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DRAFT BIOLOGICAL OPINION FOR MONKFISH 04-10-03

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Action Agency: NOAA Fisheries, Northeast Region Sustainable Fisheries Division

Activity: Authorization of fisheries under Monkfish Fishery Management Plan [Consultation No. F/NER/2003/00196]

Consulting Agency: NOAA Fisheries, Northeast Region Protected Resources Division

Date Issued: April 14, 2003

Approved by: Patricia A. Kurkul

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Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*; ESA) requires each federal agency to ensure that any action they authorize, fund, or carry out 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. Agencies generally fulfill this obligation in consultation with either the National Marine Fisheries Service (NOAA Fisheries), the U.S. Fish and Wildlife Service (FWS), or both depending on the species or critical habitat their actions may affect. 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 with NOAA Fisheries Northeast Region Protected Resources Division.

This document represents NOAA Fisheries biological opinion (Opinion) on the continued implementation of the Monkfish Fishery Management Plan (FMP) under section 7 of the ESA. This Opinion will consider the effects to protected species from actions proposed under Framework Adjustment 2 of the Monkfish FMP. These are: (1) an increase in the target Total Allowable Catch (TAC) for the Southern Fishery Management Area (SFMA) and the Northern Fishery Management Area (NFMA), (2) an increase in trip limits for limited access monkfish vessels fishing under a monkfish Day-At-Sea (DAS) in the SFMA, and (3) allocation of 40 monkfish DAS to each monkfish limited access boats to replace the Year 5 (the 2003-2004 fishing year, beginning May 1, 2003) default measures which would have ended the directed monkfish fishery. This Opinion will consider the effects of these actions on North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis)*, sperm whale (*Physeter macrocephalus*), blue whale (*Balaenoptera musculus*), loggerhead sea turtle (*Caretta caretta*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*) and green sea turtles (*Chelonia mydas*), in accordance with section 7 of the ESA.

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Formal intra-service section 7 consultation on NOAA Fisheries implementation of Framework Adjustment 2 was initiated on February 12, 2003. This Opinion is based on the information developed by the NOAA Fisheries' Office of Sustainable Fisheries, and other sources of information. A complete administrative record of this consultation is on file at the NOAA Fisheries Northeast Regional Office, Protected Resources Division, Gloucester, Massachusetts [Consultation No. F/NER/2003/00196].

1.0 CONSULTATION HISTORY

Informal Consultation - Cause for Reinitiation

Informal consultation on the proposed action concluded on February 12, 2003, that parts of the action, as proposed, may adversely affect ESA-listed right whales, humpback whales, fin whales, sei whales, blue whales, sperm whales, loggerhead sea turtles, Kemp's ridley sea turtles, green sea turtles, and leatherback sea turtles as a result of increased monkfish fishing effort beyond that

anticipated for year 5 during the May 14, 2002 consultation on the fishery. Although there are measures in place to reduce the number and/or severity of interactions between ESA-listed species and monkfish fishing gear, these measures do not apply throughout the range where operation of the monkfish fishery and ESA-listed species co-occur. Therefore, since the monkfish fishery uses a gear type that is known to take (*e.g.*, capture, kill) ESA-listed cetaceans and sea turtles and the fishery operates in areas and at times where these species occur, the proposed action (implementation of Framework 2 measures) may adversely affect ESA-listed cetaceans and sea turtles under NOAA Fisheries jurisdiction.

Formal Consultation History

The consultation history for the Monkfish fishery was reviewed in the May 14, 2002, Opinion [Consultation number F/NER/2002/00185]. In brief, formal consultation on the fishery was first initiated in 1998 and concluded that the operation of the fishery would not result in jeopardy to any ESA protected species under NOAA Fisheries jurisdiction provided that the gillnet portion of this fishery was modified by the application of the Atlantic Large Whale Take Reduction Plan (ALWTRP). The Opinion also concluded that the gillnet sector might adversely affect sea turtles, and an Incidental Take Statement (ITS) with Reasonable and Prudent Measures (RPMs) to minimize take was provided. Consultation was reinitiated in 2000 after new information indicated a change in the status of right whales, and observer data indicated that the ITS for sea turtles in the monkfish fishery was exceeded during Year 1 (November 8, 1999 - April 30, 2000) of the FMP. The consultation [Consultation number F/NER/2001/00546] was concluded on June 14, 2001, and resulted in a jeopardy finding for northern right whales. In response to the jeopardy conclusion, NOAA Fisheries Protected Resources Division developed one Reasonable and Prudent Alternative (RPA) with multiple management components that collectively are designed to avoid the likelihood of the federal monkfish fishery jeopardizing the continued existence of the endangered right whale. Incidental take of sea turtles was also anticipated but was not expected to lead to jeopardy for any of the affected sea turtle species. An ITS was provided along with RPMs to minimize the taking of sea turtles in the monkfish fishery.

In 2002, following NOAA Fisheries' rejection of Framework Adjustment 1, 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.

NOAA Fisheries is currently proposing regulations to implement Framework Adjustment 2 to the

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Monkfish FMP. Framework 2 will: (1) eliminate the Year 5 default measure that would reduce DAS to zero, (2) provide 40 DAS for each limited access monkfish permit holder, (3) increase the TACs for the NFMA and the SFMA, and (4) increase trip limits in the SFMA. Reinitiation of section 7 consultation is, therefore, once again required since the proposed action is expected to result in increases in fishing effort which may result in the addition of adverse effects to ESA-listed cetaceans and sea turtles that were not considered during the May 14, 2002, consultation on the Monkfish FMP.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is based on more recent analyses and assessments that provide new information on monkfish stocks and alternative fishing mortality reference points that need to be incorporated into the FMPs overfishing definition and control rules. To this end, the proposed action would: (a) revise the overfishing definitions in the FMP, (b) implement a method for setting optimum yield (OY) and annual target total allowable catch levels (TACs), and (c) establish target TACs and corresponding trip limits for the 2003 fishing year beginning May 1, 2003. These include:

- allocating 40 monkfish DAS to each limited access monkfish fisher whether fishing in the NFMA or the SFMA;
- increasing the SFMA TAC to 10,211 metric tons (mt) (as compared to 7,921 mt and 5,673 mt for the 2001 and 2002 fishing years, respectively);
- increasing the NFMA TAC to 17,708 mt (as compared to 11,764 mt and 5,673 mt for the 2001 and 2002 fishing years, respectively);
- increasing the trip limit for Category A and C vessels fishing in the SFMA from 550 lbs (tail-weight monkfish) per DAS to 1,250 lbs per DAS;
- increasing the trip limit for Category B and D vessels fishing in the SFMA from 450 lbs (tail-weight monkfish) per DAS to 1,000 lbs per DAS;
- continuing to allow limited access monkfish vessels to fish in the NFMA under a monkfish or multispecies DAS with no monkfish trip limit; and,
- increasing the incidental catch limit for Category E vessels fishing in the NFMA under a multispecies DAS to the lesser of 400 lbs of monkfish tails per DAS or 50% of the total weight of fish on board.

The FMP implementing regulations require annual review of the progress of the plan toward the rebuilding goals and adjustment of management measures as needed to achieve these goals. The original FMP contained a four-year phase in of management measures to reduce fishing effort and rebuild the stocks within ten years or less. Based on a review in Year 3 of the FMP, the Year 4 measures to eliminate the directed monkfish fishery were deferred for one year. Now new information suggests that eliminating the directed monkfish fishery completely is no longer necessary to meet the rebuilding goals of the FMP. Therefore, the proposed action will eliminate the default Year 5 measures that would have reduced monkfish DAS to zero. In addition, based on new stock surveys, the target TAC has been increased for both the SFMA and NFMA. As a

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result, trip limits are also proposed to be increased for the SFMA and the "no trip limit" will remain in place for the NFMA.

The proposed action also seeks to establish an index and landings based method for setting annual harvest targets (TACs). It is expected that TACs and associated management measures could be implemented more expeditiously in the future using the proposed method since the action would require only a notice, rather than a proposed and/or final rulemaking, provided the measures are within the range of those that have been previously analyzed and reviewed by the public. Finally, the proposed action addresses past problems with the monkfish overfishing definition and fishing mortality rate threshold by incorporating the overfishing reference point adopted by NOAA Fisheries in the 2002 Emergency Interim Final Rule into the 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 Monkfish

2.1.1 FMP Measures

There are multiple measures in place to assist and meet the management objectives of the Monkfish FMP. However, for monkfish management, as well as for reducing the potential for interaction with listed species, the measures that reduce effort in the monkfish fishery are the most important. These include:

- limited access to the fishery;
- DAS effort restrictions;
- maximum carry-over of 10 unused monkfish DAS from the previous fishing year;
- different trip limits for northern vs. southern management areas;
- minimum fish size and possession restrictions;
- gear restrictions (*e.g.*, net limits and minimum mesh size);
- spawning season restrictions for vessels with Category A or B permits;
- restrictions on vessel upgrading; and,
- restrictions on the transfer, voluntary relinquishment or abandonment of permits.

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. Although primarily distributed north of Cape Hatteras, monkfish range from the northern Gulf of St. Lawrence to Florida. Thus, the monkfish fishery could be prosecuted throughout the management area where sufficient concentrations exist.

The limited access program restricts participation in the monkfish fishery to those boats with sufficient landings during a qualification period (between February 28, 1991 and February 27,

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1995, a period of development of the directed fishery). There are four types of limited access permits that differ based on the amount of monkfish landed during the qualifying period, and whether the vessel also possesses either a limited access multispecies or scallop permit (Appendix 1). Category A and B permits are for qualified monkfish vessels that do not also possess a limited access multispecies or scallop permit while Category C and D vessels are for qualified monkfish vessels that do possess either a multispecies or scallop limited access permit. Approximately 738 vessels qualified for monkfish limited access permits. However, only about six percent of these are for Category A or B permits (Monkfish SAFE Report 2000). A fifth permit category (Category E) is an open-access permit, meaning that it is available to any vessel which applies for it. However, this permit only allows for an incidental catch of monkfish. The amount of latent effort in the fishery varies by permit type. Amongst the limited access permit categories, 45% of vessels with a monkfish Category A permit did not land any monkfish during the 2000 fishing year (Year 2; May 1, 2000-April 30, 2001) (Monkfish SAFE Report 2001). By comparison, 28%, 5.7%, and 10.7% of Category B, C, and D permitted vessels, respectively, did not land any monkfish during the 2000 fishing year (Monkfish SAFE Report 2001). A substantial number of vessels with a Category E permit (56%) also did not land any monkfish during the 2000 fishing year (Monkfish SAFE Report 2001). However, given that Category E is not a limited access permit many fishers may apply for the permit regardless of whether he or she expects to land monkfish.

Days-At-Sea usage also varies by permit type. For both the 2000 and 2001 fishing years, DAS usage was higher for Category A and B vessels as compared to Category C and D vessels (Table 1, Monkfish SAFE Report 2001). These results are biased, however, by monkfish vessels with Category C or D permits which tend not to call in under a monkfish DAS when fishing in the NFMA. The reason for this is that, prior to recent reductions in multispecies DAS allocations, vessels typically possessed more multispecies DAS than monkfish. In addition, (1) there is no NFMA trip limit for monkfish regardless of whether the vessel is fishing under a multispecies or monkfish DAS, (2) a vessel is required to give up a multispecies DAS for each monkfish DAS used but not the reverse, and (3) a vessel fishing under a monkfish DAS in the NFMA has to declare into that area for a minimum of 30 days whereas a vessel does not if it fishing under a multispecies DAS. Therefore, by calling in under a multispecies DAS, the vessel can retain and land as much legal sized monkfish as is caught, has as many DAS to fish for monkfish as allocated under the vessels multispecies permit, and does not have to restrict its fishing activity to the NFMA for a minimum 30 days. By contrast, the monkfish trip limit in the SFMA is less when fishing under a multispecies DAS as compared to a monkfish DAS. Therefore, the same incentives for fishing under a multispecies DAS do not exist in the SFMA. As a result, DAS usage by Category C and D vessels in the SFMA are more comparable to DAS use by Category A and B vessels in the SFMA (Table 1, Monkfish SAFE Report 2001).

Table 1. Comparison by permit type of the percentage of the total DAS used by all limited access permitted monkfish vessels to the percentage of the DAS used by just those vessels that fished under a monkfish DAS in the SFMA.

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Permit Category	Total DAS Allocated ÷ Total DAS used (expressed as %)		Total DAS Allocated to vessels that called-in ÷ DAS used by vessels that called-in (vessels that fished in the SFMA) (expressed as %)	
	FY 2000	FY 2001	FY 2000	FY2001
A	39%	57%	55%	65%
B	50%	56%	64%	63%
C	17%	11%	56%	49%
D	13%	12%	38%	41%
Total	17%	14%	48%	48%

The Monkfish FMP contains a list of gear types which may be used on a monkfish DAS; these gear types include large mesh trawls, large mesh beam trawls, large mesh gillnets, and any hook gear (*i.e.*, handline, rod-and-reel, and bottom longline). Trawls, gillnets and scallop dredges are the principal gear types that have historically landed monkfish. During 1997-1999, trawl gear accounted for 53 percent of the total landings, gillnet gear approximately 26 percent, and scallop dredges approximately 20 percent. However, the FMP prohibited the use of scallop dredge gear when fishing under a monkfish DAS. Vessels fishing with scallop dredge gear on board may take monkfish only as an incidental catch. The use of trawl vs. gillnet gear as primary gear type varies by area. For example, vessels homeported in Portland, ME, Boston, MA, New Bedford, MA, and Point Judith, RI, use predominantly trawl gear (93%, 99%, 70%, and 73%, respectively). In contrast, vessels homeported in New Jersey, New Hampshire, and New York use predominantly gillnet gear (75%, 91%, and 69%, respectively). In some communities, the use of these gear types is split (*e.g.*, Gloucester, MA - 48% trawl and 50% gillnet) (NEFMC and MAFMC 2002).

In the NFMA, the percentage of total landings by gear type has remained fairly constant since implementation of the Monkfish FMP (Monkfish SAFE Report 2001). However, in the SFMA, gillnet landings have changed considerably; from 49% of the total SFMA landings in Year 1 of the FMP, to 40% in Year 2, and 60% in Year 3 (the 2001 fishing year). These changes are likely due, in part, to a 2001 court order that vacated the differential trip limits in the SFMA based on gear type. As a result, trip limits for gillnet vessels in the SFMA increased to 1500 lbs and 1000 lbs (monkfish tail-weight) per DAS for several months. Landings data show that landings of monkfish by gillnet gear more than doubled in the SFMA for the 2001 fishing year.

Although there is a directed otter trawl fishery for monkfish, most of the monkfish taken by otter trawls is bycatch in other bottom trawl fisheries. For example, although monkfish landings by trawl gear accounted for 73% and 43% of the total monkfish landings for the NFMA and SFMA,

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respectively in Year 2, only 6.1% and 8.8% of trawl landings (NFMA and SFMA, respectively) that included monkfish appear to have been directed on monkfish (defined as a trip with at least half of the catch in weight as monkfish; NEFSC 2002). The directed trawl fishery for monkfish has historically taken place primarily in the canyons and steep edges of the continental shelf lying south and east of southern New England. From 1994 to 1999, monkfish otter trawl trips in the NFMA occurred in a wide variety of depths, in waters between 20 and 201 meters. However, most of the monkfish were caught in water depths between 148 to 183 meters. In the SFMA, otter trawl trips from 1994 to 1999 were generally distributed in waters between 20 and 73 meters but some did occur in much deeper waters. A large number of monkfish were caught in waters between 38 and 92 meters, but most monkfish were caught in waters greater than 366 meters.

2.1.2 Requirements of the MMPA and ESA for Gillnet Fisheries

2.1.2.1 Modifications to Gillnet fisheries required by the ALWTRP and HPTRP

The Atlantic Large Whale Take Reduction Plan (ALWTRP) and the Harbor Porpoise Take Reduction Plan (HPTRP) were developed pursuant to the Marine Mammal Protection Act to, in part, reduce the level of serious injury and mortality of whales and harbor porpoise, respectively, in East Coast gillnet fisheries. The gillnet sector of the monkfish fishery is subject to the ALWTRP and HPTRP measures for use of gillnets in northeast and Mid-Atlantic waters. Current requirements include gear marking, the use of weak links in buoy lines and net panels, area closures, and other seasonal restrictions. Briefly, within the action area for this consultation, the ALWTRP measures for anchored gillnet gear require that there is no floating line at the surface and no wet storage of gear. In addition, the following requirements apply based on area:

For Northeast Waters (includes Cape Cod Bay Critical Habitat Area, Great South Channel Critical Habitat Area, Great South Channel Sliver Area, Stellwagen Bank/Jeffrey's Ledge, and Other Northeast Gillnet Waters) -

- gear must be marked (4" green mark midway on the buoy line);
- buoy lines must have weak links with a breaking strength ≤ 1100 lbs (498.8 kg);
- net panels must have weak links with a breaking strength ≤ 1100 lbs (498.8 kg) in the center of the headrope of each net panel;
- strings of 20 or fewer net panels must be secured as described in the ALWTRP;
- the Cape Cod Bay (CCB) Critical Habitat area is closed to gillnetting January 1-May 15; and,
- the Great South Channel (GSC) Critical Habitat Area is closed to gillnetting April 1-June 30.

For Mid-Atlantic Coastal Waters (defined as the area bounded by the southern shoreline of Long Island, NY at 72°30'W, then due south to 33°51'N, then west to the North Carolina/South Carolina border) -

- buoy lines must have weak links with a breaking strength ≤ 1100 lbs (498.8 kg);

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- the bitter end of the buoy line must be clean and free of any knots when the weak link breaks;
- net panels must have weak links with a breaking strength ≤ 1100 lbs (498.8 kg) in the center of the headrope of each 50 fathom net panel in a net string or every 25-fathoms for longer panels;
- all gillnets must return to port with the vessel or be anchored at each end as described in the ALWTRP.

In addition, NOAA Fisheries recently issued new rules for Seasonal Area Management ((SAM); seasonal restrictions of specific fishing areas when right whales are present), and Dynamic Area Management ((DAM);restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly). The measures for SAM apply to two defined areas called SAM West and SAM East, in which additional gear restrictions for anchored gillnet gear are required. SAM West and SAM East will occur on an annual basis for the period March 1 through April 30 and May 1 through July 31, respectively. The dividing line between SAM West and SAM East is at the 69°24' W longitude line (67 FR 1142; published January 9, 2002). The measures for DAM apply to areas north of 40°N latitude, and would allow for establishment of a zone within which NOAA Fisheries might impose restrictions on fishing or fishing gear within the zone for a period of 15 days. If no restrictions are imposed, NOAA Fisheries will issue an alert to fishers, and request that fishers voluntarily remove gillnet gear from the zone, and not set additional gear within the zone for a minimum of 15 days (67 FR 1130; published January 9, 2002).

Like the ALWTRP, the HPTRP includes measures for gear modifications and area closures. Applicable measures are based on area fished, time of year fished, and mesh size of the gillnet fished. In general, the Gulf of Maine component of the HPTRP includes time and area closures, some of which are complete closures; others are closures to gillnet fishing unless pingers are used in the prescribed manner. The Mid-Atlantic component includes some time and area closures in which gillnet fishing is prohibited regardless of the gear specifications. Under the HPTRP, monkfish gillnets are required to comply with the requirements for large-mesh gillnets (defined as 7-18 inch mesh under the HPTRP). These include mandatory use of tie-downs and a net cap of 80 nets. The net cap is particularly relevant since the current FMP for monkfish has a net cap of 160 nets. Fishers are required to comply with the most restrictive of all measures that apply to them. Therefore, monkfish gillnetters fishing in the Mid-Atlantic (as defined under the HPTRP) can only fish up to 80 nets (nets may be up to 300' long).

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2.1.2.2 Requirements for fisheries listed on the MMPA List of Fisheries

In accordance with the MMPA, NOAA Fisheries must place a commercial fishery on the List of Fisheries (LOF) under one of three categories based upon the level of serious injury and mortality of marine mammals that occur incidental to that fishery. The categorization of a fishery in the LOF determines whether participants in that fishery are subject to certain provisions of the MMPA. The 2002 LOF includes the northeast sink gillnet fishery as a Category I fishery, and the Mid-Atlantic coastal gillnet fishery as a Category II fishery. In addition, the U.S. Atlantic

monkfish trawl fishery is listed in Category III of the LOF. Therefore, monkfish gillnet and trawl fishers must comply with the following MMPA requirements:

for Category I and II -

- owners of vessels or gear engaging in a Category I or II fishery are required to register with NOAA Fisheries and obtain a marine mammal authorization from NOAA Fisheries in order to lawfully incidentally take a marine mammal in a commercial fishery;
- any vessel owner or operator participating in a Category I or II fishery must report all incidental injuries or mortalities of marine mammals that occur during commercial fishing operations to NOAA Fisheries;
- fishers participating in a Category I or II fishery are required to take an observer aboard the vessel upon request;
- fishers participating in a Category I or II fishery must comply with any relevant take reduction plan (*e.g.*, the ALWTRP or HPTRP); and,

for Category III -

- any vessel owner or operator participating in a Category III fishery must report all incidental injuries or mortalities of marine mammals that occur during commercial fishing operations to NOAA Fisheries.

These measures do not, in themselves, reduce the chance that a protected species-gear interaction will occur. They are intended, however, to identify the number and severity of interactions that do occur so action can be taken to reduce the likelihood of additional interactions.

On January 10, 2003, NOAA Fisheries published a notice (68 FR 1414) in the *Federal Register* with proposed changes for the 2003 LOF. These changes include moving the Mid-Atlantic coastal gillnet fishery from Category II to Category I. A final decision on the proposal will be made after review of the comments received.

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2.1.2.3 ESA Final Rule for Large-Mesh Gillnet Fisheries

On March 21, 2002, NOAA Fisheries issued an interim final rule ("Interim Final Rule") under the authority of the ESA to protect sea turtles from takes in large-mesh gillnet gear as the turtles moved into North Carolina and Virginia waters during that spring (67 FR 13098). Following review of public comments submitted on the Interim Final Rule, NOAA Fisheries published a Final Rule on December 3, 2002, (67 FR 71895) that establishes the restrictions on an annual basis. Specifically, the Final Rule enacts seasonally-adjusted closure of EEZ waters off of North Carolina and Virginia to fishing with large-mesh gillnets (mesh-size greater than 8 inches stretched). Four areas are identified: (1) waters north of 33°51.0' N (North Carolina/South Carolina border at the coast) and south of 35°46.0' N (Oregon Inlet) are closed at all times, (2) waters north of 35°46.0' N (Oregon Inlet) and south of 36°22.5' N (Currituck Beach Light, NC) are closed from March 16 through January 14, (3) waters north of 36°22.5' N (Currituck Beach Light, NC) and south of 37°34.6' N (Wachapreague Inlet, VA) are closed from April 1 through January 14, and (4) waters north of 37°34.6' N (Wachapreague Inlet, VA) and south of 37°56.0'

N (Chincoteague, VA) are closed from April 16 through January 14. The purpose of this action is to reduce the impact of the large-mesh gillnet fisheries on endangered and threatened species of sea turtles primarily from the monkfish fishery.

2.1.3 Summary of the Fishery as it Currently Operates

The monkfish fishery is currently managed under the Monkfish FMP. Operation of the gillnet sector of the fishery is also affected by regulations implementing the ALWTRP, the HPTRP, and the ESA Final Rule (67 FR 71895; published December 3, 2002). As mentioned above, the most important measures from a protected species perspective are those that control or modify effort in the fishery. In summary, effort control measures for the monkfish fishery as it currently operates are:

- a limited access permit system;
- 40 DAS for all limited access vessels with a maximum 10 DAS carry-over;
- trip limits of 550 lbs and 450 lbs (tail weight monkfish) per DAS for Category A/C and B/D vessels, respectively in the SFMA (there are no trip limits in the NFMA);
- required time out of the fishery for Category A and B vessels between April 1 and June 30; and,
- net limits.

