ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

BIOLOGICAL OPINION

Action Agency:	National Marine Fisheries Service, Northeast Regional Office
Activity:	Reinitiation of Consultation on Federal Lobster Management in the Exclusive Economic Zone for Implementation of Historical Participation [Consultation No. F/NER/2001/01263] GARFO-2001-00001
Consulting Agency:	National Marine Fisheries Service, Northeast Region Protected Resources Division
Date Issued:	Oct 31, 2002
Approved by:	David [signature]

TABLE OF CONTENTS

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

This document represents NMFS' biological opinion (Opinion) on the implementation of new management measures for the Federal American Lobster trap fishery, and the effects of the action on North Atlantic right whale (*Eubalaena glacialis*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*), loggerhead sea turtle (*Caretta caretta*), and leatherback sea turtle (*Dermochelys coriacea*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA).

Formal intra-service section 7 consultation on NMFS' implementation of new management measures was initiated on July 11, 2001. This Opinion is based on information developed by NMFS' State, Federal and Constituents Programs Office, and other sources of information. A complete administrative record of this consultation is on file at the NMFS Northeast Regional Office, Office of Protected Resources, Gloucester, Massachusetts [Consultation No. F/NER/2001/01263].

1.0 CONSULTATION HISTORY

Informal Consultation - Cause for Reinitiation

Informal consultation on the proposed action concluded on March 1, 2001, that parts of the action, as proposed, may adversely affect ESA-listed right whales, humpback whales, fin whales, sei whales, sperm whales, leatherback sea turtles and loggerhead sea turtles as a result of displacement of lobster trap gear from Federal Lobster Management Area's (FLMA) 3, 4, and 5 to nearshore lobster management areas where these species are known to occur (see Appendix 1). Following revisions to the draft proposed action which did not change the likelihood that the action may adversely affect the above named species, on July 11, 2001, NMFS' State, Federal and Constituents Programs Office, forwarded a letter to NMFS' Office of Protected Resources requesting formal consultation.

Formal Consultation History

The consultation history for the American Lobster fishery was reviewed in the June 14, 2001, Opinion [Consultation number F/NER/2001/00651]. In brief, formal consultation on the fishery was first initiated in 1988 and concluded that the lobster fishery may affect but was not likely to jeopardize the continued existence of any population of listed species. Several formal and informal consultations followed. In 1996, consultation on the fishery concluded that the lobster trap fishery was likely to jeopardize the continued existence of right whales. Serious injury and mortality of endangered whales, including right whales, have occurred as a result of interactions with lobster trap gear (Waring *et al.*, 2001; 2001 List of Fisheries (66 FR 42780)). A Reasonable and Prudent Alternative (RPA) was provided to avoid the likelihood that operation of the fishery would jeopardize the continued existence of right whales. This RPA was supplemented in 1997 by the inclusion of measures developed per the Atlantic Large Whale

Take Reduction Plan (ALWTRP). However, consultation was reinitiated in 2000 in light of new information on the status of right whales, and changes to the ALWTRP. This new consultation, completed on June 14, 2001, concluded that the ALWTRP measures were not sufficient to remove the likelihood of jeopardizing the continued existence of right whales as a result of operation of the federal lobster trap/pot fishery. An RPA with additional measures was provided to avoid jeopardy and has been implemented, in part, through rulemaking.

2.0 DESCRIPTION OF THE PROPOSED ACTION

NMFS proposes regulations to modify the management measures applicable to the American lobster fishery in the EEZ that will: (1) limit the number of federally-permitted lobster trap fishers allowed to set lobster trap gear in Federal Lobster Management Areas (FLMA) 3, 4, and 5, and (2) will allow lobster fishers who use trap gear and who possess both a New Hampshire full commercial lobster license and a federal lobster permit to fish up to 400 additional lobster traps in New Hampshire state waters. This action is being taken in response to recommendations made by the Atlantic States Marine Fisheries Commission (ASMFC) to control fishing effort in the lobster trap fisheries conducted in the offshore Federal Lobster Management Area (FLMA 3), and in the nearshore lobster conservation management areas from New York through North Carolina (FLMA 4 and FLMA 5). The action would also implement a mechanism for conservation equivalency and associated trap limits for Federal lobster permit holders fishing in New Hampshire state waters. A third component of the action, modification of the coordinates for lobster management areas in Massachusetts state waters, will not be considered in this Opinion since NMFS determined during informal consultation that this action will not affect ESA-listed species.

