP 1982; Shoop and Kenney 1992) during summer and fall, Kemp's ridley and green sea turtles are expected to occur predominantly in inshore waters (*i.e.*, bays and estuaries, and other coastal waters) during foraging seasons where the scallop fishery does not typically operate (Lutcavage and Musick 1985; Keinath *et al.* 1987; Morreale and Standora 1993; Spotila *et al.* 1998). In addition, while the broadest extent of the western Atlantic green turtle's range is from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, they are considered rare north of Cape Hatteras (Wynne and Schwartz 1999).

For similar reasons, Kemp's ridleys and green sea turtles are not expected to interact with scallop trawl gear. The scallop trawl fishery occurs primarily in the Mid-Atlantic in the same depth/temperature range as the scallop dredge fishery. It is a much smaller fishery than the scallop dredge fishery. For the 2003 scallop fishing year (March 1, 2003 - February 29, 2004), scallop landings from trawl gear operating in the Mid-Atlantic accounted for ~ 5% of the total landings (NOAA Fisheries Preliminary Fisheries Statistics). For the 2003 scallop fishing year, 302 limited access permits were issued to scallop dredge vessels of which 236 were for the full-time category. By comparison, only 31 limited access permits were issued to scallop trawl vessels of which 16 were for the full-time category. Therefore, based on both landings and vessel participation, the scallop trawl fishery is a much smaller fishery in terms of effort than the scallop dredge fishery. In addition, although turtle takes have been observed in the summer flounder, *Loligo* squid, *Illex* squid, groundfish, Atlantic croaker and, most recently, scallop trawl fisheries operating within the action area, all takes have been loggerhead sea turtles with the exception of one leatherback take, and two unidentified species. Given this information as well as observer identification of only loggerhead sea turtles captured in scallop dredge gear despite the expansion of observer coverage for the 2003 and 2004 scallop fishing years and improved training of observers to identify and document turtles captured in scallop dredge gear, NOAA Fisheries has determined that it is not reasonably likely that Kemp's ridley or green sea turtles will be captured in scallop trawl gear. Therefore, these species are not likely to be adversely affected by the continued operation of the scallop fishery.

The remainder of this section will focus on the status of loggerhead and leatherback sea turtles within the action area that are likely to be affected by the continued operation of the scallop fishery, summarizing the information necessary to establish the environmental baseline against which the effects of the proposed action will be assessed. Additional background information on the range-wide status of these species can be found in a number of published documents, including sea turtle status reviews and biological reports (NOAA Fisheries and USFWS 1995; Turtle Expert Working Group (TEWG) 1998; 2000; NOAA Fisheries SEFSC 2001), and recovery plans for the loggerhead sea turtle (NOAA Fisheries and USFWS 1991), and leatherback sea turtle (NOAA Fisheries and USFWS 1992).

3.1 Status of Sea Turtles

Loggerhead and leatherback sea turtles continue to be affected by many factors occurring on the nesting beaches and in the water. Poaching, habitat loss (because of human development), and nesting predation by introduced species affect hatchlings and nesting females while on land. Fishery interactions from many sources affect loggerhead and leatherback sea turtles in the pelagic and benthic environments. As a result, loggerhead and leatherback sea turtles still face many of the original threats that were the cause of their listing under the ESA.

Loggerhead and leatherback sea turtles were listed under the ESA at the species level rather than as individual populations or recovery units. However, this Opinion treats the loggerhead and leatherback sea turtle populations in the Atlantic Ocean as distinct from populations that occur in the Pacific for the purposes of this consultation. Loggerhead and leatherback sea turtle populations in the Atlantic Ocean are geographically discrete from populations in the Pacific Ocean, with limited genetic exchange (see NOAA Fisheries and USFWS 1998). Given the similar or greater threats faced by Pacific Ocean populations, the loss of these sea turtle populations in the Atlantic Ocean would result in a significant gap and reduction in the distribution and abundance of each turtle species, which makes these populations biologically significant and would, by itself, appreciably reduce the entire species' likelihood of surviving and recovering in the wild.

With respect to western Atlantic loggerhead sea turtles, NOAA Fisheries recognizes that there are at least five subpopulations: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29°N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota, Florida 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, Florida (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) (NOAA Fisheries SEFSC 2001). Genetic analyses conducted at these nesting sites since the listing indicate that they are distinct subpopulations (TEWG 2000). Therefore, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species likelihood of survival and recovery in the wild. Consequently, this Opinion will treat the five nesting aggregations of loggerhead sea turtles as subpopulations whose survival and recovery is critical to the survival and recovery of the species.

Since this Opinion treats the loggerhead and leatherback sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations and the loss of Atlantic Ocean sea turtle populations would appreciably reduce each species' likelihood of surviving and recovering in the wild, this consultation will focus on the Atlantic populations of leatherback sea turtles and the Atlantic subpopulations of loggerhead sea turtles. Information on the status of Pacific stocks of loggerhead and leatherback sea turtles are included, however, to provide the reader with information on the status of each species, overall.

3.1.1 Loggerhead sea turtle

Loggerhead sea turtles are a cosmopolitan species, found in temperate and subtropical waters and inhabiting pelagic waters, continental shelves, bays, estuaries and lagoons. Loggerhead sea turtles are the most abundant species of sea turtle in U.S. waters.

Pacific Ocean. In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10-20 years. Loggerhead sea turtles in the Pacific are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996). More recent estimates are unavailable. However, qualitative reports infer that the Japanese nesting aggregation has declined since 1995 and continues to decline (Tillman 2000). In addition, genetic analyses of female loggerheads nesting in Japan indicates the presence of genetically distinct nesting colonies (Hatase *et al.* 2002). As a result, Hatase *et al.* (2002) suggest that the loss of one of these colonies would decrease the genetic diversity of loggerheads that nest in Japan, and recolonization of the site would not be expected on an ecological time scale. In Australia, long-term census data has been collected at some rookeries since the late 1960's and early 1970's, and nearly all the data show marked declines in nesting populations since the mid-1980's (Limpus and Limpus 2003). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico, commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries.

Atlantic Ocean. Loggerheads commonly occur throughout the inner continental shelf from Florida through Cape Cod, Massachusetts although their presence varies with the seasons due to changes in water temperature (Braun and Epperly 1996; Epperly *et al.* 1995a, Epperly *et al.* 1995b; Shoop and Kenney 1992). Aerial surveys of loggerhead turtles north of Cape Hatteras indicate that they are most common in waters from 22 to 49 meters deep although they range from the beach to waters beyond the continental shelf (Shoop and Kenney 1992). The presence of loggerhead turtles in an area is also influenced by water temperature. Loggerheads have been observed in waters with surface temperatures of 7-30° C but water temperatures of ≥11° C are favorable to sea turtles (Epperly *et al.* 1995b; Shoop and Kenney 1992). Loggerhead sea turtles occur year round in offshore waters off of North Carolina where water temperature is influenced by the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to migrate to North Carolina inshore waters (*e.g.*, Pamlico and Core Sounds) and also move up the coast (Braun-McNeill and Epperly 2004; Epperly *et al.* 1995a; Epperly *et al.* 1995b; Epperly *et al.* 1995c), occurring in Virginia foraging areas as early as April and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September but some may remain in Mid-Atlantic and Northeast areas until late Fall. By December loggerheads have migrated from inshore North Carolina waters and more northern coastal waters to waters offshore of North Carolina, particularly off of Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles (Epperly *et al.* 1995b; Shoop and Kenney 1992).

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. As described above, there are at least five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29° N; (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990; TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS SEFSC 2001). Cohorts from three of these, the south Florida, Yucatán, and northern subpopulations, are known to occur within the action area of this consultation (Bowen *et al.* 2004; Rankin-Baransky *et al.*

2001) and there is genetics evidence that cohorts from the other two also likely occur (Bass *et al.* in press; Bowen *et al.* 2004). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. This nest beach fidelity will make recolonization of nesting beaches with sea turtles from other subpopulations unlikely. In addition, a recent study by Bowen *et al.* (2004) lends support to the hypothesis that juvenile loggerhead sea turtles also exhibit homing behavior with respect to using foraging areas in the vicinity of their nesting beach. Therefore, coastal hazards that affect declining nesting populations may also affect the next generation of turtles when they are feeding in nearby habitats (Bowen *et al.* 2004).

Mating takes place in late March-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).

A number of stock assessments (TEWG 1998; 2000; NMFS SEFSC 2001; Heppell *et al.* 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. 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 (USFWS and NOAA Fisheries 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 group is the largest known loggerhead nesting assemblage in the Atlantic and one of only two loggerhead nesting assemblages worldwide that has greater than 10,000 females nesting per year (USFWS and NOAA Fisheries 2003; USFWS Fact Sheet). Annual nesting totals have ranged from 48,531 - 83,442 annually over the past decade (USFWS and NOAA Fisheries 2003). South Florida nests make up the majority (90.7%) of all loggerhead nests counted along the U.S. Atlantic and Gulf coasts during the period 1989-1998. The northern subpopulation is the second largest loggerhead nesting assemblage within the United States but much smaller than the south Florida nesting group. Of the total number of nests counted along the U.S. Atlantic and Gulf coasts during the period 1989-1998, 8.5% were attributed to the northern subpopulation. The number of nests for this subpopulation have ranged from 4,370 - 7,887 for the period 1989-1998, for an average of approximately 1,524 nesting females per year (USWFS and NOAA Fisheries 2003). The remaining three subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations. Annual nesting totals for the Florida Panhandle subpopulation ranged from 113-1,285 nests for the period 1989-2002 (USFWS and NOAA Fisheries 2003). The Yucatán nesting group was reported to have had 1,052 nests in 1998 (TEWG 2000). Nest counts for the Dry Tortugas subpopulation ranged from 168-270 during the 9-year period from 1995-2003.

While nesting beach data is a useful tool for assessing sea turtle populations, the detection of nesting trends requires consistent data collection methods over long periods of time (USFWS and NOAA Fisheries 2003). In 1989, a statewide sea turtle Index Nesting Beach Survey (INBS) program was developed and implemented in Florida, and similar standardized daily survey programs have been implemented in Georgia, South Carolina, and North Carolina (USFWS and NOAA Fisheries 2003). Although not part of the INBS program, nesting survey data are also available for the Yucatán Peninsula, Mexico (USFWS and NOAA Fisheries 2003). However, the currently available nesting data is still too limited to indicate statistically reliable trends for these loggerhead subpopulations. To date, analysis of nesting data from the INBS program, including nesting data through 2003, indicate 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; USFWS and NOAA Fisheries 2003). Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida's statewide survey program. Survey effort has been relatively stable during the 9-year 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) did find significant increases in loggerhead nesting on seven 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 of time. Using the information gathered from these select south Florida and northern subpopulation nesting beaches, the Turtle Expert Working Group (TEWG) concluded that the south Florida subpopulation was increasing based on nesting data over the last couple of decades, and that the northern subpopulation was stable or declining (TEWG 2000).

Sea turtle biologists are cautiously watching nest counts for the subpopulations. Nest counts appear to be down for the past five years. Loggerheads do exhibit a cyclical pattern to nesting 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 hurricane season of 2004, can also destroy many nests thereby influencing the nest also effect nesting trends since a majority of the nests are destroyed in any particular year. Therefore, it is unknown at this time whether the nest counts over the past five 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 (mature females), using nesting trend data to make conclusions about the status of the 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. While there is no current evidence to support or refute these assumptions, multiple management actions have been implemented in the United States that either directly or indirectly address the known sources of mortality for loggerhead sea turtles (*e.g.*, fishery interactions, power plant entrainment, destruction of nesting beaches, etc.). These management actions are discussed more fully in section 4.1 of this Opinion.

One of the difficulties associated with using loggerhead nesting trend data as an indicator of subpopulation status is the late age to maturity for loggerhead sea turtles. Past literature gave an estimated age at maturity for loggerhead sea turtles of 21-35 years (Frazer and Ehrhart 1985;

Frazer *et al.* 1994) with the benthic immature stage lasting at least 10-25 years. New data from tag returns, strandings, and nesting surveys suggested estimated ages of maturity ranging from 20-38 years and the benthic immature stage lasting from 14-32 years (NOAA Fisheries SEFSC 2001). Caution must still be exercised, however, when defining the benthic immature stage. Like other sea turtles, loggerhead hatchlings enter the pelagic environment upon leaving the nesting beach. It had previously been thought that after approximately 7-12 years in the pelagic environment, immature loggerheads entered the benthic environment and undertook seasonal north and south migrations along the coast. However, the use of pelagic and benthic environments by loggerhead sea turtles is now suspected of being much more complex (Witzell 2002). Loggerheads may remain in the pelagic environment for longer periods of time or move back and forth between the pelagic and benthic environment (Witzell 2002). 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 (Witzell 2002; 1999). 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 2002; 1999).

In 2001, NOAA Fisheries (SEFSC) reviewed and updated the stock assessment for loggerhead sea turtles of the western Atlantic (NOAA Fisheries SEFSC 2001). The assessment reviewed and updated information on nesting abundance and trends, estimation of vital rates (including age to maturity), 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 also looked at the impact of the U.S. pelagic longline fishery on loggerheads 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]. NOAA Fisheries SEFSC (2001) modified the model developed by Heppell *et al.* (2003) to include updated vital rate information (*e.g.*, new estimates of the duration of life stages and time to maturity) and, unlike Heppell *et al.* (2003), also considered sex ratios other than 1:1 (NOAA Fisheries SEFSC 2001). The latter is an important point since studies have suggested that the proportion of females produced by the northern subpopulation is only 35% while the proportion of females produced by the south Florida subpopulation is 80% (NOAA Fisheries SEFSC 2001).

NOAA Fisheries SEFSC (2001) constructed four different models that differed based on the duration of life stages. Each model was run using three different inputs for population growth, and three different sex ratios (35%, 50%, and 80% female) for a total of 36 model runs. The models also included a 30% decrease in small benthic juvenile mortality based on research findings of (existing) TED effectiveness (Crowder *et al.* 1995; NOAA Fisheries SEFSC 2001; Heppell *et al.* 2003). Using 27 of the 36 model runs (runs for Model 2 were not further tested at this point because it was producing unrealistic results), the runs were then compared with respect to the change in population status when modified to include: (a) an estimated 30% increase in the survival rate of large benthic juveniles as a result of implementing the requirement for larger

[4] Although Heppell *et al.* is a later publication, NOAA Fisheries 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 actually published after NOAA Fisheries 2001.

TEDs (Epperly *et al.* 2002), (b) a projected change in pelagic immature survival from -10% to +10% in 5% increments, and (c) the combined effect of the estimated 30% increase in survival for large benthic juveniles plus changes in the survival rate of pelagic immature survival from -10% to +10% in 5% increments.

NOAA Fisheries SEFSC (2001) ran the model scenarios using 35%, 50%, and 80% as the proportion of females in the population, where 35% was thought to be representative of the northern subpopulation and 80% was believed to be representative of the south Florida subpopulation. The 50% was included since it was used in historical models (NOAA Fisheries SEFSC 2001; Heppell *et al.*, 2003). The range of sex ratios bracket the estimated sex ratio (69%) of the Yucatán subpopulation. The results of the modeling indicated that the proposed change in the TED regulations that would allow larger benthic immature loggerheads and sexually mature loggerheads to escape from shrimp trawl gear would have a positive or at least stabilizing influence on the subpopulation (depending on the estimated growth rate of the subpopulation and proportion of females) in nearly all scenarios. Coupling the anticipated effect of the proposed TED changes with changes in the survival rate of pelagic immature loggerheads revealed that subpopulation status would be positive or at least stable when pelagic immature survival was changed by 0 to +10% in all but the most conservative model scenarios.

NOAA Fisheries' SEFSC (2001) assessment was reviewed by three independent experts (Center for Independent Experts (CIE) 2001). As a result, NOAA Fisheries SEFSC's stock assessment report, the reviews of it, and the body of scientific literature upon which these documents were derived represent the best available scientific and commercial information for Atlantic loggerheads. Given that the proposed TED regulations have now been implemented, and given that the mortality of pelagic immature loggerhead sea turtles has also been addressed with the goal of increasing pelagic immature survival by 10%, based on the modeling work, loggerhead subpopulations in the western Atlantic should experience positive or at least stable growth as loggerheads in the various age classes mature. These changes are unlikely to be evident in nesting beach censuses for many years to come given the late age at maturity for loggerhead sea turtles and the normal fluctuations in nesting.

Given direction from Congress to provide "benefit of the doubt" to the species, for the purposes of this Opinion, NOAA Fisheries only considered the model runs that used the following parameters: a starting population growth rate of 0.97 (*i.e.*, a 3% annual decline in the population), average age to maturity as 39 years (model 4), and a 35% or 50% proportion of females in the population. Overall, these were the most conservative model runs with the exception of model runs that were initiated with a population growth rate of 0.95 (*i.e.*, a 5% annual decline in the population). NOAA Fisheries chose not to use the model runs with a starting growth rate of 0.95 given that this growth rate is not supported by other data sets (NOAA Fisheries 2002). Likewise, a growth rate of 1.0 as calculated from the meta-analysis of multiple northern subpopulation nesting beaches (NOAA Fisheries SEFSC 2001) may be overly optimistic given that, as described in NOAA Fisheries SEFSC (2001), it is an unweighted analysis and does not consider the beaches' relative contribution to the total nesting activity. With respect to the age to maturity, we have chosen to use model 4 which is more conservative since it is based on an average age to maturity (39 years) compared to a minimum age to maturity (30 years). Similarly, although there is information to suggest that the south Florida and Yucatán subpopulations produce a greater proportion of female hatchlings (80% and 69%, respectively; NOAA Fisheries SEFSC 2001), this Opinion errs on the side of caution and uses only those model runs which assumed a sex ratio of 35% and 50% female hatchlings. Model runs by NOAA Fisheries SEFSC indicated that the effect of the TED regulation to allow larger benthic immature and sexually mature loggerheads to escape for a population with an initial growth rate of 0.97, average age to maturity of 39 years, and a sex ratio of 35% females would result in moving the population from declining to stable. Coupling these measures with an increase in pelagic immature survival of 5 to10% would result in a population increase. For a population with a female sex ratio of 50% (and all other parameters the same), the effect of the TED regulation would be to change the population trend from declining to increasing. Coupling the TED regulation with an increase in pelagic immature survival of 5 to 10% would result in even greater positive population growth. Therefore, based on the modeling approach of NOAA Fisheries SEFSC 2001, the western Atlantic loggerhead subpopulations should experience stable or increased subpopulation growth in the coming years as the current immature age classes reach maturity, and as shrimp trawl mortality of mature loggerheads is reduced.

Anthropogenic effects to loggerhead sea turtles

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 benthic environment, and in the pelagic 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. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton *et al.* 1994). Early reports suggest that extensive loggerhead nest destruction has occurred in Florida and other southern states in 2004 due to damage from multiple hurricanes and storm events. 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 led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest 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.

Sea turtles, including 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 pelagic environment loggerheads are exposed to a series of longline fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, a Japanese longline fleet, Chinese longline fleet, an Azorean longline fleet, a Spanish longline fleet, and various fleets in the Mediterranean Sea (Aguilar *et al.* 1995; Bolten *et al.* 1994; Crouse 1999). Globally, the number of loggerhead sea turtles captured in pelagic longline fisheries is significant (Lewison *et al.* 2004). The effects of the U.S. tuna and swordfish longline fisheries on loggerhead sea turtles have been assessed through section 7 consultation on the Highly Migratory Species Fishery Management Plan (HMS FMP). Further information on the effects of these fisheries on loggerhead sea turtles is provided in section 4.1.1 of this document. In short, NOAA Fisheries estimates that 1,869 loggerheads will be captured in the pelagic longline fishery (no more than 438 mortalities) for the 3-year period from 2004-2006. For each subsequent 3-year period, 1,905 loggerheads are expected to be taken with no more than 339 mortalities (NOAA Fisheries 2004b). NOAA Fisheries continues to work with pelagic longline fishers on gear modifications to help minimize turtle interactions with longline gear.

In the benthic environment in waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries. Perhaps the most well documented U.S. fishery with respect to interactions with sea turtles, including loggerheads, is the U.S. shrimp fishery. NOAA Fisheries continues to address the effects of this fishery on loggerheads as well as other sea turtle species. Turtle Excluder Devices have proven to be effective at excluding Kemp's ridley sea turtles and some age classes of loggerhead and green sea turtles from shrimp trawls. However, it was apparent that TEDs were not effective at excluding large benthic immature and sexually mature loggerheads (as well as large greens) from shrimp trawls (Epperly and Teas 2002). Therefore, on February 21, 2003, NOAA Fisheries issued a final rule that required increasing the size of TED escape openings to allow larger loggerheads (and green sea turtles) to escape from shrimp trawl gear. As a result of the new rules, annual loggerhead mortality from capture in shrimp trawls is expected to decline from 62,294 to 3,947 turtles (Epperly *et al.* 2002). Additional information is provided in section 4.1.1 of this Opinion regarding loggerhead turtle interactions with U.S. fisheries that operate in total or in part within the action area.

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

Summary of Status for Loggerhead Sea Turtles
In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (*e.g.*, due to egg poaching).

There are at least five western Atlantic loggerhead subpopulations (NMFS SEFSC 2001; TEWG 2000; Márquez 1990). 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.* in press). A separate study (Bowen *et al.* 2004) conducted genetic analysis of samples collected from loggerhead sea turtles from Florida to Massachusetts and similarly found that all five western Atlantic loggerhead subpopulations were represented. The south Florida nesting group is the largest known loggerhead nesting assemblage in the Atlantic and one of only two loggerhead nesting assemblages worldwide that have greater than 10,000 females nesting per year (USFWS and NOAA Fisheries 2003; USFWS Fact Sheet). The northern subpopulation is the second largest loggerhead nesting assemblage within the United States. The remaining three subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations with nest counts ranging from roughly 100 - 1,000 nests per year.

Loggerheads are a long-lived species and reach sexual maturity relatively late; 20-38 years (NMFS SEFSC 2001). The INBS program helps to track loggerhead status through nesting beach surveys. However, given the cyclical nature of loggerhead nesting, and natural events that sometimes cause destruction of many nests in a nesting season, multiple years of nesting data are needed to detect relevant nesting trends in the population. The INBS program has not been in place long enough to provide statistically reliable information on the subpopulation trends for western Atlantic loggerheads. In addition, given the late age of maturity for loggerhead sea turtles, nesting data represents effects to female loggerheads that have occurred through the various life stages over the past couple of decades. Therefore, caution must be used when interpreting nesting trend data since they may not be reflective of the current subpopulation trend if effects to the various life stages have changed.