In addition, the following areas are closed to monkfish gillnets as specified below:

- CCB Critical habitat from January 1-May 15;
- GSC Critical habitat from April 1-June 30;
- waters west of 72°30' W to the Mid-Atlantic shoreline from Cape Henlopen, DE, to the North Carolina/South Carolina border from February 15-March 15;
- EEZ waters north of the North Carolina/South Carolina border and south of Oregon Inlet, NC are closed year round;
- EEZ waters north of Oregon Inlet and south of Currituck Beach Light, NC from March 16-January 14;
- EEZ waters north of Currituck Beach Light, NC and south of Wachapreague Inlet, VA from April 1- January 14; and,
- EEZ waters north of Wachapreague Inlet, VA and south of Chincoteague, VA from April 16-January 14.

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2.2 Action Area

The management unit for the Monkfish FMP has not been changed. The action area for this consultation is therefore defined as in past consultations, and includes all waters under U.S. jurisdiction from the U.S./Canadian border to the North Carolina/South Carolina border.

3.0 STATUS OF THE SPECIES AND CRITICAL HABITAT

NOAA Fisheries has determined that the action being considered in the Opinion may adversely

affect the following species provided protection under the ESA.

Right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered [1]

NOAA Fisheries has determined that the action being considered in the Opinion is not expected to affect shortnose sturgeon *(Acipenser brevirostrum)*, the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon (*Salmo salar*), or hawksbill sea turtles (*Eretmochelys imbricata*) all of which are listed species under the ESA. Thus, these species will not be considered further in this Opinion. NOAA Fisheries has also determined that the action being considered is not expected to adversely affect critical habitat that has been designated for right whales, which occurs within the action area (Cape Cod Bay and Great South Channel). The following discussion summarizes 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). Since the activities proposed to be authorized by the FMP will be conducted in Federal waters beyond where concentrations of shortnose sturgeon are most likely to be found, it is highly unlikely that the action will affect shortnose sturgeon.

The wild population of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.-Canada border is listed as endangered under the ESA. The rivers containing wild Atlantic salmon within the range of the DPS include 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

[1] Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

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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. 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 does not believe that the proposed action will affect ESA-listed Atlantic salmon since operation of the monkfish fishery will not occur in or near the rivers where concentrations of Atlantic salmon are most likely to be found, monkfish gear operates at or near the bottom rather than near the surface, and there have been no recorded takes of Atlantic salmon in monkfish 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.

Although previous consultations on the monkfish fishery did consider the effects of the action on hawksbill sea turtles, this species is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. 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 New England Fisheries Science Center (NEFSC) observer program. Therefore, given the range of hawksbill sea turtles, it is unlikely that the proposed action will affect hawksbill sea turtles. This species will not be considered further in this Opinion.

Critical habitat for right whales has been designated for Cape Cod Bay, Great South Channel, and coastal Florida and Georgia (outside of the action area for this Opinion). Cape Cod Bay and Great South Channel were designated critical habitat for right whales due to their importance as spring/summer foraging grounds for this species. Although the physical and biological processes shaping acceptable right whale habitat are poorly understood, there is no evidence to suggest that operation of the monkfish fishery adversely affects the value of critical habitat designated for the right whale. Right whale critical habitat will, therefore, not be considered further in this Opinion.

The remainder of this section will focus on the status of the various species within the action area, 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;

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Marine Turtle Expert Working Group (TEWG) 1998 & 2000), recovery plans for the humpback whale (NOAA Fisheries 1991a), right whale (1991b), loggerhead sea turtle (NOAA Fisheries and USFWS 1991a), Kemp's ridley sea turtle (USFWS and NOAA Fisheries 1992), green sea turtle (NOAA Fisheries and USFWS 1991b) and leatherback sea turtle (NOAA Fisheries and USFWS 1992), the Marine Mammal Stock Assessment Reports (SAR) (Waring *et al.* 2000; Waring *et al.* 2001), and other publications (*e.g.*, Perry *et al.* 1999; Clapham *et al.* 1999; IWC 2001a). A draft recovery plan for fin and sei whales is available at http://www.NOAA Fisheries.noaa.gov/prot_res/PR3/recovery.html (NOAA Fisheries 1998b, unpublished). An updated draft recovery plan for right whales (Silber and Clapham 2001) is also available at the same web address.

3.1 Status of whales

All of the cetacean species considered in this Opinion were once the subject of commercial whaling which likely caused their initial decline. Right whales were probably the first large whale to be hunted on a systematic, commercial basis (Clapham *et al.* 1999). Records indicate that right whales in the North Atlantic were subject to commercial whaling as early as 1059. Between the 11th and 17th centuries an estimated 25,000-40,000 North Atlantic right whales are believed to have been taken. World-wide, humpback whales were often the first species to be taken and frequently hunted to commercial extinction (Clapham *et al.* 1999). Meaning that their numbers had been reduced so low by commercial exploitation that it was no longer profitable to target the species. Wide-scale exploitation of the more offshore fin whale occurred later with the introduction of steam-powered vessels and harpoon gun technology (Perry *et al.* 1999). Sei whales became the target of modern commercial whalers primarily in the late 19th and early 20th century after populations of other whales, including right, humpback, fin and blues, had already been depleted. The species continued to be exploited in Iceland until 1986 even though measures to stop whaling of sei whales in other areas had been put into place in the 1970's (Perry *et al.* 1999). Sperm whales were hunted in America from the 17th century through the early 20th century. However, greater attention was paid to sperm whales as the number of larger rorquals decreased with the advent of modern whaling (Clarke 1954). All killing of sperm whales was banned by the IWC in 1988. However, at the 2000 meetings of the IWC, Japan indicated it would include the take of sperm whales in its scientific research whaling operations. Japan reported the take of 5 sperm whales from the North Pacific as a result of this research, and has proposed to issue a permit for the take of up to 10 sperm whales for the second year of the study (IWC 2001ab).

All of the cetacean species considered in this Opinion were listed under the ESA at the species level; therefore, any jeopardy determinations need to be made by considering the effects of the proposed action on the entire species. This presents a unique situation for right whales for which NOAA Fisheries recognizes three major subgroups: North Pacific, North Atlantic, and Southern Hemisphere. Southern Hemisphere right whales have always been a different species, biologically, although that species was included in the right whale listing. Similarly, recent,

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published, scientific literature argues that right whales in the North Pacific Ocean are also a different species, biologically, from right whales in the North Atlantic. Therefore, right whales in the North Atlantic Ocean represent a unique genetic lineage that cannot be replaced or substituted by any of the other "right whales." Other cetaceans considered by this Opinion are similarly recognized as consisting of separate stocks or populations by the IWC (Donovan 1991) or other scientific bodies (Waring *et al.* 2001; Carretta *et al.* 2001; Angliss *et al.* 2001). Service policy allows for an exemption to the normal requirement of basing jeopardy opinions on species, as they are listed, by looking instead at distinct population segments (DPSs) of a species or recovery units of the species (USFWS and NOAA Fisheries Consultation handbook). However DPSs or recovery units have not been designated for right, humpback, fin, sei or sperm whales. Therefore, this Opinion must consider the effects of the proposed action on each species as listed. Since the proposed action is most likely to directly affect those members of the species that occur within the action area, the Opinion will focus on the effects of the proposed action on the specific subpopulations or species groupings that occur in the action area and then consider the consequences of those effects on the species as they are listed under the ESA.

As described above, NOAA Fisheries recognizes three major subgroups of right whales. Scientific literature on right whales has historically recognized distinct eastern and western populations or subpopulations in the North Atlantic Ocean (IWC 1986). Because of our limited understanding of the genetic structure of the entire species, the most conservative approach to this species would treat these right whale subpopulations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. Consequently, this Opinion will focus on the western North Atlantic subpopulation of right whales which occurs in the action area, and their relation to the survival of the species.

Similarly, the six western North Atlantic humpback whale feeding areas, including the Gulf of Maine, are recognized as representing relatively discreet subpopulations (Waring *et al.* 2000). Previously, the North Atlantic humpback population was treated as a single population for management purposes (Waring *et al.* 1999). However, the decision was recently made to reclassify the Gulf of Maine as a separate feeding population based upon the strong site fidelity of individual whales to this region and the assumption that, were this subpopulation wiped out, repopulation by immigration from adjacent areas would not occur on any reasonable management timescale (Waring *et al.* 1999). Therefore, this biological opinion will focus on the Gulf of Maine feeding population of humpback whales which occurs in the action area, and their relation to the survival of the species.

The sei whale population in the western North Atlantic is believed to consist of two populations; a Nova Scotian Shelf population and a Labrador Sea population (Mitchell and Chapman 1977). The Nova Scotian Shelf population includes the continental shelf waters of the northeastern United States, and extends northeastward to south of Newfoundland (Waring *et al.* 1999). This is the only sei whale population within the action area for this consultation. The population identity of North Atlantic fin whales has received relatively little attention, and it is uncertain

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whether the current population boundaries represent biologically isolated units (Waring *et al.* 2000). While the existence of fin whale subpopulations in the North Atlantic has been suggested from localized depletions resulting from commercial exploitation as well as from genetic studies, for the purposes of this Opinion, NOAA Fisheries will treat all western North Atlantic fin whales as a single population consistent with their treatment in the marine mammal stock assessment reports (Waring *et al.* 1999; Waring *et al.* 2000). Similarly, NOAA Fisheries currently uses the IWC population structure guidance which recognizes one population of sperm whales for the entire North Atlantic (Waring *et al.* 1999).

Consequently, this Opinion will focus on the effects of the proposed action on:

- the western North Atlantic subpopulation of right whales;
- the Gulf of Maine feeding group of humpback whales;
- the Nova Scotian group of sei whales, and
- fin whales and sperm whales in the North Atlantic, which will each be treated as a single population.

3.1.1 Right Whale

Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes, with their distribution correlated to the distribution of their zooplankton prey (Perry *et al.* 1999). In both hemispheres they have been observed at low latitudes and nearshore waters where calving takes place, and then tend to migrate to higher latitudes during the summer (Perry *et al.* 1999).

Pacific Ocean and Southern Hemisphere. Very little is known of the size and distribution of right whales in the North Pacific and very few of these animals have been seen in the past 20 years. In 1996, a group of 3 to 4 right whales (which may have included a calf) were observed in the middle shelf of the Bering Sea, west of Bristol Bay and east of the Pribilof Islands (Goddard and Rugh 1998). In June 1998, a single whale was observed on historic whaling grounds near Albatross Bank off Kodiak Island, Alaska (Waite and Hobbs 1999). Surveys conducted in July of 1997–2000 in Bristol Bay reported observations of lone animals or small groups of right whales in the same area as the 1996 sighting (Hill and DeMaster 1998; Perryman *et al.* 1999). Less is known about the winter distribution patterns of right whales in the Pacific as compared to the Atlantic. Sightings have been made along the coasts of Washington, Oregon, California, and Baja California south to about 27° N in the eastern North Pacific (Scarff 1986; NOAA Fisheries 1991b). Sightings have also been reported for Hawaii (Herman *et al.* 1980).

A review of southern hemisphere right whales is provided in Perry *et al.* (1999). Since these right whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for southern hemisphere right whales. Southern hemisphere right whales appear to be the most numerous of the right whales. Perry *et al.* (1999) provide a best estimate of abundance for southern hemisphere right whales as 7,000 based on estimates from separate breeding areas. In

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addition, unlike North Pacific or North Atlantic right whales, southern hemisphere right whales have shown some signs of recovery in the last 20 years. However, like other right whales, southern hemisphere right whales were heavily exploited (Perry *et al.* 1999). In addition, Soviet catch records made available in the 1990's (Zemsky *et al.* 1995) revealed that southern hemisphere right whales continued to be targeted well into the 20th century. Therefore, any indications of recovery should be viewed with caution.

Atlantic Ocean. As described above, scientific literature on right whales has historically recognized distinct eastern and western populations or subpopulations in the North Atlantic Ocean (IWC 1986). Current information on the eastern stock is lacking and it is unclear whether a viable population in the eastern North Atlantic still exists (Brown 1986, NOAA Fisheries 1991b). This Opinion will focus on the western North Atlantic subpopulation of right whales which occurs in the action area.

North Atlantic right whales generally occur west of the Gulf Stream. They are not found in the Caribbean and have been recorded only rarely in the Gulf of Mexico. Like other baleen whales, they occur in the lower latitudes and more coastal waters during the winter, where calving takes place, and then tend to migrate to higher latitudes for the summer. The distribution of right whales in summer and fall appears linked to the distribution of their principal zooplankton prey (Winn *et al.* 1986). New England waters include important foraging habitat for right whales and at least some right whales are present in these waters throughout most months of the year. They are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill *et al.* 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Kenney *et al.* 1986; Payne *et al.* 1990) where they have been observed feeding predominantly on copepods, largely of the genera *Calanus* and *Pseudocalanus* (Waring *et al.* 1999). Right whales also frequent Stellwagen Bank and Jeffrey's Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro Banks, in the spring and summer months. Mid-Atlantic waters are used as a migratory pathway from the spring and summer feeding/nursery areas to the winter calving grounds off the coast of Georgia and Florida.

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There is, however, much about right whale movements and habitat that is still not known or understood. Based on photo-identification, it has been shown that of 396 identified individuals, 25 have never been seen in any inshore habitat, and 117 have never been seen offshore (IWC 2001a). Telemetry data have shown lengthy and somewhat distant excursions into deep water off of the continental shelf (Mate *et al.* 1997). Photo-id data have also indicated excursions of animals as far as Newfoundland, the Labrador Basin, southeast of Greenland (Knowlton *et al.* 1992), and Norway (IWC 2001a). During the winter of 1999/2000, appreciable numbers of right whales were recorded in the Charleston, South Carolina area. Because survey efforts in the Mid-Atlantic have been limited, it is unknown whether this is typical or whether it represents a northern expansion of the normal winter range, perhaps due to unseasonably warm waters.

Data collected in the 1990's suggested that western North Atlantic right whales were

experiencing a slow, but steady recovery (Knowlton *et al.* 1994). However, more recent data strongly suggest that this trend has reversed and the species is in decline (Caswell *et al.* 1999, Fujiwara and Caswell 2001).

While it is not possible to obtain an exact count of the number of western North Atlantic right whales, IWC participants from a 1999 workshop agreed that it is reasonable to state that the current number of western North Atlantic right whales is probably around 300 (+/- 10%) (IWC 2001a). This conclusion was based, in large part, on a photo-id catalog comprising more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than 6 years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (IWC 2001a) suggesting that the 396 individuals is a close approximation of the entire population. Since the 1999 IWC workshop there have been at least 53 right whale births; 1 in 2000, 31 in 2001, and 21 in 2002. In addition, one animal was "resurrected" meaning that it was seen after an absence of at least 6 years. However, at least four of the calves are known to be dead and a fifth was not resighted with its mother on the summer foraging grounds. Three adult right whales are known to have died and two are suspected of having died since the 1999 IWC workshop. Although the "count" of right whales based on the original count of 396 individually identified whales, the number of observed right whale births and the known and presumed mortalities equals 342 animals, for the purposes of this Opinion, NOAA Fisheries considers the best approximation for the number of North Atlantic right whales to be approximately 300 +/- 10% given that all mortalities are not known.

The sightings data and genetics data also support the conclusion that, as found previously, calving intervals have increased (from 3.67 years in 1992 to 5.8 years in 1998) and the survival rate has declined (IWC 2001a). Even more alarming, the mortality of mature, reproductive females has increased, causing declines in population growth rate, life expectancy and the mean lifetime number of reproductive events between the period 1980-1995 (Fujiwara and Caswell 2001). In addition, for reasons which are unknown, many (presumed) mature females are not yet known to have given birth (an estimated 70% of mature females are reproductively active). Simply put, the western North Atlantic right whale population is declining because the trend over the last several years has been a decline in births coupled with an increase in mortality.

Factors that have been suggested as affecting right whale reproductive success and mortality include reduced genetic diversity, pollutants, and nutritional stress. However, there is no evidence available to determine their potential effect, if any, on western North Atlantic right whales. The size of the western North Atlantic subpopulation of right whales at the termination of whaling is unknown, but is generally believed to have been very small. Such an event may have resulted in a loss of genetic diversity which could affect the ability of the current population to successfully reproduce (*i.e.*, decreased conceptions, increased abortions, and increased neonate mortality). Studies by Schaeff *et al.* (1997) and Malik *et al.* (2000) indicate that western North Atlantic right whales are less genetically diverse than southern right whales. However, several

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apparently healthy populations of cetaceans, such as sperm whales and pilot whales, have even lower genetic diversity than observed for western North Atlantic right whales (IWC 2001a). Similarly, while contaminant studies have confirmed that right whales are exposed to and accumulate contaminants, researchers could not conclude that these contaminant loads were negatively affecting right whales since concentrations were lower than those found in marine mammals proven to be affected by PCB's and DDT (Weisbrod *et al.* 2000). Finally, although North Atlantic right whales appear to have thinner blubber than right whales from the South Atlantic (Kenney 2000), there is no evidence at present to demonstrate that the decline in birth rate and increase in calving interval is related to a food shortage. These concerns were also discussed at the 1999 IWC workshop where it was pointed out that since *Calanus* sp. is the most common zooplankton in the North Atlantic and current right whale abundance is greatly below historical levels, the proposal that food limitation was the major factor seemed questionable (IWC 2001a).

Anthropogenic mortality in the form of ship strikes and fishing gear entanglements do, however, appear to be affecting the status of western North Atlantic right whales. Data collected from 1970 through 1999 indicate that anthropogenic interactions are responsible for a minimum of two-thirds of the confirmed and possible mortality of non-neonate animals (Knowlton and Kraus 2001). Of the 45 right whale mortalities documented during this period, 16 were due to ship collisions and three were due to entanglement in fishing gear (there were also 13 neonate deaths and 13 deaths of non-calf animals from unknown causes) (Knowlton and Kraus 2001). Based on the criteria developed by Knowlton and Kraus (2001), 56 additional serious injuries and mortalities from entanglement or ship strikes are believed to have occurred between 1970 and 1999: 9 from ship strikes and 28 from entanglement. Nineteen were considered to be fatal interactions (16 ship strikes, 3 entanglements). Ten were possibly fatal (2 ship strikes, 8 entanglements), and 27 were non-fatal (7 ship strikes, 20 entanglements) (Knowlton and Kraus 2001). Scarification analysis also provides information on the number of right whales which have survived ship strikes and fishing gear entanglements. Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57 percent of right whales exhibited scars from entanglement and 7 percent from ship strikes (propeller injuries). This work was updated by Hamilton *et al.* (1998) using data from 1935 through 1995. The new study estimated that 61.6 percent of right whales exhibit injuries caused by entanglement, and 6.4 percent exhibit signs of injury from vessel strikes. In addition, several whales have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. Because some animals may drown or be killed immediately, the actual number of interactions is expected to be higher.

As described in Section 1.0, previous section 7 consultation on the American Lobster fishery was concluded on June 14, 2001, and found that proposed activities under the American Lobster federal regulations were likely to jeopardize the continued existence of the northern right whale. In response to the jeopardy conclusion, NOAA Fisheries Protected Resources Division developed one RPA with multiple management components to minimize the overlap of right whales and

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lobster gear, and to expand gear modifications to Mid-Atlantic waters. These measures include: Seasonal and Dynamic Area Management, and continued gear research and modifications. Cumulatively, these measures were developed to eliminate mortalities and serious injuries of right whales in lobster trap gear, eliminate serious and prolonged entanglements, and significantly reduce the total number of right whale entanglements in lobster trap gear and associated scarification observed on right whales.

Eight new right whale entanglements and six right whale mortalities were observed in calendar year 2002, and one new entanglement has been observed in 2003 as of March 11, 2003. The number of entanglements and deaths are of concern given the critical nature of the North Atlantic right whale subpopulation. However, the entanglements also demonstrate the complexity of the problem for this species. For example, as has been observed in past years, many of the whales are entangled in line of unknown origin making it difficult to determine what specific marine activities are contributing to entanglement interactions for right whales. In addition, it is often difficult to determine where interactions occur given that much about right whale movements and habitat is still not known or understood. For example, five of the whales were first observed entangled in Canadian waters despite substantial survey effort in U.S. waters in the Southeast and Northeast during the winter and spring/early summer months. Although previous biological opinions have taken a conservative approach and assumed all right whale entanglements occurred in U.S. waters unless there was conclusive evidence to suggest otherwise, some entanglements may be occurring in Canadian waters but are being attributed to U.S. activities. This assumption may prevent NOAA Fisheries from addressing the full extent of the entanglement problem since current efforts to reduce entanglements in U.S. fisheries do not address Canadian activities.

NOAA Fisheries is closely monitoring these entanglements. NOAA Fisheries is also gathering information to consider if additional measures are needed to supplement measures already in place to protect right whales. Because gear entanglements continue to cause serious injury and mortality of right as well as humpback and fin whales new and revised regulatory measures may be necessary.

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Summary of Right Whale Status

The North Atlantic right whales' association with shallow coastal areas along the highly-populated Atlantic coast of North America, the number and distribution of major shipping lanes that occur throughout the right whales' range increases the probability of interactions between right whales and ship traffic and fishing gear. The result of these interactions is apparent in the number of right whales killed in collisions with ships and injured or killed after becoming entangled in fishing gear. The number of whales killed in ship strikes and entanglements in fishing gear are the greatest known anthropogenic threat to right whales.

In addition, western North Atlantic right whales have a population size of approximately 300 animals (+/- 10%), which poses it own risk of extinction. Based on recent reviews of the status of the right whales, their reproductive rate (the number of calves that are born in the population

each year) appears to be declining, which could increase the whales' extinction risk (Caswell *et al.* 1999; Fujiwara and Caswell 2001; IWC 2001a). Based on the best available data on the right whales' population estimate and population trend, the western North Atlantic subpopulation of right whales is declining based on a combination of a low, estimated population size, increased mortality rate (particularly among adult, female whales), and decreased reproductive rate.

Although scientific literature recognizes the North Atlantic, North Pacific and Southern Hemisphere right whales as separate species, they are all listed as one species under the ESA. The North Pacific right whales appear to have been severely reduced and they may number only in the tens of animals (Tynan *et al.* 2001). In contrast, Southern Hemisphere right whales number in the thousands and have shown signs of recovery over the past 20 years. All of these are known or are suspected as being affected by anthropogenic mortality resulting from fishing gear interactions and/or ship strikes. Therefore, the status of right whales, in general, is considered critical.

3.1.2 Humpback Whales

Humpback whales inhabit all major ocean basins from the equator to subpolar latitudes. They generally follow a predictable migratory pattern in both hemispheres, feeding during the summer in the higher near-polar latitudes and migrating to lower latitudes where calving and breeding takes place in the winter (Perry *et al.* 1999).

North Pacific, Northern Indian Ocean and Southern Hemisphere. Humpback whales range widely across the North Pacific during the summer months; from Port Conception, CA, to the Bering Sea (Johnson and Wolman 1984; Perry *et al.* 1999). Although the IWC recognizes only one stock (Donovan 1991) there is evidence to indicate multiple populations or stocks within the North Pacific Basin (Perry *et al.* 1999; Carretta *et al.* 2001). NOAA Fisheries recognizes three management units within the U.S. EEZ for the purposes of managing this species under the MMPA. These are: the eastern North Pacific stock, the central North Pacific stock and the western North Pacific stock (Carretta *et al.* 2001). There are indications that the eastern North Pacific stock is increasing in abundance (Caretta *et al.* 2001) and the central North Pacific stock appears to have increased in abundance between the 1980's -1990's (Angliss *et al.* 2001). However, there is no reliable population trend data for the western North Pacific stock (Angliss *et al.* 2001).