NMFS proposes to implement a historical participation management regime to control lobster fishing effort in FLMAs 3, 4, and 5. NMFS proposes to do this by limiting the number of traps fished in FLMAs 3, 4, and 5 based on proof of historical participation in the respective FLMA and the numbers of traps fished by a vessel during a qualifying period from March 25, 1991, through September 1, 1999. Once qualified, a lobster permit holder for FLMA 3 would be allocated a certain number of traps based on the affidavit and supporting documentation provided, but no permit holder would be given an initial lobster trap allocation of more than 2,656 lobster traps. Each trap allocation of more than 1,200 traps would be reduced annually on a sliding scale basis over 4 years. Trap reductions would not go below a baseline of 1,200 traps (Appendix 2). Each initial allocation of fewer than 1,200 traps would remain at that allocation (NMFS 2000). NMFS is proposing a trap limit not to exceed 1,440 lobster traps per vessel for FLMA's 4 and 5 based on public comment received on the Draft Supplemental Environmental Impact Statement (DSEIS), and associated conservation benefit to the species. NMFS is not proposing a trap reduction requirement for qualified historical participants in FLMAs 4 and 5.

The management of trap fishing effort on the basis of historical participation was proposed as a means to reduce current levels of trap fishing effort on American lobster in FLMAs 3, 4, and 5. The premise is that this approach will result in fewer traps being fished in FLMAs 3, 4 and 5 as compared to leaving it open to all Federal lobster permit holders under existing trap limits of 1800 traps per vessel for FLMA 3 and 800 traps per vessel in FLMAs 4 and 5. Since there is no distinct reporting requirement for Federal lobster permit holders the specific number of fishers who will qualify as historical participants for FLMAs 3, 4 and/or 5, and the number of traps each of those fishers is currently fishing in FLMAs 3, 4, and/or 5 is unknown. Only Federal lobster permit holders who also possess another Federal fisheries permit are required to report their lobster catch. In addition, the utility of these reports for documenting lobster fishing effort is further restricted to those permit holders who accurately note on the reports the number of traps fished on an area by area basis (Lobster DSEIS 1999). In the absence of more detailed information, NMFS estimated how many fishers might qualify as historical participants for FLMAs 3, 4 and/or 5. Voluntary data provided by a group of FLMA 3 participants indicate that there are at least 64 vessels that would qualify for historical participation in FLMA 3 (NMFS 2000). An alternative estimate was obtained by using available permit data and making certain assumptions related to the trap history of the vessel. By this method, NMFS estimated that the total number of qualifiers for historical participation in FLMA 3 could range from low of 53 vessels to a high of 117 vessels (NMFS 2000). Using the same method, NMFS estimated that the total number of qualifiers for historical participation in FLMAs 4 and 5 ranged from 47 to 60 vessels (NMFS 2000). Under the current lobster program, NMFS estimates that 202 and 162 lobster permit holders could be expected to participate in FLMAs 4 and 5, respectively (NMFS 2000) while previous analyses (NMFS 1999) estimated that 297 vessels may be currently involved in the offshore lobster fishery (FLMA 3), fishing an average of 1,321 traps per vessel. Therefore, it does appear that limiting FLMAs 3, 4 and 5 to historical participants will result in a reduction of lobster trap fishing effort in these areas.