NOAA Fisheries SEFSC (2001) took an alternative approach for looking at trends in loggerhead subpopulations. Using multiple model scenarios that varied based on differences in starting growth rates, sex ratios, and age to maturity, the model looked at the relative change in the subpopulation trend when mortality of pelagic immature, benthic immature, and mature loggerhead sea turtles was reduced as a result of changes to the U.S. shrimp trawl fishery and the U.S. pelagic longline fishery. For the purposes of this Opinion, NOAA Fisheries has provided "benefit of the doubt" to the species and uses those model runs which are conservative (starting growth rate of 0.97, average age to maturity as 39 years (model 4), and a 35% or 50% proportion of females in the population) as a predictor of the trend for western loggerhead subpopulations. Based on the results of the specified model runs, the modeling work suggests that western Atlantic loggerhead subpopulations should increase as a result of implementation of the new TED regulations that substantially reduce mortality of large, benthic immature and sexually mature loggerheads combined with a reduction in mortality of pelagic immature loggerheads resulting from implementation of new measures for the pelagic longline fishery. Even in the absence of a reduction in pelagic immature mortality from changes to the pelagic longline fishery, the model work supports the conclusion that the trend for western Atlantic loggerhead subpopulations will move from declining to stable (with an initial growth rate of 0.97, average age to maturity of 39 years, and a sex ratio of 35% females) or from declining to increasing (with an initial growth rate of 0.97, average age to maturity of 39 years, and female sex ratio of 50%) (NOAA Fisheries SEFSC 2001) given the reduction in mortality of large benthic immature and mature loggerheads as a result of changes to the TED requirements for the shrimp trawl fishery.

3.1.2 Leatherback sea turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtle species. Their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NOAA Fisheries and USFWS 1995). In 1980, the global population of adult female leatherbacks was estimated at approximately 115,000 (Pritchard 1982). By 1995, this global population of adult females had declined to 34,500 (Spotila *et al.* 1996).

Pacific Ocean. Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila *et al.* 1996; NOAA Fisheries and USFWS 1998; Sarti *et al.* 2000; Spotila *et al.* 2000). Leatherback turtles disappeared from India before 1930, have been virtually extinct in Sri Lanka since 1994, and appear to be approaching extinction in Malaysia (Spotila *et al.* 2000). For example, the nesting assemblage on Terengganu (Malaysia) - which was one of the most significant nesting sites in the western Pacific Ocean - has declined severely from an estimated 3,103 females in 1968 to 2 nesting females in 1994 (Chan and Liew 1996). Nesting assemblages of leatherback turtles along the coasts of the Solomon Islands, which historically supported important nesting assemblages, are also reported to be declining (D. Broderick, pers. comm., *in* Dutton *et al.* 1999). In Fiji, Thailand, Australia, and Papua-New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest, extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 3,000 nests recorded annually (Putrawidjaja 2000; Suárez *et al.* 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, however, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suárez 1999); unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region where observers report that nesting assemblages are well below abundance levels that were observed several decades ago (*e.g.*, Suárez 1999).

In the western Pacific Ocean and South China Seas, leatherback turtles are captured, injured, or killed in numerous fisheries including Japanese longline fisheries. Leatherback turtles in the western Pacific are also threatened by poaching of eggs, killing of nesting females, human encroachment on nesting beaches, incidental capture in fishing gear, beach erosion, and egg predation by animals.

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches located on the Pacific coast of Mexico support as many as half of all leatherback turtle nests. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 during 1998-99 and 1999-2000 (Sarti *et al.* 2000). Spotila *et al.* (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila *et al.* (2000) estimated that the colony could fall to less than 50 females by 2003-2004. Commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries are known to capture, injure or kill leatherback turtles in the eastern Pacific Ocean. Although all causes of the declines in Pacific leatherback turtle colonies have not been documented, the Pacific population has continued to decline leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (*e.g.*, Spotila *et al.* 1996; Spotila *et al.* 2000).

Atlantic Ocean. Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate and tropical waters (NOAA Fisheries and USFWS 1992). A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in water depths ranging from 1-4151 m but 84.4% of sightings were in waters less than 180 m (Shoop and Kenney 1992). Leatherbacks were sighted in waters within a sea surface temperature range similar to that observed for loggerheads; from 7-27.2 ° C (Shoop and Kenney 1992). However, leatherbacks appear to have a greater tolerance for colder waters in comparison to loggerhead sea turtles since more leatherbacks were found at the lower temperatures as compared to loggerheads (Shoop and Kenney 1992). This aerial survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North

Carolina). However, this estimate was based on turtles visible at the surface and does not include those that were below the surface out of view. Therefore, it likely underestimates the leatherback population for the northeastern U.S. Estimates of leatherback abundance of 1,052 turtles (C.V.= 0.38) and 1,174 turtles (C.V.= 0.52) were obtained from surveys conducted from Virginia to the Gulf of St. Lawrence in 1995 and 1998, respectively (Palka 2000). However, since these estimates were also based on sightings of leatherbacks at the surface, the author considered the estimates to be negatively biased and the true abundance of leatherbacks may be 4.27 times the estimates (Palka 2000).

Leatherbacks are also a long lived species (> 30 years). They mature at a younger age than loggerhead turtles, with an estimated age at sexual maturity of about 13-14 years for females with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NOAA Fisheries SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. As is the case with other sea turtle species, leatherback hatchlings enter the water soon after hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (CCL), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm CCL.

Leatherbacks 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. For example, leatherbacks occur annually in Cape Cod Bay and Vineyard and Nantucket Sounds during the summer and fall months.

Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (9.1-11.5% increase), although it is critical to note that there was also an increase in the survey area in Florida over time (NOAA Fisheries SEFSC 2001). The largest leatherback rookery in the western Atlantic remains along the northern coast of South America in French Guiana and Suriname. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). Nest numbers in Suriname have shown an increase and the long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). Studies by Girondot et al. (in review) also suggest that the trend for the Suriname - French Guiana nesting population over the last 36 years is stable or slightly increasing.

Tag return data emphasize the link between these South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, VA. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database). Many other examples also exist. For example, leatherbacks tagged at nesting beaches in Costa Rica have been found in Texas, Florida, South Carolina, Delaware, and New York (STSSN database). Leatherback turtles tagged in Puerto Rico, Trinidad, and the Virgin Islands have also been subsequently found on U.S. beaches of southern, Mid-Atlantic and northern states (STSSN database).

Of the Atlantic turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), and their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in longline fisheries. They are also susceptible to entanglement in gillnets (used in various fisheries) and capture in trawl gear (*e.g.*, shrimp trawls). Sea turtles entangled in fishing gear generally have a reduced ability to feed, dive, surface to breathe or perform any other behavior essential to survival (Balazs 1985). They may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in tissue necrosis.

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. According to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NOAA Fisheries SEFSC 2001). Since the U.S. fleet accounts for only 5-8% of the hooks fished in the Atlantic Ocean, adding up the under-represented observed takes of the other 23 countries actively fishing in the area would likely result in annual take estimates of thousands of leatherbacks over different life stages (NOAA Fisheries SEFSC 2001).

Leatherbacks are susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine (Dwyer *et al.* 2002). Additional leatherbacks stranded wrapped in line of unknown origin or with evidence of a past entanglement (Dwyer *et al.* 2002). A review of leatherback mortality documented by the STSSN in Massachusetts suggests that vessel strikes and entanglement in fixed gear (primarily lobster pots and whelk pots) are the principal sources of this mortality (Dwyer *et al.* 2002). Fixed gear fisheries in the Mid-Atlantic have also contributed to leatherback entanglements. For example, in North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm. to Sheryan Epperly, NOAA Fisheries SEFSC 2001). A third leatherback was reported entangled in a crab pot buoy in Pamlico Sound off of Ocracoke. This turtle was disentangled and released alive; however, lacerations on the front flippers from the lines were evident (D. Fletcher, pers. comm. to Sheryan Epperly, NOAA Fisheries SEFSC 2001). In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries as documented on stranding forms. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 were due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm. to Joanne Braun-

McNeill, NOAA Fisheries SEFSC 2001). Since many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast shrimp fishery, which operates from North Carolina through southeast Florida (NOAA Fisheries 2002), are also common. The National Research Council Committee on Sea Turtle Conservation identified incidental capture in shrimp trawls as the major anthropogenic cause of sea turtle mortality (NRC 1990). Leatherbacks are likely to encounter shrimp trawls working in the coastal waters off the Atlantic coast (from Cape Canaveral, Florida through North Carolina) as they make their annual spring migration north. For many years, TEDs that were required for use in the southeast shrimp fishery were less effective for leatherbacks as compared to the smaller, hard-shelled turtle species, because the TED openings were too small to allow leatherbacks to escape. To address this problem, on February 21, 2003, NOAA Fisheries issued a final rule to amend the TED regulations. Modifications to the design of TEDs are now required in order to exclude leatherbacks as well as large benthic immature and sexually mature loggerhead and green turtles.

Other trawl fisheries are also known to interact with leatherback sea turtles although on a much smaller scale. In October 2001, for example, a fisheries observer documented the take of a leatherback in a bottom otter trawl fishing for *Loligo* squid off of Delaware. The observed take was noted as occurring in bottom trawl gear where the scallop fishery also operates. TEDs are not required in this fishery.

Gillnet fisheries operating in the nearshore waters of the Mid-Atlantic states are also suspected of capturing, injuring and/or killing leatherbacks when these fisheries and leatherbacks co-occur. Data collected by the NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54% to 92%. In North Carolina, a leatherback was reported captured in a gillnet set in Pamlico Sound in the spring of 1990 (D. Fletcher, pers.comm. to Sheryan Epperly, NOAA Fisheries SEFSC 2001). It was released alive by the fishermen after much effort. Five other leatherbacks were released alive from nets set in North Carolina during the spring months: one was from a net (unknown gear) set in the nearshore waters near the North Carolina/Virginia border (1985); two others had been caught in gillnets set off of Beaufort Inlet (1990); a fourth was caught in a gillnet set off of Hatteras Island (1993), and a fifth was caught in a sink net set in New River Inlet (1993). In addition to these, in September 1995 two dead leatherbacks were removed from a large (11-inch) monofilament shark gillnet set in the nearshore waters off of Cape Hatteras, North Carolina (STSSN unpublished data reported in NOAA Fisheries SEFSC 2001).

Poaching is not known to be a problem for nesting populations in the continental U.S. However, the NOAA Fisheries SEFSC (2001) noted that poaching of juveniles and adults was still occurring in the U.S. Virgin Islands. In all, four of the five strandings in St. Croix were the result of poaching (Boulon 2000). A few cases of fishermen poaching leatherbacks have been reported from Puerto Rico, but most of the poaching is on eggs.

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

It is important to note that, like marine debris, fishing gear interactions and poaching are problems for leatherbacks throughout their range. Entanglements are common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line and crab pot line. Leatherbacks are known to drown in fish nets set in coastal waters of Sao Tome, West Africa (Castroviejo *et al.* 1994; Graff 1995). Gillnets are one of the suspected causes for the decline in the leatherback sea turtle population in French Guiana (Chevalier *et al.* 1999), and gillnets targeting green and hawksbill turtles in the waters of coastal Nicaragua also incidentally catch leatherback turtles (Lagueux *et al.* 1998). Observers on shrimp trawlers operating in the northeastern region of Venezuela documented the capture of six leatherbacks from 13,600 trawls (Marcano and Alio 2000). An estimated 1,000 mature female leatherback sea turtles are caught annually in fishing nets off of Trinidad and Tobago with mortality estimated to be between 50-95% (Eckert and Lien 1999). However, many of the turtles do not die as a result of drowning, but rather because the fishermen butcher them in order to get them out of their nets (NOAA Fisheries SEFSC 2001).

Summary of Leatherback Status

In the Pacific Ocean, the abundance of leatherback turtles on nesting colonies has declined dramatically. At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

The largest leatherback rookery in the western Atlantic remains along the northern coast of South America in French Guiana and Suriname. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). Nest numbers in Suriname have shown an increase and the long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). Studies by Girondot et al. (in review) also suggest that the trend for the Suriname - French Guiana nesting population over the last 36 years is stable or slightly increasing.

Some of the same factors that led to precipitous declines of leatherbacks in the Pacific also affect leatherbacks in the Atlantic. Leatherbacks are captured and killed in many kinds of fishing gear and interact with fisheries in U.S. state and federal waters as well as in international waters. Poaching is a problem and affects leatherbacks that occur in U.S. waters. Leatherbacks also appear to be more susceptible to death or injury from ingesting marine debris than other turtle species.

4.0 ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this Opinion includes the effects of several activities that may affect the survival and recovery of loggerhead and leatherback sea turtles in the action area. The activities that shape the environmental baseline in the action area of this consultation generally fall into the following three categories: fisheries, other impacts that cause death or otherwise impair a turtles ability to function, and recovery activities associated with reducing those impacts.

4.1 Fishery Operations

4.1.1 Federal fisheries

Several 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 trap gear have been documented as unintentionally capturing or entangling sea turtles. In some cases, the entangled turtles are harmed, injured, or killed as a result of the interaction. Formal ESA section 7 consultation has been conducted on the American Lobster, Atlantic Bluefish, Atlantic Herring, Atlantic Mackerel/Squid/Atlantic Butterfish, Highly Migratory Species, Monkfish, Northeast Multispecies, Red Crab, Skate, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Tilefish fisheries. An Incidental Take Statement (ITS) has been issued for the take of sea turtles in each of the fisheries (Appendix 2). A summary of each consultation is provided but more detailed information can be found in the respective Opinions.

The *American lobster trap fishery* has been identified as a source of gear causing serious injuries and mortality of endangered whales and leatherback sea turtles. Previous Opinions for this fishery have concluded that operation of the lobster trap fishery is likely to jeopardize the continued existence of right whales and may adversely affect leatherback sea turtles. A Reasonable and Prudent Alternative (RPA) to avoid the likelihood that the lobster fishery would jeopardize the continued existence of right whales was implemented. However, these measures are not expected to reduce the number or severity of leatherback sea turtle interactions with the fishery. Information on leatherback entanglements in lobster trap gear is generally lacking. There are no reporting requirements for the lobster trap fishery with respect to sea turtles and, unlike cetaceans, there is no formal disentanglement network for leatherbacks caught in lobster trap gear. Leatherbacks are known, however, to be caught in lobster trap gear (Dwyer *et al.* 2002). Although there is an ITS for leatherback interactions with the lobster trap fishery, better information is needed to more fully assess the effects of this fishery on leatherback sea turtles.

The *Atlantic Bluefish fishery* may pose a risk to protected marine mammals, but is most likely to interact with sea turtles (primarily Kemp's ridley and loggerheads) given the time and locations where the fishery occurs. Gillnets are the primary gear used to commercially land bluefish. Turtles can become entangled in the buoy lines of the gillnets or in the net panels.

Section 7 consultation was completed on the *Atlantic Herring* FMP on September 17, 1999, and concluded that the federal herring fishery was not likely to jeopardize the continued existence of threatened or endangered species or adversely modify designated critical habitat. Since much of the herring fishery occurs in state waters, the fishery is managed in these waters under the guidance of the Atlantic States Marine Fisheries Commission (ASMFC). The *Atlantic Herring Interstate Fishery Management Plan (ISFMP) and Amendment 1 to the Herring ISFMP* were approved by the ASMFC in October 1998. This plan is complementary to the Federal FMP for herring and includes similar measures for permitting, recordkeeping/reporting, area-based management, sea sampling, Total Allowable Catch (TAC) management, effort controls, use restrictions, and vessel size limits as well as measures addressing spawning area restrictions, directed mealing, the fixed gear fishery, and internal waters processing operations (transfer of fish to a foreign processor in state waters). The ASMFC plan, implemented through regulations promulgated by member states, is expected to benefit listed species and critical habitat by reducing effort in the herring fishery.

The *Atlantic Mackerel/Squid/Atlantic Butterfish fishery* is known to take sea turtles and may occasionally interact with whales and shortnose sturgeon. Several types of gillnet gear may be used in the mackerel/squid/butterfish fishery. Other gear types that may be used in this fishery include midwater and bottom trawl gear, pelagic longline/hook-and-line/handline, pot/trap, dredge, poundnet, and bandit gear. Entanglements or entrapments of whales, sea turtles, and sturgeon have been recorded in one or more of these gear types.

Components of the *Highly Migratory Species (HMS)* Atlantic pelagic fishery for swordfish/tuna/shark in the EEZ occur within the action area for this consultation. Use of pelagic longline, pelagic driftnet, bottom longline, hand line (including bait nets), and/or purse seine gear in this fishery has resulted in the take of sea turtles and whales. The Northeast swordfish driftnet portion of the fishery was prohibited during an emergency closure that began in December 1996, and was subsequently extended. A permanent prohibition on the use of driftnet gear in the swordfish fishery was published in 1999. In June 2001, NOAA Fisheries completed consultation on the HMS pelagic longline fishery and concluded that the pelagic longline fishery and the bottom longline fisheries for shark could capture as many as 1,417 pelagic, immature loggerhead turtles each year and could kill as many as 381 of them and was also expected to capture 875 leatherback turtles each year, killing as many as 183 of them. After considering the status and trends of populations of these two species of sea turtles, the impacts of the various activities that constituted the baseline, and adding the effects of this level of incidental take in the fisheries, the Opinion concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. An RPA was provided to avoid jeopardy to leatherback and loggerhead sea turtles as a result of operation of the HMS fisheries. Consultation was subsequently reinitiated on the HMS fishery following new information on the number of loggerhead and leatherback sea turtles captured in the fishery. NOAA Fisheries completed the biological opinion for that consultation on June 1, 2004. The Opinion concluded that the continued prosecution of the HMS pelagic longline fishery was likely to jeopardize the continued existence of leatherback sea turtles, given that an estimated 805 takes (of which 266 mortalities would result) were expected to occur in 2004, and an estimated 588 takes (with 198 mortalities) were expected in subsequent years, continuing indefinitely. A new RPA was developed. As a result of implementation of the new RPA, leatherback takes are estimated to be 1,981 for the period 2004-2006 with no more than 548 mortalities, and 1764 takes for subsequent 3-year periods with no more than 252 mortalities in each 3-year period (NOAA Fisheries 2004b). The continued implementation of the HMS fisheries is not expected to jeopardize the continued existence of loggerhead sea turtles, and loggerheads are expected to benefit from implementation of the RPA. As a result, a new ITS has been issued for this species. For the 3-year period from 2004-2006, an estimated 1,869 loggerheads are expected to be taken in the fishery with no more than 438 mortalities. For each subsequent 3-year period, 1,905 loggerheads are expected to be taken with no more than 339 mortalities (NOAA Fisheries 2004b).

The Federal *Monkfish fishery* occurs in all waters under federal jurisdiction from Maine to the North Carolina/South Carolina border. The current commercial fishery operates primarily in the deeper waters of the Gulf of Maine, Georges Bank, and southern New England, and in the Mid-Atlantic. Monkfish have been found in depths ranging from the tide line to 840 meters with concentrations between 70 and 100 meters and at 190 meters. The monkfish 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. NOAA Fisheries reinitiated consultation on the Monkfish FMP on May 4, 2000, in part, to reevaluate the effects of the monkfish gillnet fishery on sea turtles. With respect to sea turtles, the Opinion concluded that 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 as a result of capture in monkfish gillnet and trawl gear.

In 2002, following NOAA Fisheries' rejection of Framework Adjustment 1 to the Monkfish FMP, the agency published an Emergency Interim Final Rule to establish the Year 4 specifications for the monkfish fishery. The Emergency Interim Final Rule included deferral of the Year 4 default that would have reduced DAS in the monkfish fishery to zero, effectively eliminating the directed monkfish fishery. Since the June 14, 2001, Opinion had not considered the effects of monkfish fishing effort on ESA-listed species for year 4 of the FMP, NOAA fisheries concluded that deferral of the Year 4 measures for one year may adversely affect ESA-listed species. NOAA Fisheries, therefore, reinitiated section 7 consultation on the continued implementation of the monkfish fishery and on May 14, 2002, concluded that the fishery was not likely to jeopardize any ESA-listed species under NOAA Fisheries jurisdiction. A new ITS and RPMs to address the anticipated take of sea turtles in the fishery for Year 4 were provided.

Consultation on the Monkfish FMP was subsequently reinitiated on February 12, 2003, to consider the effects of the Framework Adjustment 2 measures on ESA-listed species. Framework Adjustment 2 proposed to eliminate the Year 5 default measure that would have ended the directed monkfish fishery and to replace this measure with increased Total Allowable Catch (TACs), increased trip limits for limited access vessels fishing in the Southern Fishery Management Area, and increased incidental catch limits for Category E vessels fishing under a multispecies DAS in the Northern Fishery Management Area. NOAA Fisheries concluded consultation on the proposed implementation of Framework Adjustment 2 on April 14, 2003. A revised ITS and RPMs to address the anticipated take of sea turtles in the fishery were provided.

Although the estimated capture of sea turtles in monkfish gillnet gear is relatively low, there is concern that much higher levels of interaction could occur. Two unusually large stranding events occurred in April and May 2000 during which 280 sea turtles (275 loggerheads and 5 Kemp's ridleys) washed ashore on ocean facing beaches in North Carolina. Although there was not enough information to specifically determine the cause of the sea turtle deaths, there was information to suggest that the turtles died as a result of entanglement with large-mesh gillnet gear. The monkfish gillnet fishery, which uses a large-mesh gillnet, was known to be operating in waters off of North Carolina at the time the stranded turtles would have died. As a result, in March 2002, NOAA Fisheries published new restrictions for the use of gillnets with larger than 8 inch (20.3 cm) stretched mesh, in Federal waters (3-200 nautical miles) off of North Carolina and Virginia. These restrictions were published in an Interim Final Rule under the authority of the Endangered Species Act (67 FR 13098) and were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened species of sea turtles in areas where sea turtles are known to concentrate. Following review of public comments submitted on the Interim Final Rule, NOAA Fisheries published a Final Rule on December 3, 2002, that established the restrictions on an annual basis.

Multiple gear types are used in the *Northeast Multispecies fishery*. However, the gear type of greatest concern is sink gillnet gear that can entangle whales and sea turtles (*i.e.*, in buoy lines and/or net panels). Data indicate that sink gillnet gear has seriously injured or killed northern right whales, humpback whales, fin whales, loggerhead and leatherback sea turtles. The northeast multispecies sink gillnet fishery has historically occurred from the periphery of the Gulf of Maine to Rhode Island in water to 60 fathoms. In recent years, more of the effort in the fishery has occurred in offshore waters and into the Mid-Atlantic. Participation in this fishery has declined since extensive groundfish conservation measures have been implemented. The fishery operates throughout the year with peaks in spring, and from October through February. NOAA Fisheries reinitiated consultation on the Multispecies FMP on May 4, 2000, and concluded that operation of the fishery may adversely affect loggerhead, Kemp's ridley and green sea turtles but would not jeopardize these species. A new RPA was also included to avoid the likelihood that operation of the gillnet sector of the multispecies fishery would result in jeopardy to right whales.

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 the red crab fishery. However, given the type of gear used in the fishery, takes may be possible where gear overlaps with the distribution of ESA-listed species. Section 7 consultation was completed on the proposed implementation of the Red Crab FMP, and concluded that the action is not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries jurisdiction. An ITS was provided that addresses takes of loggerhead and leatherback sea turtles.