Little or no research has been conducted on humpbacks in the Northern Indian Ocean so information on their current abundance does not exist (Perry *et al.* 1999). .Since these humpback whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for the northern Indian Ocean humpback whales. Likewise, there is no recovery plan or stock assessment report for southern hemisphere humpback whales, and there is also no current estimate of abundance for humpback whales in the southern hemisphere although there are estimates for some of the six southern hemisphere humpback whale stocks recognized by the

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IWC (Perry *et al.* 1999). Like other whales, southern hemisphere humpback whales were heavily exploited for commercial whaling. Although they were given protection by the IWC in 1963, Soviet whaling data made available in the 1990's revealed that 48,477 southern hemisphere humpback whales were taken from 1947-1980, contrary to the original reports to the IWC which accounted for the take of only 2,710 humpbacks (Zemsky *et al.* 1995; IWC 1995; Perry *et al.* 1999).

North Atlantic. Humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffrey's Ledge (CeTAP 1982) and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999).

In winter, whales from the six feeding areas (including the Gulf of Maine) mate and calve primarily in the West Indies where spatial and genetic mixing among these groups occur (Waring *et al.* 2000). Various papers (Clapham and Mayo 1990; Clapham 1992; Barlow and Clapham 1997; Clapham *et al.* 1999) summarized information gathered from a catalogue of photographs of 643 individuals from the western North Atlantic population of humpback whales. These photographs identified reproductively mature western North Atlantic humpbacks wintering in tropical breeding grounds in the Antilles, primarily on Silver and Navidad Banks, north of the Dominican Republic. The primary winter range also includes the Virgin Islands and Puerto Rico (NOAA Fisheries 1991a). Calves are born from December through March and are about 4 meters at birth. Sexually mature females give birth approximately every 2 to 3 years. Sexual maturity is reached between 4 and 6 years of age for females and between 7 and 15 years for males. Size at maturity is about 12 meters.

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Humpback whales use the Mid-Atlantic as a migratory pathway to and from the calving/mating grounds, but it may also be an important winter feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the Mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle *et al.* 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle *et al.* (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Identified whales using the Mid-Atlantic area were found to be residents of the Gulf of Maine and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding populations in the Mid-Atlantic region. Strandings of humpback whales have increased between New Jersey and Florida since 1985 consistent with the

increase in Mid-Atlantic whale sightings. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley *et al.* 1995).

It is not possible to provide a reliable estimate of abundance for the Gulf of Maine humpback whale feeding group at this time (Waring *et al.* 2000). Available data are too limited to yield a precise estimate, and additional data from the northern Gulf of Maine and perhaps elsewhere are required (Waring *et al.* 2000). Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project gave an ocean-basin-wide estimate of 10,600 (95% c.i. = 9,300 - 12,100) (Waring *et al.* 2000). For management purposes under the MMPA, the estimate of 10,600 is regarded as the best available estimate for the North Atlantic population (Waring *et al.* 2000).

Humpback whales, like other baleen whales, may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries, coastal development and vessel traffic. However, evidence of these is lacking. There are strong indications that a mass mortality of humpback whales in the southern Gulf of Maine in 1987/1988 was the result of the consumption of mackerel whose livers contained high levels of a red-tide toxin. It has been suggested that red tides are somehow related to increased freshwater runoff from coastal development but there is insufficient data to link this with the humpback whale mortality (Clapham *et al.* 1999). Changes in humpback distribution in the Gulf of Maine have been found to be associated with changes in herring, mackerel, and sand lance abundance associated with local fishing pressures (Waring *et al.* 2000). However, there is no evidence that humpback whales were adversely affected by these trophic changes.

As is the case with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales occur from commercial fishing gear entanglements and ship strikes. Sixty percent of Mid-Atlantic humpback whale mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley *et al.* 1995). Between 1992 and 2002 at least 103 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. The disentanglement program help to alleviate some of the affects of gear entanglements but cannot remove the risk of injury and death for entangled whales. For example, of the 11 humpback whales observed entangled in 2002, six were disentangled and gear was shed by one other. However, one of the disentangled animals was found dead just days later. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent --- and possibly as many as 78 percent --- of animals in the Gulf of Maine exhibit scarring caused by entanglement. These estimates are based on sightings of free-swimming animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher.

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Summary of Humpback Whales Status

The best available population estimate for humpback whales in the North Atlantic Ocean is regarded as 10,600 animals, but the number of humpback whales that feed in the Gulf of Maine (the focus of this Opinion) is unknown. Anthropogenic mortality associated with ship strikes and fishing gear entanglements is significant. The winter range where mating and calving occurs is located in areas outside of the United States where the species is afforded less protection. Despite these, modeling using data obtained from photographic mark-recapture studies estimates the growth rate of the Gulf of Maine feeding population at 6.5% (Barlow and Clapham 1997). With respect to the species overall, there are also indications of increasing abundance for the eastern and central North Pacific stocks. However, trend and abundance data is lacking for the western North Pacific stock, the Southern Hemisphere humpback whales, and the Southern Indian Ocean humpbacks. Given the best available information, changes in status of the North Atlantic humpback population are, therefore, likely to affect the overall survival and recovery of the species.

3.1.3 Fin Whale

Fin whales inhabit a wide range of latitudes between 20-75° N and 20-75° S (Perry *et al.* 1999). Fin whales spend the summer feeding in the relatively high latitudes of both hemispheres, particularly along the cold eastern boundary currents in the North Atlantic and North Pacific Oceans and in Antarctic waters (IWC 1992).

North Pacific and Southern Hemisphere. Within the U.S. waters in the Pacific, fin whales are found seasonally off of the coast of North America and Hawaii, and in the Bering Sea during the summer (Angliss *et al.* 2001). NOAA Fisheries recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. These are: Alaska (Northeast Pacific), California/Washington/Oregon, and Hawaii (Angliss *et al.* 2001). Reliable estimates of current abundance for the entire Northeast Pacific fin whale stock are not available (Angliss *et al.* 2001). Stock structure for fin whales in the southern hemisphere is unknown. Prior to commercial exploitation, the abundance of southern hemisphere fin whales is estimated to have been at 400,000 (IWC 1979; Perry *et al.* 1999). There are no current estimates of abundance for southern hemisphere fin whales. Since these fin whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for the southern hemisphere fin whales.

North Atlantic. During 1978-1982 aerial surveys, fin whales accounted for 24% of all cetaceans and 46% of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring *et al.*1998). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain *et al.*1992).

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Like right and humpback whales, fin whales are believed to use North Atlantic waters primarily for feeding, and more southern waters for calving. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda and into the West Indies, but neonate strandings along the U.S. Mid-Atlantic coast from October through January suggest the possibility of an offshore calving area (Hain *et al.* 1992).

Fin whales achieve sexual maturity at 5-15 years of age (Perry *et al.* 1999), although physical maturity may not be reached until 20-30 years (Aguilar and Lockyer 1987). Conception is believed to occur during the winter with birth of a single calf after a 12 month gestation (Mizroch and York 1984). The calf is weaned 6-11 months after birth (Perry *et al.* 1999). The mean calving interval is 2.7 years (Agler *et al.* 1993).

The predominant prey of fin whales varies greatly in different geographical areas depending on what is locally available (IWC 1992). In the western North Atlantic, fin whales feed on a variety of small schooling fish (*i.e.*, herring, capelin, sand lance) as well as squid and planktonic crustaceans (Wynne and Schwartz 1999). As with humpback whales, fin whales feed by filtering large volumes of water for their prey through their baleen plates.

NOAA Fisheries has designated one population of fin whale for U.S. waters of the North Atlantic (Waring *et al.* 1998) where the species is commonly found from Cape Hatteras northward although there is information to suggest some degree of separation. A number of researchers have suggested the existence of fin whale subpopulations in the North Atlantic based on local depletions resulting from commercial overharvesting (Mizroch and York 1984) or genetics data (Bérubé *et al.* 1998). Photoidentification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and between years (Seipt *et al.* 1990) suggesting some level of site fidelity. In 1976, the IWC's Scientific Committee proposed seven stocks (or populations) for North Atlantic fin whales. These are: (1) North Norway, (2) West Norway-Faroe Islands, (3) British Isles-Spain and Portugal, (4) East Greenland-Iceland, (5) West Greenland, (6) Newfoundland-Labrador, and (7) Nova Scotia (Perry *et al.* 1999). However, it is uncertain whether these boundaries define biologically isolated units (Waring *et al.* 1999).

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Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. One method used the catch history and trends in Catch Per Unit Effort to obtain an estimate of 3,590 to 6,300 fin whales for the entire western North Atlantic (Perry *et al.* 1999). Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The 2001 Stock Assessment Report (SAR) gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362 (Waring *et al.* 2001). However, this is considered an underestimate since the estimate derives from surveys over a limited portion of the western North Atlantic.

Like right whales and humpback whales, anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. From 1996-July 2001, there were nine observed fin whale entanglements and at least four ship strikes. It is believed to be the most commonly struck cetacean by large vessels (Laist *et al.* 2001). In addition, hunting of fin whales continued well into the 20th century. Fin whales were given total protection in the North Atlantic in 1987 with the exception of a subsistence whaling hunt for Greenland (Gambell 1993, Caulfield 1993). However, Iceland reported a catch of 136 whales in the 1988/89 and 1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry *et al.* 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995.

Summary of Fin Whale Status
The minimum population estimate for the western North Atlantic fin whale is 2,362 which is believed to be an underestimate. Fishing gear appears to pose less of a threat to fin whales in the North Atlantic Ocean than North Atlantic right or humpback whales. However, more fin whales are struck by large vessels than right or humpback whales (Laist *et al.* 2001). Some level of whaling for fin whales in the North Atlantic may still occur.

Information on the abundance and population structure of fin whales worldwide is limited. NOAA Fisheries recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. These are: Alaska (Northeast Pacific), California/Washington/Oregon, and Hawaii (Angliss *et al.* 2001). Reliable estimates of current abundance for the entire Northeast Pacific fin whale stock are not available (Angliss *et al.* 2001). Stock structure for fin whales in the southern hemisphere is unknown and there are no current estimates of abundance for southern hemisphere fin whales. Given the best available information, changes in status of the North Atlantic fin whale population are, therefore, likely to affect the overall survival and recovery of the species.

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3.1.4 Sei Whales

Sei whales are a widespread species in the world's temperate, subpolar, subtropical, and even tropical marine waters. However, they appear to be more restricted to temperate waters than other baleen whales (Perry *et al.* 1999). Sei whales winter in warm temperate or subtropical waters and summer in more northern latitudes. In the northern Atlantic, most births occur in November and December when the whales are on the wintering grounds. Conception is believed to occur in December and January. Gestation lasts for 12 months and the calf is weaned at 6-9 months when the whales are on the summer feeding grounds (NOAA Fisheries 1998b). Sei whales reach sexual maturity at 5-15 years of age. The calving interval is believed to be 2-3 years (Perry *et al.* 1999).

North Pacific and Southern Hemisphere. The IWC only considers one stock of sei whales in the

North Pacific (Donovan 1991), but for NOAA Fisheries management purpose under the MMPA, sei whales in the eastern North Pacific are considered a separate stock (Carretta *et al.* 2001). There are no abundance estimates for sei whales along the U.S. west coast or in the eastern North Pacific (Carretta *et al.* 2001). The stock structure of sei whales in the southern hemisphere is unknown. Like other whale species, sei whales in the southern hemisphere were heavily impacted by commercial whaling, particularly in the mid-20th century as humpback, fin and blue whales became scarce. Sei whales were protected by the IWC in 1977 after their numbers had substantially decreased and they also became more difficult to find (Perry *et al.* 1999). Since southern hemisphere sei whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for southern hemisphere sei whales.

North Atlantic. Sei whales occur in deep water throughout their range, typically over the continental slope or in basins situated between banks (NOAA Fisheries 1998b). In the northwest Atlantic, the whales travel along the eastern Canadian coast in June, July, and autumn on their way to and from the Gulf of Maine and Georges Bank where they occur in winter and spring. Within the action area, the sei whale is most common on Georges Bank and into the Gulf of Maine/Bay of Fundy region during spring and summer, primarily in deeper waters. Individuals may range as far south as North Carolina. It is important to note that sei whales are known for inhabiting an area for weeks at a time then disappearing for years or even decades; this has been observed all over the world, including in the southwestern Gulf of Maine in 1986 (Clapham pers. comm. 2001). The basis for this phenomenon is not clear.

Although sei whales may prey upon small schooling fish and squid in the action area, available information suggests that calanoid copepods and euphausiids are the primary prey of this species. Sei whales are occasionally seen feeding in association with right whales in the southern Gulf of Maine and in the Bay of Fundy. However, there is no evidence to demonstrate interspecific competition between these species for food resources.

There are insufficient data to determine trends of the sei whale population. Abundance surveys are problematic because this species is difficult to distinguish from the fin whale and because too little is known of the sei whale's distribution, population structure and patterns of movement; thus survey design and data interpretation are very difficult. Because there are no abundance estimates within the last 10 years, a minimum population estimate cannot be determined for NOAA Fisheries management purposes (Waring *et al.* 1999).

Few instances of injury or mortality of sei whales due to entanglement or vessel strikes have been recorded in U.S. waters. Entanglement is not known to impact this species in the U.S. Atlantic, possibly because sei whales typically inhabit waters further offshore than most commercial fishing operations, or perhaps entanglements do occur but are less likely to be observed. A small number of ship strikes of this species have been recorded. The most recent documented incident occurred in 1994 when a carcass was brought in on the bow of a container ship in Charlestown, Massachusetts. Other impacts noted above for other baleen whales may also occur.

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Summary of Sei Whale Status
There are insufficient data to determine trends of the Nova Scotian sei whale population. Because there are no abundance estimates within the last 10 years, a minimum population estimate cannot be determined for NOAA Fisheries management purposes (Waring *et al.* 1999). Few instances of injury or mortality of sei whales due to entanglement or vessel strikes have been recorded in U.S. waters. Information on the status of sei whale populations world wide is similarly lacking. There are no abundance estimates for sei whales along the U.S. west coast or in the eastern North Pacific (Carretta *et al.* 2001), and the stock structure of sei whales in the southern hemisphere is unknown. Given the lack on information on sei whale abundance and stock structure, it is unknown how effects to the Nova Scotian population of sei whales would affect the species, overall.

3.1.5 Blue Whale

Blue whales were intensively hunted in all of the world's oceans from the turn of the century to the mid-1960's (NOAA Fisheries 1998c), leading to severe depletion of blue whale stocks worldwide (Perry *et al.* 1999). Like the fin whale, blue whales occur worldwide and are believed to follow a similar migration pattern from northern summering grounds to more southern wintering areas (Perry *et al.* 1999). Three subspecies have been identified; *Balaenoptera musculus musculus, B.m. intermedia*, and *B.m. brevicauda* (NOAA Fisheries 1998c). Only *B. musculus* occurs in the northern hemisphere.

North Pacific, Northern Indian Ocean, and Southern Hemisphere. NOAA Fisheries recognizes two blue whale stocks in the Pacific for the purposes of managing this species under the MMPA. These are: the Eastern North Pacific stock and the Hawaiian stock. Little is known about blue whales in Hawaii which are primarily known to occur there based on acoustic recordings (Carretta *et al.* 2001). Similarly, in the Eastern North Pacific, blue whales are occasionally heard (via acoustic recordings) but rarely seen off of Oregon (Carretta *et al.* 2001). Blue whales are, however, found regularly off of the coast of California where they feed from June to November (Carretta *et al.* 2001). The best estimate of abundance for this feeding stock of blue whales is 1,940. No estimate is available for blue whales occurring in Hawaii (Carretta *et al.* 2001).

Blue whales have been reported year-round in the Northern Indian Ocean but there are no current estimates of abundance for this blue whale stock (Perry *et al.* 1999). Similarly, there is no current reliable estimate of abundance for southern hemisphere blue whales (Perry *et al.* 1999). The IWC has designated six stock areas for southern hemisphere blue whales based on feeding locations (Perry *et al.* 1999). However, there is very little reliable information on the distribution of blue whales in the southern hemisphere (Perry *et al.* 1999). There are no recovery plans or stock assessment reports for blue whales that occur in the southern hemisphere or Northern Indian Ocean since these do not occur in U.S. waters.

North Atlantic. Blue whales range in the North Atlantic from the subtropics to Baffin Bay and

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the Greenland Sea (Aecium and Leatherwood 1985). The IWC currently recognizes these whales as one stock (Perry *et al.* 1999). There are no good estimates of the pre-exploitation size of the western North Atlantic blue whale stock but it is widely believed that this stock was severely depleted by the time legal protection was introduced in 1955 (Perry *et al.* 1999). Photo-identification studies of blue whales in the Gulf of St. Lawrence from 1979 to 1995 identified 320 individual whales (NOAA Fisheries 1998c). The NOAA Fisheries recognizes a minimum population estimate of 308 blue whales for the western North Atlantic (Waring *et al.* 1999).

Blue whales are more commonly found in Canadian waters as compared to U.S. waters. They are present in the Gulf of St. Lawrence for most of the year, and other areas of the North Atlantic. However, 3 blue whale sightings were made in U.S. waters in 2002 during expanded survey flights for right whales. Sightings occurred in June, July and October. Only one animal was observed for each of the sightings, and one of the animals (the July sighting) was observed feeding. It is assumed that blue whale distribution is governed largely by food requirements (NOAA Fisheries 1998c). In the Gulf of St. Lawrence, blue whales appear to predominantly feed on *Thysanoessa raschii* and *Meganytiphanes norvegica*. In the eastern North Atlantic, *T. inermis* and *M. norvegica* appear to be the predominant prey (NOAA Fisheries 1998c).

Compared to the other species of large whales, relatively little is known about this species. Sexual maturity is believed to occur in both sexes at 5-15 years of age. Gestation lasts 10-12 months and calves nurse for 6-7 months. The average calving interval is estimated to be 2-3 years. Birth and mating both take place in the winter season (NOAA Fisheries 1998c), but the location of wintering areas is speculative (Perry *et al.* 1999). In 1992 the U.S. Navy and contractors conducted an extensive blue whale acoustic survey of the North Atlantic and found concentrations of blue whales on the Grand Banks and west of the British Isles. One whale was tracked for 43 days during which time it traveled 1,400 nautical miles around the general area of Bermuda (Perry *et al.* 1999).

There is limited information on the factors affecting natural mortality of blue whales in the North Atlantic. Ice entrapment is known to kill and seriously injure some blue whales, particularly along the southwest coast of Newfoundland, during late winter and early spring. Habitat degradation has been suggested as possibly affecting blue whales such as in the St. Lawrence River and the Gulf of St. Lawrence where habitat has been degraded by acoustic and chemical pollution. However, there is no data to confirm that blue whales have been affected by such habitat changes (Perry *et al.* 1999).

Entanglement in fishing gear and ship strikes are believed to be the major sources of anthropogenic mortality and injury of blue whales. However, confirmed deaths or serious injuries from either are few. In 1987, concurrent with an unusual influx of blue whales into the Gulf of Maine, one report was received from a whale watch boat that spotted a blue whale in the southern Gulf of Maine entangled in gear described as probable lobster pot gear. A second animal found in the Gulf of St. Lawrence apparently died from the effects of an entanglement. In

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March 1998, a juvenile male blue whale was carried into Rhode Island waters on the bow of a tanker. The cause of death was determined to be due to a ship strike, although not necessarily caused by the tanker on which it was observed, and the strike may have occurred outside the U.S. EEZ (Waring *et al.* 1999). No recent entanglements of blue whales have been reported from the U.S. Atlantic. Other impacts noted above for other baleen whales may occur.

Summary of Blue Whale Status
There are insufficient data to determine trends of the western North Atlantic stock of blue whales. For management purposes, NOAA Fisheries recognizes 308 blue whales as the minimum estimate of the western North Atlantic stock based on work conducted in the Gulf of St. Lawrence (Waring *et al.* 2001). Few instances of injury or mortality of blue whales due to entanglement or vessel strikes have been recorded in U.S. waters. Information on the status of blue whale populations world wide is similarly lacking. There are no abundance estimates for blue whales in Hawaii (Carretta *et al.* 2001), the Northern Indian Ocean or the southern hemisphere (Perry *et al.* 1999). Given the lack on information on blue whale abundance and stock structure, it is unknown how effects to the western North Atlantic stock of blue whales would affect the species, overall.

3.1.6 Sperm Whale

Sperm whales inhabit all ocean basins, from equatorial waters to the polar regions (Perry *et al.* 1999). Sperm whales generally occur in waters greater than 180 meters in depth. Their distribution shows a preference for continental margins, sea mounts, and areas of upwelling, where food is abundant (Leatherwood and Reeves 1983).

North Pacific, Northern Indian Ocean, and Southern Hemisphere. Sperm whales are distributed widely in the North Pacific (Angliss *et al.* 2001). The IWC recognizes eastern and western management units for sperm whales in the North Pacific (Donovan 1991). However, for NOAA Fisheries management purposes under the MMPA, three stocks are recognized for U.S. waters of the Pacific: Alaska, California/Oregon/Washington, and Hawaii (Angliss *et al.* 2001). There is very limited data on estimates of abundance for North Pacific, Northern Indian Ocean and Southern Hemisphere sperm whales. Current and historic estimates of abundance of sperm whales in Alaska are considered unreliable (Angliss *et al.* 2001) as are estimates for the Southern Hemisphere (Perry *et al.* 1999). There are no current population abundance estimates for sperm whales in the northern Indian Ocean (Perry *et al.* 1999). A minimum estimate of 1,026 for the California/Oregon/Washington stock is used for NOAA Fisheries management purposes, however, there is no data to indicate trends in abundance of this stock (Angliss *et al.* 2001). As part of the Marine Mammal Research Program of the Acoustic Thermometry of Ocean Climate (ATOC) study, a total of twelve aerial surveys were conducted within about 25 nm of the main Hawaiian Islands in 1993, 1995 and 1998 from which an average abundance estimate was calculated (Carretta *et al.* 2001). However, this is considered an underestimate of the total number of sperm whales within the U.S. EEZ off Hawaii because areas around the Northwest

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Hawaiian Islands and beyond 25 nm from the main islands were not surveyed, and because sperm whales spend a large proportion of time diving, causing additional downward bias in the abundance estimate (Carretta *et al.* 2001).

North Atlantic. In the western North Atlantic sperm whales range from Greenland to the Gulf of Mexico and the Caribbean. Within U.S. EEZ in that range, sperm whales are distributed in a distinct seasonal cycle; concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring *et al.* 1999). Sperm whales prey on larger mesopelagic squid (*e.g.*, *Architeuthis* and *Moroteuthis*) and fish species (Perry *et al.* 1999). Sperm whales, especially mature males in higher latitude waters, have also been observed to take significant quantities of large demersal and mesopelagic sharks, skates, and bony fishes (Clarke 1962, 1980).

Sperm whales have a distinct social structure. Sperm whale populations are organized into two types of groupings: breeding schools and bachelor schools. Breeding schools consist of females of all ages, calves and juvenile males. Bachelor schools consist of maturing males who leave the breeding school and aggregate in loose groups of about 40 animals. As the males grow older they separate from the bachelor schools and remain solitary most of the year (Best 1979). During the time when females are ovulating (April through August in the Northern Hemisphere) one or more large mature bulls temporarily join each breeding school. A single calf is born after a 15-month gestation. A mature female will produce a calf every 4-6 years. Females attain sexual maturity at a mean age of nine years, while males have a prolonged puberty and attain sexual maturity at about age 20 (Waring *et al.* 1999). Male sperm whales may not reach physical maturity until they are 45 years old (Waring *et al.* 1999).

Total numbers of sperm whales off the USA or Canadian Atlantic coast are unknown, although eight estimates from regions of the habitat do exist for select time periods (Waring *et al.* 2000). For purposes of the SAR, NOAA Fisheries considers the best estimate of abundance for the North Atlantic population of sperm whales to be 4,702 (CV=0.36) (Waring *et al.* 2000). This estimate is likely to be an underestimate of abundance since estimates were not corrected for sperm whale dive time. Given the long dive-time for sperm whales, the proportion of time that they are at the surface and available to observers is assumed to be low (Waring *et al.* 2000).