NMFS is also proposing to modify the lobster regulations to allow Federal lobster permit holders who also possess a New Hampshire full commercial lobster license to fish 400 additional lobster traps in New Hampshire's state waters. This change is proposed based on the ASMFC's approval of New Hampshire's two-tier lobster license system for state waters. New Hampshire developed the two-tiered system on the basis that it, potentially, would result in 18,000 fewer lobster traps in New Hampshire state waters as compared to a uniform allocation of 800 traps per lobster fisher. The Lobster Technical Committee (LTC) concluded that, in the absence of information on the number of lobster traps actually being fished in New Hampshire, that it was not possible to conclude whether the two-tier approach would actually result in fewer traps fished. The LTC's analysis noted, however, that New Hampshire's system included a moratorium on new entrants in the full license category and established more conservative trap limits for limited license holders. New Hampshire state lobster fishers who qualify for a full license may fish up to 1,200 lobster traps in state waters, and those in the limited category may fish a maximum of 600 lobster traps in state waters (200 less than the currently allowed 800 trap allocation). However, this presents a problem for lobster fishers who possess both a full commercial lobster license and a federal lobster permit. Since the regulations specify that the most restrictive of state and federal regulations apply, New Hampshire's full licensed lobster fishers can only fish up to 800 traps. According to information provided to NMFS by the New Hampshire Fish and Game Department (NMFS 2000), there are approximately 80 Federal lobster permit holders with vessel ports in New Hampshire who harvest lobster primarily with trap gear. Twenty-two of these individuals qualified for a full commercial lobster license (*i.e.*, were allowed by New Hampshire law to fish up to 1200 traps in state waters) but their Federal permit capped their allocation at 800 traps. NMFS is, therefore, proposing measures that would allow these lobster fishers to fish 400 additional traps in New Hampshire state waters in accordance with the measures approved by the ASMFC. This measure would potentially result in the addition of lobster trap gear to New Hampshire state waters. However, it is not expected to negate the conservation benefit of New Hampshire's trap reduction program since the number of affected lobster fishers is small. In addition, New Hampshire's two-tiered lobster license system also affected dual licensed lobster fishers who possess a federal lobster permit and a "limited" New Hampshire lobster license. Since these fishers also have to comply with the stricter of the lobster licensing requirements, these fishers can fish only 600 traps in accordance with New Hampshire's licensing requirements versus the 800 traps allowed by federal regulations. According to New Hampshire data, 26 New Hampshire limited lobster fishers also possess a Federal lobster permit (NMFS 2000).

2.1 Description of the Current Fishery for Lobster

A complete review of the Federal American Lobster fishery is provided in the June 14, 2001, Opinion. Briefly, the American Lobster Fishery Management Plan (FMP) was withdrawn in 1999 and replaced with regulations developed under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) (50 CFR Part 697) following completion of an interstate fishery management plan (ISFMP) developed by the ASMFC. Current federal lobster regulations manage the lobster fishery in the Exclusive Economic Zone (EEZ) from Maine through North Carolina, and affect Federal lobster permit holders regardless of whether they fish in federal or state waters (Appendix 1). The most important area of harvest in the United States is the Gulf of Maine, in depths up to 40 meters (NEFMC 1994). Since the 1960's, a secondary offshore fishing area has developed, from Cape Hatteras to Corsair Canyon in depths to 600 meters. Although lobster traps are set at various depths, it is unlikely that the level of effort is consistent at all depths throughout the range of the fishery since approximately 80% of the American lobster trap fishery occurs in state waters.

Commercial lobster fishing occurs year-round, although the fishery peaks in summer and early fall months. There are approximately 3400 vessels with permits to fish for lobster (with either trap or non-trap gear) in Federal waters. The fishery is limited access meaning that no new entrants are allowed. However, permitted vessels may be sold or otherwise transferred to a new owner. Although several gear types are used in the Federal lobster fishery, the primary gear type is trap gear. Non-trap gears include trawl, dredge, gillnet, and hand gear, amongst others. However, the non-trap sector of the lobster fishery is intended as a bycatch fishery, and permit holders have a possession limit of 100 lobster per day (or parts thereof) up to 500 lobster per trip. In contrast, limited access permit holders fishing with trap gear do not have possession limits. However, effort is controlled by limiting the number of traps that may be fished per vessel. Currently, fishers who choose to fish in FLMA 3, one of the 8 FLMAs defined for managing the lobster trap fishery, are allowed to fish up to 1800 traps. Fishers in all other FLMAs are allowed to fish up to 800 traps. If a fisher selects to fish in more than one FLMA, then the most restrictive measures apply regardless of which FLMA is being fished. For example, if a fisher chooses to fish in FLMA 3 and any other area, then he or she is allowed to fish 800 traps, only. This Opinion will only consider the effects of lobster trap gear to ESA-listed species since the proposed action applies only to this gear type. Further information on lobster trap gear is provided in Section 5.4.2.