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. The seven species of skate are distributed along the coast of the northeast U.S. from the tide line to depths exceeding 700m (383 fathoms). 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. An ITS was provided.

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. In the Northwest Atlantic, spiny dogfish range from Florida to Labrador, but are most abundant from Nova Scotia to Cape Hatteras. Spiny dogfish make seasonal inshore-offshore and coastal migrations related to their preferred temperature range (45°-55°F). Spiny dogfish are landed in every state from Maine to North Carolina. Spiny dogfish are landed in all months of the year and throughout a broad area with the distribution of landings varying by area and season. During the fall and winter months, spiny dogfish are captured principally in Mid-Atlantic waters and southward from New Jersey to North Carolina. During the spring and summer months, spiny dogfish are landed mainly in northern waters from New York to Maine. In calendar year 2000, Massachusetts accounted for the largest share of the landings (27.3%), followed by New Jersey (24.7%), North Carolina (16.8%), and New Hampshire (11.1%).

Sea turtles can be incidentally captured in all gear sectors of the spiny dogfish fishery. Turtle takes in 2000 included one dead and one live Kemp's ridley. Since the ITS issued with the August 13, 1999, Opinion anticipated the take of only one Kemp's ridley (lethally or non-lethally), the incidental take level for the Spiny Dogfish FMP was exceeded. In addition, a right whale mortality occurred in 1999 as a result of entanglement in gillnet gear that may (but was not determined to be) have originated from the spiny dogfish fishery. NOAA Fisheries, therefore, reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardy to right whales, and the affect of the spiny dogfish gillnet fishery on sea turtles. The Opinion concluded that continued implementation of the Spiny Dogfish FMP was likely to jeopardize the existence of the northern right whale. A new RPA was provided that is expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the spiny dogfish fishery. In addition, a new ITS was provided for the take of sea turtles in the fishery.

The FMP for spiny dogfish called for a 30% reduction in quota allocation levels for 2000 and a 90% reduction in 2001. Although there have been delays in implementing the plan, quota allocations are expected to be substantially reduced over the 4½ year rebuilding schedule which should result in a substantial decrease in effort directed at spiny dogfish. For the last four years of the rebuilding period, dogfish landings are likely to be limited to incidental catch in other fisheries. The reduction in effort should be of benefit to protected species by reducing the number of gear interactions that occur.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Summer flounder, scup and black sea bass are managed under one FMP since these species occupy similar habitat and are often caught at the same time. They are present in offshore waters throughout the winter and migrate and occupy inshore waters throughout the summer. The primary gear types used in the summer flounder, scup and black sea bass fisheries are mobile trawl gear, pots and traps, gillnets, pound nets, and handlines.

Summer flounder are taken principally by otter trawl. Since 1980, 70% of the commercial landings of summer flounder have come from the EEZ. However, large variability in summer flounder landings exist among the states, over time, and the percent total summer flounder landings taken from the EEZ has varied widely among the states. Since the implementation of the annual commercial landings quota in 1993, the commercial landings have become concentrated during the first calendar quarter of the year with 46% of the landings taken during the first quarter in 2002. In general, over 80% of the commercial landings have come from statistical areas 537-539 (Southern New England), areas 611-616 (New York Bight), areas 621, 622, 625 and 626 (Delmarva region), and areas 631-632 (Norfolk Canyon area). The North Carolina winter trawl fishery accounts for about 99% of summer flounder commercial landings in North Carolina (Terceiro 2003).

The otter trawl is also the principal commercial fishing gear for scup, accounting for an average 74% of the total catch in 1979-2001. The remainder of the commercial landings are taken by floating trap (12%), and hand lines (6%), with paired trawl, pound nets, and pot and traps each contributing 2-3%. About two-thirds of the commercial scup landings for the period 1979-2001 were in Rhode Island (37%) and New Jersey (28%). Landings in New York composed an average of 15% of the total. Landings fluctuated between 7000-10,000 mt from 1974-1986 but have since declined to less than 2000 mt per year (NEFSC 2002).

Otter trawls, which harvested 40% of the black sea bass coastwide, account for most of the black sea bass landings in most states with the exception of Massachusetts, New Jersey, Delaware, and Maryland (from 1990-1999). Fish pots/traps accounted for a significant proportion of landings for the remaining states. In addition, handlines harvested a significant proportion of black sea bass in Massachusetts, Connecticut, New York, Virginia, and North Carolina. Based on landings by month for the period 1990-1999, most black sea bass were harvested from January-June with peak landings in March and May. Massachusetts, New York, and Maryland had peak landings from April-August while landings for all states peaked in the winter months. Activity at the ports indicates that 57% of total black sea bass commercial landings occurred at ports within 5 states: Massachusetts, Rhode Island, New Jersey, Maryland, and Virginia (MAFMC 2002).

Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring the use TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, NC and seasonally (March 16-January 14) for trawl vessels fishing between Oregon Inlet, NC and Cape Charles, VA. Developmental work is also ongoing for a TED that will work in the flynet fisheries. Based on the occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales and sea turtles. The pot gear and staked trap sectors could also entangle whales and sea turtles. As a result of new information not considered in previous consultations, NOAA Fisheries has reinitiated section 7 consultation on this FMP to consider the effects of the fisheries on ESA-listed whales and sea turtles.

The management unit for the *Tilefish* FMP is all golden tilefish under U.S. jurisdiction in the Atlantic Ocean north of the Virginia/North Carolina border. Tilefish have some unique habitat characteristics, and are found in a warm water band (8-18° C) at approximately 250 to 1200 feet deep on the outer continental shelf and upper slope of the U.S. Atlantic coast. Because of their restricted habitat and low biomass, the tilefish fishery in recent years has occurred in a relatively small area in the Mid-Atlantic Bight, south of New England and west of New Jersey. Section 7 consultation was completed on this fishery in March 2001. An ITS was provided for loggerhead and leatherback sea turtles.

Formal Section 7 consultation has also been conducted for the issuance of an Exempted Fisheries Permit (EFP) for the collection of horseshoe crabs from the Carl N. Shuster, Jr. Federal Horseshoe Crab Reserve (in Federal waters off of the mouth of Delaware Bay), and for an EFP for Jonah crab. The EFP for the collection of horseshoe crabs was first issued in October 2001 and includes an ITS for loggerhead sea turtles (NOAA Fisheries 2001b). Horseshoe crabs collected under this permit are used for data collection on the species and to obtain blood for biomedical purposes. The EFP for Jonah crab was issued to the Maine Department of Marine Fisheries to allow lobster trap fishers to fish additional (modified) lobster traps in federal waters off of Maine in order to determine the traps efficiency at catching Jonah crabs while excluding lobster. The purpose of the experiment is to develop a trap that will catch Jonah crab with minimal lobster bycatch. The Opinion concluded that proposed activities under the Jonah crab EFP were likely to jeopardize the continued existence of right whales, and may adversely affect but were not likely to jeopardize the continued existence of humpback whales, fin whales, and leatherback sea turtles. An RPA was provided to avoid the likelihood that the Jonah crab experimental fishery will jeopardize the continued existence of the endangered right whale. An ITS as well as RPMs were also included to address the anticipated take of leatherback sea turtles.

4.1.2 Non-Federally regulated fisheries

Several trap/pot fisheries, gillnet and trawl fisheries for non-federally regulated species do occur in the action area. The amount of gear contributed to the environment by these fisheries is unknown.

Nearshore and inshore gillnet fisheries occur throughout the Mid-Atlantic in state waters from Connecticut through North Carolina; areas where sea turtles also occur. Captures of sea turtles in these fisheries have been reported (NOAA Fisheries SEFSC 2001). Two 10-14 inch mesh gillnet fisheries, the black drum and sandbar shark gillnet fisheries, occur in Virginia state waters along the tip of the eastern shore. These fisheries may take sea turtles given the gear type, but no interactions have been observed. Similarly, small mesh gillnet fisheries occurring in Virginia state waters are suspected to take sea turtles but no interactions have been observed. During May - June 2001, NOAA Fisheries observed 2 percent of the Atlantic croaker fishery and 12 percent of the dogfish fishery (which represent approximately 82% of Virginia's total small mesh gillnet landings from offshore and inshore waters during this time), and no turtle takes were observed. In North Carolina, a large-mesh gillnet fishery for summer flounder in the southern portion of Pamlico Sound was found to contribute to takes of sea turtles in gillnet gear. In 2000, an Incidental Take Permit was issued to the North Carolina Department of Marine Fisheries for the take of sea turtles in the Pamlico Sound large-mesh gillnet fishery. The fishery was closed when the incidental take level for green sea turtles was met (NOAA Fisheries SEFSC 2001). Long haul seines and channel nets are also known to incidentally capture sea turtles in North Carolina sounds and inshore waters.

An Atlantic croaker fishery using trawl gear also occurs within the action area. Turtle takes have been observed in Atlantic croaker trawl gear. Between 1996 and 1998, five turtles (four loggerheads and one unidentified species) were taken in otter trawls targeting croaker. In October 2004, observers documented the capture of two loggerhead sea turtles in Atlantic croaker trawl gear operating off of Virginia, north of Cape Charles. Both turtles were released alive and uninjured.

A *whelk fishery* using pot/trap gear is known to occur in several parts of the action area, including waters off of Maine, Connecticut, Massachusetts, Delaware, Maryland, and Virginia. Landings data for Delaware suggests that the greatest effort in the whelk fishery in the waters off of that state 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, blue crab, and Jonah crab. Effort in the latter is currently limited to some extent by trap limits set for the lobster fishery since many Jonah crab fishers are also federally-permitted lobster fishers and Jonah crabs are collected using lobster gear. However, there is interest in developing a separate fishery. If the Jonah crab fishery were to develop exclusive of the lobster fishery, there is a potential for a significant amount of trap/pot gear to be added to the environment. Other fishery activities occurring in waters within the action area which use gear known to be an entanglement risk for protected species include a slime eel (hagfish) pot/trap fishery in Northeast waters (*e.g.*, Massachusetts and Connecticut) and finfish trap fisheries (*i.e.*, for tautogs). 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.

In addition to these, NOAA Fisheries is also concerned about the take of sea turtles 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 pound net leader. As described in section 4.4.3.4 below, NOAA Fisheries has taken regulatory action to address turtle takes in the Virginia poundnet fishery.

4.2 Vessel Activity

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the U.S. Coast Guard (USCG), which maintain the largest federal vessel fleets, the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineers (ACOE). NOAA Fisheries has conducted formal consultations with the USCG, the USN and is currently in early phases of consultation with other federal agencies on their vessel operations (*e.g.*, NOAA research vessels). Through the Section 7 process, where applicable, NOAA Fisheries has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. At the present time, however, there is the potential for some level of interaction.

4.3 Other Activities

4.3.1 Hopper Dredging

The Sandbridge Shoal is an approved Minerals Management Service borrow site located approximately 3 miles off Virginia Beach. This site has been used in the past for both the Navy's Dam Neck Annex beach renourishment project and the Sandbridge Beach Erosion and Hurricane Protection Project, and is likely to be used in additional beach nourishment projects in the future. The Sandbridge Beach Erosion and Hurricane Protection Project involved hopper dredging of approximately 972,000 cubic yards (cy) of sand during the first year of the project and an anticipated 500,000 cy every two years thereafter. NOAA Fisheries completed section 7 consultation on this project in April 1993, and anticipated the take of eight loggerhead turtles or one Kemp's ridley or green turtle. Actual dredging did not begin until May 1998, and no sea turtle takes were observed during the 1998 dredge cycle. In June 2001, the ACOE indicated that the next dredge cycle, which was scheduled to begin in the summer of 2002, would require 1.5 million cy of sand initially, with an anticipated 1.1 million cy every two years thereafter. Although the volume of sand had increased from the previous cycle, NOAA Fisheries reduced the ITS to five loggerheads and one Kemp's ridley or green turtle due to the lack of observed takes in the previous cycle, along with the levels of anticipated and observed take in hopper dredging projects in nearby locations.

NOAA Fisheries completed section 7 consultation on the Navy's Dam Neck Annex beach nourishment project in January 1996, which involved the removal of 635,000 cy of material beginning in 1996 and continuing on a 12-year cycle thereafter. NOAA Fisheries anticipated the take of ten loggerheads and one Kemp's ridley or green sea turtle during each dredge cycle. However, no takes were observed during the 1996 cycle. The Navy reinitiated consultation on June 27, 2003, based on an accelerated dredge cycle (from 12 years to 8 years), an increase in the volume of sand required, and new information on the status of loggerhead sea turtles since the original Opinion was issued in 1996. The consultation was concluded on December 12, 2003, and anticipated the take of four loggerheads and one Kemp's ridley or green sea turtle during each dredge cycle. NOAA Fisheries concluded that this level of take was not likely to jeopardize the continued existence of any of these species.

4.3.2 Maritime Industry

Private and commercial vessels, including fishing vessels, operating in the action area of this consultation also have the potential to interact with sea turtles. The effects of fishing vessels, recreational vessels, or other types of commercial vessels on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines.

Small vessel traffic is known to strike sea turtles. Over 500 fishing vessels and over 11,000 pleasure craft frequent Massachusetts and Cape Cod Bays (Wiley *et al.* 1995). Significant hubs of vessel activity exist to the south as well. These activities have the potential to result in lethal (through boat strikes) or non-lethal (through harassment) takes of listed species that could prevent or slow a species recovery. It is important to note that minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so it is more likely to become vulnerable to effects such as entanglements.

Other than injuries and mortality resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. Other than entanglement in fishing gear, effects of fishing vessels on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Listed species or critical habitat may also be affected by fuel oil spills resulting from vessel accidents. Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species. Larger oil spills may result from accidents, although these events would be rare and involve small areas. No direct adverse effects on listed species or critical habitat resulting from fishing vessel fuel spills have been documented.

4.3.3 Pollution

Sources of pollutants in coastal regions of the action area include atmospheric loading of pollutants such as PCBs, storm water runoff from coastal towns, cities and villages, runoff into rivers emptying into bays, groundwater discharges and sewage treatment effluent, and oil spills. A present concern, not yet completely defined, is the possibility of habitat degradation in Massachusetts and Cape Cod Bays due to the Massachusetts Bay Disposal Site (MBDS) located 9.5 miles east of Deer Island. The MBDS began discharging secondary sewage effluent into Massachusetts Bay in 2000. NOAA Fisheries concluded in a 1993 biological opinion that the discharge of sewage at the MBDS may affect, but is not likely to jeopardize, the continued existence of any listed species under NOAA Fisheries jurisdiction. However, scientific uncertainties remain about the potential unforeseen impacts to the marine ecosystem, the food chain, and endangered species. Therefore, post-discharge monitoring is being conducted by the Massachusetts Water Resources Authority.

Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effect to larger embayments is unknown. Contaminants could indirectly degrade habitat if pollution and other factors reduce the food available to marine animals.

4.3.4 Catastrophic events

An increase in commercial vessel traffic/shipping increases the potential for oil/chemical spills. The pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo *et al.* 1986). There have been a number of documented oil spills in the northeastern U.S.

4.4 Reducing Threats to ESA-listed Sea Turtles

4.4.1 Education and Outreach Activities

Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. NOAA Fisheries has been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. For example, NOAA Fisheries has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue these outreach efforts in an attempt to increase the survival of protected species through education on proper release techniques.

4.4.2 Sea Turtle Stranding and Salvage Network (STSSN)

There is an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts which not only collects data on dead sea turtles, but also rescues and rehabilitates live stranded turtles. Data collected by the STSSN are used to monitor stranding levels and identify areas where unusual or elevated mortality is occurring. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN tag live turtles when encountered (either via the stranding network through incidental takes 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.

Unlike cetaceans, there is no organized, formal program for at-sea disentanglement of sea turtles. However, recommendations for such programs are being considered by NOAA Fisheries 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. Staff of the Maine Department of Marine Resources (DMR) have received anecdotal reports from fishermen who have disentangled leatherbacks from their lobster pot gear (J. Lewis, pers. comm.).

4.4.3 Regulatory Measures for Sea Turtles

4.4.3.1 Final Rules for Large-Mesh Gillnets

In March 2002, NOAA Fisheries published new restrictions for the use of gillnets with larger than 8 inch (20.3 cm) stretched mesh, in Federal waters (3-200 nautical miles) off of North Carolina and Virginia. These restrictions were published in an Interim Final Rule under the authority of the ESA (67 FR 13098) and were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened species of sea turtles in areas where sea turtles are known to concentrate. Following review of public comments submitted on the Interim Final Rule, NOAA Fisheries published a Final Rule on December 3, 2002, that established the restrictions on an annual basis. As a result, gillnets with larger than 8 inch stretched mesh are not allowed in Federal waters (3-200 nautical miles) in the areas described as follows: (1) north of the North Carolina/South Carolina border at the coast to Oregon Inlet at all times, (2) north of Oregon Inlet to Currituck Beach Light, NC from March 16 through January 14, (3) north of Currituck Beach Light, NC to Wachapreague Inlet, VA from April 1 through January 14, and (4) 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 NOAA Fisheries 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.

NOAA Fisheries has also issued a rule addressing takes of sea turtles in gillnet gear fished in the southern flounder fishery in Pamlico Sound. NOAA Fisheries 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 ¼ inch (10.8 cm) stretched mesh 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 35° 46.3' N. lat., north of 35°00' N. lat., and east of 76° 30' W. long

4.4.3.2 Final Rule for Larger TED Openings

On February 21, 2003, NOAA Fisheries 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 United States. TEDs have proven to be effective at excluding sea turtles from shrimp trawls. However, NOAA Fisheries has determined that modifications to the design of TEDs need to be made to exclude leatherbacks as well as large benthic immature and sexually mature loggerhead and green turtles. In addition, several previously approved TED designs do not function properly under normal fishing conditions. Therefore, NOAA Fisheries disallowed these TEDs (*e.g.*, weedless TEDs, Jones TEDs, hooped hard TED, and the use of accelerator funnels) as described in the final rule.

Finally, the rule also requires modifications to the trynet and bait shrimp exemptions to the TED requirements to decrease mortality of sea turtles.

4.4.3.3 TED requirements for the summer flounder fishery

As mentioned in Section 4.1.1, significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other 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. The TED requirements for the summer flounder trawl fishery do not, however, require the use of larger TEDs that are used in the shrimp trawl fishery to exclude leatherbacks as well as large benthic immature and sexually mature loggerheads and green sea turtles.

4.4.3.4 Final Rule for Virginia Pound Nets

Existing information indicates that pound nets with large mesh and stringer leaders as used in the Chesapeake Bay incidentally take sea turtles. To address the high and increasing level of sea turtle strandings, NOAA Fisheries published a Temporary Rule in June 2001 (66 FR 33489) that prohibited fishing with pound net leaders with a mesh size measuring 8 inches or greater (20.3 cm) and pound net leaders with stringers in mainstream waters of the Chesapeake Bay and its tributaries for a 30-day period beginning June 19, 2001. NOAA Fisheries subsequently published an Interim Final Rule in 2002 (67 FR 41196, June 17, 2002) that further addressed the take of sea turtles in large-mesh pound net leaders and stringer leaders used in the Chesapeake Bay and its tributaries. Following new observations of sea turtle entanglements in pound net leaders in the spring of 2003, NOAA Fisheries issued a temporary final rule (68 FR 41942, July 16, 2003) that restricted all pound net leaders throughout Virginia's waters of the Chesapeake Bay and a portion of its tributaries from July 16 - July 30, 2003. NOAA Fisheries is continuing to address these entanglements, as well as impingements of turtles against leaders, and published a new final rule (69 FR 24997, May 5, 2004) for the use of pound net leaders in the Chesapeake Bay during the period May 6 - July 15 each year. The current rule prohibits the use of all pound net leaders, set with the inland end of the leader greater than 10 horizontal feet (3 meters) from the mean low water line, from May 6 - July 15 each year in the Virginia waters of the mainstream Chesapeake Bay, south of 37° 19' N and west of 76° 13' W, and all waters south of 37° 13' N 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 of 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 - July 15 each year.

4.4.3.5 HMS Sea Turtle Protection Measures

As described in *Section 4.1.1* above, NOAA Fisheries completed the most recent biological opinion on the FMP for the Atlantic HMS fisheries for swordfish, tuna, and shark on June 1, 2004, and concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of leatherback sea turtles. An RPA was provided to avoid jeopardy to leatherback sea turtles as a result of operation of the HMS fisheries. Although the Opinion did not conclude jeopardy for loggerhead sea turtles, the RPA is also expected to benefit this species by reducing mortalities resulting from interactions with the gear.

4.4.3.6 Sea Turtle Handling and Resuscitation Techniques

NOAA Fisheries has also developed and published as a final rule in the *Federal Register* (66 FR 67495, December 31, 2001) specific sea turtle handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to take these measures to help prevent mortality of turtles caught in fishing or scientific research gear. However, the measures are principally developed for hard-shelled turtles and have less applicability for leatherback sea turtles which lack a shell.

4.5 Summary and synthesis of the status of species and environmental baseline

Sections 3.1.1 and 3.1.2 summarized the numerous hazards that loggerhead and leatherback sea turtles have been and continue to be exposed to in the action area and on a global scale. The hazards that appear to be having the greatest impact on these listed species are entanglements in fishing gear and poaching (of eggs from nests as well as mature animals). Other phenomena with anthropogenic causes, like water pollution and the disruption of marine food chains, may contribute to the status and trend of loggerhead and leatherback subpopulations/populations in the action area, although the specific impacts of these phenomena on those listed species remains unknown. Given what we do know, the aggregate impact of the environmental baseline on loggerhead and leatherback sea turtles in the action area can be summarized as follows.

Loggerhead Sea Turtles. NOAA Fisheries recognizes that there are at least five subpopulations of loggerhead sea turtles in the western Atlantic. Cohorts from all of these are expected to occur within the action area (Bass *et al.* in press). The south Florida nesting group is the largest known loggerhead nesting assemblage in the Atlantic and one of only two loggerhead nesting assemblages worldwide that have greater than 10,000 females nesting per year (USFWS and NOAA Fisheries 2003; Ehrhart *et al.* 2003). The northern subpopulation is the second largest loggerhead nesting assemblage within the United States. The remaining three western Atlantic subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations with nest counts of roughly 100 - 1000 nests per year.

The primary known threats to loggerhead sea turtles in the Atlantic are: fishing gear associated with fisheries in U.S. state and federal waters, and international waters; poaching, development and erosion on their nesting beaches, and ingestion of marine debris. Given the geographic range of loggerhead sea turtles at various life history stages, loggerheads may be affected by human activities far from the nesting beach. For example, Laurent *et al.* (1998) found that approximately 47% of pelagic loggerhead juveniles captured in the western Mediterranean longline fisheries originated from western Atlantic subpopulations. In and near the action area, loggerhead turtles are captured and injured or killed in interactions with fishing gear that includes pound net leaders, whelk pots, gillnets, pelagic longlines, trawls, and scallop dredges. Injuries and mortalities may also occur as a result of entrainment in power plant intakes or as a result of dredging for channel maintenance and beach nourishment projects within or adjacent to the action area. A recent study by Bowen *et al.* (2004) lends support to the hypothesis that juvenile loggerhead sea turtles also exhibit homing behavior with respect to using foraging areas in the vicinity of their nesting beach. Therefore, coastal hazards that affect declining nesting populations may also affect the next generation of turtles when they are feeding in nearby habitats (Bowen *et al.* 2004).