Few instances of anthropogenic injury or mortality of sperm whales due to human impacts have been recorded in U.S. waters. Preliminary data for 2000 indicate that of ten sperm whales reported to the stranding network (nine dead and one injured) there was one possible fishery interaction, one ship strike (wounded with bleeding gash on side) and eight animals for which no signs of entanglement or injury were sighted or reported. Because of their generally more offshore distribution and their pelagic feeding habits, sperm whales are expected to be less subject to entanglement than right or humpback whales. However, injured or mortally wounded

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sperm whales may also be less likely to strand than nearshore cetacean species given the distance to shore. The take of sperm whales in fishing gear have been documented by NOAA Fisheries in several fisheries; primarily offshore fisheries such as the pelagic driftnet and pelagic longline fisheries. The NOAA Fisheries Sea Sampling program recorded three entanglements (in 1989, 1990, and 1995) of sperm whales in the swordfish drift gillnet fishery prior to permanent closure of the fishery in January 1999. All three animals were injured, found alive, and released. However, at least one was still carrying gear. Opportunistic reports of sperm whale entanglements for the years 1993-1997 include three records involving fine mesh gillnet from an unknown source, longline gear, and net with trailing buoys (Waring *et al.* 2000). Observers aboard Alaska sablefish and Pacific halibut longline vessels have documented sperm whales feeding on longline caught fish in the Gulf of Alaska (Perry *et al.* 1999). Behavior similar to that observed in the Alaskan longline fishery has also been documented during longline operations off South America where sperm whales have become entangled in longline gear, have been observed feeding on fish caught in the gear, and have been reported following longline vessels for days (Perry *et al.* 1999).

Sperm whales are also struck by ships. In May 1994 a ship struck sperm whale was observed south of Nova Scotia (Waring *et al.* 1999). A sperm whale was also seriously injured as a result of a ship strike in May 2000 in the western Atlantic. Other impacts noted above for baleen whales may also occur.

Summary of Status for Sperm Whales

Total numbers of sperm whales off the USA or Canadian Atlantic coast are unknown. The best estimate of abundance for the North Atlantic population of sperm whales (4,702; CV=0.36) is likely to be an underestimate (Waring *et al.* 2000). Male sperm whales may not reach physical maturity until they are 45 years old (Waring *et al.* 1999). Few instances of anthropogenic injury or mortality of sperm whales have been recorded in U.S. waters. However, interactions that do occur are less likely to be observed as compared to right or humpback whales given the generally offshore distribution of sperm whales. Similarly, there is very limited data on estimates of abundance for North Pacific, Northern Indian Ocean and Southern Hemisphere sperm whales. Current and historic estimates of abundance of sperm whales in Alaska are considered unreliable (Angliss *et al.* 2001) as are estimates for the Southern Hemisphere (Perry *et al.* 1999). There are no current population abundance estimates for sperm whales in the northern Indian Ocean (Perry *et al.* 1999). A minimum estimate of 1,026 for the California/Oregon/Washington stock is used for NOAA Fisheries management purposes, however, there is no data to indicate trends in abundance of this stock (Angliss *et al.* 2001). As part of the ATOC study, a total of twelve aerial surveys were conducted within about 25 nm of the main Hawaiian Islands in 1993, 1995 and 1998 from which an average abundance estimate was calculated (Carretta *et al.* 2001). However, this is considered an underestimate of the total number of sperm whales within the U.S. EEZ off Hawaii because areas around the Northwest Hawaiian Islands and beyond 25 nm from the main islands were not surveyed, and because sperm whales spend a large proportion of time diving, causing additional downward bias in the abundance estimate (Carretta *et al.* 2001). Given the

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lack on information on sperm whale abundance and stock structure, it is unknown how effects to sperm whales occurring within the action area would affect the species, overall.

3.2 Status of sea turtles

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 sea turtles in the pelagic and benthic environments. As a result, sea turtles still face many of the original threats that were the cause of their listing under the ESA.

Like cetaceans, sea turtles were listed under the ESA at the species level rather than as individual populations or recovery units. However, this Opinion treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations for the purposes of this consultation. This approach is allowable based on interagency policy on the recognition of distinct vertebrate populations (61 FR 4722; published February 7, 1996). To address specific criteria outlined in that policy, 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 subpopulations, 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 five subgroups: (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 biological 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. Loggerheads from any of these nesting sites may occur within the action area. However, the majority of the loggerhead turtles in the action area are expected to have come from the northern nesting subpopulation and the south Florida nesting subpopulation. For the purposes of this

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Opinion, NOAA Fisheries will therefore focus on:

- the northern loggerhead subpopulation; and,
- the south Florida loggerhead subpopulation.

Since this Opinion treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations, this consultation will focus on the Atlantic populations of Kemp's ridley sea turtles, green sea turtles, and leatherback sea turtles although information on the status of Pacific stocks are included.

3.2.1 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. Within the Pacific Ocean, loggerhead sea 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. Based on available information, the Japanese nesting aggregation is significantly larger than the southwest Pacific nesting aggregation. 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). We have no recent, quantitative estimates of the size of the nesting aggregation in the southwest Pacific, but 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. In addition, the abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years. Loggerhead turtle colonies in the 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 reduced the reproductive success of females that manage to nest (*e.g.*, due to egg poaching).

Atlantic Ocean. Loggerheads commonly occur throughout the inner continental shelf from Florida through Cape Cod, Massachusetts, and may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable (NEFSC survey data 1999). Aerial surveys of

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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). Like other sea turtles, loggerhead hatchlings enter the pelagic environment upon leaving the nesting beach. Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments where they opportunistically forage on crustaceans and mollusks (Wynne and Schwartz 1999). However, some loggerheads may remain in the pelagic environment for longer periods of time or move back and forth between the pelagic and benthic environment (Witzell, in prep). Loggerheads that have entered the benthic environment appear to undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles are found in Virginia foraging areas as early as April but are not usually found on the most northern foraging grounds in the Gulf of Maine until June. The large majority leave the Gulf of Maine by mid-September but some may remain in Mid-Atlantic and Northeast areas until late Fall. During November and December loggerheads appear to concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters off North Carolina (Epperly *et al.* 1995a). Support for these loggerhead movements are provided by the collected work of Morreale and Standora (1998) who showed through satellite tracking that 12 loggerheads traveled along similar spatial and temporal corridors from Long Island Sound, New York, in a time period of October through December, within a narrow band along the continental shelf before becoming sedentary for one or two months south of Cape Hatteras.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. 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. On average, 90.7% of these nests were of the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation the turtles making these nests belong. According to the TEWG assessment for loggerhead sea turtles (2000), there are few nesting surveys for loggerheads in Mexico. However, approximately 1000 nests were recorded for Quintana Roo beaches in 1998 (Xcaret 1999) and nesting appears to be stable or increasing (TEWG 2000).

Nesting data is also used to indirectly estimate both the number of females nesting in a particular year (based on an average of 4.1 nests per nesting female, Murphy and Hopkins (1984)) and the number of adult females in the entire population (based on an average remigration interval of 2.5 years; Richardson *et al.* 1978). However, an important caveat is that this data may reflect trends in adult nesting females, but it may not reflect overall population growth rates. With this in mind, using data from 1989-1998, the average adult female loggerhead population was estimated to be 44,970. Assuming an average remigration rate of 2.5 years, the total number of nesting and non-nesting adult females in the northern subpopulation is estimated at 3,810 adult females (TEWG 1998, 2000).

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Although foraging grounds contain cohorts from nesting colonies from throughout the Western North Atlantic, loggerhead subpopulations are not equally represented on all foraging grounds. In general, south Florida turtles are more prevalent on southern foraging grounds and their concentrations decline to the north. Conversely, loggerhead turtles from the northern nesting group are more prevalent on northern foraging grounds and less so in southern foraging areas (Table 2; NOAA Fisheries SEFSC 2001; Bass *et al.* 1998).

Table 2. Contribution of loggerhead subpopulations to foraging grounds

SUBPOPULATION[a]	% CONTRIBUTION TO FORAGING GROUND				
	Western Gulf	Florida	Georgia	Carolinas	North of Cape Hatteras/Virginia[b]
South Florida	83%	73%	73%	65-66%	46%
Northern	10%	20%	24%	25-28%	46%
Yucatán	6-9%	6-9%	3%	6-9%	6-9%

[a] - The Florida Panhandle population was not included because it contributes less than 1% in the overall nesting effort and including it could result in overestimating its contribution.

[b]- Virginia was the most northern area sampled for the study (Bass *et al.* 1998)

Further testing of loggerhead turtles from foraging areas north of Virginia is needed to assess the proportion of northern subpopulation turtles that occur on northern foraging grounds. A recent analysis (Rankin-Baransky *et al.* 2001) of 79 loggerhead sea turtles that stranded from Virginia to Massachusetts determined that the turtles originated from three nesting areas; the northeast Florida/North Carolina (25% ± 10%), south Florida (59% ± 14%), and Quintana Roo, Mexico (16% ± 7%) (Rankin-Baransky *et al.* 2001). However, these results should be reviewed with caution given that the majority (51) of the sampled turtles were obtained from the most northern point of the study (Barnstable County, Massachusetts). Nonetheless, they do provide new information on the complexity of loggerhead movements from the various nesting areas and suggest that the number of loggerhead turtles originating from the northern and south Florida subpopulations does not vary proportionally along the coast.

The role of males from the northern subpopulation also needs further investigation. Unlike the much larger south Florida subpopulation which produces predominantly females (80%), the northern subpopulation produces predominantly males (65%; NOAA Fisheries SEFSC 2001). New results from nuclear DNA analyses indicate that males do not show the same degree of site fidelity as do females. It is possible then that the high proportion of males produced in the northern subpopulation are an important source of males throughout the southeast U.S., lending even more significance to the critical nature of this small subpopulation (NOAA Fisheries SEFSC 2001).

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The number of nests in the northern subpopulation from 1989 to 1998 ranged from 4,370 to 7,887 with a 10-year average of 6,247 nests (TEWG 2000). The status of the northern population based on the number of loggerhead nests has been classified as stable or declining (TEWG 2000). NOAA Fisheries' 2001 Stock Assessment further examined nesting trends for the northern subpopulation (NOAA Fisheries SEFSC 2001). Three estimates were provided. Two of these indicate a decline in nesting while the third suggests an increase in nesting. However, those that indicate a decline (-3% and -5%) are based on data collected from two different sites (Little Cumberland Island, Georgia (Frazer 1983) and South Carolina (TEWG 1998), respectively) prior to the implementation of TEDs. In addition, NOAA Fisheries' 2001 Stock Assessment notes that Little Cumberland Island is a highly erosional beach and nesting at Cape Island, South Carolina (the largest South Carolina nesting site) may have been affected by raccoon predation control in the first half of the 20th century, suggesting that these sites are not representative of the overall northern subpopulation (NOAA Fisheries SEFSC 2001). A third method was employed to estimate changes in nesting activity over time for the northern subpopulation by using nesting data from selected beaches in a type of analysis known as meta-analysis. Depending on the statistical assumptions made for the meta-analysis, the pre-1990 growth rate for the northern subpopulation varies from 0 to -3% (NOAA Fisheries SEFSC 2001). The results appear to be more optimistic for the post 1990 period for which the rate of growth is estimated to be 2.8-2.9%. However, this latter estimate is considered a best-case scenario since the data used in the analysis were limited to nesting sites where surveys were believed to have been relatively constant over time by including only the years where consistent length of beach was surveyed and survey start dates were within a two week time period. This data was unavailable for Georgia, so the assumption that survey effort was constant in this area may not be true. In addition, the analysis did not consider each nesting beaches' relative contribution to the total nesting activity (NOAA Fisheries SEFSC 2001). Given the range of results for the meta-analysis (from -3% growth to 2.9% growth), the assumptions made for the analysis, and considering previous studies conducted at specific northern nesting sites, for the purposes of this Opinion, NOAA Fisheries considers the status of the northern subpopulation based on nesting trends to be stable, at best, or declining.

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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). Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased

human presence at some nesting beaches or close to nesting beaches has lead to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums) 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.

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, 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). 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 (see further discussion in the Environmental Baseline of this Opinion).

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Summary of Status for Loggerhead Sea Turtles

The global status and trend of loggerhead turtles is difficult to summarize. 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. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996), but has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

NOAA Fisheries recognizes five subpopulations of loggerhead sea turtles in the western Atlantic based on genetic studies. Cohorts from three of these, the south Florida, Yucatán, and northern subpopulations, are known to occur within the action area of this consultation. Nest rates for the south Florida subpopulation have increased at a rate of 3.9 - 4.2% since 1990 (approximately 83,400 nests in 1998). Similarly, nesting for the Yucatán subpopulation appears to be stable or increasing (TEWG 2000). In contrast, based on nesting data from several sources (Frazer 1983; TEWG 1998; TEWG 2000; NOAA Fisheries SEFSC 2001), NOAA Fisheries considers the northern subpopulation to be stable, at best, or declining. Results from analysis of nuclear DNA suggests that the high proportion of males produced by the northern subpopulation are an

important source of males throughout the southeast U.S., lending even more significance to the critical nature of this small subpopulation (NOAA Fisheries SEFSC 2001).

All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (*i.e.*, fisheries in international waters). For the purposes of this consultation, NOAA Fisheries will assume that the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate) and the south Florida and Yucatán subpopulations of loggerhead sea turtles are stable (the conservative estimate) or increasing (the optimistic estimate).

3.2.2 Kemp's Ridley Sea Turtle

The Kemp's ridley is the most endangered of the worlds sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). Estimates of the adult female nesting population reached a low of 300 in 1985. Conservation efforts by Mexican and U.S. agencies have aided this species by eliminating egg harvest, protecting eggs and hatchlings, and reducing at-sea mortality through fishing regulations. From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. Current totals exceed 3000 nests per year, allowing cautious optimism that the population is on its way to recovery (TEWG 2000).

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

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al.* 1987; Musick and Limpus 1997). In the Chesapeake Bay, where the juvenile population of Kemp's ridley sea turtles is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridley's consume a variety of crab species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined

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there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly *et al.* 1995a; Epperly *et al.* 1995b)

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999/2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (R. Prescott, pers. comm.). Annual cold stun events do not always occur at this magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Although many cold-stun turtles can survive if found early enough, cold-stunning events can represent a significant cause of natural mortality.

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

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

Summary of Kemp's ridley Status

The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. Current totals exceed 3000 nests per year (TEWG 2000). It has been suggested that Kemp's ridley sea turtles mature

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much sooner (6-7 years) than other sea turtles but there is some doubt that these figures are accurate given the disparity with age at sexual maturity for other carnivorous sea turtles, namely loggerheads (USFWS and NOAA Fisheries 1992). Anthropogenic impacts to the Kemp's ridley population are similar to those discussed above for loggerhead sea turtles. Despite these, there is cautious optimism that the Kemp's ridley sea turtle population is increasing.

3.2.3 Green Sea Turtle

Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz 1999). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species. In the Gulf of Mexico, green turtles were once abundant enough in the shallow bays and lagoons to support a commercial fishery. In 1890, over one million pounds of green turtles were taken in the Gulf of Mexico green sea turtle fishery (Doughty 1984). However, declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan *et al.* 1995). More recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan *et al.* 1995). Recent population estimates for the western Atlantic area are not available.

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While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtles life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages (Bjorndal 1985). At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet but may also consume jellyfish, salps, and sponges (Bjorndal 1997). Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs

between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). In North Carolina, green turtles are known to occur in estuarine and oceanic waters and to nest in low numbers along the entire coast. The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of Chesapeake Bay and as far north as Long Island Sound (Musick and Limpus 1997).

Green turtles face many of the same natural threats as loggerhead and Kemp's ridley sea turtles. In addition, green turtles appear to be susceptible to fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtles body. Juveniles are most commonly affected. The occurrence of fibropapilloma tumors may result in impaired foraging, breathing, or swimming ability, leading potentially to death. Stranding reports indicate that between 200-400 green turtles strand annually along the Eastern U.S. coast from a variety of causes most of which are unknown (STSSN database).

As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality. Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles.

Summary of Green sea turtle Status
Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz 1999). Green turtles face many of the same natural and anthropogenic threats as loggerhead and Kemp's ridley sea turtles. In addition, green turtles are also susceptible to fibropapillomatosis which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Recent population estimates for the western Atlantic area are not available. However, the pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in 1989. There is cautious optimism that the green sea turtle population is increasing.

3.2.4 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 leatherback population was estimated at approximately 115,000

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(adult females) globally (Pritchard 1982). By 1995, this global population of adult females had declined to 34,500 (Spotila *et al.* 1996).

Although leatherbacks are 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, and an estimated minimum age at sexual maturity of 5-6 years, 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. The eggs will incubate for 55-75 days before 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.

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). The size of the current nesting assemblage represents less than 2 percent of the size of the assemblage reported from the 1950s; with one or two females nesting in this area each year (P. Dutton, personal communication, 2000). 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, personal communication, *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 1,000 nesting females during the 1996 season (Suarez *et al.* in press). 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 (Suarez 1999); unless hatchling and adult turtles on nesting beaches receive

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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 (for example, Suarez 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.

In the eastern Pacific Ocean, leatherback turtles are captured, injured, or killed in 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. Because of the limited available data, we cannot accurately estimate the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8 and 17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/ Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992, the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,002 leatherback turtles each year, killing about 111 of them each year.

Although all causes of the declines in leatherback turtle colonies have not been documented, Sarti *et al.* (1998) suggest that the declines result from egg poaching, adult and sub-adult mortalities incidental to high seas fisheries, and natural fluctuations due to changing environmental conditions. Some published reports support this suggestion. Sarti *et al.* (2000) reported that female leatherback turtles have been killed for meat on nesting beaches like Píedra de Tiacoyunque, Guerrero, Mexico. Eckert (1997) reported that swordfish gillnet fisheries in Peru and Chile contributed to the decline of leatherback turtles in the eastern Pacific. The decline in the nesting population at Mexiquillo, Mexico occurred at the same time that effort

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doubled in the Chilean driftnet fishery. In response to these effects, the eastern 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. Shoop and Kenney (1992) also observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. Leatherbacks in these waters are thought to be following their preferred jellyfish prey. 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).

Leatherbacks are predominantly a pelagic species and feed on jellyfish (*i.e., Stomolophus, Chryaora,* and *Aurelia* (Rebel 1974)), and tunicates (salps, pyrosomas). However, 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.

Leatherback populations in the eastern Atlantic (*i.e.,* off Africa) and 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 North Atlantic remains along the northern coast of South America in French Guiana and Suriname. Recent information suggests that Western Atlantic populations declined from 18,800 nesting females in 1996 (Spotila *et al.* 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm). The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot 1998). Poaching and fishing gear interactions are, once again, believed to be the major contributors to the decline of leatherbacks in the area (Chevalier *et al.* in press; Swinkels *et al.* in press). While Spotila *et al.*(1996) indicated that turtles may have been shifting their nesting from French Guiana to Suriname due to beach erosion, analyses show that the overall area trend in number of nests has been negative since 1987 at a rate of 15.0 -17.3 % per year (NOAA Fisheries SEFSC 2001). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females. Tag return data emphasize the global nature of the leatherback and the link between these South American nesters and animals found in U.S. waters. For example, a nesting

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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).

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. Unlike loggerhead turtle interactions with longline gear, leatherback turtles do not ingest longline bait. Instead, leatherbacks are foul hooked by longline gear (*e.g.*, on the flipper or shoulder area) rather than mouth or throat hooked. 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. Leatherbacks also make up a significant portion of takes in the Gulf of Mexico and South Atlantic areas, but are more often released alive. The Hawaii based pelagic longline fishery is known to take leatherback sea turtles as well (McCracken 2000).

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 Sea Turtle Stranding and Salvage Network (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. In North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm.). 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.). 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

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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.). 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 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 nearshore waters off the Atlantic coast as they make their annual spring migration north. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. Therefore, NOAA Fisheries has used several alternative measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25620; published May 12, 1995). NOAA Fisheries established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. It allows NOAA Fisheries to quickly close the area or portions of the area to shrimp fishermen who do not use TEDs with an escape opening large enough to exclude leatherbacks on a short-term basis when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates.

Other emergency measures may also be used to minimize interactions between leatherbacks and the shrimp fishery. Since 1999, NOAA Fisheries has implemented 8 temporary rules requiring shrimp vessels operating in specified areas to use TEDs with a larger opening. Several of these actions were outside of the spatial and temporal time specified in the existing leatherback conservation zone rule. Thus, NOAA Fisheries will require larger TED openings beginning April 15 in the Atlantic and August 22, 2003 in the Gulf of Mexico. The larger openings will also allow large loggerheads and greens to escape the trawl net.

Other trawl fisheries are also known to interact with leatherback sea turtles. In October 2001, a Northeast Fisheries Center Observer documented the take of a leatherback in a bottom otter trawl fishing for *Loligo* squid off of Delaware.

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 NOAA Fisheries 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 at the north end of Hatteras Island in the spring of 1990 (D. Fletcher, pers.comm.). It was released alive by the fishermen after much effort. Five other leatherbacks were released alive from nets set in North Carolina during the

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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.

Poaching is not known to be a problem for nesting populations in the continental U.S. However, NOAA Fisheries SEFSC (2001) notes that poaching of juveniles and adults is 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.

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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 reported taken by the many other nations, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland that participate in Atlantic pelagic longline fisheries (see NOAA Fisheries SEFSC 2001, for a complete description of take records). 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). In Ghana, nearly two thirds of the leatherback sea turtles that come up to nest on the beach are killed by local fishermen.

Summary of Leatherback Status

The global status and trend of leatherback turtles is difficult to summarize. 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. In addition, egg poaching has reduced the reproductive success of females that manage to nest. 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.

In the Atlantic Ocean, the status and trends of leatherback turtles appears much more variable. The number of female leatherbacks reported at some nesting sites in the Atlantic Ocean has increased, while at others they have decreased. 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 State, Federal and international waters; poaching is a problem and affects leatherbacks that occur in U.S. waters; and leatherbacks also appear to be more susceptible to death or injury from ingesting marine debris than other turtle species. Nevertheless, the trend of the Atlantic population is uncertain. For the purposes of this Opinion, NOAA Fisheries will assume that the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate).

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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 threatened and endangered species 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: vessel operations, fisheries, 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 cetaceans and/or sea turtles. Several federally-regulated fisheries that use gillnet, longline, trawl, seine, dredge, and pot gear have been documented as unintentionally capturing or entangling whales and/or sea turtles. In some cases, the entangled whales and turtles are harmed, injured, or killed as a result of the interaction. Formal ESA section 7 consultation has been conducted on the American Lobster, Monkfish, Summer Flounder/Scup/Black Sea Bass, Atlantic Mackerel/Squid/Atlantic Butterfish, Atlantic Bluefish, Spiny Dogfish, Red Crab, Tilefish, Northeast Multispecies, Atlantic Herring, Atlantic Sea Scallop, and Atlantic Highly Migratory Species (HMS) fisheries. All of these may occur in the action area for this consultation. An 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 pot fishery*. Serious injuries and mortality of endangered whales and leatherback sea turtles have occurred as a result of interactions with lobster trap gear and previous consultations on the fishery resulted in a jeopardy finding for right whales. The RPA provided to remove jeopardy consisted of several measures but primary amongst these are Seasonal Area Management ((SAM); seasonal restrictions of specific fishing areas when right whales are present), Dynamic Area Management ((DAM); restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly), and gear modifications to reduce the amount of floating line in the water. Consultation on the American lobster pot fishery was reinitiated in 2002 to consider the effects of implementation of historical participation for parts of the Federal lobster management area, and implementation of a conservation equivalency measure for state-permitted New Hampshire lobster fishers who also held a federal lobster permit. This consultation concluded on October 31, 2002, that the proposed action was not likely to jeopardize the continued existence of any ESA-listed species under NOAA Fisheries' jurisdiction but was expected to result in the take of one additional leatherback sea turtle biennially.

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. Whales and turtles can become entangled in the buoy lines of the gillnets or in the net panels. Operation of the Atlantic bluefish gillnet fishery is modified by the ALWTRP measures for gillnet gear.