2.2 Requirements of the MMPA and ESA for Trap Fisheries

2.2.1 Modifications to Trap fisheries required by the ALWTRP and the most recent Biological Opinion for the Lobster Fishery

The Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed pursuant to the Marine Mammal Protection Act to reduce the level of serious injury and mortality of all whales in East Coast lobster trap and gillnet fisheries. The ALWTRP measures vary by designated areas that roughly approximate the FLMAs designated in the Federal lobster regulations. These ALWTRP measures are:

For Northern Nearshore Waters (includes FLMAs 1, 2, and the Outer Cape (AOC), but excludes the critical habitat areas and the Stellwagen Bank/Jeffrey's Ledge Restricted Area) -

- Knotless weak links at the buoy with a breaking strength of 600 lbs or less
- Multiple-trap trawls only (single-trap trawls are not allowed)
- Limit of one buoy line on all trawls up to and including five traps
- Gear must be marked (Red - 4" long) midway on the buoy line.

For Offshore Waters (FLMAs 3 and the 2/3 Overlap, excluding the Great South Channel Restricted Lobster Area) -

- Knotless weak links at the buoy with a breaking strength of 2000 lbs or less (effective February 2002)
- Multiple-trap trawls only (single-trap trawls are not allowed)
- Limit of one buoy line on all trawls up to and including five traps
- Gear must be marked (Black - 4" long) midway on the buoy line.

For Southern Nearshore Waters (FLMAs 4 and 5)

- Knotless weak links at the buoy with a breaking strength of 600 lbs or less (effective February 2002)
- Multiple-trap trawls only (single-trap trawls are not allowed)
- Limit of one buoy line on all trawls up to and including five traps
- Gear must be marked (Orange - 4" long) midway on the buoy line.

In addition to new requirements for gear modifications, included above, which became effective as of February 11, 2002, NMFS also 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) that were effective as of March 1 and February 8, 2002, respectively. The measures for SAM apply to two defined areas called SAM West and SAM East, in which additional gear restrictions for lobster trap (and 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). The measures for DAM apply to areas north of 40°N latitude, and would allow for establishment of a zone within which NMFS might impose restrictions on fishing or fishing gear within the zone for a period of 15 days. If no restrictions are imposed, NMFS will issue an alert to fishers, and request that fishers voluntarily remove lobster trap (and gillnet gear) from the zone, and not set additional gear within the zone for a minimum of 15 days (67 FR 1130).

2.2.2 Requirements for Northeast/Mid-Atlantic Lobster Trap/Pot Fisheries under the MMPA 2001 List of Fisheries

Under the MMPA, NMFS 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, such as registration, observer coverage, and take reduction plan requirements. The LOF includes the Northeast/Mid-Atlantic Lobster Trap/Pot fishery as a Category I fishery. Fishers fishing for lobster using trap gear must abide by the requirements for a Category I fishery. These are:

- Owners of vessels or gear engaging in a Category I fishery are required to register with NMFS and obtain a marine mammal authorization from NMFS in order to lawfully incidentally take a marine mammal in a commercial fishery;
- Any vessel owner or operator participating in a Category I fishery must report all incidental injuries or mortalities of marine mammals that occur during commercial fishing operations to NMFS;
- Fishers participating in a Category I fishery are required to take an observer aboard the vessel upon request.

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.

2.3 Action Area

The management area for the Federal lobster regulations is all EEZ waters from Maine to Cape Hatteras, North Carolina. Therefore, the primary geographic area affected by this action includes Northeast and Mid-Atlantic waters of the United States EEZ within the management area. In addition, territorial waters for Maine through North Carolina are affected through the regulation of activities of Federal permit holders fishing in those areas.

3.0 STATUS OF THE SPECIES AND CRITICAL HABITAT

NMFS 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
Sperm whale (*Physeter macrocephalus*)	Endangered
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Loggerhead sea turtle (*Carettta caretta*)	Threatened