NOAA Fisheries is working to address loggerhead captures and mortality in many of the U.S. fisheries known to capture and injure or kill sea turtles. In 2003, NOAA Fisheries issued a final rule that required increasing the size of TED escape openings to allow larger loggerheads to escape from shrimp trawl gear. As a result of the new rules, annual loggerhead mortality from capture in shrimp trawls is expected to decline from 62,294 to 3,947 turtles (Epperly *et al.* 2002). New rules have also been implemented in recent years for reducing turtle interactions and mortality in the U.S. pelagic longline fishery, the Virginia pound net fishery, the Pamlico Sound gillnet fishery, and large-mesh gillnet fisheries in federal waters off of North Carolina and Virginia as well as the large-mesh southern flounder fishery in Pamlico Sound, NC.

Loggerheads are a long-lived species and reach sexual maturity relatively late (NMFS SEFSC 2001). The currently available information on nesting trends for western Atlantic loggerhead subpopulations suggests that these subpopulations are still exhibiting the effects of any number of sources of mortality. However, the benefits of the most recently promulgated measures to address loggerhead capture and mortality in U.S. Atlantic fisheries may not be evident on the nesting beaches for many years given the late age to maturity. The most recent modeling data suggests that the change in TED regulations to increase survival of large, benthic immature and sexually mature loggerheads coupled with changes to increase pelagic immature survival should result in positive population growth. Nevertheless, NOAA Fisheries recognizes that there are still many threats to the survival of loggerheads of various age classes both within and outside of U.S. jurisdiction.

Leatherback turtles. Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). In 1980, the global population of adult leatherback females was estimated to be approximately 115,000 (Pritchard 1982). By 1995, this global population of adult females had declined to 34,500 (Spotila *et al.* 1996).

In the Pacific Ocean, the abundance of leatherback turtles on nesting colonies has declined dramatically over the past 10 to 20 years. Nesting colonies throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females, and by egg poaching. At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

Leatherback populations in the eastern Atlantic (*i.e.,* off Africa) and in the Caribbean appear to be stable, but there is conflicting information for some sites (Spotila, pers. comm) and it is certain that some nesting populations (*e.g.*, St. John and St. Thomas, U.S. Virgin Islands) have been extirpated (NOAA Fisheries and USFWS 1995). Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (9.1-11.5% increase), although it is critical to note that there was also an increase in the survey area in Florida over time (NOAA Fisheries SEFSC 2001). The largest leatherback rookery in the western Atlantic remains along the northern coast of South America in French Guiana and Suriname. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). The long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). Studies by Girondot *et al.* (in review) also suggest that the trend for the Suriname - French Guiana nesting population over the last 36 years is stable or slightly increasing.

Fishing gear associated with fisheries in U.S. state and federal waters, and in international waters as well as poaching, development and erosion on their nesting beaches, and ingestion of marine debris are the primary known threats to leatherback turtles in the Atlantic Ocean. In and near the action area, leatherback turtles are captured and injured or killed in interactions with fishing gear that include gillnets, trawl gear, and trap/pot gear.

5.0 EFFECTS OF THE PROPOSED ACTION

Pursuant to Section 7(a)(2) of the ESA (16 USC 1536), federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. In this section of a biological opinion, NOAA Fisheries assesses the direct and indirect effects of the proposed action on threatened and endangered species. The purpose of the assessment is to determine if it is reasonable to conclude that the proposed action is likely to have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution.

As described in Section 3.0, this Opinion examines the likely effects of the proposed action on ESA-listed loggerhead and leatherback sea turtles that occur within the action area to determine if the continued implementation of the scallop fishery is likely to jeopardize the continued existence of these listed species. This analysis is done after careful review of the listed species status and the factors that affect the survival and recovery of the species, as described above.

As further described in Section 3.0, this Opinion will not reconsider the effects of the scallop fishery on ESA-listed right whales, humpback whales, fin whales, sei whales, blue whales, sperm whales, shortnose sturgeon, the Maine Atlantic salmon DPS, or hawksbill sea turtles. NOAA Fisheries has previously determined that the continued operation of the scallop fishery is not likely to adversely affect the continued existence of these ESA-listed species. Since there is no new information for either the fishery or these species that changes the previous effects analysis, this Opinion does not reconsider the effects of the scallop fishery on these ESA-listed species. Although previous Opinions for the scallop fishery 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 (NOAA Fisheries 2003a; 2004a), NOAA Fisheries has now determined that these species are not likely to be adversely affected by the continued operation of the scallop fishery given the range and distribution of Kemp's ridley and green sea turtles in relation to where vessels fish for sea scallops, and given the lack of any evidence of capture of these species in scallop gear.

Finally, NOAA Fisheries has determined that the action being considered is not expected to destroy or adversely modify critical habitat that has been designated for right whales (Cape Cod Bay and Great South Channel). Given that right whales feed largely on copepods and there is no evidence to suggest that operation of the scallop fishery destroys or adversely modifies the value of critical habitat designated for the right whale as a feeding area, right whale critical habitat will, therefore, not be considered further in this Opinion.

5.1 Approach to the Assessment

NOAA Fisheries generally approaches jeopardy analyses in three steps. The first step identifies the probable direct and indirect effects of an action on the physical, chemical, and biotic environment of the action area. The second step determines the reasonableness of expecting threatened or endangered species to experience reductions in reproduction, numbers or distribution in response to these effects. The third step determines if any reductions in a species reproduction, numbers or distribution (identified in the second step of our analysis) can be expected to appreciably reduce a listed species likelihood of surviving and recovering in the wild. A species reproduction, numbers, and distribution are interdependent. For example, reducing a species reproduction will reduce its population size; reducing a species population size will usually reduce its reproduction, particularly if those reductions decrease the number of adult females or the number of young that recruit into the breeding population; and reductions in a species reproduction and population size normally precede reductions in a species distribution.

The final step of the analysis - relating reductions in a species' reproduction, numbers, or distribution to reductions in the species' likelihood of surviving and recovering in the wild - is the most difficult step because (a) the relationship is not linear; (b) to persist over geologic time, most species have evolved to withstand some level of variation in their birth and death rates without a corresponding change in their likelihood of surviving and recovering in the wild; and, (c) our knowledge of the population dynamics of other species and their response to human perturbation is usually too limited to support anything more than rough estimates. Nevertheless, our analysis must distinguish between anthropogenic reductions in a species' reproduction, numbers, and distribution that can reasonably be expected to reduce the species likelihood of survival and recovery in the wild and other (natural) declines.

Analyses contained in biological opinions can minimize the likelihood of concluding that an action reduced a listed species' likelihood of surviving or recovering in the wild (or no effect on the value of critical habitat that has been designated for a listed species) when, in fact, no reduction occurred or the analyses can minimize the likelihood of concluding that an action did not reduce a listed species likelihood of surviving and recovering in the wild when, in fact, a reduction occurred. To comply with direction from the U.S. Congress to provide the "benefit of the doubt" to threatened and endangered species [House of Representatives Conference Report No.697, 96th Congress, Second Session,12 (1979)], jeopardy analyses are designed to avoid concluding that actions had no effect on listed species or critical habitat when, in fact, there was an effect.

5.2 Scope of the Analyses

As discussed in the *Description of the Proposed Action*, the activity being considered by NOAA Fisheries is the continued implementation of the Atlantic Sea Scallop FMP. Dredge gear is the primary gear type used in the scallop fishery although trawl gear is also used, particularly in the Mid-Atlantic. The commercial fishery is considered a limited access fishery meaning that effort in the fishery is controlled, in part, by the number of vessels allowed to participate in the fishery. Only vessels that met specific qualifying criteria were able to obtain a limited access scallop permit. No new entrants to the limited access scallop fishery are allowed although vessels with a limited access permit may be transferred to a new owner. As is the case with many other limited access fisheries, NOAA Fisheries' regulations implementing the Scallop FMP do allow vessels that did not qualify for a limited access permit to obtain a general category permit. The general category permit allows for the possession and landing of up to 400 pounds of shucked scallops, or 50 U.S. bushels, per trip (compared to limited access permit holders who have no trip limit or a trip limit of 7,500 - 18,000 pounds depending on permit type and area fished).

Dredge and trawl gear are the most common gear types used by general category permit holders (NEFMC 2003). Although general category permit holders may fish with all gear types, including gillnets, pot/trap gear and clam/quahog dredges, the effects of these gear types on ESA-listed sea turtles are not being considered as part of this Opinion because general category permit holders use those other types of gear while fishing in other federally regulated fisheries and may land scallops that were caught incidentally while fishing for other species. The effects of those other gear types on ESA-listed species are considered during section 7 consultation on those other fishery actions.

The February 24, 2003, and February 23, 2004, Opinions on the continued implementation of the scallop fishery identified two probable sources of injury and mortality to ESA-listed sea turtles as a result of operation of the scallop fishery. These are: (a) capture in scallop dredge and scallop trawl fishing gear, and (b) vessel strikes as a result of traffic from boats operating in the scallop fishery. As mentioned in section 1.0 of this current Opinion, on August 31, 2004, NOAA Fisheries received new information on the capture of sea turtles in scallop dredge gear. The new information was based on a bycatch assessment of sea turtles in the Mid-Atlantic sea scallop dredge fishery in 2003 (Murray 2004). Using observer records of 22 sea turtle takes in the scallop fishery during the 2003 scallop fishing year, and information on scallop effort for that fishing year (measured in terms of dredge hours), the NEFSC estimated that 630 (Coefficient of Variation (CV) = 0.28) loggerhead sea turtles were captured in scallop dredge gear during the

2003 fishing year (Murray 2004). This estimate was later revised to 749 (C.V. = 0.28) loggerhead sea turtles after improved spatial information in the commercial fisheries became available (Murray 2004, 2nd ed.). Turtle takes in the 2003 fishing year were observed for 12 of the 71 observed trips (Murray 2004, 2nd ed.). In all, 10,674.8 dredge hours[5] were observed (Murray 2004, 2nd ed.). Consultation was reinitiated on the basis of the new information to reconsider the effects of the scallop dredge fishery on ESA-listed loggerhead sea turtles. At the time that the consultation was reinitiated, NOAA Fisheries had not received any new information on the capture of loggerhead or leatherback sea turtles in scallop trawl fishing gear. However, in October 2004, during consultation on the fishery, the NEFSC notified the NER that observers had reported three takes of loggerhead sea turtles in scallop trawl gear that month. This new information is considered here in order to gain a more complete picture of the effects of the fishery on loggerhead and leatherback sea turtles as a result of capture in the gear.

NOAA Fisheries has not received any new information on the likelihood of turtle strikes by vessels operating in the scallop fishery. The previous Opinion (dated February 23, 2004) concluded that it was unlikely that a scallop vessel will strike a loggerhead or leatherback sea turtle given that: (a) the proposed action is not expected to increase the amount of vessel traffic in areas where sea turtles occur, (b) the fishery will continue as a limited access fishery and DAS allocations to those vessels will be reduced, (c) Amendment 10 will further limit DAS use in scallop open areas, (d) scallop fishing vessels operate at a relatively slow operating speed, (e) the fishery is distributed over a wide area, (f) a portion of the fishing occurs in areas in which sea turtles are not likely to be present (*e.g.*, Georges Bank, northern Gulf of Maine), and (g) a portion of the fishing occurs at times when sea turtles are not likely to be present (the winter period in Mid-Atlantic waters and the late-fall though mid-spring in New England waters). The risk of a turtle being struck by a vessel operating in the scallop fishery is more likely to have been reduced further as a result of implementation of Framework 16/39. Framework 16/39 is expected to cause a shift in effort from Mid-Atlantic areas to the Georges Bank access areas where loggerhead and leatherback sea turtles are far less prevalent (CeTAP 1982; Shoop and Kenney 1992). In addition, Framework 16/39 is expected to result in an overall reduction in the number of scallop tows, a reduction in tow times, and a reduction in the overall area swept (NEFMC 2004). For the aforementioned reasons, this Opinion concludes that injury and mortality to ESA-listed loggerhead or leatherback sea turtles as a result of vessel strikes from boats operating in the scallop fishery is unlikely.

The analyses in this Opinion are based on an implicit understanding that the species considered in this Opinion are threatened by a wide array of human activities and natural phenomena. This Opinion focuses solely on whether the direct and indirect effects of the activities proposed to occur as a result of the continued implementation of the Scallop FMP can be expected to appreciably reduce the listed species' likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution given the best available information on the current status of the species.

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[5] A dredge hour is defined as the number of dredges x the dredge haul duration (in hours) (Murray 2004).

5.3 Information Available for the Assessment

Information on the effects of fishing gear entanglements on loggerhead and leatherback sea turtles has been published in a number of documents including sea turtle status reviews and biological reports (NOAA Fisheries and USFWS 1995; TEWG 1998; TEWG 2000), recovery plans (NOAA Fisheries and USFWS 1991; NOAA Fisheries and USFWS 1992), the stock assessment report for loggerhead and leatherback sea turtles (NOAA Fisheries SEFSC 2001) and data collected by the STSSN. Other sources of information are cited below.

5.4 Effects of the Scallop Fishery

5.4.1 Effects of Capture in Scallop Gear

As previously described, dredge and otter trawl gear are the gear types typically used in the scallop fishery (NEFMC 2000a). Dredge is the predominant gear type. For the 2003 scallop fishing year, 302 limited access permits were issued to scallop vessels using dredge gear. By comparison, 31 limited access permits were issued to scallop vessels using trawl gear for the 2003 scallop fishing year (NEFMC 2003). Vessels with a general category permit can use several types of gear, but dredge and trawl gear are the most common gear type used (NEFMC 2003). Approximately 200 - 300 vessels with general category permits actually land scallops although many more obtain the permit (NEFMC 2004).

Scallop dredges are generally defined by the width of their frame with most limited access vessels towing two 15 foot dredges (NEFMC 2003). Scallop vessels in the small dredge permit categories (approximately 54 vessels in the 2003 scallop fishing year) are limited to fishing with only one dredge, no more than 10.5 feet in width. In either case, the gear operates similarly. The front of the steel frame usually rides off the sea floor except in rocky locations where it might hit. The cutting bar, which is located on the bottom aft part of the frame, rides about four inches off of the seabed. A sweep chain in the form of an arc, is attached to each end of the dredge frame at a bottom pad called the shoe. The bottom ring bag is attached to the sweep chain, and drags along the bottom. The very end of the ring bag is the club stick which is responsible for maintaining the shape of the ring bag, especially while on deck. For scalloping on hard bottoms, rock chains running front to back from the frame to the ring bag, are used in addition to tickler chains which run from side to side between the frame and the ring bag. Fishermen use a lot of rock chains when fishing on rocky bottoms to prevent boulders from getting into the ring bag which would cause damage to the gear or to the scallops in the bag (Smolowitz 1998). Dredges also have a twine top which allows for reduced bycatch of groundfish and other finfish. Twine tops are required to have a 10 inch minimum mesh size (69 FR 35194).

Bottom trawls are cone-shaped nets that are towed on the bottom. They employ large rectangular doors attached to two cables used to tow the net to keep the mouth of the net open while deployed. The bottom of an otter trawl mouth is called the foot rope or ground rope which can bear many heavy (tens to hundreds of kilograms) steel weights (bobbins) which keep the trawl on the seabed. Bottom trawls may be constructed with large (up to 40 cm in diameter) rubber discs or steel bobbins (rockhoppers) that can ride over structures such as boulders and coral heads that might otherwise snag the net. Some trawls are constructed with tickler chains that disturb the seabed ahead of the mouth of the net to flush the target species into the water column and into the net. The back of the net is called the codend. Vessels fishing with trawl gear in the scallop fishery are limited to using a net with a maximum sweep of 144 ft and a 5.5 inch minimum mesh size to ensure selectivity and reduction of some bycatch. These nets are often the same nets that vessels use to fish for summer flounder in southern New England and the Mid-Atlantic waters. TEDs are not used in scallop trawl nets.

One of the risks to sea turtles from capture in dredge and trawl gear is forced submergence. Sea turtles forcibly submerged in any type of restrictive gear 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. The NRC (1990) has suggested that physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles, would be expected to exacerbate the harmful effects of forced submergence from trawl capture. Scallop vessel tow times vary but are typically less than 90 minutes in duration. The majority of hauls (84%) that were observed to take turtles in the period 1996 - 2002 were between 45-80 minutes in duration.

Sea turtles caught in scallop dredge gear are often injured; usually with damage to the carapace. The exact cause of the injuries are unknown, but the most likely causes 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. In addition to this, 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. So the dumping of the catch and the sudden lowering of the gear onto the deck are both times at 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.

5.4.2 Observed interactions between sea turtles and scallop dredge gear

The February 24, 2003, Opinion for the scallop fishery described the known interactions between sea turtles and scallop gear as of that date. Briefly, a total of 31 turtle takes were attributed to the scallop dredge fishery during the 1996-2002 scallop fishing years based on observer coverage of the fishery; 1 each in 1996, 1997 and 1999, 11 in 2001, and 17 in 2002. The condition of the 31 turtles varied from fresh dead animals to live animals with injuries, and live turtles with no apparent injuries. There were no documented interactions between sea turtles and scallop trawl gear during this time period.

There were three monitoring programs for observing the scallop fishery in the 2003 scallop fishing year (March 1, 2003 - February 29, 2004). These were: (1) observer coverage for the scallop fishery in the Hudson Canyon Access Area, (2) observer coverage for open areas of the sea scallop management unit, and (3) observer coverage for an experiment involving permitted scallop fishers that compared turtle catch rates in a modified vs. unmodified dredge. All observer information was reported to the NEFSC. Observer data for the 2003 scallop fishing year is the most up to date and complete data currently available. The 2004 scallop fishing year is still in progress (through February 28, 2005). Information on sea turtle takes in the scallop fishery as of October 31, 2004 are provided in this Opinion. However, these takes are not used to estimate the effects of the scallop dredge fishery on sea turtles as the fishery currently operates under Framework Adjustment 16/39 since the data by which to make that assessment will not be complete and available until after completion of the 2004 scallop fishing year.

Observers in the scallop fishery (excluding the experimental fishery) reported a total of 28 turtles observed captured in scallop dredge gear during the 2003 scallop fishing year, and two additional turtles that were reported by the crew but not observed by the observer. Other than species identification (both loggerheads), further information is not available on the sea turtles that were reported to observers. Of the remaining 28 turtles, six were severely decomposed upon retrieval of the dredge. Given the state of decomposition, the six turtles clearly did not die as a result of the particular scallop dredge tow in which they were retrieved since the tow times are far less than what is necessary for a turtle to die and begin to decompose. Since the cause of death cannot be determined, for the purposes of this Opinion, these six takes are not counted as takes in the scallop fishery. Of the remaining 22 turtles that were observed, 1 was fresh dead, 1 was alive but required resuscitation, 5 were reported as alive and uninjured, 12 were reported as alive and injured, and 3 were reported as alive but condition unknown (Murray 2004, 2nd ed.).

The experimental dredge gear trials were conducted from July 17, 2003 - July 19, 2004. Experimental tows were conducted using permitted scallop fishing vessels with each towing an unmodified dredge as well as a dredge that had been modified by increasing the number of up and down chains between the sweep, ticklers, and dredge frame, and hanging the chains in such a way that there would be no more than a 24" diagonal between connection points (DuPaul *et al.* 2004). This modification is referred to as a chain mat. Eighteen experimental fishing trips were completed to test the gear modification, totaling 2,675 observed tows (DuPaul *et al.* 2004). Seven turtles takes were observed in the control dredge during the study period. No turtles were observed in the modified dredge. All of the takes occurred from July - October 2003. Two of the turtles were uninjured, three were released with injuries and two were dead (DuPaul *et al.* 2004). It is important to note, however, that the number of turtles observed taken in the normal operation of the scallop fishery are not directly comparable to those taken in the experimental fishery since the experimental fishery was intentionally conducted in scallop fishing areas with known high turtle abundance and observer coverage was nearly 100 percent.

Currently, capture of sea turtles in the scallop dredge fishery continue to be monitored by fishery observers and reported to the NEFSC. As of October 31, 2004, observers had reported nine observed turtle captures in scallop dredge gear. Three of the turtles were reported as alive and uninjured while five were reported as alive and injured, and one was reported as fresh dead. All were identified as loggerhead sea turtles (NEFSC Observer Program, pers. comm).

In summary, during the period March 1, 1996 - October 31, 2004, a total of 62 observed turtle captures in scallop dredge gear during normal fishery operations (excludes the experimental fishery) have been attributed as takes in the scallop fishery[6]. An additional seven turtles were observed captured during the course of the experimental fishery to test a modified scallop dredge. To date, only loggerhead sea turtles have been identified as being captured in scallop dredge gear. Of the 62 turtles observed captured in scallop dredge gear over the period March 1, 1996 - October 31, 2004, 19 were not identified to species. Most of the unknowns (9 of 19) were reported during the 2001 scallop fishing year. The species identification for the three sea turtles observed caught in scallop dredge gear in 1996, 1997, and 1999 (one turtle take observed in each year) could not be confirmed as well. Additional training has been provided since 2001 in order to improve species identification of turtles captured in scallop dredge gear. Of the total 62 turtles observed captured in the scallop dredge fishery during the period March 1,1996 - October 31, 2004, 4 were fresh dead upon retrieval or died on the vessel, 1was alive but required resuscitation, 25 were alive but injured, 20 were alive and uninjured, and 12 were listed as alive but condition unknown because the observer did not have sufficient opportunity to examine the turtle (*e.g.*, turtle dropped out of the dredge before being brought on board). As described above, of the seven turtles captured in scallop dredge gear during the experimental fishery, two turtles were uninjured, three were released with injuries, and two were fresh dead (DuPaul *et al.* 2004).

5.4.3 Observed interactions between sea turtles and scallop trawl gear

[6] Decomposed turtles observed caught in scallop dredge gear are not attributed to the scallop dredge fishery since the turtle would have had to have died prior to being caught in that particular dredge haul. Therefore, the cause of death cannot be determined.

The first observed takes of sea turtles in scallop trawl gear were documented in October 2004. On October 20, 2004, three loggerhead sea turtles were caught in separate trawl tows by a single vessel operating off of the Delmarva peninsula north and south of the Maryland/Virginia border. All three turtles were reported by the observer as uninjured and were released back into the water.