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 ASMFC. A new *Atlantic Herring Interstate Fishery Management PLan (ISFMP) and Amendment 1 to the Herring ISFMP* was approved by the ASMFC in October 1998. This plan is complementary to the Federal FMP for herring and includes similar measures

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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 can 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.

It was previously believed that the *Atlantic Sea Scallop fishery* was unlikely to take sea turtles given the speed at which the gear operates. However, with the reopening of the Hudson Canyon and Virginia Beach Scallop Closed Areas in 2001, it became apparent that turtle takes were occurring in scallop dredge gear. NOAA Fisheries initiated section 7 consultation on the fishery and on February 24, 2003, concluded that the fishery may adversely affect loggerhead, Kemp's ridley, green , and leatherback sea turtles. A ITS and Reasonable and Prudent Measures to minimize take have been provided.

Components of the *Atlantic HMS* 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. NOAA Fisheries completed the most recent biological opinion on the FMP for the Atlantic HMS fisheries for swordfish, tuna, and shark on June 8, 2001. The Opinion concluded that the pelagic longline and 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. The Opinion concluded that these fisheries would be 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. The RPA includes area closures and gear modifications to reduce the number of sea turtle takes in the HMS fisheries.

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

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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. Takes of loggerhead and leatherback sea turtles are considered unlikely but possible.

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. Sea turtles can be incidentally captured in all gear sectors of this 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 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 also considered new information on the status of the northern right whale and new ALWTRP measures. The Opinion concluded that continued implementation of the Spiny Dogfish FMP is likely to jeopardize the existence of the northern right whale. A new RPA has been 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 has been provided for the take of sea turtles in the fishery.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. 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

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Charles, VA. Developmental work is also ongoing for a TED that will work in the flynets used in the summer flounder fisheries. The summer flounder, scup and black sea bass fisheries also include the use of gillnet and pot/trap gear; both of these gear types have been found to interact with 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 (47-65° F) 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 newly regulated fishery in March 2001. An incidental take statement is provided for loggerhead and leatherback sea turtles.

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 issued in October 2001 and includes an ITS for loggerhead sea turtles. 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 Biological Opinion concluded that proposed activities under the Jonah crab EFP were likely to jeopardize the continued existence of the western north Atlantic right whale, and may adversely affect but were not likely to jeopardize the continued existence of humpback whales, fin whales, or 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 non-discretionary RPMs and discretionary Conservation Recommendations were also included to address the anticipated take of leatherback sea turtles.

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4.1.2 Non-Federally Regulated Fisheries

There is limited information on non-federally regulated fisheries occurring in the action area. 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 known to incidentally capture sea turtles in North Carolina sounds and inshore waters.

Bottom trawl fisheries for *horseshoe crab* are suspected of taking sea turtles off of Delaware (Spotila *et al.* 1998). Leatherbacks are also known to have been taken in trawls operating in Rhode Island state waters, and are suspected as having been taken in trawl gear operating in Mid-Atlantic state waters.

A *whelk fishery* using pot/trap gear is known to occur in several parts of the action area, including Maine, Connecticut, Massachusetts, Delaware, Maryland, and Virginia. In Maine, state regulations limit the number of whelk pots to three per trawl. 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), finfish trap fisheries (*i.e.*, for tautogs), and an American eel pot/trap fishery in Mid-Atlantic waters. 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 pound

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net fishery in Virginia. 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. On June 17, 2002, NOAA Fisheries published an interim final rule that included seasonal gear requirements for the use of such leaders in the Chesapeake Bay to address these sea turtle interactions (67 FR 41196).

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 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 and cetaceans. 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. Shipping traffic, private recreational vessels, and private businesses such as high-speed catamarans for ferry services and whale watch vessels all contribute to the risk of vessel traffic to protected species.

Shipping traffic to and from east coast ports poses a serious risk to cetaceans. Boston, Massachusetts is one of the Atlantic seaboard's busiest ports. In 1999, 1,431 commercial ships used the port of Boston (Container vessels-304, Auto-84, Bulk Cargo-972). The major shipping lane to Boston traverses the Stellwagen Bank National Marine Sanctuary, a major feeding and nursery area for several species of baleen whales. Vessels using the Cape Cod Canal, a major conduit for shipping along the New England Coast must pass through Massachusetts and Cape Cod Bays. In a 1994 survey, 4093 commercial ships (> 20 meters in length) passed through the Cape Cod Canal, with an average of 11 commercial vessels crossing per day (Wiley *et al.* 1995).

High-speed catamarans for ferry services and whale watch vessels operating in congested coastal areas pose potential risks to whales. The Bar Harbor, ME – Yarmouth, Nova Scotia high-speed

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ferry (aka the "Cat") conducted its first season of operations in 1998. The 91-meter (300-foot) catamaran travels at speeds up to 90 km/h (48 knots) and transits the Bay of Fundy between May and October. Because these waters are part of the summer foraging grounds for right whales, there is some risk of an interaction between the catamaran and right whales; given the catamaran's size and speed, it would probably kill or seriously injure any whale it struck. Although there have been no incidents between whales and the Cat since its operation in the region, this vessel and other high-speed craft such as high-speed whale watching boats pose potential risks of ship strikes to threatened and endangered whales and sea turtles in the action area and Canadian waters.

Small vessel traffic is also known to strike marine mammals and sea turtles. Recent whale strikes resulting from interaction with whale watch boats and recreational vessels have been recorded (Pat Gerrior, pers. comm.). In New England, there are approximately 44 whale watching companies, operating 50-60 boats, with the majority of effort during May through September. The average whale watching boat is 85 feet long but size ranges from 50 to 150 feet (NOAA Fisheries 1998d). In addition, 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 entanglement or 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. Because most of the whales involved in vessel interactions are juveniles, areas of concentration for young or newborn animals are particularly vulnerable. This also raises concerns that future recruitment to the breeding population may be affected by the focused mortality on one age-class.

Other than injuries and mortality resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. Attempts have been made to evaluate the impacts of vessel activities such as whale watch operations on whales in the Gulf of Maine. However, no conclusive detrimental effects have been demonstrated. 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. However, no collisions between commercial fishing vessels and listed species or adverse effects resulting from disturbance have been documented.

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.

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4.3.2 Pollution

In feeding areas of the northeast such as the Massachusetts Bay area, the dominant circulation patterns make it probable that pollutant inputs into Massachusetts Bay will affect Cape Cod Bay's right whale critical habitat. Sources of pollutants in the Gulf of Maine and other coastal regions 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 about 16 miles from identified right whale critical habitat. 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 or proposed species or critical habitat 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.

4.3.3 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.

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4.4 Reducing Threats to ESA-listed Cetaceans

A number of activities are in progress that may ameliorate some of the threat that activities summarized in the *Environmental Baseline* pose to threatened and endangered species in the action area of this consultation. These include education/outreach activities, gear modifications, fishing gear time-area closures and whale disentanglement, and measures to reduce ship and other vessel impacts to protected species. Many of these measures have been implemented to reduce risk to critically endangered right whales. Despite the focus on right whales, other cetaceans will likely benefit from the measures as well.

4.4.1 ALWTRP

The ALWTRP is a major component of NOAA Fisheries' activities to reduce threats to listed cetaceans. It is a multi-faceted plan that includes both regulatory and non-regulatory actions. Regulatory actions are directed at reducing serious entanglement injuries and mortality of right, humpback, fin, and minke whales (a non-ESA listed species) from fixed gear fisheries to levels approaching zero within five years of its implementation. The four fisheries principally affected by the ALWTRP are American lobster, Northeast multispecies, spiny dogfish, and monkfish.

The regulatory component of the ALWTRP includes a combination of broad fishing gear modifications and time-area closures supplemented by progressive gear research to reduce the chance that entanglements will occur, or that whales will be seriously injured or die as a result of an entanglement. The long-term goal, established by the 1994 Amendments to the MMPA, is to reduce entanglement related serious injuries and mortality of right, humpback, fin, and minke whales to insignificant levels approaching zero within five years of its implementation. The ALWTRP is a "work-in-progress", and revisions are made as new information and technology becomes available. Because gear entanglements of right, humpback, fin, and minke whales have continued to occur, including serious injuries and mortality, new and revised regulatory measures are anticipated. These changes are made with the input of the Atlantic Large Whale Take Reduction Team (ALWTRT), which is comprised of representatives from federal and state government, the fishing industry, and conservation organizations.

The non-regulatory component of the ALWTRP is composed of four principal parts: (1) gear research and development, (2) disentanglement, (3) the Northeast Implementation Team, and (4) the Sighting Advisory System. These components of the ALWTRP address both fishing gear entanglements and ship strikes; the two primary anthropogenic causes of right whale mortality. These are discussed further below.

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4.4.1.1 Gear Modifications and Development

Gear research and development is a critical component of the ALWTRP, with the aim of finding new ways of reducing the number and severity of protected species-gear interactions while still allowing for fishing activities. The gear research and development program follows two approaches: (a) reducing the number of lines in the water without shutting down fishery operations, and (b) devising lines that are weak enough to allow whales to break free and at the same time strong enough to allow continued fishing. This aspect of the ALWTRP is also important in that it incorporates the knowledge and participation of the fishing industry for developing and testing modified and experimental gear.

4.4.1.2 Whale Disentanglement Network

In recent years, NOAA Fisheries has greatly increased funding for the Whale Disentanglement Network; purchasing equipment caches to be located at strategic spots along the Atlantic coastline, supporting training for fishers and biologists, purchasing telemetry equipment, etc.

This has resulted in an expanded capacity for disentanglement along the Atlantic seaboard including offshore areas. The Center for Coastal Studies (CCS), under NOAA Fisheries authorization, has responded to numerous calls since 1984 to disentangle whales entrapped in gear, and has developed considerable expertise in whale disentanglement. NOAA Fisheries has supported this effort financially since 1995. Memorandum of Understandings developed with the USCG ensure their participation and assistance in the disentanglement effort. Hundreds of Coast Guard and Marine Patrol workers have received training to assist in disentanglements. As a result of the success of the disentanglement network, NOAA Fisheries believes that many whales that may otherwise have succumbed to complications from entangling gear have been freed and survived the ordeal.

4.4.1.3 Northeast Recovery Implementation Team

The Northeast Recovery Plan Implementation Team (NEIT) was founded in 1994 to help implement a right whale recovery plan developed under the ESA. The NEIT provides advice and expertise to address the issues affecting right whale and humpback whale recovery, and is comprised of representatives from federal and state regulatory agencies and private organizations, and is advised by a panel of scientists with expertise in right and humpback whale biology. NEIT activities include: (a) a food web study to provide a better understanding of whale prey resource requirements and the activities that might affect the availability of plankton resources to feeding right whales in the Gulf of Maine, and (b) a comprehensive plan for reducing ship strikes of right and humpback whales in the Northeast.

The NEIT Ship Strike Committee has undertaken several efforts to reduce ship collisions with northern right whales. These include production of a video titled: *Right Whales and the Prudent Mariner*, that provides information to mariners on the distribution and behavior of right whales in relation to vessel traffic. The purpose of the video is to raise awareness of mariners to the plight of the right whale in the North Atlantic and solicit the industry to become part of the solution. In addition, NEIT members conducted workshops with representatives of the maritime industry from Georgia to Massachusetts to seek solutions to the ship strike problem, particularly with respect to regulating vessel speed or re-routing vessels in areas of right whale concentrations.

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4.4.1.4 Sighting Advisory System

The Sighting Advisory System (SAS) documents the presence of right whales in and around right whale critical habitat and nearby shipping/traffic separation lanes in order to provide information to mariners with the intent of averting ship strikes. Through a fax-on-demand system, fishermen and other vessel operators can obtain SAS sighting reports, and make necessary adjustments in operations to decrease the potential for interactions with right whales. The SAS has also served as the only form of active entanglement monitoring in the Cape Cod Bay and Great South Channel critical habitat. Some of these sighting efforts have resulted in

successful disentanglement of right whales. SAS flights have also contributed sightings of dead floating animals that can occasionally be retrieved to increase our knowledge of the biology of the species and effects of human impacts. The Commonwealth of Massachusetts has been a key collaborator to the SAS effort and has continued the partnership. The USCG has also played a vital role in this effort, providing air and sea support as well as a commitment of resources to the NOAA Fisheries operations. Other potential sources of sightings include the U.S. Navy, Northeast Fisheries Science Center/NOAA and independent research vessels. Canada funded a small number of flights in 2000 in the Bay of Fundy and is expected to do the same this year. The Northeast Fisheries Science Center (NEFSC) conducts aerial surveys, on an annual basis, for cetacean population assessment in the North Atlantic. The principal purpose of the survey effort is to provide an estimation of abundance and determination of population structure of cetaceans. Survey efforts are directed to provide photo identification of right whales in known critical habitat areas and to research other areas of right whale aggregation in the North Atlantic. Aerial survey efforts by the NEFSC have provided initial reports of entangled large whales and provided support for disentanglement efforts. Sighting information from these flights is forwarded to the SAS for fax on demand distribution to mariners.

4.4.2 Education and Outreach Activities

Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. For example, outreach efforts for fishermen under the ALWTRP are fostering a more cooperative relationship between all parties interested in the conservation of threatened and endangered species. NOAA Fisheries has also been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. 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.

4.4.3 Other Measures to Reduce Ship and Vessel Impacts

Other on-going activities to benefit right whales, in particular, include the *Mandatory Ship Reporting System (MSR).* The USCG educates mariners on whale protection measures and uses its program - such as radio broadcasts and notice to mariner publications - to alert the public to potential whale concentration areas. In April 1998, the USCG submitted on behalf of the United States, a proposal to the International Maritime Organization (IMO) requesting approval of an MSR in two areas off the east coast of the United States. The system became operational in July 1999, and requires ships greater than 300 gross tons to report to a shore-based station when they enter two key right whale habitats - one off the northeast U.S. and one off the southeast U.S. In return, ships receive a message about right whales, their vulnerability to ship strikes, precautionary measures the ship can take to avoid hitting a whale, and locations of recent sightings. Much of the program is aimed at increasing mariner's awareness of the severity of the

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ship strike problem and seeking their input and assistance in minimizing the threat of ship strikes.

Disturbance was identified in the Recovery Plan for the western north Atlantic right whale as one of the principal human-related factors impeding right whale recovery (NOAA Fisheries 1991b). As part of recovery actions aimed at minimizing human-induced disturbance, NOAA Fisheries published an interim final rule on February 13, 1997, (62 FR 6729) restricting vessel approach to right whales to 500 yards (50 CFR 224.103(b)). Exceptions for closer approach are provided when: (a) compliance would create an imminent and serious threat to a person, vessel or aircraft, (b) a vessel or aircraft is restricted in its ability to maneuver around the 500 yard perimeter of a whale and unable to comply with the right whale avoidance measures, (c) a vessel is investigating or involved in the rescue of an entangled or injured right whale, (d) the vessel is participating in a permitted activity, such as a research project, and (e) for aircraft operations, unless that aircraft is conducting whale watch activities. If the vessel operator finds that he or she has unknowingly approached closer than 500 yards, the rule requires that a course be steered away from the whale at a slow, safe speed. Similarly, aircraft are required to take a course away from the right whale and immediately leave the area at a constant airspeed. The regulations are consistent with the Commonwealth of Massachusetts' approach regulations for right whales.

4.5 Reducing Threats to ESA-listed Sea Turtles

4.5.1 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 are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of the small subpopulation of northern nesting loggerheads. These states also 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) has received anecdotal reports from fishermen who have disentangled

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leatherbacks from their lobster pot gear (J. Lewis, pers. comm.).

4.5.2 Regulatory Measures for Sea Turtles

4.5.2.1 Final Rule for Large-Mesh Gillnets

On March 21, 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 establishes 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) north of 33°51.0'N (the North Carolina/South Carolina border at the coast) to 35°46.0'N (Oregon Inlet, NC) at all times; north of Oregon Inlet to 36°22.5'N (Currituck Beach Light, NC) from March 16 through January 14; north of Currituck Beach Light to 37°34.6'N (Wachapreague Inlet, VA) from April 1 through January 14; and, north of Wachapreague Inlet to 37°56.0'N(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. NOAA Fisheries is also considering extending these measures into state territorial waters from the North Carolina/South Carolina at the coast to Chincoteague, VA in order to prevent fishers from shifting large-mesh gillnet effort into state waters where sea turtles also occur. 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.

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4.5.2.2 Seasonal Restrictions for Summer Flounder Trawls

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). These measures are attributed with significantly reducing turtle deaths in the area. In addition, NOAA Fisheries has 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 4.25 inch (10.8 cm) stretched mesh on a seasonal basis, from September 1 through December 15 each

year, to protect migrating sea turtles. The closed area includes all inshore waters of Pamlico Sound south of 35°46.3' N. lat., north of 35°00' N. lat., and east of 76°30.0'W. long.

4.5.2.3 Proposed 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 and large and sexually mature loggerhead and green turtles. In addition, several approved TED designs do not function properly under normal fishing conditions. Therefore, NOAA Fisheries will disallow these TEDs (*e.g.*, weedless TEDs, Jones TEDs, hooped hard TED, and the use of accelerator funnels). Finally, the rule will require modifications to the trynet and bait shrimp exemptions to the TED requirements to decrease mortality of sea turtles.

4.5.2.4 Interim 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. Based on the available information, NOAA Fisheries determined that fishing with this gear is the most likely cause of significant increases in the stranding of sea turtles in the Chesapeake Bay. To address the high and increasing level of sea turtle strandings, NOAA Fisheries published a Temporary Rule on June 22, 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 that further addresses the take of sea turtles in large-mesh pound net leaders and stringer leaders used in the Chesapeake Bay and its tributaries.

4.5.2.5 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 8, 2001 and concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. A reasonable and prudent alternative was provided to avoid jeopardy to leatherback and loggerhead sea turtles as a result of operation of the HMS fisheries. This RPA has been implemented in part through rulemaking. A final rule published July 9, 2002, (67 FR 45393) implements measures that close the northeast distant statistical reporting area (NED) to vessels that have been issued, or are required to have, Federal HMS limited access permits and use pelagic longline gear. In addition to the closure, the final rule implements gear modifications designed to reduce the

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mortality rate of captured sea turtles, year-round and in all fishing areas. These include: (1) deploying gear so that hooked or entangled turtles have sufficient slack to reach the surface and avoid drowning, and (2) a requirement to use only corrodible, non-stainless steel hooks. Additional gear requirements were implemented as part of a related Interim Final Rule published March 30, 2001 (66 FR 17370) that requires pelagic longline vessels that have been issued a Federal HMS permit to carry on board line clippers and dipnets that meet NOAA Fisheries design and performance standards. Federally permitted pelagic longline fishers are required to use line cutters and dipnets in the manner specified by the regulations to cut fishing line as close as possible to hooked or entangled turtles in order to facilitate the release of turtles with a minimum of injury.

4.5.2.6 Sea Turtle Handling and Resuscitation Techniques

The NOAA Fisheries has also developed specific sea turtle handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. The Sea Turtle Handling and Resuscitation Techniques regulations published in the FR as a final rule on December 31, 2001. 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.

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4.6 Summary and Synthesis of the Status of Species and Environmental Baseline

Previous discussions summarized the numerous hazards that endangered whales and threatened and endangered sea turtles have been and continue to be exposed to in the action area. The hazards that appear to be having the greatest impact on listed cetaceans are entanglements in fishing gear and ship strikes while the primary hazards for sea turtles are entanglements in fishing gear and poaching (of eggs from nests as well as mature animals). Further, other phenomena with anthropogenic causes, like water pollution and the disruption of marine food chains, may contribute to the status and trend of listed species in the action area, although their specific impacts of these phenomena on those listed species remains unknown.

Nevertheless, we can summarize the aggregate impact of the environmental baseline on listed species in the action area:

Right whales. The western North Atlantic subpopulation of right whales continues to decline toward extinction. The action area for this consultation includes right whale foraging grounds in the Gulf of Maine and waters used by right whales when traveling to and from foraging areas in the U.S. and Canada, and to the southeast nursery/calving grounds. As discussed in the *Status of the Species* section of this Opinion, the death of right whales in collisions with ships and entanglements in fishing gear are the greatest hazards to this species (Caswell *et al.* 1999, Silber *et al.* 2002). Of the 45 right whales whose deaths were recorded between 1970 and 1990, 16

deaths (35.6%) resulted from injuries caused by collisions with ships, 13 deaths (28.9%) were neonates who apparently died from perinatal complications or natural causes, 2 death (4.4%) were related to fishing gear, and 14 deaths (31.1%) were of unknown causes (Silber *et al.* 2002). More recently, Fujiwara and Caswell (2001) concluded that the death of female whales, particularly reproductive females, appears to pose the greatest demographic risk of extinction to right whales.

Preceding subsections of this *Environmental Baseline* summarized the efforts NOAA Fisheries, the States, the Coast Guard, and other agencies have implemented to prevent right whales from being injured or killed in collisions with vessels or fishing gear. Although the available data do not allow us to determine if these measures, either individually or in aggregate, have reduced the hazards ships and fishing gear pose to right whales, the right whale recovery team continues to identify these efforts as essential to the recovery of right whales. Despite these efforts, the available evidence strongly suggests that the western Atlantic subpopulation of right whales cannot sustain the number or rate of deaths that result from the various fisheries, vessels traffic, and any other possible sources (*e.g.*, pollution) that were summarized in the *Environmental Baseline*. If the impacts of these activities continue at current rates, they are likely to result in the extirpation of the western Atlantic subpopulation of right whales. Given the low population size of right whales in the eastern Atlantic Ocean, the extirpation of right whales in the western Atlantic Ocean would render this entire species effectively extinct.

Humpback whales. The Gulf of Maine encompasses important summer feeding areas for humpback whales in the North Atlantic Ocean based on the number of humpback whales that consistently forage there. Although the humpback population in the North Atlantic Ocean probably numbers around 10,600 animals, their status and trend is unknown. Similarly, the number of humpback whales that feed in the Gulf of Maine is unknown, although some investigators have suggested that the number of humpback whales using the action area has increased. Ship strikes and entanglement in fishing gear represent significant threats to humpback whales in the action area.

Fin whales. Although the fin whale population in the western North Atlantic Ocean probably numbers more than 2,362 animals, the status and trend of fin whales in the Atlantic Ocean remains unknown. Fishing gear appears to pose less of a threat to fin whales in the North Atlantic Ocean than it does for North Atlantic right or humpback whales. However, more fin whales are struck by large vessels than right or humpback whales (Laist *et al.* 2001) and fin whales may be killed by whalers in the North Atlantic. Nevertheless, it is impossible to estimate the impact of these threats on the status and trend of the fin whale population without more information on the population size and population ecology of the species.

Sei whales. There are insufficient data to determine trends of the Nova Scotian sei whale population. Because there are no abundance estimates within the last 10 years, a minimum population estimate cannot be determined for NOAA Fisheries management purposes (Waring *et*

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al. 1999). Few instances of injury or mortality of sei whales due to entanglement or vessel strikes have been recorded in U.S. waters. This may be related to the sei whales preference for deep water throughout their range, typically over the continental slope or in basins situated between banks (NOAA Fisheries 1998b). Given the lack of information on sei whale abundance and population trends, it is impossible to estimate the impact of these threats on the status and trend of the sei whale population without more information on the population size and population ecology of the species.

Blue whales. For management purposes, NOAA Fisheries recognizes 308 blue whales as the minimum estimate of the western North Atlantic stock based on work conducted in the Gulf of St. Lawrence (Waring *et al.* 2001). Few instances of injury or mortality of blue whales due to entanglement or vessel strikes have been recorded in U.S. waters. This species is more commonly found in Canadian waters but observations have been made in U.S. waters. There were three separate sightings of blue whales in U.S. waters in 2002 during expanded survey effort for right whales. The paucity of blue whale sightings may, in part, be due to their more offshore distribution and the limited survey effort in areas where they are most likely to occur.