NMFS 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*), Kemp's ridley sea turtles (*Lepidochelys kempii*), green sea turtles (*Chelonia mydas*) or hawksbill sea turtles (*Eretmochelys imbricata*), and blue whales (*Balaenoptera musculus*) all of which are listed species under the Endangered Species Act of 1973. Thus, these species will not be considered further in this Opinion. NMFS has also determined that the action being considered is not expected to destroy or adversely modify right whale critical habitat that occurs within the action area (Cape Cod Bay and Great South Channel). The following discussion is NMFS' 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 (NMFS 1998). Since the proposed activities 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 are listed as endangered under the ESA. These 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 dragger (fishing) vessel engaged in fishing operations captured an adult salmon. Although this was subsequently determined to be an escaped aquaculture fish, it does show the potential for take of ESA-listed salmon in commercial fishing gear. In addition, results from a 2001 post-smolt trawl survey in Penobscot Bay and the nearshore waters of the Gulf of Maine indicate that Atlantic salmon post-smolts are prevalent in the upper water column throughout this area in mid to late May. 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, NMFS does not believe that the proposed action will affect ESA-listed Atlantic salmon since operation of the lobster trap fishery will not occur in or near the rivers where concentrations of Atlantic salmon are most likely to be found, and there have been no recorded takes of Atlantic salmon in lobster trap 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.

Blue whales are commonly found in Canadian waters, particularly the Gulf of St. Lawrence where they are present for most of the year, and other areas of the North Atlantic (Waring *et al.* 2000) but are only occasional visitors to east coast U.S. waters. In 1987, one report of a blue whale in the southern Gulf of Maine entangled in gear described as probable lobster pot gear was received from a whale watch vessel. However, the gear type was not confirmed and no recent entanglements of blue whales have been reported from the U.S. Atlantic. Given their infrequent occurrence in U.S. waters, this species is not likely to occur within the action area of this consultation. Therefore, the proposed action is not expected to affect blue whales and this species will not be considered further in this Opinion.

The effects of the lobster fishery on Kemp's ridley sea turtles and green sea turtles was considered during development of the June 14, 2001, Opinion. The Opinion concluded that these sea turtle species were not expected to be taken in the fishery. Although the foraging range of Kemp's ridley and green sea turtles overlaps with part of the action area of this consultation, no takes of ridleys or green sea turtles in lobster trap gear have been observed or reported. In addition, there have been no reported or observed takes of these species in other trap/pot fisheries that occur within the action area of this consultation or in other areas where Kemp's ridley and green sea turtles occur. This suggests that there is not a reasonable likelihood of interaction between lobster trap gear and Kemp's ridley or green sea turtles within the action area of this consultation. Therefore, these species will not be considered further in this Opinion.

The hawksbill turtle 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, and based on the lack of documented takes of hawksbill sea turtles in the lobster trap fishery, 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 (CCB), Great South Channel (GSC), and coastal Florida and Georgia (outside of the action area for this Opinion). Two other areas under Canadian jurisdiction have been identified as critical to the continued existence of the species.

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 Federal lobster fishery has any adverse effects on the value of critical habitat designated for the right whale. The right whale's zooplankton prey is probably more dependent on oceanic conditions than bottom habitat. In addition, lobster gear is fixed gear and less likely to cause the dispersal of plankton concentrations as compared to mobile gear that moves through the water column. 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 (NMFS and USFWS 1995, Marine Turtle Expert Working Group (TEWG) 1998 & 2000), recovery plans for the humpback whale (NMFS 1991a), right whale (1991b), loggerhead sea turtle (NMFS and USFWS 1991) and leatherback sea turtle (NMFS 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 also available at http://www.nmfs.noaa.gov/prot_res/PR3/recovery.html (NMFS unpublished). An updated draft recovery plan for right whales (Silber and Clapham 2001) is 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 2001b).

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 NMFS 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, 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 NMFS 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, NMFS 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 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, NMFS 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, NMFS 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; NMFS 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 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, NMFS 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.

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 2001). 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 2001). During the winter of 1999/2000, appreciable numbers of right whales were recorded in the Charleston, S.C. 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 2001). 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 2001) 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, NMFS 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 2001). 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 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 2001). 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 2001).

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, NMFS Protected Resources Division developed one RPA with multiple management components to minimize the overlap of right whales and 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.

As of October 23, 2002, eight new right whale entanglements and six right whale mortalities have been observed in calendar year 2002 (Appendix 3). 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 NMFS from addressing the full extent of the entanglement problem since current efforts to reduce entanglements do not address Canadian activities.

NMFS is closely monitoring these entanglements. NMFS 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. Before the end of the calendar year NMFS will have determined whether it is necessary to reinitiate consultation on the lobster fishery.