Observer coverage of the scallop trawl fishery has been low. Based on dealer reported trips, approximately 0.2% of trips from 2001-2003 were observed (Murray 2004). A total of 7 scallop trawl trips were observed during the period from March 1, 2001 - July 31, 2004 (Murray 2004). No sea turtles were observed on any of these trips (Murray 2004). Due to funding constraints, the NEFSC prioritized available funding for observer coverage of the 2003 scallop fishing year and focused on obtaining sufficient coverage of the dredge sector in open areas so that an acceptable coefficient of variation was achieved for the estimate of sea turtle bycatch from scallop dredge fishery. As described above, the scallop dredge sector is the larger of the two primary gear components of the fsihery and the one in which sea turtle bycatch was known to occur. Additional observer coverage for the trawl sector of the scallop fishery is planned (Murray 2004) and, as described above, the first observed take of sea turtles in the scallop trawl fishery were reported in October 2004. Turtle takes have been observed in other trawl fisheries operating in the action area during the period 1995-October 31, 2004. These are the *Loligo* squid, *Illex* squid, summer flounder, Atlantic croaker and groundfish (targeting tautog) trawl fisheries (NEFSC Observer data, pers. comm.). All of the observed takes were loggerhead sea turtles with the exception of one leatherback sea turtle, and two unidentified species.

5.4.4 Factors contributing to interactions between sea turtles and scallop gear

With respect to scallop dredge gear, leatherback sea turtles are not expected to be captured in this gear given that their typical prey (*i.e.*, cnidarians, tunicates, and salps) is found within the water column rather than on the bottom, and given the large size of leatherbacks which makes it unlikely that a leatherback could enter a dredge bag that is being hauled in the water or held at the surface. Trawl gear is configured differently than dredge gear. Although there have been no observed or reported captures of leatherbacks in scallop trawl gear, it is reasonably likely that they could be caught in scallop trawl gear given that the distribution of leatherbacks overlaps with the distribution of scallop trawl gear, and given that leatherbacks have been caught in comparable trawl gear used in other fisheries that operate in a similar area. For example, in 2001 a fisheries observer reported the capture and release of a live leatherback sea turtle from a *Loligo* squid bottom trawl off of Delaware. The observed take was noted as occurring in bottom trawl gear where the scallop fishery also operates.

With respect to loggerhead sea turtles, previous Opinions for the scallop fishery have discussed several factors that may increase the risk of turtle interactions with scallop dredge and trawl gear, including a sea turtle's reaction to oncoming gear, attraction to scallop areas because of the presence of prey, geographical or oceanographic features, and certain scallop fishing practices. Video footage recorded by NOAA Fisheries, Southeast Fisheries Science Center, Pascagoula Laboratory indicated that loggerhead sea turtles will keep swimming in front of an advancing shrimp trawl, rather than deviating to the side, until the turtles become fatigued and are caught by the trawl or the trawl is hauled up (NOAA Fisheries 2002). Turtles have also been observed to dive to the bottom and hunker down when alarmed by loud noise or gear (Steve Morreale, pers. comm.) which could place it in the path of bottom gear such as a scallop dredge or trawl.

With respect to the scallop dredge fishery, although loggerhead sea turtles are not known to feed on scallops, the scallop dredge fishery also harvests turtle prey such as horseshoe crab and other types of crab as bycatch, suggesting that at least part of the scallop fishery overlaps with some loggerhead foraging areas. As a result, some turtles may be exposed to scallop dredge gear while they are foraging on or near the bottom. In addition, the general disturbance of the scallop dredge stirs up prey species that may attract turtles to foraging areas where scallop gear is operating. The taking of turtle prey as bycatch is not expected to cause any indirect effect on loggerhead sea turtles since the bycatch is thrown back.

Other possible factors influencing the likelihood of loggerhead sea turtle captures in scallop dredge gear include geographic and oceanographic features. Intense biological activity is usually associated with oceanographic fronts because they are areas where water masses of different densities converge (Robison and Hamner; website posting February 18, 2004). A review of the data associated with the 11 sea turtles captured by the scallop dredge fishery in 2001 concluded that the turtles appeared to have been near the shelf/slope front (D. Mountain, pers. comm.). Such oceanographic features occurring in the same area as the operation of scallop dredge gear may increase the risk of interactions between scallop dredge gear and loggerhead sea turtles.

The review of the previous sea turtle interactions with scallop dredge gear also suggest that some interactions occur on the bottom while others occur off of the bottom; perhaps as the dredge is being hauled or when it is at the surface. It is common practice in the fishery to keep one dredge in the water while the second is hauled and the catch sorted. Turtles swimming at the surface may swim into the dredge bag while the dredge is at the surface before it is hauled onto the vessel. Loggerheads are known to scavenge fish or fish parts or incidentally ingest fish in some circumstances (NOAA Fisheries and USFWS 1991), and have been known to bite a baited hook (NOAA Fisheries SEFSC 2001). This characteristic of loggerheads raises concerns that loggerhead turtles may be attracted to the area where scallop dredge vessels are operating by the discard of scallop waste from the vessel as the catch is shucked thus increasing the risk of interaction with a dredge. However, there is currently no evidence that scallop discards attract loggerhead sea turtles to scallop vessels.

While any or all of the factors described above may increase the risk of turtle interactions with scallop gear, evidence for these is presently lacking. At the present time, the best that can be said is that interactions of loggerhead and leatherback sea turtles with scallop gear are likely where sea turtle distribution overlaps with operation of vessels fishing for scallops. With respect to the turtle species considered in this Opinion, the distribution of both species overlap in part with the distribution of scallop dredge and trawl gear. However, loggerheads are the most abundant and interactions with this species may be greater as compared to leatherbacks simply because there are more loggerhead turtles present and because the trawl fishery is a much smaller fishery (in terms of number of participating vessels and fishing effort) than the scallop dredge fishery. Loggerhead and leatherback sea turtles also undergo seasonal migrations along the coastal U.S. and continental shelf waters that are dependent on changes in sea temperature (Morreale and Standora 1998; Plotkin and Spotila 2002). In general, loggerhead sea turtles occur year round in waters off of North Carolina, in the inshore waters (*i.e.*, bays, estuaries, and other coastal waters) of Virginia from May through November, and in New York's inshore waters from June until October (NOAA Fisheries 1994). Loggerheads have been observed in waters with surface temperatures of 7-30° C but sea turtles are more likely to occur in water temperatures of ≥ 11° C (Epperly *et al.* 1995b; Shoop and Kenney 1992). As water temperatures along the coast decline, generally starting in mid-late September in the Long Island area, loggerhead sea turtles start their migration southward to warmer waters, once again transiting through the Mid-Atlantic (USFWS and NOAA Fisheries 1992) to southern Mid-Atlantic waters and waters further south. Given these characteristic movements, the distribution of loggerhead sea turtles is expected to overlap with the distribution of scallop dredge and trawl gear to some degree from April through November. Although more cold tolerant than loggerheads, leatherback sea turtles also exhibit seasonal movements. No leatherbacks were sighted during surveys of continental shelf waters north of Cape Hatteras, NC in December and sightings were low in November (CeTAP 1982; Shoop and Kenney1992). The distribution of leatherback sea turtles is, therefore, likewise expected to overlap with the distribution of scallop trawl gear from approximately April through November.

In 2003, the NEFSC conducted modeling work using the 2001 and 2002 observer data from the Hudson Canyon and Virginia Beach Access Areas to examine environmental factors and gear characteristics that might influence turtle bycatch rates in the scallop dredge fishery (Murray 2004b). Several factors affecting bycatch rates were identified including season, sea surface temperature, depth zone, and time-of-day (Murray 2004b). Highest turtle bycatch rates occurred during the summer season (July-September), in waters with a sea surface temperature warmer than 19° C, and in water depths from 49-57 meters (Murray 2004b). Additional observer data was collected on sea turtle bycatch in the scallop dredge fishery during the 2003 scallop fishing year. In particular, observer coverage was expanded in open areas of the fishery from Long Island, NY south to Cape Hatteras, NC (Murray 2004). The NEFSC used the new observer data to reexamine the environmental factors and gear characteristics that might influence turtle bycatch rates in the fishery (Murray 2004). Based on the observer data for the 2003 scallop fishing year, sea surface temperature and tow speed were identified as significant factors affecting sea turtle bycatch (Murray 2004). With respect to sea surface temperature, the highest probability of bycatch occurred in waters with a sea surface temperature of 22° C or warmer (Murray 2004).

5.4.5 Effects of the proposed action on sea turtles

As described in Section 2.0, the proposed action is NOAA Fisheries' continued authorization of the sea scallop fishery managed under the Scallop FMP. Consultation has been reinitiated as a result of new information from the NEFSC regarding sea turtle bycatch in scallop dredge gear. The new information is based on expanded observer coverage of the fishery in the 2003 scallop fishing year. As described in Section 2.1, substantive changes have been made to management of the scallop fishery in the 2004 scallop fishing year as a result of implementation of Amendment 10 and Framework 16/39. Section 7 consultations for Amendment 10 and

Framework 16/39 concluded that these actions would likely benefit sea turtles by reducing effort in the fishery and by shifting scallop fishing effort from Mid-Atlantic to New England waters (NOAA Fisheries 2004a; NOAA Fisheries 2004c). Therefore, as a result of these actions, turtle bycatch in the scallop dredge fishery is likely to be less in the 2004 and subsequent scallop fishing years compared to what was estimated to have occurred in the 2003 scallop fishing year. There are indications that this is the case. Preliminary information suggests that this may be the case. Nine turtle takes have been observed in the scallop dredge fishery during 1,995 observer days for the period March 1, 2004 - October 31, 2004, compared to 22 turtle takes observed during 911 observer days for the same time period in 2003 (NEFSC Observer program, pers. comm.). However, the reduction in sea turtle takes in the scallop fishery as a result of implementation of the Amendment 10 and Framework 16/39 measures cannot be quantified at this time given that the 2004 scallop fishing year is the first year for which these measures were in effect (and for parts of the year, only) and the data for the fishing year (*e.g.*, number of turtle takes and the amount/location of effort) will not be available until the fishing year is completed (February 28, 2005). Therefore, the bycatch estimate provided by the NEFSC for the 2003 scallop fishing year (749 loggerheads; Murray 2004, 2nd ed.) is the best currently available information on the take of sea turtles in the scallop dredge fishery despite that this is likely a worst case scenario.

5.4.6 Current actions that reduce the number and/or severity of sea turtle interactions with the scallop fishery

Certain factors associated with the scallop fishery may help to reduce the severity of sea turtle interactions that occur. As previously mentioned, a field study that examined the effects of shrimp trawl tow times and sea turtle deaths showed a strong positive correlation between the length of time of the tow and sea turtle deaths (Henwood and Stuntz 1987). Epperly *et al.* (2002) updated and re-analyzed the data set used by Henwood and Stuntz , and followed the recommendations of the NRC to reexamine the association between tow times and sea turtle deaths. The findings of Epperly *et al.* were comparable to Henwood and Stuntz (1987) but with some modifications. In general, tows of short duration have little effect on mortality, intermediate tow times result in a rapid escalation to mortality, and eventually reach a plateau of high mortality, but will not equal 100 percent as a turtle caught within the last hour of a long tow will likely survive (Epperly *et al.* 2002). Tows by scallop dredge vessels are usually around 1 hour or less which should help to reduce the risk of death from forced submergence for turtles caught in scallop gear but does not eliminate the risk. Epperly *et al.* (2002) found that, for the shrimp trawl fishery, a three percent mortality was predicted from tows of 40 minutes or less in the summer an five percent mortality was predicted from tows of 40 minutes or less in the winter. To achieve a negligible mortality rate (defined by the NRC as <1 percent), tow times would have to be less than 10 minutes (Epperly *et al.* 2002). Therefore, NOAA Fisheries cannot discount that turtle mortalities will occur as a result of forced submergence in scallop gear.

5.5 Summary of Effects of the Scallop Fishery

The distribution of loggerhead sea turtles overlaps seasonally with the distribution of scallop fishing effort from the southern boundary of the management area from approximately the North

Carolina/South Carolina border to Cape Cod. Leatherbacks have a broader distribution and are expected to overlap with operation of the scallop fishery throughout the area where vessels fish for scallops from the North Carolina/South Carolina border through the Gulf of Maine. Based on the CeTAP study (1982) and Shoop and Kenney (1992), the distributions of loggerhead and leatherback sea turtles are expected to overlap with scallop fishing gear throughout Mid-Atlantic continental shelf waters in the summer with lower concentrations in the spring and fall. Loggerhead sea turtles are considered to be the most abundant of these two turtle species in the action area (CeTAP 1982; Shoop and Kenney 1992). This is not unexpected given that the population of Atlantic loggerheads is more numerous than leatherback sea turtles.

Hard-shelled sea turtles have been injured and killed as a result of being captured in scallop dredge gear. To date, only loggerhead sea turtles have been identified as being captured in scallop dredge gear. Of the 62 turtles observed captured in scallop dredge gear over the period March 1, 1996 - October 31, 2004 (excluding the experimental fishery), 43 were positively identified as loggerhead sea turtles. Nineteen could only be identified as hard-shelled turtle species (*i.e.*, not leatherbacks). Twelve of the nineteen were observed in 2001 or earlier, before additional training was provided to observers to help them identify turtle species. Given their large size and differences in prey and habitat preferences, leatherback sea turtles are not expected to be caught in scallop dredge gear or struck by the gear when it is operating on the bottom.

There have been three observed interactions between scallop trawl gear and loggerhead sea turtles. There have been no observed or reported interactions between scallop trawl gear and leatherback sea turtles. Although there is no evidence that leatherback sea turtle interactions with scallop trawl gear have occurred, given the direction from Congress to provide "benefit of the doubt" to the species, for the purpose of this Opinion, NOAA Fisheries is assuming that leatherback sea turtle interactions with scallop trawl gear are reasonably likely to occur. This is believed to be a reasonable assumption given that the distribution of leatherback sea turtles overlaps with the use of scallop trawl gear and this species has been caught in trawl gear used in the *Loligo* squid trawl fishery. Although all three of the loggerhead sea turtles observed captured in scallop trawl gear were alive and uninjured and the leatherback sea turtle observed captured in *Loligo* trawl gear was also uninjured, NOAA Fisheries believes that loggerhead and leatherback sea turtles may suffer injuries or be killed as a result of capture (forced submergence) in scallop trawl gear. This determination is based on the estimated mortality of sea turtles captured in shrimp trawl gear in the Southeast U.S. that operates outside of the action area (Epperly *et al.* 2002), observed sea turtle mortalities in other trawl fisheries (*e.g.*, summer flounder) that operate in the action area, and the lack of tow time restrictions for scallop trawl gear.

A modified scallop dredge that utilizes a series of chains to restrict the opening between the sweep, ticklers, and dredge frame has shown promise in industry trials at preventing the capture of sea turtles in the dredge bag. Based in part on the results of the experimental fishery, NOAA Fisheries announced that it will conduct rulemaking under the authority of the ESA to consider enacting measures by May 2005 to address the incidental capture of sea turtles in scallop fishing gear (69 FR 63498, November 2, 2004).

5.6 Anticipated Take of Sea Turtles in the Scallop Fishery

As described above, NOAA Fisheries approaches jeopardy analyses in three steps. The first step identifies the direct and indirect effects of an action on the physical, chemical, and biotic environment of the action area. The second step determines the reasonableness of expecting threatened or endangered species to experience reductions in reproduction, numbers or distribution in response to these effects. The third step determines if any reductions in a species reproduction, numbers or distribution (identified in the second step of our analysis) can be expected to appreciably reduce a listed species likelihood of surviving and recovering in the wild. In response to Step 1 of this analysis, NOAA Fisheries has identified that the proposed action is likely to adversely affect loggerhead and leatherback sea turtles when the turtles are captured in or are injured by scallop dredge and/or trawl gear.

To respond to Step 2 of the analysis, NOAA Fisheries must determine, given the currently available information, the anticipated number of loggerhead and leatherback sea turtles that will be affected. The anticipated number of sea turtles affected by operation of the scallop fishery as discussed in previous Opinions for the Scallop FMP were based, in large part, on an estimate of sea turtle bycatch in the scallop dredge fishery that operated in the Hudson Canyon and Virginia Beach Access Areas. As further described in those Opinions, the NEFSC could not provide a statistically reliable estimate at that time for the number of turtles taken by scallop dredge gear throughout the fishery as there were too many unknowns and calculating the estimate would require so many assumptions such that the final number would be scientifically unsound. It was noted, however, that funding to increase observer coverage in open areas of the fishery became available part way through the 2002 scallop fishing year, and that the 2003 scallop fishing year would be the first year for which a statistically reliable estimate of the number of sea turtles captured in scallop dredge gear throughout the fishery could be calculated (NOAA Fisheries 2004a). This estimate has been completed and is the basis for reinitiating consultation on the continued implementation of the scallop fishery. The method for deriving this estimate is fully described in the Northeast Fisheries Science Center Reference Document, *Bycatch of Sea Turtles in the Mid-Atlantic Sea Scallop (Placopecten magellanicus) Dredge Fishery during 2003* (Murray 2004 2nd ed.). As described in sections 1.0 and 5.2 of this Opinion, the bycatch estimate was later revised after improved spatial information in the commercial fisheries data became available (Murray 2004, 2nd ed.). The results of the bycatch analysis and a summary of the methods relative to this Opinion are provided below.

5.6.1 Anticipated interactions between sea turtles and scallop dredge gear

During 2003, sea turtle captures in scallop dredge gear were documented by fisheries observers aboard federally-permitted scallop dredge vessels that operated in the Mid-Atlantic region from Long Island, NY to Cape Hatteras, NC (Murray 2004). Twenty-two turtles were observed captured. Sixteen of these were observed in gear operating in the Hudson Canyon Access Area and 6 were observed in gear operating in Mid-Atlantic open areas (Murray 2004). All observed turtle captures occurred from July through October (NEFSC Observer Data). Based on the data collected and the methods as described further below, an estimated 749 sea turtles C.V. = 0.28) were captured in the scallop dredge fishery during the 2003 scallop fishing year (Murray 2004, 2nd ed.).

5.6.1.1 Area and time period for anticipated interactions of sea turtles and scallop dredge gear

As described above, the estimate of sea turtle bycatch in the scallop dredge fishery for the 2003 scallop fishing year was based on observer coverage of the Mid-Atlantic region south of Long Island, NY through Cape Hatteras, NC (Murray 2004). The spatial boundaries for the bycatch estimate were limited to the Mid-Atlantic since the Georges Bank and Gulf of Maine scallop fishery operate in different ecological conditions as compared to the Mid-Atlantic, and are north of the range of hard-shelled turtles (Murray 2004). During CeTAP surveys, loggerheads were rarely observed north of 41° N latitude (Shoop and Kenney 1992). In addition, 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, for purposes of the sea turtle bycatch estimate for the scallop dredge fishery, the determination was made that: (a) turtles are not taken in the scallop fishery operating in the Georges Bank and Gulf of Maine regions, (b) expanded observer coverage was better allocated to the Mid-Atlantic, and (c) commercial scallop fishing effort north of Long Island, NY could be excluded from the bycatch analysis (Murray 2004).

Although sea turtle bycatch in the 2003 scallop dredge fishery was only observed in the months of July - October, the bycatch estimate was based on the period June - November (Murray 2004). Sea turtle captures in scallop dredge gear have previously been observed in June. Stranding records and surveys indicate that sea turtles are present in inshore (defined as bays, inlets, sounds, and rivers; Braun-McNeill and Epperly 2004) Mid-Atlantic waters as far north as Virginia by April, and possibly as far north as New York (STSSN Database; CeTAP 1982; Shoop and Kenney 1992; Braun-McNeill and Epperly 2004). Sea turtles were first sighted by anglers in May and June in nearshore (defined as within 5.6 km of shore; Braun-McNeill and Epperly 2004) and offshore waters (defined as waters beyond 5.6 km from shore; Braun-McNeill and Epperly 2004) of Virginia, Maryland, Delaware and New Jersey. Therefore, for purposes of the bycatch estimate (Murray 2004), June was used as the first month that sea turtle distribution was expected to overlap the distribution of scallop dredge gear. Although there have been no observed captures of sea turtles in scallop dredge gear in November, Murray (2004) believed it was reasonably likely that turtles could be captured given that they are still likely to be present in Mid-Atlantic waters, particularly in the southern portions of the study area, during November (Morreale 1999; Shoop and Kenney 1992).

From June - November 2003, observer coverage for the scallop dredge fishery operating south of Long Island, NY to Cape Hatteras, NC, was 2.7% overall (Murray 2004). Coverage was higher, however, in the Hudson Canyon Access Area (9.7%) as compared to open areas (1.4%) (Murray 2004).

5.6.1.2 Sea turtle species anticipated to be captured in scallop dredge gear

In addition to determining the number of turtles anticipated to be taken in scallop dredge gear as a result of the proposed action, NOAA Fisheries must consider what species are captured in the fishery. Previous sea turtle bycatch estimates for the Hudson Canyon and Virginia Beach Access Areas identified the turtles only as "hard-shelled" species based on observer records. In 2001, in particular, only 2 of 11 sea turtles observed captured in the scallop dredge fishery were positively identified to species. Species identification has since improved in light of additional training provided to observers to increase their ability to identify turtle species. In the 2003 scallop fishing year, 17 of 22 sea turtles were positively identified. All of the turtles that were positively identified by observers in the 2003 scallop fishing year were loggerheads (Murray 2004). This is consistent with all of the observed turtle takes in the scallop dredge fishery since 1996; only loggerhead sea turtles have been identified as being captured in the scallop dredge fishery. Of the 62 turtles observed captured in the scallop dredge fishery over the period March 1, 1996 - October 31, 2004 (excluding the experimental fishery), 43 were positively identified as loggerhead sea turtles. The remainder were not positively identified. All of the turtles captured in the control dredge during the experimental fishery were also loggerhead sea turtles (DuPaul *et al.* 2004). For purposes of the bycatch estimate, it was assumed that all of the turtles observed captured in scallop dredge gear during the 2003 scallop fishing year were loggerhead sea turtles (Murray 2004). NOAA Fisheries believes that this is a more reasonable assumption given turtle distribution, the 2003 observed bycatch data, and data from previous years that have never positively identified any hard-shelled turtle species other than loggerheads in the scallop dredge fishery. Therefore, unlike the February 24, 2003, and February 23, 2004, Opinions for the continued implementation of the scallop fishery, this current Opinion considers only loggerhead sea turtles as being captured by the scallop dredge fishery.

5.6.1.3 Estimated mortality of loggerheads captured in scallop dredge gear

As described in previous Opinions for the scallop fishery, most sea turtles observed captured in scallop dredge gear are alive. Of the 62 sea turtles observed captured in scallop dredge gear over the period March 1, 1996 - October 31, 2004, only 4 were fresh dead. However, many more sea turtles were observed to have fresh injuries, presumably as a result of interaction with the dredge (*e.g.*, being struck by the dredge while in the water, being struck by rocks caught in the dredge and/or during dumping of the dredge contents onto the vessel). The number of injured turtles observed in the 2003 scallop fishing year was greater than in previous years. Based on the condition code recorded by observers, Murray (2004) suggested that the survival rate for loggerhead sea turtles observed captured in scallop dredge gear in the 2003 scallop fishing year was 22.7% based on the number of turtles that were incidentally captured without any apparent injuries and released alive (5 of 22 loggerhead sea turtles). Based on the observer's condition code recorded for the remaining turtles, Murray (2004, 2nd ed.) suggested that the mortality/injury rate for loggerhead sea turtles observed captured in the 2003 scallop fishing year was 77.3% by counting any turtle injured, even slightly, or resuscitated and released alive as dead/injured.