Sperm whales. Total numbers of sperm whales off the USA or Canadian Atlantic coast are unknown. The best estimate of abundance for the North Atlantic population of sperm whales (4,702; CV=0.36) is likely to be an underestimate (Waring *et al.* 2000), in part, because sperm whales spend a large proportion of time diving and may be missed by observers during surveys. Few instances of anthropogenic injury or mortality of sperm whales have been recorded in U.S. waters. However, interactions that do occur are less likely to be observed as compared to right or humpback whales given the generally offshore distribution of sperm whales.

Loggerhead Sea Turtles. NOAA Fisheries recognizes five subpopulations of loggerhead sea turtles in the western Atlantic based on genetic studies. Turtles from two of these, the northern subpopulation and the south Florida subpopulation are expected to occur within the action area of this consultation. Based on nesting data from several sources (Frazer 1983; TEWG 1998; TEWG 2000; NOAA Fisheries SEFSC 2001), NOAA Fisheries considers the northern subpopulation to be stable, at best, or declining. In contrast, nest rates for the south Florida subpopulation have increased at a rate of 3.9 - 4.2% since 1990 (approximately 83,400 nests in 1998). Results from analysis of nuclear DNA suggests that the high proportion of males produced by the northern subpopulation are an important source of males throughout the southeast U.S., lending even more significance to the critical nature of the small northern subpopulation (NOAA Fisheries SEFSC 2001).

Fishing gear associated with fisheries in State, Federal and international waters; poaching, development and erosion on their nesting beaches, and ingesting marine debris are the primary threats to loggerhead turtles in the Atlantic Ocean. 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

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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 the action area. The northern subpopulation of loggerhead turtles appears to have a high risk of significant, future declines as a result of the various activities that threaten the adult females in its population. In contrast, the south Florida subpopulation of loggerhead turtles appears to be stable despite the various activities that threaten the adult females and the nesting beaches in its population.

Kemp's Ridley Sea Turtles. The Kemp's ridley is the most endangered of the worlds sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). Estimates of the adult female nesting population reached a low of 300 in 1985. From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. Current totals exceed 3000 nests per year, allowing cautious optimism that the population is on its way to recovery (TEWG 2000). However, like loggerhead sea turtles, Kemp's ridley sea turtles are affected by a number of anthropogenic and natural effects. Anthropogenic effects include fishing gear associated with fisheries in State, Federal and international waters; poaching, development and erosion on their nesting beaches. In and near the action area, Kemp's ridley sea turtles are captured and injured or killed in interactions with fishing gear such as gillnets and trawls, and are also injured or killed as a result of being struck by vessels operating within the action area. Nevertheless, it is impossible to estimate the impact of these activities on the status and trend of the Kemp's ridley sea turtles in the action area or the Atlantic Ocean without more information on the population size and population trend of the species and more information by which to quantify the total number of turtles affected.

Green Sea Turtles. Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz 1999). Thus, of the three turtle species considered in this Opinion, green sea turtles are expected to be the least affected by anthropogenic activities occurring within the action area of this consultation. Green turtles do, however, face many of the same natural and anthropogenic threats as loggerhead and Kemp's ridley sea turtles. Recent population estimates for the western Atlantic area are not available. However, the pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in 1989. There is cautious optimism that the green sea turtle population is increasing. Nevertheless, it is impossible to estimate the impact of these activities on the status and trend of green sea turtles in the action area or the Atlantic Ocean without more information on the population size and population trend of the species and more information by which to quantify the total number of turtles affected.

Leatherback turtles. The size of the leatherback turtle population in the Atlantic Ocean is uncertain, the number of leatherback turtles at some nesting sites has increased while they have decreased at other sites and it is difficult to produce a composite estimate from the available data. However, the population of leatherback sea turtles in the Atlantic Ocean does not appear to

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be increasing; it is either declining or stable depending on whether we accept conservative or optimistic estimates, respectively. Fishing gear associated with fisheries in State, Federal and international waters; poaching, development and erosion on their nesting beaches, and ingesting marine debris are the primary 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 includes salmon nets, herring nets, gillnets, trawl line, and crab pot line. Nevertheless, it is impossible to estimate the impact of these activities on the status and trend of the leatherback turtles in the action area or the Atlantic Ocean without more information on the population size and population trend of the species.

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. This biological opinion examines the likely effects of the proposed action on listed species within the action area to determine if implementation of the monkfish FMP is likely to jeopardize the continued existence of listed species. This analysis is done after careful review of the listed species status and the factors that affect the survival and recovery of that species, as described above.

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 fishery 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. Since the proposed action is not expected to affect designated critical habitat, this Opinion will focus only on the jeopardy analysis.

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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, including the effects on individuals of threatened or endangered species. 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) will appreciably reduce a listed species likelihood of surviving and recovering in the wild. A species' reproduction, numbers, and distribution are interdependent. 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 affect the species likelihood of survival and recovery in the wild and other (natural) declines.

Statistics provides two points of reference for analyzing data, information, or other evidence to test hypotheses: (1) analyzing data to minimize the chance of concluding that there was an effect from an activity or treatment that is being analyzed when, in fact, there was no effect or (2) analyzing data to minimize the chance of concluding that there was no effect when, in fact, there was an effect. These two points of reference are called "error" in statistics. The difference between these reference points is that the first minimizes what is called Type I error while the second minimizes what is called Type II error (Cohen 1987). Unfortunately, for most analyses, minimizing one type of error increases the risk of committing the other type of error. The concept of error is important for jeopardy analyses because Type II error places listed species at greater risk of extinction.

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 (Type I error) 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 (Type II error). 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 (Type II error). Avoiding Type II error may decrease risks to listed species and designated critical habitat, but increases the risk of concluding that there was an effect when, in fact, no effect occurred.

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5.2 Scope of the Analyses

As discussed in the *Description of the Proposed Action*, the activity being considered by NOAA Fisheries is the implementation of new FMP measures for the monkfish fishery, including elimination of the measures which would have reduced DAS to zero (effectively eliminating the

directed fishery for monkfish), increased landing limits for monkfish vessels fishing in the SFMA, and increased incidental catch limit.

As described above, the current action, implementation of Framework Adjustment 2 to the Monkfish FMP, would allocate 40 DAS to each limited access monkfish fisher for Year 5 (the 2003 monkfish fishing year) in place of DAS going to zero. In addition, Framework 2 would increase the trip limits for limited access monkfish vessels fishing with trawl or non-trawl (*e.g.*, gillnet) gear in the SFMA from 550 or 450 lbs (tail-weight monkfish) per DAS to 1250 or 1000 lbs (tail-weight) per DAS, based on permit category. Trip limits for monkfish vessels in the NMFA would remain the same; that is there would be no trip limit in the NFMA for limited access monkfish vessels fishing under a multispecies or monkfish DAS with either trawl or non-trawl gear.

Right, humpback, fin, sei, sperm, and blue whales and loggerhead, green, Kemp's ridley, and leatherback sea turtles are known to suffer injuries and mortality as a result of vessel strikes. In addition, right whales, humpback whales, fin whales, sperm whales, loggerhead, green, Kemp's ridley and leatherback sea turtles are known to be captured or entangled in trawl and/or gillnet gear. Since Framework Adjustment 2 will allow for the continued operation of the directed monkfish fishery in Year 5, this action may adversely affect ESA-listed cetaceans and sea turtles from vessel interactions and/or gear interactions as a result of the monkfish fishery. The following discussion provides further information on the likelihood that adverse effects will occur, and the degree of impact of right, humpback, fin, sei and sperm whales, and loggerhead, green, Kemp's ridley, and leatherback sea turtles to fishing gear and/or vessels proposed to be used in the monkfish fishery as modified by Framework Adjustment 2.

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The analyses in this Opinion are based on an implicit understanding that the species considered in this Opinion are threatened with global extinction by a wide array of human activities and natural phenomena. NOAA Fisheries also recognizes that some of these other human activities and natural phenomena pose a much larger and more serious threat to the survival and recovery of these species (and other flora and fauna) than the proposed activities. Further, NOAA Fisheries recognizes that these species will not recover without addressing the full range of human activities and natural phenomena (*i.e.*, ship strikes for cetaceans, and beach erosion, poaching and interactions with international fisheries for sea turtles) that could cause these animals to become extinct in the foreseeable future (USFWS and NOAA Fisheries 1997). Nevertheless, this Opinion focuses solely on whether the direct and indirect effects of the activities proposed to occur as a result of implementation of Framework 2 to the Monkfish 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. NOAA Fisheries will consider the effects of other actions on these endangered species as a separate issue. As stated previously, jeopardy analyses in biological opinions distinguish between the effects of a specific action on a species likelihood of surviving and recovering in the wild and a species background likelihood of surviving and recovering given the full set of human actions and natural

phenomena that threaten a species.

5.3 Information Available for the Assessment

Information on the effects of ship strikes and fishing gear entanglements on cetaceans and sea turtles has been published in a number of documents including sea turtle status reviews and biological reports (NOAA Fisheries and USFWS 1995; Marine Turtle Expert Working Group (TEWG) 1998 & 2000), recovery plans (draft Right Whale Recovery Plan; Silber and Clapham 2001), the Marine Mammal Stock Assessment Reports (SAR) (Waring *et al.* 2000; Waring *et al.* 2001), scientific literature (Laist *et al.* 2001; Perry *et al.* 1999; Clapham *et al.* 1999; IWC 2001a), and data collected by the STSSN. Other sources of information are cited below.

5.4 Effects of the Monkfish Fishery

5.4.1 Effect of Vessels

(1) *Effect of Vessel Collisions* - All whales are potentially subject to collisions with ships (Clapham *et al.* 1999). Of the 11 species of cetaceans known to be hit by ships, fin whales are struck most frequently; while right whales, humpback whales and others are hit commonly (Laist *et al.* 2001). In some areas, one-third of all fin whale and right whale strandings appear to involve ship strikes (Laist *et al.* 2001). Of the 45 right whale mortalities recorded between 1970 and 1999, 16 (35.6%) were determined to be the result of ship strikes (Knowlton and Kraus 2001). Ship strike injuries to whales take two forms: (1) propellor wounds characterized by external gashes or severed tail stocks; and (2) blunt trauma injuries indicated by fractured skulls, jaws, and vertebrae, and massive bruises that sometimes lack external expression (Laist *et al.* 2001). Collisions with smaller vessels may result in propellor wounds or no apparent injury, depending on the severity of the incident.

Vessel strikes of sea turtles take several forms from the most severe (bisection of the animal or penetrating injuries to the viscera), to severed limbs or cracks to the carapace which can also lead to death. Sea turtle stranding data for the U.S. Gulf of Mexico and Atlantic coasts, Puerto Rico, and the U.S. Virgin Islands show that between 1986 and 1993, about 9% of living and dead stranded sea turtles had propellor or other boat strike injuries (Lutcavage *et al.* 1997). According to 2001 STSSN stranding data, at least 33 sea turtles (loggerhead, green, Kemp's ridley and leatherbacks) that stranded on beaches within the action area of this consultation (Maine through North Carolina) were struck by a boat. According to 1980-1999 STSSN stranding data, the number of leatherback strandings involving boat strikes or collisions (231) was considerably greater than the number of strandings involving entanglement in fishing gear (81), ingestion of marine debris (36) or some kind of intentional interaction (*i.e.*, gaff wounds or rope deliberately tied to a flipper) (21) combined (NOAA Fisheries SEFSC 2001). The number of boat struck turtles counted underestimates the actual number of boat strikes that occur since not every boat struck turtle will strand, every stranded turtle will not be found, and many

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stranded turtles are too decomposed to determine whether the turtle was struck by a boat. However, it should also be noted that in most cases it is not known whether all boat strikes were the cause of death or whether they occurred post-mortem (NOAA Fisheries SEFSC 2001).

(2) *Factors which may contribute to the occurrence of vessel strikes* - For cetaceans, a great majority of ship strikes seem to occur over or near the continental shelf; probably reflecting the concentration of vessel traffic and whales in these areas (Laist *et al.* 2001). Other factors which may contribute to a whale being struck include the amount of time spent at the surface, the use of habitats in the vicinity of major shipping lanes, and the speed at which the animal travels (Clapham *et al.* 1999). However, while it appears that all sizes and types of vessels can hit whales, the most severe or lethal injuries are caused by ships 80 m or longer, and vessels traveling 14 kn or faster (Laist *et al.* 2001). The massive nature of most blunt trauma and propellor injuries observed on dead ship-struck whales also suggests that most, if not all, lethal collisions are caused by large ships rather than small vessels (Laist *et al.* 2001).

The vessels used in the monkfish fisheries are all commercial fishing vessels typical of those used in other commercial fishing operations. Vessel length overall is typically in the range of 40-60 feet but many are in the mid-50's; far less than the size of vessels known to pose the most likely risk of serious injury and mortality to large whales. In addition, these vessels typically operate at slower speeds than what is observed by large ships, ferry services, or other vessels.

The factors which contribute to the occurrence of turtle vessel strikes are uncertain, although there does appear to be a correlation between the number of vessel struck turtles and the level of recreational boat traffic (NRC 1990). This may be a reflection of the greater speed of (some) recreational boaters as well as the concentration of recreational vessel traffic in areas of high turtle use. Within the action area of this consultation, loggerhead, green, and Kemp's ridley sea turtles occur in benthic environments from North Carolina to Cape Cod during the spring and summer foraging months, and in other continental shelf waters, primarily the Mid-Atlantic, for all or part of the year. For example, Shoop and Kenney (1992) found an extensive area of loggerhead distribution from near Long Island, New York, along the mid-shelf to near Cape Hatteras, North Carolina. Larger loggerheads also occur along the shelf edge (CeTAP 1982). Leatherbacks are typically considered a pelagic species but do occur in inshore waters at certain times of the year, apparently in search of their jellyfish prey.

(3) Changes in Vessel Activity as a Result of Framework Adjustment 2 - As previously described Framework Adjustment 2 would keep the allocation of monkfish DAS for Year 5 at 40 rather than reducing DAS to zero. Framework Adjustment 2 would also increase the trip limits for limited access monkfish vessels fishing in the SFMA from 550 or 450 lbs (monkfish tail-weight) per DAS to 1250 lbs or 1000 lbs (monkfish tail-weight) per DAS, respectively, depending on the permit category. Framework Adjustment 2 would not change the current trip limits for the NFMA.

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Since Framework Adjustment 2 will allocate 40 monkfish DAS to limited access monkfish vessels for Year 5, effort is the fishery is expected to be greater than that which would have occurred in Year 5. However, since the DAS allocation and the trip limits for the NFMA are the same as what has been considered in past biological opinions for this fishery, the Framework Adjustment 2 measures are not expected to result in changes in how vessels operate that normally fish just in the NFMA.

It is unclear what effect an increase in trip limits for the SFMA will have on monkfish fishing effort in that area. There are four possible scenarios: (1) vessels will fish the same amount of days and the same amount of gear as in Year 4 but retain more of what is caught, (2) the increased trip limits will provide an incentive for vessels that might not otherwise have fished to make trips at the higher trip limit, (3) vessels will make more tows or set more gear on any particular trip in order to take advantage of a higher trip limit, or (4) some combination of these scenarios. There is limited information on which to determine which of these scenarios or what combination of scenarios may occur. Based on the fall 2002 survey indices, both the northern and southern monkfish stocks are not overfished (NEFMC 2003) and the target TAC has been increased, accordingly. This information suggests that monkfish vessels will be able to retain a higher trip limit of monkfish in Year 5 as compared to Year 4 by making the same number of trips but retaining more of what is caught. Even if we were to take a worse case scenario approach and assume that an increase in the SFMA trip limits will provide an incentive for some vessels to make additional trips as compared to Year 4, the effect is expected to be minimal given that DAS will remain the same as in Year 4, there are relatively few directed monkfish trips by trawl vessels in the SFMA (only 8.8% of all trawl trips in the south are directed on monkfish (defined as a trip with at least half of the catch in weight is monkfish); NEFSC 2002), and gillnet vessels can modify their fishing practices by making more trips, such as by setting more net or increasing the soak time of the nets.

Shifts in vessel activity could occur as a result of the proposed changes in trip limits. However, NOAA Fisheries does not anticipate a significant shift in vessel activity as a result of Framework 2. In some years, limited access monkfish vessels that homeport in the NFMA have traveled to the SFMA to fish for monkfish despite the trip limit restrictions in the SFMA. Given that the Large-Mesh Gillnet restrictions now limit gillnet fishing in federal waters off of North Carolina and north to Chincoteague, Virginia in the spring, and given that there continues to be no trip limit for monkfish gillnet vessels fishing in the NFMA under a monkfish DAS, Framework 2 is not expected to provide sufficient incentive to encourage vessel operators that typically fish only in the NFMA to move their operations to the SFMA.

(4) *Summary of Effect of Vessel Collisions* - As previously described, the monkfish fisheries operate in federal waters from the North Carolina/South Carolina border to Maine (U.S. Canadian border). Vessel interactions with protected species are expected to be more likely in areas where vessels and protected species both concentrate. Right whales, humpback, and fin whales use different parts of the action area throughout the year. Overlap of vessels used in

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these fisheries with right and humpback whales may occur during the fall and spring when right and humpback whales travel between northern foraging grounds and southern calving areas. Overlap of the fishery with humpback whales may also occur in the winter off of Virginia where juvenile humpback whales have been observed feeding. Fin whales are more ubiquitous in their distribution, and less is known about their winter distribution than for right and humpback whales. In the North Atlantic, the single most important area for this species appears to be from Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain *et al.* 1992). Within the action area, the sei whale is most common on Georges Bank and into the Gulf of Maine/Bay of Fundy region during spring and summer, primarily in deeper waters. Individuals may range as far south as North Carolina. Blue whales are still considered to occur more regularly in Canadian waters as compared to U.S. waters, but blue whales have been observed in the Gulf of Maine including three sightings in the summer and early fall 2002. In the U.S. EEZ, sperm whales are distributed in a distinct seasonal cycle; concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring *et al.* 1999). The vessels operating in the monkfish fisheries also operate in areas known to be utilized by sea turtles for foraging and migration. Since the monkfish fishery in the SFMA is primarily a fall through spring fishery, sea turtle interactions with vessels used in the fishery are most likely to occur in Mid-Atlantic waters as turtles migrate to and from wintering grounds in the south.

Although vessels operating in the monkfish fishery operate in areas and at times known to be utilized by ESA-listed cetaceans and sea turtles for foraging and migration, there have been no known interactions between monkfish fishing vessels and ESA-listed whales or turtles in the action area. Although this may be due to a lack of reporting of events that do occur, it may also be a reflection of the slower operating speed of monkfish vessels compared to, for example, recreational vessels and/or the density of monkfish vessels in relation to whale and sea turtle distribution. The proposed Framework 2 measures are not expected to result in the addition of vessels to the fishery since it will not change the number of qualified limited access permit holders vessels operating in the fishery. The Framework 2 measures do remove an anticipated benefit to ESA-listed whales and sea turtles that would have occurred as a result of elimination of the directed monkfish fishery (assuming that effort was not displaced to another fishery with an equal or greater risk of interaction with ESA-listed species). However, the Framework 2 measures are not expected to increase the likelihood of a vessel interaction with ESA-listed cetaceans or sea turtles as compared to the fishery as it operated in Year 4, since vessels are not expected to make additional trips. Even in a worst case scenario approach, the increased trip limits for the SFMA are not expected to increase the number of trips taken by SFMA monkfish gillnet vessels since these vessels will be constrained by the same number of DAS as in Year 4 and fishers can catch and retain a higher limit of monkfish by landing more of what is caught and/or alter their fishing practices in other ways (setting more net if they are currently setting less than the maximum allowed, and/or increasing soak times). Even if the increased trip limit

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were an incentive for trawl vessels fishing for monkfish in the SFMA to make trips that they otherwise would not have under the current (Year 4) trip limits, it is not expected to increase the risk of vessel interactions with ESA-listed species given that this sector of the fishery is so small. Based on the information presented above, NOAA Fisheries believes the risk of any vessel participating in the proposed activity striking a right, humpback, fin, sei, sperm or blue whale or loggerhead, Kemp's ridley, green or leatherback sea turtle in the action area is unlikely.

5.4.2 Effects of Fishing Gear

(1) Effect of capture in monkfish gear - Bottom trawls are typically cone-shaped nets which are towed on the bottom. Large, rectangular doors attached to the two cables to tow the net keep the net open while deployed. At the bottom of an otter trawl mouth is the footrope or ground rope that can bear many heavy (tens to hundreds of kilograms) steel weights (bobbins) that keep the trawl on the seabed. In addition, bottom trawls may be constructed with large (up to 40 cm diameter) rubber discs or steel bobbins (rockhoppers) that 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 to flush shrimp or fishes into the water column to be caught by the net. The constricted posterior netting of a trawl is called the codend.

Fixed gillnets are panels of net anchored in some form, with a top rope, referred to as the headrope or floatline, and a bottom rope, referred to as the lead line. As their names imply, floats are attached to the floatline while the lead line is weighted to help maintain the vertical profile of the gillnet in the water column. Multiple net panels are typically attached together in series to form a net-string. Buoy lines attached to each end of a net string rise to the surface to mark the location of the gear. Gillnets fish by presenting a wall of netting in which fish are incidentally snagged or entangled. However, in some areas, fishers either choose or are required to reduce the vertical profile of their gillnets by using "tie-downs". Tie-downs refer to twine used between the floatline and the lead line as a way to create a pocket or bag of netting to trap fish. Fishers may use tie-downs in order to better entangle bottom species (*i.e.*, monkfish or flounder) in the gillnet or to reduce the vertical profile of the net to minimize species entanglements (*e.g.*, to reduce harbor porpoise interactions). Monkfish gillnet fishers issued a Category A-D permit are allowed to fish up to 160 gillnets, each up to 300' (91.44 m or 50 fathoms) in length, with the exception that vessels fishing in Mid-Atlantic waters are limited to 80 nets in accordance with the HPTRP. Regulations require monkfish gillnet fishers to use a minimum 10-inch diamond stretched mesh but 12-inch (stretched) mesh is commonly used in the fishery.

The risk to sea turtles from capture in gillnet 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 in trawl fisheries and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or

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comatose turtles rising from 0% for the first 50 minutes of capture to 70% after 90 minutes of capture (Henwood and Stuntz 1987). However, metabolic changes that can impair a sea turtle's ability to function can occur within minutes of 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 found that an acid-base imbalance resulted 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. A subsequent study by Stabenau and Vietti (2000) examined the physiological effects of forced submergence on loggerheads by analyzing pre and post submergence blood samples. Based on the results, Stabenau and Vietti (2000) concluded that the initial submergence produced a severe and pronounced metabolic acidosis in all turtles. Similarly, Henwood and Stuntz (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles captured in shrimp trawls for less than 30 minutes to return to normal. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. Physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles would be expected to exacerbate the harmful effects of forced submergence from trawl capture (NRC 1990). Soak times for monkfish gillnets in the SFMA range from 24-120 hours; far longer than the submergence tolerance time for sea turtles as described above.

Unlike sea turtles, ESA-listed whales are rarely caught in trawl gear. This may be due to their large size and greater mobility. Whales can, however, become entangled in the buoy lines or the anchor lines of gillnet gear, and may also become entangled in the net panels. A whale that encounters the vertical "wall" of the gillnet may become wrapped in the net if it thrashes in its attempt to get away from the gear. It is surmised that when the baleen whale encounters a line, it may move along that line until it comes up against something such as a buoy. The buoy can then be caught in the baleen, against a flipper or on some other body part. When the animal feels the resistance of the gear, it likely thrashes, which may cause it to become entangled in the lines. For large whales, there are generally three areas of entanglement: 1) the gape of the mouth, 2) around the flippers, and 3) around the tail stock. If the entanglement prevents the whale from reaching the surface then it will drown. But many whales have been observed swimming with portions of the line, with or without the fishing gear, wrapped around a pectoral fin, the tail stock, the neck or the mouth. Documented cases have indicated that entangled animals may travel for extended periods of time and over long distances before either freeing themselves, being disentangled, or dying as a result of the entanglement (Angliss and Demaster 1998). Entanglements may lead the animal to exhaustion and starvation due to increased drag (Wallace 1985) or cause a sustained stress response, leading to a weakened immune system and an increased risk of infection or disease, or may make them more prone to ship strikes. Younger animals are particularly at risk if the entangling gear is tightly wrapped since the gear will

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become more constricting as they grow. The majority of large cetaceans that become entangled are juveniles (Angliss and Demaster 1998).