The use of the observers condition code to assess the survival and mortality/injury rate of sea turtles caught in the scallop dredge fishery is different than the approach used in the previous Opinions for the scallop fishery. For those Opinions, NOAA Fisheries assumed that any turtle with a cracked carapace was likely to die as a result of its injuries. All other turtles (with the exception of those that were clearly dead) were considered to have survived following their return to the water. NOAA Fisheries recognized, however, that more expertise would be helpful for assessing the likelihood of survival of turtles injured by scallop dredge gear. NOAA Fisheries, therefore, subsequently sought the advice of a panel of experts, primarily veterinarians, with experience in the treatment and care of sea turtles. Observer information collected on sea turtle takes in the scallop dredge fishery prior to the 2003 scallop fishing year was distributed to each panel member. Each member was asked to provide his/her professional opinion on whether, based on that information, the injury was one that may result in mortality or one that may directly or indirectly impair the animal's ability to function, survive or reproduce on its own (*i.e.*, a "serious injury"). The responses were compiled and used to develop and define three categories that comprise the agency's final working guidance for serious injury determinations for sea turtles captured in scallop dredge gear (Table 1) (NOAA Fisheries Memo from Mary Colligan to Patricia A. Kurkul dated September 23, 2004).

Table 1. Serious Injury Guidance for Sea Turtles Captured in Scallop Dredge Gear

Category I	Characterized as: Animal with crack through the scutes, on any area of carapace other than on marginal scutes Animal with crack through plastron Animal with a crack or cracks to the carapace either through or not through the scutes that occur over the vertebral column (suggesting possible spinal cord damage) Animal with a crack or cracks to the carapace either through or not through the scutes that occur over the anterior to mid-sections of the carapace (suggesting possible lung damage) Animal bleeding from rectum, nose, or other orifice (suggests internal injury) Animal with injuries to head with impacts to eyes, nares or oral cavity Behavior abnormal (e.g., not able to right itself or not moving in water) Animal found comatose and released with injuries other than the ones listed in Category III
Category II	Characterized as: Animal found comatose and successfully revived on deck and released (without any other injuries) Animal with carapace cracks that do not go through the scutes (on any area of the carapace besides vertebral column or anterior to mid-carapace) or through the plastron
Category III	Characterized as: Carapace cracks to marginal scutes Superficial cuts to flippers, that do not impair movement or function in animals with good body condition Animals with no apparent injuries

To more fully assess the effects of the scallop fishery on sea turtles, the final working guidance also assigned rates of survival for each category. These are: for Category I injuries - 0% chance of survival; for Category II injuries - 50% chance of survival; for Category III injuries - 100%

chance of survival. To date, there have been no studies that have investigated the survivability of sea turtles following release from a scallop dredge, or their ability to function and reproduce. Therefore, it is possible that some turtles with Category III injuries will be seriously injured. Likewise, it is also possible that some turtles with Category I injuries will not die, otherwise fail to function or reproduce. However, the assignation of these survival percentages are based on the best information currently available from personnel experienced in the care and rehabilitation of sea turtles and, as such, NOAA Fisheries believes that they are reasonable measures of what to expect for sea turtles captured by scallop dredge gear.

Based on the information presented above, and the information obtained from observer reports of loggerhead sea turtles captured in scallop dredge gear during the 2003 scallop fishing year, NOAA Fisheries has determined that of the 21 turtles that were retrieved alive from scallop dredge gear: 6 were certain to survive (Category III); 4 had a 50% chance of survival (Category II), and 11 had 0% chance of survival (Category I). An additional turtle died on the vessel despite resuscitation attempts. The mortality rate is, therefore, determined to be 64% ((11 Cat I + 2 Cat II + 1 fresh dead) ÷ 22 total x 100) and the survival rate to be 36% ((6 Cat III + 2 Cat II) ÷ 22 total x 100). Applying these rates to the bycatch estimate, NOAA Fisheries estimates that 479 loggerhead sea turtles suffered serious injuries during the 2003 scallop fishing year that caused immediate death, will eventually cause death, or will impair the turtles ability to reproduce as a result of capture in scallop dredge gear.

5.6.1.4 Age class of loggerhead sea turtles anticipated to be captured in scallop dredge gear

Sea turtles observed captured in the scallop dredge fishery in 2003 ranged in size from 55cm - 107cm from notch to tip (curved carapace length). When converted to straight carapace length (SCL) based on the formula for loggerheads provided in Teas (1993), the size range of loggerhead sea turtles observed captured in the fishery in 2003 is 51cm - 100cm SCL. NOAA Fisheries (2001) reviewed size at stage data for Atlantic loggerheads. Depending on the dataset used, the cutoff between pelagic immature and benthic immature loggerhead sea turtles was 42cm - 49cm SCL and the cutoff between benthic immature and sexually mature loggerhead sea turtles was described as 83cm - 90cm SCL. Other authors define the benthic immature stage for loggerheads as 36cm - 100cm SCL (Bass *et al.* in press). Based on these datasets and observer measurements of loggerhead sea turtles captured in the scallop dredge fishery, NOAA Fisheries anticipates that both benthic immature and sexually mature loggerhead sea turtles are captured in the scallop dredge fishery.

5.6.1.5 Origin of loggerhead sea turtles anticipated to be captured in scallop dredge gear

Tissue samples for genetics analysis have been collected from loggerhead sea turtles captured in the scallop dredge fishery. However, the results of the genetics testing are still pending. Therefore, it is currently unknown from which subpopulation(s) turtles captured in the scallop dredge fishery originate. As described in section 3.1.1, cohorts from all five of the western Atlantic loggerhead subpopulations are expected to occur within the action area of this consultation based on genetic testing of benthic immature loggerhead sea turtles caught on the foraging grounds in the Pamlico-Albemarle Estuarine complex (North Carolina) during September - December in 1995 - 1997 (Bass *et al.* in press). Results from this study indicate that the proportion of loggerhead sea turtles originating from each of these subpopulations varies within the action area with 80 percent originating from the south Florida subpopulation, 12 percent from the northeast Florida to North Carolina subpopulation, 6 percent from the Yucatán subpopulation, and 2 percent from other rookeries (including turtles originating from rookeries in Greece, Turkey, and Brazil) (Bass *et al.* in press).

5.6.2 Anticipated interactions between sea turtles and scallop trawl gear

As noted previously, the first observed captures of sea turtles in scallop trawl gear occurred in October 2004 when three loggerhead sea turtles were observed captured by a single vessel on a single trip. Turtle captures in other trawl fisheries operating in the action area have been observed. These include the *Loligo* squid, *Illex* squid, summer flounder, Atlantic croaker, and groundfish (targeting tautog) trawl fisheries. All of the observed takes have been loggerhead sea turtles with the exception of one leatherback take in a *Loligo* squid trawl and two unidentified species (NEFSC pers. comm.). A recent review of the NEFSC database suggests that from 1995 - October 31, 2004, 31 sea turtles were observed captured in the trawl fisheries listed above (including the three loggerhead takes in the scallop trawl fishery in October 2004). As described above, all of these takes were loggerhead sea turtles with the exception of one leatherback sea turtle and two unidentified species.

NOAA Fisheries Northeast Regional Office has contacted the NEFSC to determine whether an estimate of sea turtle takes in the scallop trawl fishery can be obtained based on the currently available information. Given that only three turtle takes have been observed in the scallop trawl fishery to date, and given the low number of takes observed in other trawl fisheries within the action area and the low level of observer coverage in those fisheries, a better estimate cannot be calculated at this time. Therefore, this Opinion relies on the best available data to quantify takes of sea turtles in the trawl component of the fishery - the three takes documented in October of 2004. This estimate of three takes per year in the trawl component may be an underestimate, but it is the best estimate possible. The ESA does not require biological opinions to be based on perfect information, but rather the best available information. The ESA regulations at 50 CFR 402.16 provide the mechanism by which new information can be reflected in biological opinions. When better information on takes in the trawl component of the scallop fishery become available, NOAA Fisheries will consider the information to determine whether it warrants reinitiation. The Terms and Conditions of this Opinion are designed, in part, to generate additional information on the topic of sea turtle takes in the scallop trawl fishery. Therefore, based on observer information for 2004 (through October 31, 2004) and despite no observed sea turtle takes in scallop trawls in previous years, NOAA Fisheries anticipates the take of up to three loggerhead sea turtles per year in scallop trawl gear. As described above, there has been only one known interaction between leatherback sea turtles and trawl fisheries operating in the action area. Previous Opinions presumed that leatherback and loggerhead sea turtles would have an equal rate of interaction with trawl gear operating in the action area. Based on data provided by the NEFSC, this does not appear to be the case. Of the 31 sea turtles observed captured in trawl fisheries operating in the action area from 1995 - October 31, 2004, only one was a leatherback sea turtles. All but two of the remaining 30 animals were identified as loggerhead sea turtles. The two other sea turtles were not identified to species. However, given the very large size and characteristic appearance of leatherback sea turtles, it is unlikely that the two unidentified sea turtles were leatherbacks. Therefore, for the purpose of this Opinion, NOAA Fisheries anticipates that one leatherback sea turtle may be taken annually in scallop trawl gear based on the observation of one leatherback sea turtle taken in a *Loligo* squid trawl in October 2001 in an area where the scallop fishery also operates. Based on the review of Epperly *et al.* (2002) and observed condition of sea turtles caught in trawl gear within the action area, NOAA Fisheries anticipates that any sea turtle caught in scallop trawl gear may die as a result of capture and forced submergence.

As described in previous Opinions for the scallop fishery, sea turtles are well known to be captured in trawls for the southeast U.S. shrimp fishery that occurs from Florida to North Carolina as well as the Gulf of Mexico shrimp fishery (that occurs throughout the Gulf), and in trawls for the summer flounder winter trawl fishery off of North Carolina. Both of these fisheries are required to use TEDs in their trawl gear throughout all or part of the area where the fishery operates. However, the southeast U.S. shrimp trawl fishery and the North Carolina winter summer flounder trawl fishery are not comparable to the scallop trawl fishery. Turtle concentrations in the southeast where the shrimp trawl fishery occurs are higher than in the Mid-Atlantic area where the scallop fishery operates. Similarly, the summer flounder winter trawl fishery south of Cape Charles, VA occurs primarily off of North Carolina where turtles concentrate in the winter. A study of the winter distribution of sea turtles in the vicinity of Cape Hatteras and their interactions with the summer flounder trawl fishery found that turtles occurred in waters ranging from 8-24° C but were most likely to occur in waters ≥11° C (Epperly *et al.* 1995b).

5.7 Summary of anticipated incidental take of sea turtles in the scallop fishery

NOAA Fisheries anticipates the annual take of 749 loggerhead sea turtles (C.V.= 0.28) as a result of the continued operation of the scallop dredge fishery with 479 suffering injuries to the extent that they will die, cease to function in other respects (eventually leading to death) or fail to reproduce. Loggerhead turtles captured by scallop dredge gear are expected to include benthic immature and sexually mature turtles. Based on genetic analysis of foraging benthic immature turtles (Bass *et al.* in press) and the mortality and survival rates as described in the agency's final working guidance, 383 loggerhead sea turtles ((749 x 0.80) x 0.64)) that originate from the south Florida subpopulation are anticipated to be killed as a result of capture in scallop dredge gear or injured to the extent that they otherwise fail to function (eventually leading to death) or fail to reproduce. For turtles originating from the northern subpopulation and captured in scallop dredge gear, 58 ((749 x 0.12) x 0.64) are anticipated to be killed as a result of capture in scallop dredge gear or injured to the extent that they otherwise fail to function (eventually leading to death) or fail to reproduce. For turtles originating from the Yucatán subpopulation and captured in scallop dredge gear, 29 ((749 x 0.06) x 0.64) are anticipated to be killed as a result of capture in scallop dredge gear or injured to the extent that they otherwise fail to function (eventually leading to death) or fail to reproduce. The remaining 10 turtles anticipated to be killed or seriously injured ((749 x 0.02) x 0.64) are expected to originate from the other western Atlantic subpopulations although this number might be slightly overestimated given that the study sample also included foraging benthic immature turtles that originated from non-U.S. nesting sites[7].

Scallop trawl gear is expected to result in the annual capture of three loggerhead sea turtles and one leatherback sea turtle. These takes may be either lethal or non-lethal.

As described in Section 2.1, substantive changes have been made to management of the sea scallop fishery in the 2004 scallop fishing year as a result of implementation of Amendment 10 and Framework 16/39 to the Scallop FMP and Northeast Multispecies FMP. Analysis of the effects of Amendment 10 and Framework 16/39 concluded that these actions would likely benefit sea turtles by reducing effort in the fishery and by shifting effort from Mid-Atlantic to New England waters (NOAA Fisheries 2004a; NOAA Fisheries 2004c). As previously mentioned, Amendment 10 established a rotational area management program, with each area to be opened or closed as proposed through subsequent framework actions. Framework 16/39 is the first such action. As described in section 2.1, Framework 16/39 allows scallop vessels to dredge for scallops in portions of the existing Georges Bank groundfish closed areas (Nantucket Lightship, Closed Area I, and Closed Area II). It allocates additional DAS to scallop fishermen for fishing in the Georges Bank access areas, along with time/area restrictions, and scallop possession limits, amongst others. Given the abundance and size of scallops in the Georges Bank access areas, scallop fishers are expected to shift their effort from Mid-Atlantic waters to these areas. As a result, the estimated area swept in the Mid-Atlantic is expected to decline from 3,000 nm^2 in 2003 to 2,100 nm^2 in 2004 (NEFMC 2004). After 2004, the area swept in the Mid-Atlantic is expected to be 58-67% less with access to the Georges Bank access areas as compared to no access (NEFMC 2004). Therefore, one might expect that as a result of these actions, turtle bycatch in the scallop dredge fishery will be less in the 2004 and subsequent scallop fishing years compared to what was estimated to have occurred in the 2003 scallop fishing year. Preliminary information suggests that this may be the case. Nine turtle takes have been observed in the scallop dredge fishery during 1,995 observer days for the period March 1, 2004 - October 31, 2004, compared to 22 turtle takes observed during 911 observer days for the same time period in 2003 (NEFSC Observer program, pers. comm.). However, the reduction in sea turtle takes in the scallop fishery as a result of implementation of the Amendment 10 and Framework 16/39 measures cannot be quantified at this time given that the 2004 scallop fishing year is the first year for which these measures were in effect (and for parts of the year, only) and the data for the fishing year (*e.g.*, number of turtle takes and the amount/location of effort) will not be available until the fishing year is completed (February 28, 2005). Therefore, the bycatch estimate provided by the NEFSC for the 2003 scallop fishing year (Murray 2004) is the best currently available information on the take of sea turtles in the scallop dredge fishery despite that this is likely a worst case scenario.

6.0 CUMULATIVE EFFECTS

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7 Due to rounding, the individual numbers do not add up to the total. Since a part of a turtle cannot be taken, the numbers were rounded to the whole number using the standard rules for rounding.

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Sources of human-induced mortality and/or harassment of turtles in the action area include incidental takes in state-regulated fishing activities, vessel collisions, ingestion of plastic debris, and pollution. While the combination of these activities may affect populations of endangered and threatened sea turtles, preventing or slowing a species' recovery, the magnitude of these effects is currently unknown.

State Water Fisheries - Fishing activities are considered one of the most significant causes of death and serious injury for sea turtles. A 1990 National Research Council report estimated that 550 to 5,500 sea turtles (juvenile and adult loggerheads and Kemp's ridleys) die each year from all other fishing activities besides shrimp fishing. Fishing gear in state waters, including bottom trawls, gillnets, trap/pot gear, and pound nets, take sea turtles each year. NOAA Fisheries is working with state agencies to address the take of sea turtles in state-water fisheries within the action area of this consultation where information exists to show that these fisheries take sea turtles. Given that state managed commercial and recreational fisheries along the Atlantic coast are expected to continue within the action area in the foreseeable future, additional takes of sea turtles in these fisheries is anticipated. Further information on state water fisheries is available in Section 4.1.2.

Vessel Interactions - NOAA Fisheries STSSN data indicate that vessel interactions are responsible for a large number of sea turtles strandings within the action area each year. Collision with boats can stun or easily kill sea turtles, and many stranded turtles have obvious propeller or collision marks (R. Boettcher, pers. comm.). However, it is not always clear whether the collision occurred pre- or post-mortem, and as a result an estimate of the number of sea turtles killed by vessels is not possible.

Pollution and Contaminants - Marine debris (*e.g.*, discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food. Chemical contaminants may also have an effect on sea turtle reproduction and survival. While the effects of contaminants on turtles is relatively unclear, pollution may be linked to the fibropapilloma virus that kills many turtles each year (NOAA Fisheries 1997). If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems. Excessive turbidity due to coastal development and/or construction sites could influence sea turtle foraging ability. As mentioned previously, turtles are not very easily 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, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999). Noise pollution has been raised, primarily, as a concern for marine mammals but may be a concern for other marine organisms, including sea turtles.

7.0 INTEGRATION AND SYNTHESIS OF EFFECTS

The *Status of Affected Species*, and *Environmental Baseline* sections of this Opinion discuss the natural and human-related phenomena that caused populations of listed species to become threatened or endangered and may continue to place their populations at high risk of extinction. The present section of this Opinion examines the effects of the continued implementation of the Scallop FMP to determine if: (a) those effects can be expected to reduce the reproduction, numbers, or distribution of threatened or endangered species in the action area, (b) any reductions in reproduction, numbers or distribution would be expected to reduce the species' likelihood of surviving and recovering in the wild, and (c) a reduction in a species' likelihood of surviving and recovering in the wild would be appreciable.

As described above, the use of dredge gear for the proposed activity is expected to adversely affect loggerhead sea turtles as a result of interactions with scallop dredge gear. Loggerheads and leatherback sea turtles are also expected to be adversely affected as a result of interactions with scallop trawl gear. Of the species considered, loggerheads are the most likely to be affected by scallop gear given that they are the most abundant of the sea turtle species in the area, and their distribution appears to have the greatest overlap with scallop fishing effort in the Mid-Atlantic. Although leatherback sea turtles have never been observed or reported captured in scallop gear, and are less abundant than loggerheads in the area, NOAA Fisheries is taking a precautionary approach and considers that capture of this species may also occur in scallop trawl gear since leatherbacks occur at times and in areas where the scallop trawl fishery operates and have been caught in other trawl gear fished within the action area.

In the *Approach to the Assessment* section of this Opinion, it was noted that the jeopardy analysis proceeds in three steps: (1) identification of the probable direct and indirect effects of an action on the physical, chemical and biotic environment of the action area; (2) determination of whether there is a reasonable expectation that threatened or endangered species will experience reductions in reproduction, numbers or distribution in response to these effects; and (3) determination of whether any reductions in a species' reproduction, numbers, or distribution (identified in the second step) can be expected to appreciably reduce a listed species' likelihood of surviving and recovering in the wild.

This Opinion has identified in Section 5 that the proposed activity for continued implementation of the Scallop FMP will directly affect loggerhead and leatherback sea turtles as a result of interactions (including capture) with scallop dredge and/or scallop trawl gear. No other direct or indirect effects to ESA-listed species are expected as a result of the activity. The following discussion in Section 7.1.1 and 7.1.2 below provide NOAA Fisheries' determinations of whether there is a reasonable expectation that loggerhead and/or leatherback sea turtles will experience reductions in reproduction, numbers or distribution in response to these effects, and whether any reductions in the reproduction, numbers, or distribution of these species can be expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

7.1 Integration and Synthesis of Effects on Sea Turtles

Based on past patterns of take of sea turtles in scallop dredge gear, the dredge component of the scallop fishery can be expected to capture up to 749 (C.V. = 0.28) loggerheads, annually, of which 479 loggerheads are expected to suffer serious injuries (defined as injuries that will result in death or an inability for the turtle to reproduce). The number of loggerheads expected to be captured is based on the takes of sea turtles in scallop dredge gear that are estimated to have occurred from Long Island, NY to Cape Hatteras, NC during the period June - November 2003. As described previously, the Amendment 10 and Framework 16/39 measures are expected to reduce the likelihood of sea turtles takes in the scallop dredge fishery for the 2004 scallop fishing year and subsequent scallop fishing years compared to what was estimated to have occurred in the 2003 scallop fishing year. However, the reduction in sea turtle takes in the scallop fishery as a result of implementation of the Amendment 10 and Framework 16/39 measures cannot be quantified at this time given that the 2004 scallop fishing year is the first year for which these measures were in effect (and for parts of the year, only) and all of the data for the fishing year (*e.g.*, number of turtle takes and the amount/location of effort) will not be available until the fishing year is completed (February 28, 2005). Therefore, the bycatch estimate provided by the NEFSC for the 2003 scallop fishing year (Murray 2004) is the best currently available information on the take of sea turtles in the scallop dredge fishery despite that this is likely a worst case scenario.

NOAA Fisheries has calculated the number of turtles that are expected to die immediately or suffer serious injuries as a result of capture in scallop dredge gear based on NOAA Fisheries final working guidance on serious injury determinations for sea turtles taken in scallop dredge gear, and the bycatch estimate. Again, this estimate is likely to overestimate the number seriously injured or killed since it uses the sea turtle bycatch estimate from the 2003 fishing year; before the Amendment 10 and Framework 16/39 measures went into effect.

Based on past patterns of observed take of loggerhead and leatherback sea turtles in comparable trawl fisheries, the trawl component of the scallop fishery is anticipated to result in the annual lethal or non-lethal take of up to three (3) loggerhead and one (1) leatherback sea turtle.

7.1.1 Loggerhead Sea Turtle

Based on information provided in this Opinion, NOAA Fisheries anticipates the capture of up to 749 loggerhead 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 will lead to death or an inability of the turtle to reproduce. The remaining 270 loggerhead turtles that are captured in scallop dredge gear and released alive are not expected to suffer any ill effects as a result of capture and there should be no negative impact to the species from the capture of these 270 turtles. With respect to the scallop trawl fishery, NOAA Fisheries anticipates the capture of up to three loggerhead sea turtles annually, all of which may result in mortality. Therefore, NOAA Fisheries anticipates that up to 482 loggerhead sea turtles will die or be seriously injured annually as a result of the continued operation of the scallop fishery (dredge and trawl gear components combined).