(2) Factors contributing to interactions between ESA-listed species and monkfish fishing gear - The location of the fishery in relation to the distribution of listed species is a factor influencing the likelihood that a gear entanglement will occur. All of the species considered in this Opinion occur in the action area where monkfish gillnet gear is set. Overlap of monkfish gillnet gear with right and humpback whales occurs during the fall and spring when right and humpback whales travel between northern foraging grounds and southern calving areas as well as when these species are on the foraging grounds in the Gulf of Maine. Overlap of the fishery with humpback whales can also occur in the winter off of Virginia where juvenile humpback whales have been observed feeding. Fin whales are more ubiquitous in their distribution, and less is known about their winter distribution than for right and humpback whales. In the North Atlantic, the single most important area for this species appears to be from Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain *et al.* 1992). Within the action area, the sei whale is most common on Georges Bank and into the Gulf of Maine/Bay of Fundy region during spring and summer, primarily in deeper waters. Individuals may range as far south as North Carolina. Blue whales are still considered to occur more regularly in Canadian waters as compared to U.S. waters, but blue whales have been observed in the Gulf of Maine including three sightings in the summer and early fall 2002. In the U.S. EEZ, sperm whales are distributed in a distinct seasonal cycle; concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring *et al.* 1999). Given the distribution of these species, all occur in areas where monkfish gillnet gear is set, although blue whales and sperm whales are expected to have the least extent of overlap with monkfish gillnet gear given the depths at which these species typically occur.

Sea turtles also occur through all or most of the area in which monkfish gillnet gear is set. Of the turtle species considered, loggerheads are the most abundant in the action area. Loggerhead turtle abundance is relatively high from Cape Hatteras to Long Island throughout continental shelf waters (NOAA Fisheries 1994). Loggerhead, green and Kemp's ridley turtles are also sighted in inshore waters of the Mid-Atlantic area (NOAA Fisheries 1994). While leatherbacks are most often sighted offshore, they may follow jellyfish into nearshore waters (NOAA Fisheries 1994). Turtles occurring in the inshore waters of Virginia tend to stay from May through November, and turtles generally occur in New York inshore waters from June until October (NOAA Fisheries 1994). Coincidentally, peak monkfish landings by gillnet gear occur in the SFMA in May-June and November-December (Monkfish SAFE Report 2001). Of particular concern is the early spring monkfish gillnet fishery that occurs off of North Carolina and Virginia in March through May. It has been previously shown that the narrowness of the continental shelf and the influence of the Gulf Stream on nearshore regions serves to concentrate

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sea turtles emigrating from nearshore waters in the Mid-Atlantic Bight and Pamlico and Core Sounds in the late fall and early winter (Epperly *et al.* 1995b). As water temperatures warm in the spring, these turtles begin to move north and disperse to summer foraging grounds. Although monkfish fishing effort in EEZ waters off of North Carolina and Virginia is far less than elsewhere in the action area, the high concentration of turtles in the area means there is a risk of a high level of interaction with the fishery.

As described above, monkfish trawl gear is used more often in New England waters and in deeper waters throughout the action area where sea turtles are less likely to occur. Therefore, the risk of entanglement for sea turtles in this gear type is expected to be less than for gillnet gear. However, based on take of sea turtles in trawl gear used in other fisheries, sea turtle takes in monkfish gear are possible when the distribution of sea turtles and operation of this gear in the monkfish fishery overlap.

Another factor influencing the likelihood that a gear entanglement will occur is the configuration of the fishing gear. Baleen whales, including right, humpback, fin, sei and blue whales, skim and gulp for prey and filter vast quantities of water through rows of baleen plates suspended from the upper jaw on the inside of their large mouths. Line suspended in the water column such as from buoy lines may become caught in the baleen if the whale incidentally encounters the line when feeding. Whales may also be more likely to become incidentally entangled in gillnets when distracted by feeding or social behavior.

Leatherback sea turtles may actually be attracted to buoys used on trawl and gillnet gear which could appear to be jellyfish, or they may be attracted to the organisms which colonize ropes and buoys. Tie-downs used on monkfish gillnet gear in the Mid-Atlantic may also contribute to sea turtle entanglements in such gear. While tie-downs reduce the vertical profile of the net which can help to reduce interactions with harbor porpoise, the tie-down also creates a pocket of netting which can increase the likelihood of entanglement for species that occur at or near the bottom. Using tie-downs is a common practice in portions of the monkfish fishery in order to increase the catch rate of monkfish (a bottom dwelling fish species). Given that hard-shelled sea turtles such as loggerheads, greens, and Kemp's ridleys forage at or near the bottom in benthic habitats, the use of tie-downs for gillnets set in the same areas may increase the likelihood that turtles will be caught in the net. The long soak time of monkfish gillnets, particularly in the Mid-Atlantic, also increases the risk of sea turtle entanglements by increasing the length of time (*i.e.*, the opportunity for incidental capture) that the net is in the water. Soak times for monkfish gillnets, in general, are greater than the submergence tolerance of sea turtles. Therefore, sea turtles are almost certainly expected to die as a result of capture in a monkfish gillnet unless the animal is caught in the net close to the surface and has the ability to breathe, or is caught immediately prior to hauling of the net.

(3) Changes in the Amount of Monkfish Gear Fished as a Result of Framework Adjustment 2 - As previously described, Framework Adjustment 2 would keep the allocation of monkfish DAS

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for Year 5 at 40 rather than reducing DAS to zero. Framework Adjustment 2 would also increase the trip limits for limited access monkfish vessels fishing in the SFMA from 550 or 450 lbs (monkfish tail-weight) per DAS to 1250 lbs or 1000 lbs (monkfish tail-weight) per DAS, respectively, depending on the permit category. These trip limits are similar to those in place for trawl vessels that fished in the SFMA under a monkfish DAS during Year 2, and for gillnet vessels following a 2001 court order that vacated differential trip limits based on gear type for limited access monkfish vessels fishing in the SFMA (vessels with Category A or C permits were allowed up to 1500 lbs (monkfish tail-weight) per DAS and Category B and D vessels were allowed up to 1000 lbs/DAS). Framework Adjustment 2 would not change the current trip limits for the NFMA (for which there is no trip limit).

Since Framework Adjustment 2 will allocate 40 monkfish DAS to limited access monkfish vessels for Year 5, effort is the fishery is expected to be greater in Year 5 than what was anticipated during consultation that was completed May 14, 2002. However, the effects of this fishery on ESA-listed cetaceans and sea turtles have been considered several times in the past under different trip limit scenarios. With respect to operation of the directed monkfish fishery in the NFMA, the Framework 2 measures will continue the 40 DAS allocation and the lack of a trip limits for limited access monkfish vessels fishing in the NFMA. Therefore, this action is not expected to result in changes in the amount of gear fished by vessels that normally fish just in the NFMA.

As described in Section 5.4.1, it is unclear what effect an increase in trip limits for the SFMA will have on monkfish fishing effort in that area. There are four possible scenarios: (1) vessels will fish the same amount of days and the same amount of gear as in Year 4 but retain more of what is caught, (2) the increased trip limits will provide an incentive for vessels that might not otherwise have fished to make trips at the higher trip limit, (3) vessels will make more tows or set more gear on any particular trip in order to take advantage of a higher trip limit, or (4) some combination of these scenarios. There is limited information on which to determine which of these scenarios or what combination of scenarios may occur. Based on the fall 2002 survey indices, both the northern and southern monkfish stocks are not overfished (NEFMC 2003) and the target TAC has been increased, accordingly. This information suggests that monkfish vessels will be able to retain a higher trip limit of monkfish in Year 5 as compared to Year 4 by making the same number of trips but retaining more of what is caught. In a worst case scenario approach, the Framework 2 measures would provide sufficient incentive for limited access monkfish vessels fishing in the SFMA to increase their fishing effort by making more trips, making more tows (in the case of trawl vessels), setting more net or increasing soak time (in the case of gillnet vessels). However, even if the higher trip limit for trawl vessels were an incentive for vessels to make trips that they would not have otherwise taken under the current (lower) trip limits, or to make more tows to obtain a larger quantity of monkfish, additional interactions with turtles are not expected (as compared to those which might occur during current fishing practices) given that the monkfish trawl fishery is a relative small component of the fishery, and trawl fishing effort occurs in the SFMA in areas where sea turtles are less likely to occur. As

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described above, ESA-listed whales are not expected to be caught in monkfish trawl gear. Therefore, a change in trip limits for these vessels is not expected to affect ESA-listed cetaceans in the action area.

In section 5.4.1, it is suggested that in a worst case scenario approach, monkfish gillnet fishers fishing in the SFMA may react to an increase in the monkfish trip limit by using more DAS to make more trips, setting more net or increasing the soak time of the nets. While setting more net (for those fishers that do not already set up to the maximum amount of net allowed) could result in an increase in gillnet fishing effort in the SFMA, it could also result in an increase in the use of DAS and increased soak times. Since the DAS allocation will remain the same under the proposed Framework 2 measures as in Year 4, the amount of additional net set may be constrained to some extent by the time it would take to check all of the nets[2]. In addition, increasing the soak time of the nets can result in an increased quantity of deteriorated fish (*e.g.*, from damage due to sharks or sand fleas). For the same reason, it is unlikely that monkfish gillnetters fishing in the SFMA would increase the soak time of their nets (without changing the quantity of net fished) simply to try to obtain a higher trip limit. Finally, as described previously in the *Environmental Baseline*, the monkfish fisheries must comply with all requirements of the HPTRP, the Large-Mesh Gillnet Final Rule, and the ALWTRP. The HPTRP measures prohibit the setting of gillnets in certain areas for selected time periods. These closures include a prohibition on the use of gillnet gear west of 72°30' in southern Mid-Atlantic waters (Maryland, Delaware, Virginia and North Carolina) from February 15 through March 15. Although the closure is meant to prevent harbor porpoise takes in gillnet gear, it should also benefit right whales and humpback whales by reducing the risk of entanglement of these species in monkfsih gillnet gear as the whales move through Mid-Atlantic waters from southern nursery areas to northern feeding grounds. The HPTRP closures are also expected to benefit sea turtles by reducing gillnet effort in areas and at times where sea turtles also occur. Similarly, the Large-Mesh Gillnet Final rule (67 FR 71895; published December 3, 2002) restricts the use of monkfish gillnet gear in federal waters off of North Carolina and north to Chincoteague, Virginia to those times when sea turtles are not expected to be present in large or significant numbers (based on sea surface temperatures). Although intended to minimize the likelihood of turtle interactions with large-mesh gillnet gear (*e.g.*, monkfish), reducing the amount of gillnet gear in these Mid-Atlantic waters would also be of benefit for right whales and humpbacks whales that migrate through Mid-Atlantic waters in the spring and fall. Lastly, the ALWTRP measures require modifications to gillnet gear to reduce the risk of entanglement and the severity of entanglements that are unavoidable.

(4) Summary of effects of gear entanglement - Gear used in the monkfish fishery are of a type known to interact with right whales, humpback whales, fin whales, sperm whales, and

[2] A vessel fishing with gillnet gear under a monkfish DAS accrues 15 hours monkfish DAS for each trip greater than 3 hours and equal to or less than 15 hours. Vessels will accrue actual monkfish DAS hours for trips less than 3 hours or greater than 15 hours.

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loggerhead, Kemp's ridley, green, and leatherback sea turtles. The current action, implementation of Framework Adjustment 2 to the FMP, would increase the trip limits for gillnet and trawl vessels fishing in the SFMA fishing under a monkfish DAS. However, the increase in trip limits may not result in an increase in fishing effort in the area as compared to the current fishing year given that the increased trip limits are based on new survey indices suggesting an increased abundance of monkfish. Thus fishers will be able to attain a higher trip limit by retaining more of what is caught rather than by increasing effort. Even in a worst case scenario approach, an increase in monkfish trawl trip limits in the SFMA is not expected to result in the addition of adverse affects to sea turtles as compared to Year 4 since the trawl fishery is a relatively small component of the monkfish fishery and operates in areas where sea turtles are less likely to occur. Similarly, even if (worst case scenario) monkfish gillnet fishers in the SFMA responded to the increased trip limits by increasing the amount of gillnet gear set, closures required by the HPTRP and Large-Mesh Gillnet Final Rule will help to keep gillnet gear out of the areas and at the times when sea turtles and large whales (principally right whales and humpback whales) are most likely to be present. Finally, the ALWTRP measures require modifications to gillnet gear at al times of the year to minimize the likelihood and severity of interactions between large whales and gillnet gear.

Although a reduction of monkfish DAS to zero would have been of benefit to right whales, humpback whales, and fin whales, which are known to become entangled in gillnet gear, no additional adverse affects to these species are expected as a result of Framework Adjustment 2 given the current ALWTRP and HPTRP measures as well as the Large-Mesh Gillnet Final Rule (67 FR 71895; published December 3, 2002). Finally, although sperm whale entanglements in gillnet gear have been observed and this species does occur in Mid-Atlantic waters, sperm whales are unlikely to occur in the continental shelf waters where the majority of monkfish gillnet gear is set (11- 40 fathoms; NEFSC 2000).

The default Year 5 measures considered in the May 14, 2002, Opinion on the Monkfish FMP would likewise have been of benefit to sea turtles which are known to be taken in gillnet fisheries, including the monkfish gillnet fishery, and can also be taken in the monkfish trawl fishery given that it occurs in times and areas where sea turtles also occur. Given that Framework Adjustment 2 will allow for the continuation of the directed fishery into Year 5, and given that at least 21 sea turtle takes have occurred in this fishery since 1996 (NEFSC Observer Data as described in the June 14, 2001, Opinion), takes of sea turtles in the monkfish fishery are expected to occur in Year 5 as well. The Large-Mesh Gillnet Final Rule (67 FR 71895; published December 3, 2002) restricts the use of monkfish gillnet gear in federal waters off of North Carolina and north to Chincoteague, Virginia to those times when concentrations of sea turtles are not expected to be present. This should help to reduce adverse affects to sea turtles as a result of the change in the Year 5 measures. However, while the Final Rule measures are expected to minimize overlap of the fishery with sea turtle concentrations, these measures can not prevent the possibility of sea turtle takes in the fishery given that sea turtles can occur in waters less than 11°C and given the dynamics of the area which may result in warm water (and

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sea turtles) along the coast prior to the restriction dates. In addition, it appears from 2002 monkfish landings data that monkfish gillnet fishing effort may have shifted from federal waters to state waters following implementation of the Large-Mesh Gillnet Interim Final Rule in March 2002. Since sea turtles can also occur in these inshore waters, the Large-Mesh Final Rule will not reduce the likelihood of interactions between monkfish gillnet gear and sea turtles occurring in state waters off of North Carolina and Virginia in the spring. Similarly, sea turtle interactions with monkfish gillnet gear have also occurred in federal waters (*e.g.*, off of New Jersey and Maryland) that are unaffected by the Large-Mesh Gillnet Final Rule. Therefore, elimination of the Year 5 default measures may result in the addition of adverse affects to ESA-listed sea turtles that were not considered during the May 14, 2002, consultation on the fishery as a result of interactions with monkfish gillnet and trawl gear in the SFMA.

5.4.2.1 Estimating the Number of Turtles Taken in the Monkfish Fishery

Twenty-one turtles have been observed taken in the monkfish sink gillnet fishery from 1996-2001 (no sea turtle takes were observed during the 2002 fishing year). Seven of these were lethal takes. All but one turtle, a Kemp's ridley observed taken in 1999, were loggerhead sea turtles. All but four of the takes occurred in waters off of Virginia and North Carolina. Observer coverage in the fishery has been low. Therefore, takes of sea turtles in this component of the monkfish fishery may be higher. However, given the low level of observer coverage, an extrapolation of the observed takes is not statistically appropriate.

The May 14, 2002, Opinion anticipated that the Large-Mesh Gillnet Final Rule would reduce interactions between monkfish gillnet gear and sea turtles that occur in federal waters off of North Carolina and Virginia where most sea turtle takes in the fishery have been observed. Based on this and data on the number of observed takes from 1996-2001 in federal waters other than off of North Carolina and Virginia, NOAA Fisheries expected that one loggerhead sea turtle and less than one non-loggerhead sea turtle (*i.e.*, Kemp's ridley, green or leatherback sea turtle) would be taken in monkfish gillnet gear in the SFMA during Year 4. However, NOAA Fisheries is now aware that following implementation of the Large-Mesh Gillnet measures, some federally permitted monkfish fishers apparently shifted their fishing effort to state waters where the new restrictions do not apply. Therefore, the risk of interaction between monkfish gillnet gear and sea turtles in waters off of North Carolina and Virginia has not been reduced to the extent anticipated. Since (1) monkfish gillnet fishing effort continues to occur in (state) waters off of North Carolina and Virginia at times when sea turtles could also be present, and (2) since the fishery continues to operate in other federal waters where takes of sea turtles in the fishery have been observed in the past, and (3) because observer coverage has been low and monkfish gillnet fishers may not report the capture of sea turtles in their nets, for the purposes of this Opinion, NOAA Fisheries considers that the risk of an interaction between sea turtles and monkfish gillnet gear is at least the same as the average of the total number of observed interactions that have occurred from 1996-2002. NOAA Fisheries, therefore, anticipates the capture of up to 2.86 loggerhead sea turtles as a result of the continued operation of the monkfish gillnet fishery in the

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SFMA (20 observed loggerhead takes over a 7 year period from 1996-2002). Since a part of a turtle cannot be taken, this number is rounded up to 3. While only one other species has been observed taken in monkfish gillnet gear, NOAA Fisheries believes it is reasonable to expect that monkfish gillnet gear fished in the SFMA also poses a risk to green, Kemp's ridley and leatherback sea turtles given that these species occur in the area and at the times where monkfish gillnet gear is set. Therefore, NOAA Fisheries anticipates the capture of less than one of these species, annually (based on 1 take of a Kemp's ridley within a 7 year time period). Since a part of a turtle cannot be taken, this number is rounded up to 1. NOAA Fisheries recognizes that some of the observed takes occurred prior to when beneficial measures provided by the HPTRP, ALWTRP and Large-Mesh Gillnet Rule were implemented. However, since observer coverage in this fishery has been low and the number of observed takes may underestimate the number of takes that have actually occurred, it is reasonable to include all takes that have been observed. Finally, NOAA Fisheries is not considering the 250 loggerhead and Kemp's ridley sea turtles that stranded in April and May 2000 on North Carolina beaches. Although the agency believes that the monkfish fishery is the most likely cause of the mass stranding events, it does not believe it is appropriate to use this data for developing an ITS since it could not be conclusively shown that the mortalities were the result of interaction with monkfish gillnet gear.

Takes of sea turtles in monkfish trawl gear are also expected to occur given the take of sea turtles in comparable trawl gear used in other fisheries in the areas and at the time when monkfish trawl gear also operates (see also June 14, 2001, Opinion). The operation of trawl gear in the monkfish fishery is not affected by the Large-Mesh Gillnet Final Rule (67 FR 71895; published December 3, 2002). While effort in the monkfish trawl fishery since implementation of the FMP has been reduced by DAS limits and, in the SFMA, by trip limits, NOAA Fisheries is providing "benefit of the doubt" to the species and believes that there is still a reasonable likelihood of take of sea turtles in this gear type when used in the monkfish fishery. NOAA Fisheries, therefore, expects the take of one loggerhead, leatherback, green, or Kemp's ridley sea turtle (one turtle only of any of these four species) in monkfish trawl gear during Year 5.

Amendment 2 to the Monkfish FMP is currently being developed to address a number of issues with the FMP. The Framework Adjustment 2 measures are expected to be replaced by the Amendment 2 measures, most likely within a year. However, since the implementation date for Amendment 2 is still undetermined, for the purposes of this Opinion, NOAA Fisheries is assuming that the fishery will continue with the changes as proposed by Framework Adjustment 2 for at least 5 years. Based on this time period, a total of 15 loggerhead and up to 5 non-loggerhead turtles (green, leatherback, or Kemp's ridley) would be captured by the monkfish gillnet fishery over that 5-year period plus up to 5 turtles (loggerhead, green, Kemp's ridley, or leatherback) captured by monkfish trawl gear for the same period. Based on the number of observed lethal takes, up to one-fourth of the captures are expected to result in death.

6.0 CUMULATIVE EFFECTS

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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 biological 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 cetaceans and sea 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 large whales and sea turtles. Approximately 80% of the fishery for American lobsters occurs in state waters and many Atlantic states permit coastal gillnetting. Other pot/trap fisheries for species such as crabs and whelk also occur within some state waters contributing to the amount of entangling gear in areas where ESA-listed species also occur. 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.

Vessel Interactions - NOAA Fisheries STSSN data indicate that interactions with small recreational vessels are responsible for a large number of sea turtles stranded each year within the action area. Collision with boats can stun or easily kill sea turtles, and many stranded turtles have obvious propeller or collision marks (R. Boettcher, pers. comm.).

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 cetacean and sea turtle reproduction and survival. The effects of contaminants on cetaceans and sea turtles is relatively unclear. It has been suggested, however, that 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. Noise pollution has been raised, primarily, as a concern for marine mammals but may be a concern for other marine organisms, such as sea turtles, as well.

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. Portions of the *Environmental Baseline* section describe measures that may ameliorate some of

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the negative effects of these natural and human-related phenomena. The present section of this Opinion examines the net effects (taking into consideration any on-going actions that may ameliorate negative effects) of the proposed action 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) determine if any reductions in reproduction, numbers or distribution would be expected to reduce the species' likelihood of surviving and recovering in the wild, and (c) if a reduction in a species' likelihood of surviving and recovering in the wild would be appreciable.

As described above, based on the most current information available, the proposed Framework 2 measures are not expected to result in the addition of vessels to the fishery since it will not change the number of qualified limited access permit holders vessels operating in the fishery. The Framework 2 measures do remove an anticipated benefit to ESA-listed whales and sea turtles that would have occurred as a result of elimination of the directed monkfish fishery (assuming that effort was not displaced to another fishery with an equal or greater risk of interaction with ESA-listed species). However, the Framework 2 measures are not expected to increase the likelihood of a vessel interaction with ESA-listed cetaceans or sea turtles as compared to the fishery as it operated in Year 4, since vessels are not expected to make additional trips. Even in a worst case scenario approach, the increased trip limits for the SFMA are not expected to increase the number of trips taken by SFMA monkfish gillnet vessels. Even if the increased trip limit were an incentive for trawl vessels fishing for monkfish in the SFMA to make trips that they otherwise would not have under the current (Year 4) trip limits, it is not expected to increase the risk of vessel interactions with ESA-listed species given that this sector of the fishery is so small.

The current action, implementation of Framework Adjustment 2 to the FMP, would increase the trip limits for gillnet and trawl vessels fishing in the SFMA fishing under a monkfish DAS. However, the increase in trip limits may not result in an increase in fishing effort in the area as compared to the current fishing year given that the increased trip limits are based on new survey indices suggesting an increased abundance of monkfish. Thus fishers will be able to attain a higher trip limit by retaining more of what is caught rather than by increasing effort. Even in a worst case scenario approach, an increase in monkfish trawl trip limits in the SFMA is not expected to result in the addition of adverse affects to sea turtles as compared to Year 4 since the trawl fishery is a relatively small component of the monkfish fishery and operates in areas where sea turtles are less likely to occur. Similarly, even if (worst case scenario) monkfish gillnet fishers in the SFMA responded to the increased trip limits by increasing the amount of gillnet gear set, closures required by the HPTRP and Large-Mesh Gillnet Final Rule will help to keep gillnet gear out of the areas and at the times when sea turtles and large whales (principally right whales and humpback whales) are most likely to be present. Finally, the ALWTRP measures require modifications to gillnet gear at al times of the year to minimize the likelihood and severity of interactions between large whales and gillnet gear.