Genetics analysis for tissue samples collected from loggerhead sea turtles captured in the scallop dredge fishery are incomplete. Therefore, the origin of the captured turtles with respect to subpopulation is currently unknown. Based on the origin of loggerhead sea turtles as reported by

Bass *et al.* (in press), NOAA Fisheries anticipates that 386 of the 482 takes (scallop dredge and trawl gear combined) will be loggerheads originating from the south Florida subpopulation, 58 will be removed from the northern subpopulation, 29 are expected to be takes of loggerheads originating from the Yucatán subpopulation, and the remaining 10 are expected to originate from the remaining western Atlantic subpopulations although this number might be slightly overestimated given that the study sample also included foraging benthic immature turtles that originated from non-U.S. nesting sites[8]. As described in section 5.6.1.4, all of the loggerhead sea turtles captured in scallop dredge and trawl gear are expected to be benthic immature and sexually mature turtles. Data from tag returns, strandings, and nesting surveys suggest that the benthic immature stage lasts 14-32 years for loggerhead sea turtles with an estimated age of maturity ranging from 20-38 years (NMFS SEFSC 2001).

As described in the *Status of the Species* section, the threatened loggerhead sea turtle is the most abundant of the sea turtles listed as threatened or endangered in U.S. waters but is also affected by numerous anthropogenic activities. In many cases, the extent of these anthropogenic effects (in terms of number of sea turtles affected) are just beginning to be quantified. A number of stock assessments (TEWG 1998; 2000; NMFS SEFSC 2001; Heppell *et al.* 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. In the absence of this information, NOAA Fisheries must consider other methods for assessing the effects of the scallop fishery on western Atlantic loggerhead subpopulations. For the purpose of this Opinion, two methods were considered: nesting beach survey data and modeling work. In August 2004, NOAA Fisheries, Office of Protected Resources hosted a workshop attended by a panel of experts in the fields of conservation biology, population ecology, and species risk assessment. The goal of the workshop was to seek comments on an analytical framework for conducting jeopardy analyses under the ESA, and identify options for assessing species' risk when data are limited. A summary of the workshop and any recommendations is not yet available.

With respect to the other two options currently available to assess the status of western Atlantic loggerhead sea turtles, NOAA Fisheries recognizes that nesting beach survey data can be used to index the status and trends of loggerheads (USFWS and NOAA Fisheries 2003). However, detection of nesting trends requires consistent data collection methods over long periods of time (USFWS and NOAA Fisheries 2003). The currently available nesting data is still too limited to indicate statistically reliable trends for the western Atlantic loggerhead subpopulations. To date, analysis of nesting data from the INBS program, including nesting data through 2003, indicate 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; USFWS and NOAA Fisheries 2003). Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida's statewide survey program. Survey effort has been relatively stable during the 9-year 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

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[8] Due to rounding, the individual numbers do not add up to the total. Since a part of a turtle cannot be taken, the numbers were rounded to the whole number using the standard rules for rounding.

and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data). Similarly, although Zurita *et al.* (2003) did find significant increases in loggerhead nesting on seven 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 of time. Using the information gathered from these select south Florida and northern subpopulation nesting beaches, the Turtle Expert Working Group (TEWG) concluded that the south Florida subpopulation was increasing based on nesting data over the last couple of decades, and that the northern subpopulation was stable or declining (TEWG 2000).

While nesting trends provide an important indicator of subpopulation status, these cannot be viewed in isolation. Because loggerheads mature at a late age (~ 20 - 38 years), current nesting data reflect natural and anthropogenic effects to female loggerheads that occurred over the last two decades at the least. Using nesting trend data to make conclusions about the status of the entire subpopulation, therefore, 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. While there is no current evidence to support or refute these assumptions, multiple management actions have been implemented in the United States that either directly or indirectly address the known sources of mortality for loggerhead sea turtles (*e.g.*, fishery interactions, power plant entrainment, destruction of nesting beaches, etc.). These management actions are discussed more fully in section 4.1 of this Opinion. If conditions had remained the same since that time (*e.g.*, sources of anthropogenic mortality remained the same and the extent of that mortality on the various age classes has remained the same) then it could be reasonably assumed that the nesting trends are an indicator of the continuing trend in subpopulation status. However, we know that conditions have not remained the same. As described in section 4.4.3, NOAA Fisheries has taken regulatory action over the past ten years to address the capture and killing of sea turtles, including loggerhead sea turtles, in several fisheries that occur in the western Atlantic. Other on-going activities include action to address and reduce the capture and killing of loggerhead sea turtles in other fisheries (*e.g.*, the Atlantic pelagic longline fishery) as well as activities such as vessel traffic, hopper dredging, and power plant entrainment to name a few. These activities are, in part, an outcome of modeling efforts for Atlantic loggerheads which demonstrated that increasing egg and hatchling survival had a much smaller impact on population growth compared to increasing to the same extent, the survival rate of small juveniles, large juveniles, subadults, and mature breeders (Crouse *et al.* 1987; Heppell *et al.* 2003). Therefore, beginning in the 1990's, there has been an increased emphasis on reducing anthropogenic mortality of loggerheads from activities (*e.g.*, fishing operations) that effect juvenile and subadult loggerheads as well as adults away from the nesting beach. In addition, many U.S. commercial fisheries that occur in the Atlantic have also seen increased regulatory action and effort reductions since the 1990's through the development of fishery management plans (FMPs). The development of these FMPs was unrelated to sea turtle conservation. Nevertheless, in many cases they are likely to have had a beneficial effect upon loggerhead sea turtles and other sea turtle species by reducing fishing effort from gear types that are known to capture, injure and kill sea turtles.

An alternative to using nesting data trends to assess the status of western Atlantic loggerheads was developed by Heppell *et al.* (2003) and revised by NOAA Fisheries SEFSC (2001)[9] to assess the effects of changes in the shrimp trawl fishery and the pelagic longline fishery with respect to loggerhead sea turtles. NOAA Fisheries SEFSC (2001) modified the model developed by Heppell *et al.* (2003) to include updated vital rate information (*e.g.*, new estimates of the duration of life stages and time to maturity) and, unlike Heppell *et al.* (2003), also considered sex ratios other than 1:1 (NOAA Fisheries SEFSC 2001). The latter is an important point since studies have suggested that the proportion of females produced by the northern subpopulation is only 35% while the proportion of females produced by the south Florida subpopulation is 80% (NOAA Fisheries SEFSC 2001). Model runs by NOAA Fisheries SEFSC indicated that the effect of the TED regulation to allow larger benthic immature and sexually mature loggerheads to escape for a population with an initial growth rate of 0.97, average age to maturity of 39 years, and a sex ratio of 35% females would result in moving the population from declining to stable. Coupling these measures with an increase in pelagic immature survival of 5 to10% would result in a population increase. For a population with a female sex ratio of 50% (and all other parameters the same), the effect of the TED regulation would be to change the population trend from declining to increasing. Coupling the TED regulation with an increase in pelagic immature survival of 5 to 10% would result in even greater positive population growth. NOAA Fisheries has implemented the new TED regulations as modeled for in NOAA Fisheries SEFSC (2001) and has taken action to increase the survival of pelagic immature loggerheads by modification of the longline fisheries managed under the HMS FMP with the intent of increasing pelagic immature survival, overall, by 10% (NOAA Fisheries 2004b). Therefore, for the purposes of this Opinion, and based on the information provided above, NOAA Fisheries considers that the loggerhead subpopulations considered in this Opinion will experience positive population growth or, in the event that the 10% increase in pelagic immature survival is not realized,will at the very least stabilize in subsequent years. These changes are unlikely to be evident in nesting beach censuses for many years to come given the late age at maturity for loggerhead sea turtles and the normal fluctuations in nesting.

As with any modeling approach, NOAA Fisheries SEFSC (2001) and Heppell *et al.* (2003) made certain assumptions in developing the loggerhead model. NOAA Fisheries, NERO, Protected Resources Division considered these assumptions and discussed the modeling approach with the SEFSC. The SEFSC confirmed that the modeling approach did consider the effects to all western Atlantic loggerhead subpopulations although the northern subpopulation was specifically mentioned in many aspects because it was considered to have the weakest status with respect to the other subpopulations. For example, NOAA Fisheries SEFSC (2001) ran the model scenarios using 0.95, 0.97 and 1.0 as the starting growth rates based on information collected for the northern nesting subpopulation. In addition, NOAA Fisheries SEFSC (2001) ran the model scenarios using 35%, 50%, and 80% as the proportion of females in the population, where 35% was thought to be representative of the northern subpopulation and 80% was believed to be representative of the south Florida subpopulation. The 50% was included since it was used in

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9 As described in section 3.1.1, although Heppell *et al.* was published in 2003, NOAA Fisheries SEFSC 2001 is actually the most up-to-date version of this modeling approach. The discrepancy in publication dates is the result of differences in time to publication.

historical models (NOAA Fisheries SEFSC 2001; Heppell *et al.*, 2003). The range of sex ratios bracket the estimated sex ratio (69%) of the Yucatán subpopulation. NOAA Fisheries considers the NOAA Fisheries SEFSC modeling approach to be the best available information for anticipated trends of the western Atlantic loggerhead sea turtle populations. We have, nevertheless, followed direction from Congress to provide "benefit of the doubt" to the species. Therefore, for the purposes of this Opinion, NOAA Fisheries only considered the model runs that used the following parameters: a starting population growth rate of 0.97 (*i.e.*, a 3% annual decline in the population), average age to maturity as 39 years (model 4), and a 35% or 50% proportion of females in the population. Overall, these were the most conservative model runs with the exception of model runs that were initiated with a population growth rate of 0.95 (*i.e.*, a 5% annual decline in the population). NOAA Fisheries chose not to use the model runs with a starting growth rate of 0.95 given that this growth rate is not supported by other data sets (NOAA Fisheries 2002). Model runs by NOAA Fisheries SEFSC indicated that the effect of the TED regulation to allow larger benthic immature and sexually mature loggerheads to escape for a population with an initial growth rate of 0.97, average age to maturity of 39 years, and a sex ratio of 35% females would result in moving the population from declining to stable. Coupling these measures with an increase in pelagic immature survival of 5 to10% would result in a population increase. For a population with a female sex ratio of 50% (and all other parameters the same), the effect of the TED regulation would be to change the population trend from declining to increasing. Coupling the TED regulation with an increase in pelagic immature survival of 5 to 10% would result in even greater positive population growth. Therefore, based on the modeling approach of NOAA Fisheries SEFSC 2001, the western Atlantic loggerhead subpopulations should experience stable or increased subpopulation growth in the coming years as the current immature age classes reach maturity, and as shrimp trawl mortality of mature loggerheads is reduced.

In selecting to use this model approach, NOAA Fisheries has assumed that the current population growth rate for loggerhead sea turtles is not worse than 0.97. This is a reasonable assumption given that the 0.97 population growth rate used in model scenarios by NOAA Fisheries SEFSC (2001) was based on data collected for northern subpopulation loggerheads before action was taken to address many of the known anthropogenic impacts to this subpopulation and the species as described under section 4.0. Therefore, while the modeling approach does not seek to specifically identify or quantify the various anthropogenic impacts to loggerhead sea turtles, the starting growth rates reflected the on-going mortality experienced by the subpopulation. This includes impacts as a result of the scallop fishery. As described in section 2.1, the scallop fishery has a long history and was well established prior to the 1990's. Therefore, the mortality rates used in NOAA Fisheries SEFSC (2001) would have included mortality to loggerheads as a result of operation of the scallop fishery. In addition, the scallop fishery became a limited access fishery in 1994 and management measures have served to maintain or decrease, not increase, effort over the past decade. While scallop landings have increased over time, including in the Mid-Atlantic, there is evidence that these are due to increased recruitment of scallops in the region (NEFMC 2003). Therefore, the estimated bycatch of sea turtles in the scallop dredge fishery for the 2003 scallop fishing year is expected to be less than the level of mortality from the scallop fishery that is subsumed in the starting mortality rates for NOAA Fisheries SEFSC (2001).

Looking at a snap shot of population size at any specific time, it can be argued that any amount of lethal take will reduce the numbers of a population. Therefore, using the approach of this Opinion which gives "benefit of the doubt to the species" the lethal removal of 386 loggerhead sea turtles from the south Florida subpopulation, 58 sea turtles from the northern loggerhead subpopulations, 29 sea turtles from the Yucatán subpopulation, and 10 sea turtles from the remaining western Atlantic subpopulations, annually, would be expected to reduce the number of loggerhead sea turtles from these subpopulations as compared to the number of loggerheads that would have been present in the absence of the proposed action (assuming all other variables remained the same). However, this does not necessarily mean that these subpopulations will experience reductions in reproduction, numbers or distribution in response to these effects to the extent that survival and recovery would be appreciably reduced. The estimate of annual lethal take is assumed to include both males and females. There is no data on the sex of turtles captured in the scallop dredge fishery since sex cannot be easily determined by external examination. Therefore, for the current purposes, it is assumed that the estimated lethal take includes both males and females. Adult female loggerhead sea turtles exhibit natal homing meaning that they return to the beach where they were hatched to lay their eggs. Based on genetics analysis, males do not appear to mate exclusively with females from their same subpopulation (Pearce and Bowen 2001). Therefore, while female loggerhead sea turtles play an essential role in maintaining the distribution of the particular subpopulation, males do not. The likelihood that only a portion of the estimated lethal take is expected to be female loggerhead sea turtles will further lessen any effect to the reproduction and distribution of these subpopulations. Finally, action has been taken to reduce anthropogenic impacts to loggerhead sea turtles from various sources, particularly since the early 1990's. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce anthropogenic mortality of pelagic immature, benthic immature and sexually mature age classes in various fisheries and other marine activities. Current modeling data suggests that all western loggerhead subpopulations should experience positive or at least stabilizing subpopulation growth as a result of the change in TED regulations. Management actions to increase pelagic immature survival in the U.S. Atlantic longline fisheries is expected to further push the subpopulations to positive growth. Given the late age at maturity for loggerhead sea turtles, the benefit of many of these actions in terms of a positive effect on nesting trends will not be apparent for years to come. Nevertheless, given the on-going conservation measures for all western Atlantic loggerhead subpopulations, the current status of the subpopulations affected by the proposed action, and the existence of these effects prior to the 1990's (when the population trend data upon which the model is based was collected), it is unlikely that the annual loss of 386 loggerhead sea turtles from the south Florida subpopulation, 58 loggerhead sea turtles from the northern subpopulation, 29 loggerhead sea turtles from the Yucatán subpopulation, and 10 loggerhead sea turtles from the (combined) Dry Tortugas and Florida Panhandle subpopulations will affect the numbers, reproduction or distribution of these loggerhead subpopulations to an extent that would reduce the subpopulations likelihood of surviving and recovering in the wild. This conclusion is supported by modeling results (NOAA Fisheries SEFSC 2001) which demonstrated that loggerhead subpopulations would move from declining to increasing or at the very least declining to stable as a result of the new TED requirements and gear requirements for the U.S. pelagic longline fishery. Since the likelihood of survival and recovery for each of these subpopulations is not reduced, the proposed action is not expected to reduce the species' likelihood of surviving and recovering in the wild. Given that the proposed action is not expected to reduce the likelihood of the species survival and recovery, then the final criteria for making a jeopardy determination - whether the reduction in a species' likelihood of surviving and recovering in the wild would be appreciable - is also not met.

7.1.2 Leatherback Sea Turtle

In the Pacific Ocean, the abundance of leatherback turtles on nesting colonies has declined dramatically. At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

The largest leatherback rookery in the western Atlantic remains along the northern coast of South America in French Guiana and Suriname. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). Nest numbers in Suriname have shown an increase and the long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). Studies by Girondot et al. (in review) also suggest that the trend for the Suriname - French Guiana nesting population over the last 36 years is stable or slightly increasing. The number of leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s. In the 1990's the number of nesting females in the Caribbean Islands was estimated at 1,437-1,780 leatherbacks per year (Spotila *et al.* 1996)

There is no information at this time to show that leatherback sea turtles have been caught in scallop trawl gear. Nevertheless, NOAA Fisheries is taking a precautionary approach based on information of a leatherback capture in the *Loligo* squid bottom trawl fishery which captured and released alive a leatherback sea turtle off of Delaware in 2001. NOAA Fisheries is also taking a precautionary approach and assumes that any capture of a leatherback sea turtle in scallop trawl gear could result in death due to forced submergence, given that there are no regulatory controls on tow-times.

Taking a snap shot of the population at a point in time, it could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to 1 leatherback sea turtle annually would be expected to reduce the number of Atlantic leatherback sea turtles as compared to the number of leatherback sea turtles that would have been present in the absence of the proposed action (assuming all other variables remained the same). However, as discussed above, this does not necessarily mean that the population will experience reductions in reproduction, numbers or distribution in response to these effects to the extent that survival and recovery would be appreciably reduced. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). Studies by Girondot *et al.* (in review) also suggest that the trend for the Suriname - French Guiana nesting population over the last 36 years is stable or slightly increasing. The number of leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s. In the 1990's the number of nesting females in the Caribbean Islands was estimated at 1,437-1,780 leatherbacks per year (Spotila *et al.* 1996). In addition, the U.S. has taken action to reduce the number and severity of leatherback interactions with the two leading known causes of leatherback fishing mortality - the U.S. Atlantic longline fisheries, and the southeast shrimp trawl fishery. In addition, NOAA Fisheries is also pursuing information on and solutions to the apparent interactions of leatherbacks with various pot fisheries in U.S. state and federal waters.

The status of leatherback sea turtles range-wide is of concern. The Pacific population of leatherback turtles has declined precipitously and is of grave concern. Leatherback survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. Although the extent of impacts to this species are of concern, given that the trend for the Suriname - French Guiana nesting population over the last 36 years is stable or slightly increasing (Girondot *et al.* in review), the number of nests for Suriname and French Guiana combined was 60,000 in 2001 (Hilterman and Goverse 2004), and leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s and the population numbers in the thousands (based on the number of nesting females) the loss of one (1) leatherback sea turtle annually from the Atlantic population as a result of the operation of the scallop trawl fishery is unlikely to reduce the numbers, reproduction or distribution of this leatherback population to an extent that would reduce the populations likelihood of surviving and recovering in the wild. Since the likelihood of survival and recovery for the population is not reduced, the proposed action is not expected to reduce the species' likelihood of surviving and recovering in the wild. Given that the proposed action is not expected to reduce the likelihood of the species survival and recovery, then the final criteria for making a jeopardy determination - whether the reduction in a species' likelihood of surviving and recovering in the wild would be appreciable - is also not met.

8.0 CONCLUSION

After reviewing the current status of loggerhead and leatherback sea turtles, the environmental baseline for the action area, the effects of the continued implementation of the Scallop FMP, and the cumulative effects, it is NOAA Fisheries' biological opinion that the proposed activity may adversely affect but is not likely to jeopardize the continued existence of these species.

9.0 INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act and Federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, capture, or collect, or to attempt to engage in any such conduct." Incidental take is defined as take that is incidental to, and not the purpose of, the execution of an otherwise lawful activity. Under the terms of

Sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

The measures described below are non-discretionary and must therefore be undertaken in order for the exemption in section 7(o)(2) to apply. Failure to implement the terms and conditions through enforceable measures, may result in a lapse of the protective coverage section of 7(o)(2).

When a proposed NOAA Fisheries action is found to be consistent with section 7(a)(2) of the ESA, section 7(b)(4) of the ESA requires NOAA Fisheries to issue a statement specifying the impact of incidental taking, if any. It also states that reasonable and prudent measures necessary to minimize impacts of any incidental take be provided along with implementing terms and conditions. Only those takes resulting from the agency action (including those caused by activities approved by the agency) that are identified in this statement and are in compliance with the specified reasonable and prudent alternatives and terms and conditions are exempt from the takings prohibition of Section 9(a), and those of federal regulations implemented pursuant to Section 4(d) pursuant to section 7(o) of the ESA.

Anticipated Amount or Extent of Incidental Take

Based on data from observer reports for the scallop fishery, and the distribution and abundance of turtles in the action area, NOAA Fisheries anticipates that the continued implementation of the Scallop FMP, may result in the annual taking of 753 sea turtles as follows:

- for scallop *dredge* gear, NOAA Fisheries anticipates the annual taking of up to 749 loggerheads of which up to 479 will be lethal takes (includes serious injuries which are injuries that will eventually lead to death or result in the turtles failure to reproduce), and;

- for scallop *trawl* gear, NOAA Fisheries anticipates the annual take of up to 3 loggerhead, and 1 leatherback sea turtle which may be alive or dead.

For the purposes of monitoring whether the ITS has been exceeded or not, a take is counted as any sea turtle that is either taken alive and released, or dead. The extent of incidental take of sea turtles in the scallop fishery may be determined by the number of observed takes, the number of takes calculated to have occurred based on the number of observed takes and the percentage of observer coverage, the number of reported takes, the number of turtles found stranded where the cause of the stranding can be attributed to the scallop fishery, or any combination of the above, as appropriate.

This total is based on an estimate of sea turtle takes in sea scallop dredge gear in the Mid-Atlantic region during the 2003 scallop fishing year, the actual observed take of loggerhead sea turtles in scallop trawl fisheries in 2004 (through October 31, 2004), and the observed take of a leatherback sea turtle in the Mid-Atlantic *Loligo* squid trawl fishery. As described previously, the Amendment 10 and Framework 16/39 measures are expected to reduce the likelihood of sea turtles takes in the scallop dredge fishery for the 2004 scallop fishing year and subsequent scallop fishing years compared to what was estimated to have occurred in the 2003 scallop fishing year. However, since the reduction in sea turtle takes in the scallop fishery as a result of implementation of the Amendment 10 and Framework 16/39 measures cannot be quantified at this time, the bycatch estimate provided by the NEFSC for the 2003 scallop fishing year (Murray 2004, 2nd ed.) is the best currently available information on the take of sea turtles in the scallop dredge fishery despite that this is likely a worst case scenario and overestimates sea turtles takes in the scallop fishery for subsequent years.

Anticipated Impact of Incidental Take

In the accompanying Opinion, NOAA Fisheries has determined that this level of anticipated take is not likely to result in jeopardy to loggerhead or leatherback sea turtles.

NOAA Fisheries has followed direction from Congress to provide "benefit of the doubt" to loggerhead and leatherback sea turtles throughout this Opinion by making the following assumptions: (1) that up to 749 loggerhead sea turtles will be captured in scallop dredge gear during the 2004 and subsequent fishing years based on the estimated takes in the 2003 fishing year, despite that the Amendment 10 and Framework 16/39 measures are expected to benefit sea turtles by encouraging a shift in effort from Mid-Atlantic waters to New England waters where sea turtles are less likely to occur; (2) that the mortality rate for loggerhead sea turtles captured in scallop dredge gear is best represented by the number and condition of observed injured turtles rather than just those that were fresh dead; (3) that the mortality rate for turtles observed captured in scallop dredge gear is best represented by the number and condition of injured turtles observed in 2003, alone, rather than as an average using previous years in which fewer turtles were observed injured; (4) that loggerhead turtles can be captured in scallop trawl gear and die as a result of the interaction(s); and (5) that leatherback sea turtles can be captured in scallop trawl gear and die as a result of the interaction(s).

NOAA Fisheries has concluded that the continued operation of the scallop fishery may adversely affect but will not jeopardize loggerhead or leatherback sea turtles. Nevertheless, NOAA Fisheries must take action to minimize these takes. The following Reasonable and Prudent Measures (RPMs) have been identified as having a reasonable likelihood of minimizing sea turtle interactions with the scallop fishery. These measures are non-discretionary and must be implemented by NOAA Fisheries.

NOAA Fisheries considered other measures to help minimize sea turtle interactions with scallop dredge and/or trawl gear including requiring TEDs in scallop trawls and establishing one or more area closures in the Mid-Atlantic. These measures were rejected as RPMs for several reasons. With respect to TEDs, there has been no testing of existing TEDs in scallop trawl gear to determine whether any of the existing TED designs fit in a scallop dredge and whether the TED would allow turtles to escape as intended. With respect to time/area closures, no areas have yet been identified as having high rates of interaction ("hot spots") such that closure of the area would minimize sea turtle interactions. Closing the entire Mid-Atlantic to scallop fishing during months when sea turtle takes in the fishery have been observed (June through October) is, therefore, an overly broad measure to address what are relatively rare events in the scallop fishery.

Reasonable and Prudent Measures

NOAA Fisheries has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles:

1. NOAA Fisheries must reduce the capture of sea turtles in the scallop dredge fishery by requiring modification of scallop dredge gear at times and in areas where sea turtle interactions are likely to occur.

2. NOAA Fisheries must determine the nesting origin of loggerhead sea turtles taken in the scallop fishery.

3. NOAA Fisheries must conduct video work to investigate how sea turtles interact with scallop fishing gear.

4. NOAA Fisheries must require observer coverage for the scallop fishery at a level necessary to obtain statistically reliable information on sea turtle bycatch in the scallop fishery.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, and regulations issued pursuant to section 4(d), NOAA Fisheries must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To comply with #1 above, NOAA Fisheries must evaluate all data collected during the experimental fishery (DuPaul *et al.* 2004) as well as any other available information on gear modifications to the scallop dredge fishery that could reduce the number and/or severity of sea turtle interactions with scallop gear, and initiate regulatory action to require modification of all scallop gear for those times/areas where sea turtle distribution and operation of the scallop fishery are expected to co-occur. **Time Frame:** If NOAA Fisheries determines, as a result of rulemaking, that gear modifications are appropriate to achieve a reduction in the number and/or severity of sea turtle interactions with scallop gear, then the gear modifications as required by the regulatory action should be effective by May 1, 2005 in order to minimize turtle takes in the scallop fishery for the 2005 scallop fishing year.

2. To comply with #2 above, NOAA Fisheries must : (a) assess the number of genetics samples that have been obtained to date from turtles captured in the scallop dredge fishery, (b) obtain and review the results from the genetics testing of those samples, and (c) take action to process (conduct DNA analysis) in a timely manner all future samples collected by scallop fishery observers to obtain information on the origin (subpopulation) of loggerhead sea turtles taken in scallop fishing gear. **Time Frame:** obtain results of

samples already collected as soon as reasonably possible.

3. To comply with #3 above, NOAA Fisheries must conduct video work to determine how sea turtles are interacting with scallop fishing gear (*e.g.*, where within the water column turtles are interacting with scallop gear; and how sea turtles are being injured by scallop gear) by using video equipment during commercial fishing operations of scallop trawl and dredge gear within the action area, or during scallop dredge and trawl hauls that simulate scallop commercial fishing operations. **Time Frame:** Initiate by June 1, 2005, and conduct a sufficient number of trips to obtain scientifically reliable information.

4. To comply with #4 above, NOAA Fisheries must continue observer coverage for the scallop dredge component of the scallop fishery to assess the continued bycatch of sea turtles in the fishery, and must provide sufficient observer coverage of the scallop trawl component of the fishery in order to obtain a statistically reliable estimate of the number of sea turtles taken as bycatch in the trawl component of the fishery. **Time Frame:** Provide coverage by June 1, 2005 and conduct a sufficient number of trips to obtain scientifically reliable information.

10.0 CONSERVATION RECOMMENDATIONS

In addition to section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, section 7(a)(1) of the ESA places a responsibility on all Federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species. Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat to help implement recovery plans, or to develop information. The following additional measures are recommended regarding incidental take and sea turtle conservation:

1. NOAA Fisheries should work to further cooperation between the industry and NOAA Fisheries regarding the take of protected species in the fishery. Given the high cost of observer coverage in the fishery and the limited number of observers, other methods for obtaining information from the industry, exchanging information with the industry, and collectively seeking solutions to address sea turtle interactions with scallop fishing gear should be sought bearing in mind the role of the NEFMC as well.

2. In order to better understand sea turtle populations, NOAA Fisheries should support (*i.e.*, fund, advocate, promote) in-water abundance estimates of sea turtles in the action area. This information is required to provide more current information on the distribution and abundance of sea turtles than that provided by the CeTAP surveys conducted in the 1980s.

3. NOAA Fisheries should reestablish a long term in-water index study for sea turtles to monitor recruitment and health in the action area.

4. NOAA Fisheries, NER should work with NOAA Fisheries, F/PR2 in order to assess the need for regulations to allow fisheries observers to treat and/or transport for treatment sea turtles that are injured as a result of capture in scallop gear. This is particularly relevant to sea turtles that interact with scallop dredge gear which, in some cases, have demonstrated wounds that are expected to be lethal if left untreated.

5. NOAA Fisheries, NER should work with NOAA Fisheries, F/PR2 to evaluate whether the existing sea turtle resuscitation and handling guidelines should accommodate the treatment of seriously injured turtles (*e.g.* cracked carapaces) that have been recorded in the scallop dredge component.

6. NOAA Fisheries should provide guidance to permitted scallop fishermen on the sea turtle handling and resuscitation criteria as well as guidance to scallop dredge fishermen on the dumping of the dredge bag and lowering of the cutting bar to reduce the risk of injury to sea turtles that may be caught in dredge gear.

11.0 REINITIATION OF CONSULTATION

This concludes formal consultation on the continued authorization of the Atlantic sea scallop fishery as it operates under the Scallop FMP. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In the event that the amount or extent of take is exceeded, NOAA Fisheries, NERO must immediately request reinitiation of formal consultation.

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Appendix 1. Statistical areas for Northeast and Mid-Atlantic waters.

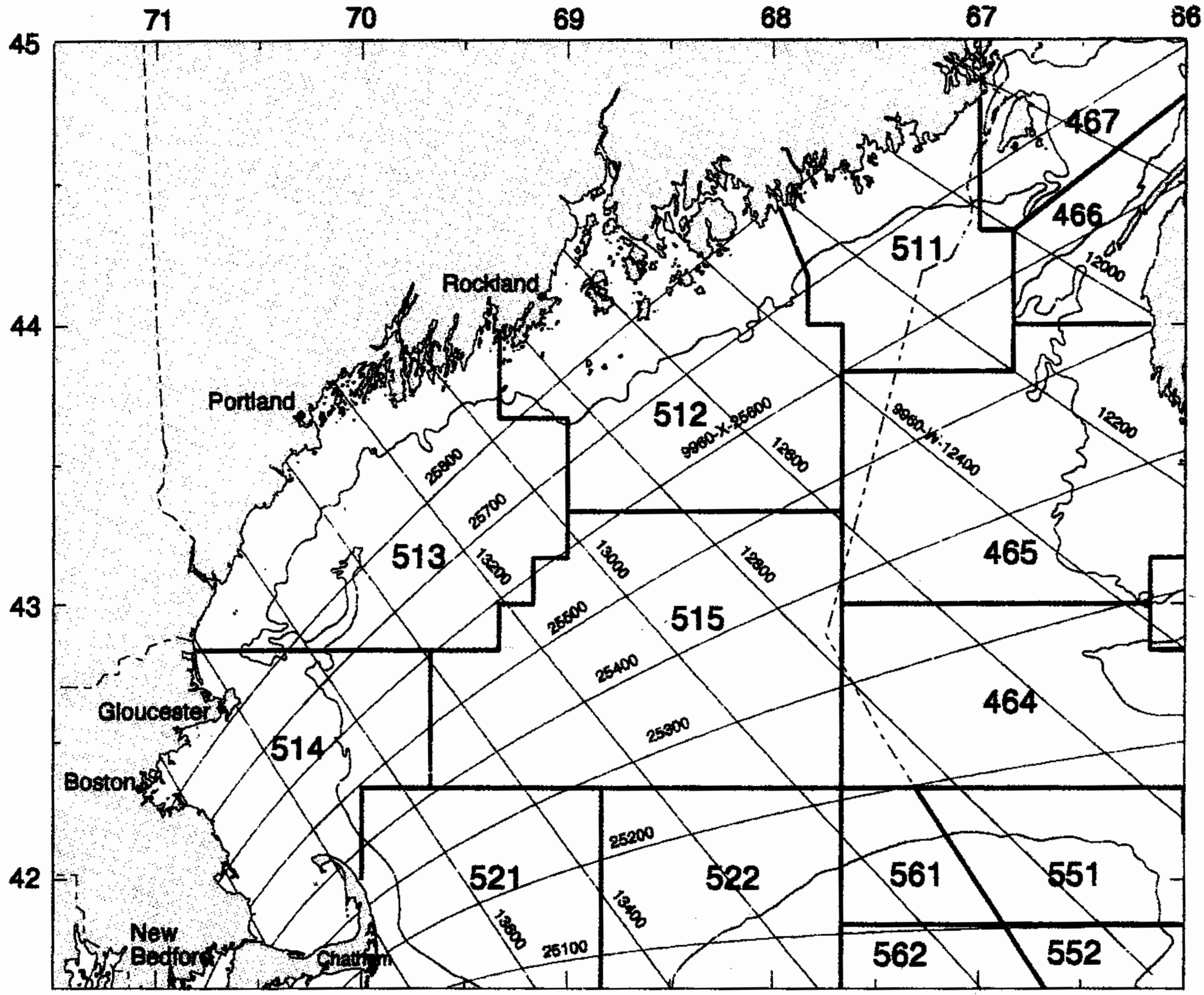

Chart 1. Chart area for the Gulf of Maine

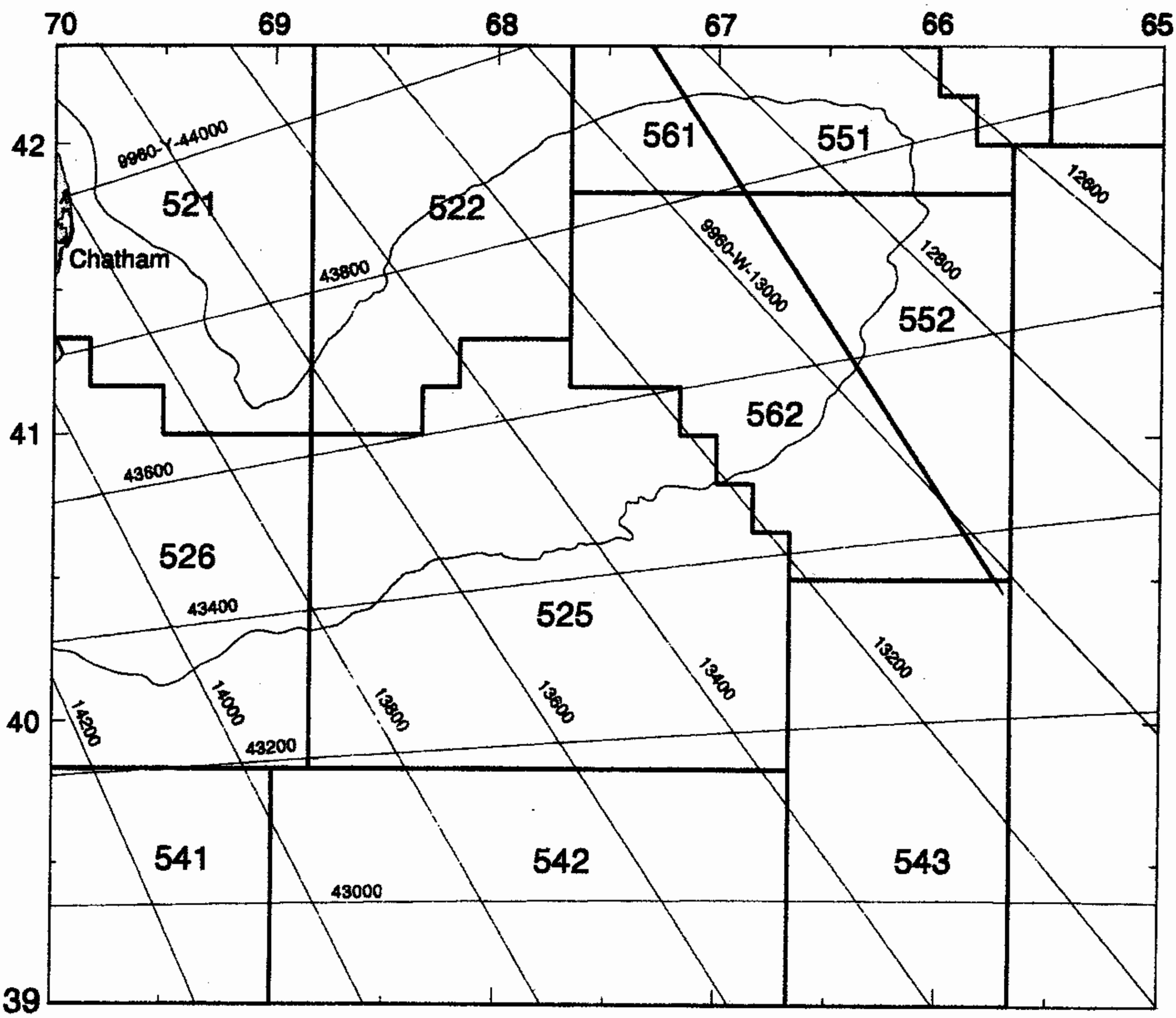

Chart 2. Chart area for Georges Bank

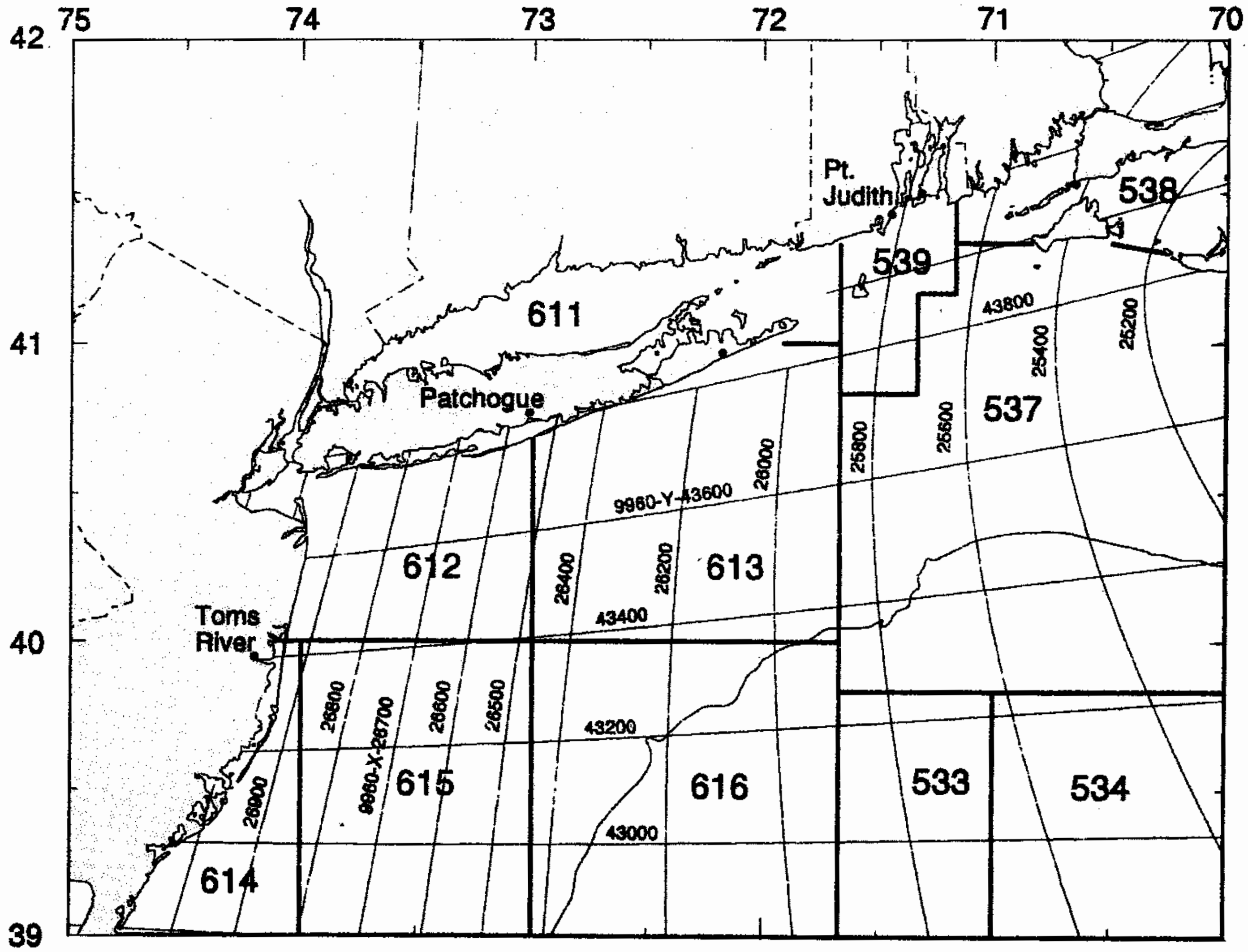

Chart 3. Chart area for Southern New England

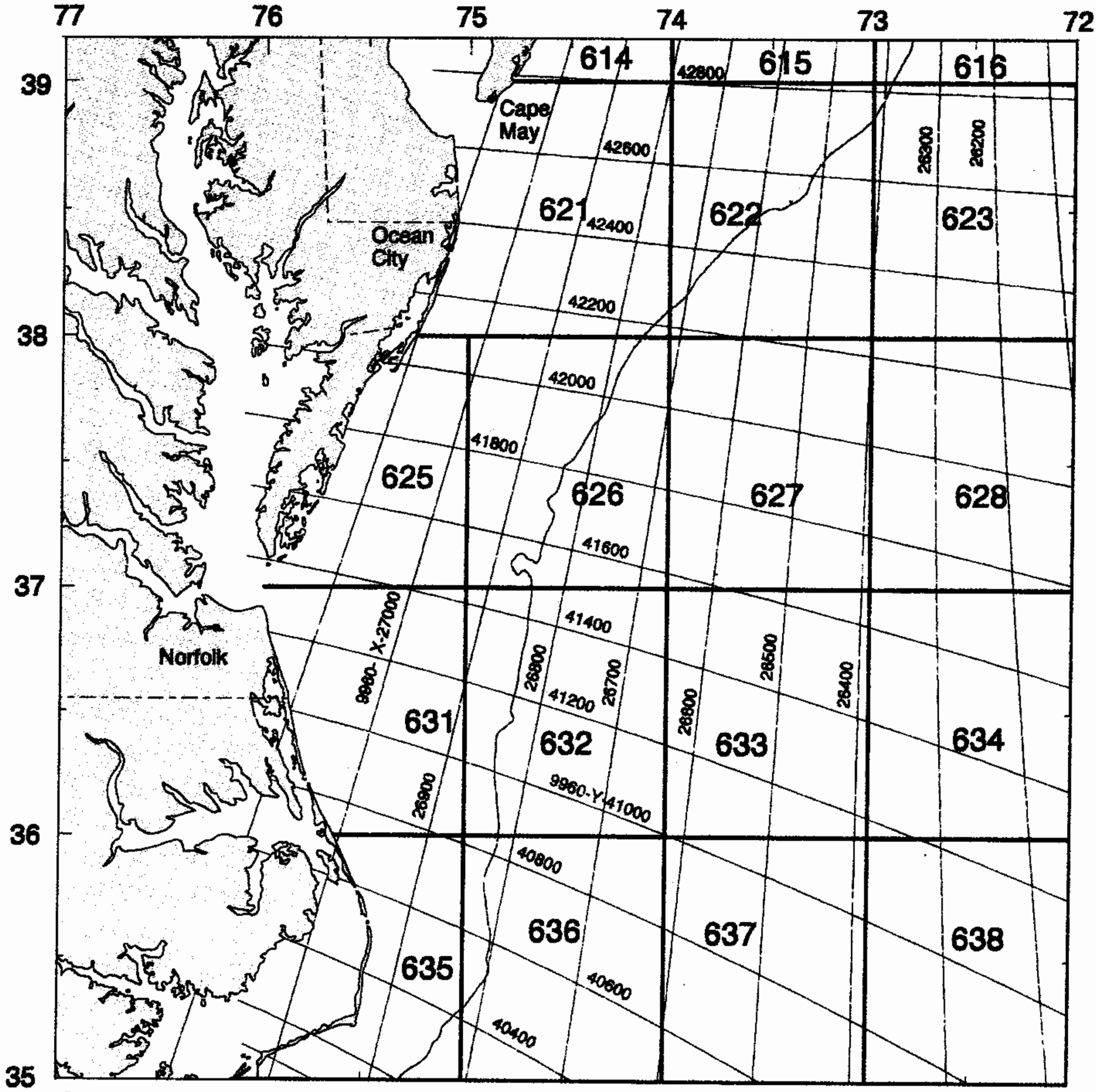

Chart 4. Chart area for Mid-Atlantic

Appendix 2. 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 NOAA Fisheries 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 represented as anticipated annual take unless otherwise noted.

FISHERY	**SEA TURTLE SPECIES**			
	Loggerhead	**Leatherback**	**Kemp's Ridley**	**Green**
Bluefish	6-no more than 3 lethal	None	6 lethal or non-lethal	None
Herring	6-no more than 3 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
HMS	1869 for 2004-2006 and 1905 for each subsequent 3-year period	1981 for 2004-2006 and 1764 for each subsequent 3-year period	105 total for each 3-year period beginning 2004-2006 (Kemp's ridleys, green, olive ridley or hawksbill in combination)	
Lobster	2 lethal or non-lethal	4 lethal or non-lethal	None	None
Mackerel/Squid/ Butterfish	6-no more than 3 lethal	1 lethal or non-lethal	2 lethal or non-lethal	2 lethal or non-lethal
Monkfish (gillnet)	3	1 leatherback, Kemp's ridley or green		
Monkfish (trawl)	1 loggerhead, leatherback, Kemp's ridley or green			
Multispecies	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Red Crab	1 lethal or non-lethal	1 lethal or non-lethal	None	None
Skate	1 (either a loggerhead, leatherback, Kemp's ridley or green) - lethal or non-lethal			
Spiny Dogfish	3-no more than 2 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Summer Flounder/Scup/ Black Sea Bass	19-no more than 5 lethal (total - either loggerheads or Kemp's ridley)	None	see loggerhead entry	2 lethal or non-lethal
Tilefish	6-no more than 3 lethal or having ingested the hook	1 lethal or non-lethal take (includes having ingested the hook)	None	None
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	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 cycle	