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Framework Adjustment 2 may result in the addition of adverse impacts to ESA-listed sea turtles from gillnet gear entanglements as a result of the elimination of the Year 5 measure that would have reduced monkfish DAS to zero. The ESA Large-Mesh Gillnet Final Rule is expected to minimize interactions between sea turtles and monkfish gillnet gear fished in Federal waters off of North Carolina and north to Chincoteague, Virginia where sea turtles are known to concentrate. However, takes of sea turtles in the monkfish gillnet fishery have also been observed in federal waters off of Maryland and New Jersey, and may still occur in parts of North Carolina and Virginia (*e.g.*, state waters, or in federal waters prior to the seasonal closure dates). In addition, sea turtles may also be captured by monkfish trawl gear whose operation is not affected by the ALWTRP, HPTRP, or Large-Mesh Gillnet Final Rule.

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 that the proposed activity for implementation of Framework Adjustment 2 to the Monkfish FMP will adversely affect loggerhead sea turtles, Kemp's ridley sea turtles, green sea turtles and leatherback sea turtles as a result of capture in monkfish gillnet and trawl gear. No other direct or indirect effects to ESA-listed species are expected as a result of the activity.

7.1 Integration and Synthesis of Effects on Sea Turtles

Based on past patterns of take of loggerhead and Kemp's ridley sea turtles in monkfish gillnet gear, and take of these species as well as leatherback and green sea turtles in other types of gillnet gear and trawl gear, the monkfish gillnet fishery can be expected to capture, injure, or kill up to three (3) loggerhead sea turtles and one green, Kemp's ridley, or leatherback sea turtle (any one of these three species), annually. In addition, one loggerhead, green, Kemp's ridley, or leatherback sea turtles is expected to be captured annually as a result of the continued operation of monkfish trawl gear. Over the course of a 5 year period that it is estimated the current measures will remain in effect, a total of 15 loggerhead sea turtles and 5 of the other three species will be taken in monkfish gillnet gear while five of any of these four species are expected to be captured by monkfish trawl gear. One fourth of these captures are expected to result in mortality. Based on published literature for loggerhead, Kemp's ridley, and green sea turtles, all of the hard-shelled turtles captured in the monkfish fishery within the management area are expected to be immature. A recent publication (Plotkin and Spotila 2002) has provided some evidence, however, that post-nesting loggerheads from the northern subpopulation use northern

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Mid-Atlantic waters. However, given that the study obtained data from only 4 turtles of the estimated thousands of loggerhead sea turtles that nest in the Mid-Atlantic, it is most likely that turtle taken in the monkfish fishery will be immature rather than mature adults.

7.1.1 Loggerhead Sea Turtles

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. In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. The southeastern U.S. nesting aggregation is the second largest and represents about 35 percent of the nests of this species. From a global perspective, this U.S. nesting aggregation is critical to the survival of this species. The status of the northern loggerhead subpopulation is, however, of concern. There are only an estimated 3,800 nesting females in the northern loggerhead subpopulation and the status of this northern population, based on number of loggerhead nests, has been classified as declining or stable at best (TEWG 2000). Nesting also occurs outside of the United States and loggerheads originating from the Yucatán subpopulation have been found in U.S. Mid-Atlantic and southern New England waters. According to the TEWG assessment for loggerhead sea turtles (2000), approximately 1000 nests were recorded for Quintana Roo beaches in 1998 (Xcaret 1999) and nesting appears to be stable or increasing.

NOAA Fisheries anticipates that the monkfish fishery may result in the take of up to three (3) loggerhead sea turtles in FY 2003 by capture in gillnet gear and up to one (1) by capture in monkfish trawl gear. One-fourth, or 1, of these is expected to result in death. Up to 20 loggerheads may be taken over a 5-year period (a combination of the gillnet and trawl sectors) as a result of the continued operation of the fishery as currently proposed, with up to 5 of these captures resulting in death. Based on genetic studies (Bass *et al.* 1998; Rankin-Baransky *et al.* 2001), loggerhead sea turtles within the action area are expected to originate from the south Florida, northern, and Yucatán subpopulations. Results from these studies indicate that the proportion of loggerhead sea turtles originating from each of these subpopulations varies within the action area. The Bass *et al.* study (1998) found that the northern and south Florida subpopulations each contributed about 46% of the loggerheads sampled on foraging grounds from Cape Hatteras, NC through Virginia while loggerheads originating from the Yucatán nesting group contributed 6-9%. Rankin-Baransky *et al.* (2001) determined that the south Florida, northern, and Yucatán subpopulations represented 59% (± 14%), 25% (± 10%), and 16% (± 7%), respectively, of 79 turtles that stranded on beaches from Virginia to Massachusetts. However, neither of the studies included good sampling coverage of loggerhead turtles in Mid-Atlantic waters from Maryland through New York where the distribution of sea turtles and monkfish fishing effort overlap at certain times of the year. The Bass *et al.* study did not include samples north of Virginia while the majority of samples (51 of 79 samples) for the Rankin-Baransky *et al.* study were obtained from beaches within a single Massachusetts county. Therefore, the proportion of south Florida, northern, and Yucatán subpopulation loggerheads in

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Mid-Atlantic waters north of Virginia is essentially unknown. Since most interactions between monkfish gear and sea turtles have occurred off of North Carolina and Virginia, for the purposes of this Opinion, NOAA Fisheries is using the results of Bass *et al.* (1998) to determine the anticipated lethal take of loggerheads from each of the represented subpopulations. NOAA Fisheries believes that this is the more conservative approach consistent with direction from Congress to err toward Type II rather than Type I errors since it assumes that at least 46% of the takes that might occur as a result of the monkfish fishery within the action area would be expected to originate from the northern subpopulation whose status is considered declining or stable, at best.

Based on information provided in this Opinion, NOAA Fisheries therefore anticipates the take of up to 4 loggerhead turtles annually as a result of the continued operation of the monkfish fishery (gillnet and trawl components) with up to 1 of these resulting in mortality. Up to 20 loggerheads may be taken over a 5-year period as a result of the continued operation of the fishery as currently proposed, with up to 5 of these captures resulting in death. Based on the origin of turtles as reported by Bass *et al.* (1998), NOAA Fisheries anticipates that 2.3 of the 5 lethal takes will be loggerheads originating from the northern subpopulation (5 lethal takes x 0.46 (the proportion of turtles anticipated to originate from the northern subpopulation)), an additional 2.3 will be removed from the south Florida subpopulation (5 lethal takes x 0.46 (the proportion of turtles anticipated to originate from the south Florida subpopulation)), and less than 1 are expected to be lethal takes of loggerheads originating from the Yucatán subpopulation (5 lethal takes x 0.09 (the proportion of turtles anticipated to originate from the Yucatán subpopulation)). Since a part of a turtle cannot be taken, NOAA Fisheries is interpreting these numbers to mean that over the course of the five-year period, the 5 lethal takes of loggerhead sea turtles from these three subpopulations may occur in any combination but with no more than 3 being from the northern subpopulation and no more than 1 from the Yucatán subpopulation. The remaining 15 turtles that are captured in monkfish gillnet and trawl gear and released uninjured are not expected to suffer any effects that would affect their survivability and there should be no affect upon the species.

Loggerhead survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. It can be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal over the next 5 years of up to 3 loggerhead sea turtles from either the south Florida and northern loggerhead subpopulations, and up to 1 loggerhead sea turtle from the Yucatán subpopulation 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. However, nest rates for the south Florida loggerhead subpopulation have increased at a rate of 3.9-4.2% per year since 1990 (approximately 83,400 nests in 1998) despite natural and anthropogenic losses to the population (including operation of the monkfish fishery). Similarly, although the Yucatán subpopulation is much smaller (approximately 1052 nests as of 1998), nesting rates are at least stable and may be increasing. In contrast, nesting rates suggest

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that the northern subpopulation is declining or stable at best. Despite this, the total number of nesting and non-nesting adult females in the northern subpopulation is estimated at 3,810 adult females (TEWG 1998, 2000). Even if NOAA Fisheries were to assume that all of the 3 turtles removed from the northern subpopulation as a result of operation of the monkfish fishery over the course of the next 5 years were immature females, it is unlikely that the loss will affect the reproduction or distribution of a subpopulation that numbers in the thousands.

Given that there is information to support that the south Florida and Yucatán subpopulations are increasing or at least remaining stable despite current natural and anthropogenic mortality including mortality experienced as a result of operation of the monkfish fishery, and given that the loss of up to 3 northern loggerheads over the course of the next 5 years is unlikely to affect the reproduction or distribution of this subpopulation, the proposed action is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

7.1.2 Kemp's Ridley Sea Turtles

The Kemp's ridley is the most endangered of the worlds sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. Current totals exceed 3000 nests per year, allowing cautious optimism that the population is on its way to recovery (TEWG 2000).

Kemp's ridleys are not the most abundant sea turtle species in the action area. During surveys of continental shelf waters in the 1980's where the monkfish fishery occurs, less than ten Kemp's ridley sea turtles were sighted (CeTAP 1982). During a 2000 stranding event off of North Carolina, only 5 of 280 stranded sea turtles were Kemp's ridleys with the remainder identified as loggerheads. NOAA Fisheries anticipates that the continued implementation of the monkfish fishery may result in the annual take of up to 2 Kemp's ridley sea turtles. Over the course of a five-year period, this would result in the capture of up to 10 Kemp's ridley sea turtles with one-fourth of these (2.5) expected to result in death of the turtle. Since a part of a turtle cannot be taken, NOAA Fisheries is estimating that up to 3 Kemp's ridley sea turtles will die as a result of capture in monkfish gillnet and trawl gear over the next five years. The remaining 7 turtles that are captured in monkfish gillnet and trawl gear and released uninjured are not expected to suffer any effects that would affect their survivability and there should be no affect upon the species.

Kemp's ridley survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. It could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to 3 Kemp's ridleys over the next 5 years from the Atlantic population would be expected to reduce the number of Kemp's ridley sea turtles in the action area as compared to the number of Kemp's ridleys that would have been present in the absence of the proposed action. However, the number of Kemp's ridley nests is increasing at 11.3% per year and current totals exceed 3000

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nests per year despite natural and anthropogenic losses to the population (including operation of the monkfish fishery). Therefore, the loss of up to 3 Kemp's ridleys over the next five years as a result of the operation of the monkfish fishery is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

7.1.3 Green Sea Turtles

The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan *et al.* 1995).

Green sea turtles are clearly not the most abundant sea turtle species within the action area. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz 1999). During surveys of continental shelf waters in the 1980's where the monkfish fishery currently occurs, less than ten green sea turtles were sighted (CeTAP 1982). There have been no known capture of green sea turtles in monkfish gillnet or trawl gear. Nevertheless, NOAA Fisheries is taking a precautionary approach and assumes that this species may be taken in monkfish gillnet and trawl gear given the times and areas where the fishery operates. NOAA Fisheries anticipates that the continued implementation of the monkfish fishery may result in the annual take of up to 2 green sea turtles. Over the course of a five-year period, this would result in the capture of up to 10 green sea turtles with one-fourth of these (2.5) expected to result in death of the turtle. Since a part of a turtle cannot be taken, NOAA Fisheries is estimating that up to 3 green sea turtles will die as a result of capture in monkfish gillnet and trawl gear over the next five years. The remaining 7 turtles that are captured in monkfish gillnet and trawl gear and released uninjured are not expected to suffer any effects that would affect their survivability and there should be no affect upon the species.

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The survivability of green sea turtles is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. It could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to 3 green sea turtles over the next 5 years from the Atlantic green sea turtle population would be expected to reduce the number of green sea turtles in the action area as compared to the number of green sea turtles that would have been present in the absence of the proposed action. However, despite natural and anthropogenic losses to the population (including operation of the monkfish fishery), green turtle nesting in the Atlantic shows a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989. Therefore, the loss of up to 3 green sea turtles over the next five years from the Atlantic population as a result of the operation of the monkfish fishery is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

7.1.4 Leatherback Sea Turtle

Recent information suggests that Western Atlantic populations of leatherback sea turtles declined from 18,800 nesting females in 1996 (Spotila *et al.* 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm). While the mortality rate of adult, female leatherback turtles has increased over the past ten years, decreasing the potential number of nesting females, 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 monkfish gillnet or trawl gear. Nevertheless, NOAA Fisheries is taking a precautionary approach based on information of leatherback captures in other gillnet and trawl fisheries, including the *Loligo* squid bottom trawl fishery which captured and released alive a leatherback sea turtle off of New Jersey in 2001. NOAA Fisheries anticipates that the continued implementation of the monkfish fishery may result in the annual take of up to 2 leatherback sea turtles. Over the course of a five-year period, this would result in the capture of up to 10 leatherback sea turtles with one-fourth of these (2.5) expected to result in death of the turtle. Since a part of a turtle cannot be taken, NOAA Fisheries is estimating that up to 3 leatherback sea turtles will die as a result of capture in monkfish gillnet and trawl gear over the next five years. The remaining 7 turtles that are captured in monkfish gillnet and trawl gear and released uninjured are not expected to suffer any effects that would affect their survivability and there should be no affect upon the species.

As described above, it could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to 3 leatherback sea turtle over the next 5 years would be expected to reduce the number of leatherback sea turtles in the action area as compared to the number of leatherback sea turtles that would have been present in the absence of the proposed action. However, despite natural and anthropogenic losses to the population (including operation of the monkfish fishery) 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), and the number of nesting females exceeds 1,000 animals.

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 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 up to 3 leatherback sea turtles from the Atlantic population over the next 5 years as a result of the

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operation of the monkfish fishery is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

8.0 CONCLUSION

After reviewing the current status of right whales, humpback whales, fin whales, sei whales, blue whales, sperm whales, loggerhead, green, Kemp's ridley, and leatherback sea turtles, the environmental baseline for the action area, and the effects of the proposed implementation of Framework Adjustment 2 to the Monkfish FMP, it is the NOAA Fisheries' biological opinion that the monkfish fishery, as modified by Framework Adjustment 2, may adversely affect but is not likely to jeopardize the continued existence of these ESA-listed 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 monkfish fishery, and the distribution and density of turtles in the action area, NOAA Fisheries anticipates that the continued implementation of the Monkfish FMP including implementation of Framework Adjustment 2 measures as proposed

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may result in the annual taking of up to 5 sea turtles as follows:

- for monkfish gillnet gear, NOAA Fisheries anticipates the capture of up to 3 loggerheads and 1 non-loggerhead species (green, Kemp's ridley, or leatherback sea turtle); and

- for monkfish *trawl* gear, NOAA Fisheries anticipates the capture of up to 1 sea turtle (loggerhead, green, Kemp's ridley, or leatherback).

Over the course of the five-year period that the action may continue to occur, NOAA Fisheries anticipates the capture of up to 25 sea turtles with no more than 15 of these being loggerheads captured in monkfish gillnet gear, no more than 5 of any combination of green, Kemp's ridley or leatherback sea turtles caught in monkfish gillnet gear, and no more than 5 being either loggerhead, green, Kemp's ridley or leatherback sea turtles captured in monkfish trawl gear. Of these, no more than 5 loggerheads are expected to die as a result of the capture in monkfish fishing gear. A maximum of 3 of any one of the other three species are expected to die as a result of capture in monkfish fishing gear.

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, green, Kemp's ridley or leatherback sea turtles.

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 in the monkfish fishery:

1. NOAA Fisheries shall provide guidance to monkfish fishers that ensures that any sea turtle incidentally captured in this fishery is handled with due care, observed for activity, and returned to the water. NOAA Fisheries' NERO must ensure that a letter is sent to all participants of the monkfish fishery that details the accepted protocol for handling sea turtles that are captured in the fishery.

2. NOAA Fisheries shall evaluate observer information from the monkfish fishery, including the percentage of observer coverage, and any other relevant information before the start of each subsequent year of the fishery to determine whether the incidental take levels provided in this Opinion should be modified or if other management measures need to be implemented to reduce take.

Terms and Conditions

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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 provide all participating fishers with a copy of the proposed sea turtle resuscitation and handling techniques (66 FR 32787; published June 18, 2001) and instruct fishers in the resuscitation and handling of sea turtles as follows:

   "Any specimen taken incidentally during the course of fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water. Sea turtles that are actively moving or determined to be dead must be released over the stern of the boat. In addition, they must be released only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels.

   Resuscitation must be attempted on sea turtles that are comatose, or inactive by: (1) placing the turtle on its bottom shell (plastron) so that the turtle is right side up, and (2) elevating its hindquarters at least 6 inches (15.2 cm) for a period of 4 up to 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches (7.6 cm) then alternate to the other side. Gently touch the eye and pinch the tail (reflex test) periodically to see if there is a response. Sea turtles being resuscitated must be shaded and kept damp or moist (such as by placing a water-soaked towel over the head, carapace, and flippers) but under no circumstance be placed into a container holding water. Turtles that revive and become active must be released over the stern of the boat only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels. Sea turtles that fail to respond to the reflex test or fail to move within 4 hours (up to 24, if possible) must be returned to the water in the same manner as that for actively moving turtles. A turtle is determined to be dead if the muscles are stiff (rigor mortis) and/or the flesh has begun to rot; otherwise the turtle is determined to be comatose or inactive and resuscitation attempts are necessary. Any specimen taken incidentally during the course of fishing or scientific research activities must not be consumed, sold, landed, offloaded, transshipped, or kept below deck."
   Time Frame: prior to the start of each fishing year.

2. To comply with #2 above, all available information collected shall be evaluated by NOAA Fisheries on an annual basis before the start of the next fishing year to determine whether estimated annual incidental injuries or mortalities of sea turtles have exceeded the levels detailed in the incidental take statement of this biological opinion. All available information includes information obtained through the Endangered Species Observer Program,

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information acquired by fisheries observers, sea turtle stranding information, and any other information deemed pertinent to identifying interactions between sea turtles and the federal monkfish fishery. In the event that incidental take is exceeded, consultation must be reinitiated.
Time Frame: annually, prior to the start of the next fishing year

For the purposes of monitoring whether the ITS has been exceeded or not, a take is counted as any loggerhead, green, Kemp's ridley or leatherback sea turtle that is either taken alive and released, or dead. The extent of incidental take of loggerhead, green, Kemp's ridley or leatherback sea turtles in the monkfish 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 conclusively attributed to the monkfish fishery (*e.g.*, gear on the animal), or any combination of the above. The reasonable and prudent measures are designed to minimize the impact of the incidental take that might otherwise result from the proposed action. If this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiating consultation and review of the reasonable and prudent measures that have been provided.

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 marine mammal and sea turtle conservation:

1. NOAA Fisheries should develop methods to better distinguish between State and Federal gear when turtles are entangled. This would help improve the analysis of where entanglements are occurring.

2. NOAA Fisheries should consider modifications to the monkfish gillnet fishery, particularly in the Mid-Atlantic where higher concentrations of sea turtles occur, such as whether the use of tie-downs are necessary and whether soak times can be reduced.

3. In order to better understand the extent of gillnet fisheries, NOAA Fisheries should collect information on other gillnet fisheries, particularly non-regulated fisheries, including information on the level of effort in each fishery and the participants in each fishery.

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4. NOAA Fisheries should support population viability analyses or other risk analyses of the sea turtle populations affected by gillnet fisheries. This will help improve the accuracy of future assessments of the effects of different levels of take on sea turtle populations.

5. NOAA Fisheries, in conjunction with the ASMFC and other appropriate regulatory authorities, should encourage states to require fishermen to report sea turtle takes as bycatch and provide instructions on release. Reports should include a description of the animal's condition at the time of release.

6. A significant amount of ghost gear is generated from fixed gear fisheries, occasionally due to conflict with mobile gear fisheries, other vessel traffic, storms, or oceanographic conditions. Mobile gear also occasionally contributes to the quantity of ghost gear. There is potential that this gear could adversely affect marine mammals, sea turtles and their habitat. In conjunction with other appropriate parties, NOAA Fisheries should review current regulations that concern fishing gear or fishing practices that may increase or decrease the amount of ghost gear to determine where action is necessary to minimize impacts of ghost gear.

7. NOAA Fisheries should examine the possibility of developing or modifying existing technologies, such as sonar, to detect and alert fishers if sea turtles or marine mammals become entangled in their gear.

8. NOAA Fisheries should further investigate the overlap of sea turtle distribution with gear used in the monkfish fishery based on sea surface temperature.

9. NOAA Fisheries needs to maintain a level of observer coverage in the monkfish fishery that will enable NOAA Fisheries to generate reliable bycatch estimates for both trawl and gillnet components of this fishery, throughout the range where the fishery is prosecuted. In addition, NOAA Fisheries should examine ways of expanding observer coverage in the monkfish fishery in order to better determine the impacts of this fishery on sea turtles.

10. NOAA Fisheries should investigate the level of compliance with conservation measures including measures developed per the ALWTRP, HPTRP and Interim Final Rule, and seek out additional funding, if needed, to support enforcement of these measures.

11. NOAA Fisheries, NER should work with NOAA Fisheries, SER, the NEFSC and the SEFSC to establish a protocol or regulatory requirements, if necessary, to ensure that genetic samples continue to be collected in an appropriate manner from loggerhead sea turtles taken in the course of fishery interactions and those recovered by the STSSN to help determine the number of loggerhead turtles from the northern subpopulation that are impacted by fishery interactions and the relative proportion of loggerhead sea turtles originating from the northern subpopulation in U.S. waters of the western Atlantic.

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12. NOAA Fisheries should work to further cooperation between the industry and NOAA Fisheries regarding the take of protected species in the fishery. Given the low observer coverage in the fishery, there is limited information on which to assess the effects of the fishery on sea turtles. In addition, there is no incentive for industry participants to report takes (even if required to do so). NOAA Fisheries needs to foster a more cooperative relationship with industry to find workable solutions to minimizing sea turtles interactions with the fishery.

13. NOAA Fisheries should expand education and outreach and establish a recognition program to promote incentives to assist in prevention activities. Outreach focuses on providing information to fishermen and the public about conditions, causes and solutions to protecting endangered species and continuing commercial fishing. Outreach is an essential element for building ongoing stewardship for endangered species. Involvement engages people to solicit their ideas and comments to help direct conservation ideas and participate meaningfully in decision-making processes. Examples of assistance by fishermen occur but often go unnoticed. Recognizing the positive efforts of individuals, fishing organizations and others encourages stewardship activities and practices and sharing good ideas. Parties that demonstrate innovation and leadership in resource protection should be recognized and used as models for others.

11.0 REINITIATION STATEMENT

This concludes formal consultation on the implementation of Framework Adjustment 2 to the Monkfish FMP. As provided in 50 CFR 402.16, reinitiating 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. If the amount of incidental take is exceeded, NOAA Fisheries shall immediately reinitiate formal consultation on the Monkfish FMP.

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DRAFT BIOLOGICAL OPINION FOR MONKFISH 04-10-03

Appendix 1. October 6, 1999, letter to Federally Fishery Permit Holders with information on the (new) regulated Monkfish FMP

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DRAFT BIOLOGICAL OPINION FOR MONKFISH 04-10-03

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, Sea Scallop, 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. 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 [1]	402	438	35 total (Kemp's ridleys, green or hawksbill)	
	Plus 3 in any combination of loggerhead, leatherback, green , Kemp's ridleys and hawksbill			
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
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
Sea Scallop (dredge)	88 - no more than 25 lethal	None	7 - no more than 2 lethal	1 lethal or non-lethal
Sea Scallop (trawl)	1 (either 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 [2]	None	6 lethal or non-lethal over a 3-year period	None	None

INACTIVE

1 - Represents the Incidental Take for the Pelagic Longline Fishery and Other HMS fisheries (excludes the southeast shark gillnet fishery and the bottom longline fishery for sharks which do not occur within the action area of this consultation)

2 - Represents an Incidental Take Statement provided in a DRAFT Biological Opinion as of 4/24/02