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 2001). 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). NMFS 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 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 (NMFS 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.

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 2001 at least 92 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded[1]. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. 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.

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). NMFS 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

---

[1]As of September 30, 2002, 10 additional humpback whale entanglements have been observed; five of which have been disentangled and one has shed the gear.

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).

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.

NMFS 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).

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. NMFS 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.

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 (NMFS 1998). 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 NMFS 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 (NMFS 1998). 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 NMFS 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.

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 NMFS 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 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 NMFS 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 NMFS 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 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, NMFS 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 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 NMFS in several fisheries; primarily offshore fisheries such as the pelagic driftnet and pelagic longline fisheries. The NMFS 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 NMFS 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 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 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). 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 NMFS and USFWS 1998a). 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, NMFS 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) (NMFS 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 Opinion, NMFS will therefore focus on:

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

This Opinion treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations. Therefore, this consultation will focus on the Atlantic population of leatherback sea turtles.

3.2.1 Loggerhead Sea Turtles

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 (for example, 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 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 appear to be 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. 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).

The status of the northern subpopulation is particularly relevant to activities that occur from New England through the Mid-Atlantic since turtles from the northern subpopulation may be more prevalent on spring and summer foraging grounds in New England and northern Mid-Atlantic waters as compared to loggerheads from other subpopulations. 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 1; NMFS SEFSC 2001; Bass *et al.* 1998).

Table 1. Contribution of loggerhead subpopulations to foraging grounds

SUBPOPULATION[1]	% CONTRIBUTION TO FORAGING GROUND				
	Western Gulf	Florida	Georgia	Carolinas	North of Cape Hatteras/Virginia[2]
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%

[1]- 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.

[2]- 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 are needed to assess the proportion of northern subpopulation turtles that occur on northern foraging grounds. However, the currently available data suggests that at least 46% of foraging turtles occurring north of Virginia are from the northern subpopulation. Finally, the role of males from the northern subpopulation appears to be vital to sustaining the whole population. Unlike the much larger south Florida subpopulation which produces predominantly females (80%), the northern subpopulation produces predominantly males (65%; NMFS 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 (NMFS SEFSC 2001).

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). NMFS' 2001 Stock Assessment further examined nesting trends for the northern subpopulation (NMFS SEFSC 2001). Three estimates were provided. Two of these indicate a decline in nesting while the third suggests an increase in nesting. 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, NMFS' 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 (NMFS 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% (NMFS 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 (NMFS 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, NMFS considers the status of the northern subpopulation based on nesting trends to be stable, at best, or declining.

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 Merrit 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 long-line fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean long-line fleet, a Spanish long-line 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).

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.

NMFS recognizes five subpopulations of loggerhead sea turtles in the western Atlantic based on genetic studies. Although these subpopulations mix on the foraging grounds, cohorts from the northern subpopulation appear to be predominant on the northern foraging grounds. Based on nesting data from several sources (Frazer 1983, TEWG 1998, TEWG 2000, and NMFS SEFSC 2001), NMFS 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 this small subpopulation (NMFS 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, NMFS will assume that the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate) and the southern Florida subpopulation of loggerhead sea turtles is increasing (the optimistic estimate).

3.2.2 Leatherback Sea Turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtles species; their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NMFS and USFWS 1995). In 1980, the leatherback population was estimated at approximately 115,000 (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 (NMFS 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; NMFS and USFWS 1998b; Sarti, *et al.* 2000; Spotila, *et al.* 2000). Leatherback turtles had 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 supported important nesting assemblages historically, 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 it 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 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 decline in leatherback turtle colonies have not been documented, Sarti *et al.* (1998) suggest that the decline results 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 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 (NMFS and USFWS 1992). In the U.S., leatherback turtles are found throughout the action area of this consultation. 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). Leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. For example, leatherbacks occur annually in places such as Cape Cod and Narragansett Bays during certain times of the year, particularly the fall (C. Ryder, pers comm.)

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 (NMFS 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 (NMFS SEFSC 2001). However, 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 (NMFS 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 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 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. Therefore, leatherbacks are foul hooked (*e.g.*, on the flipper or shoulder area) rather than mouth or throat hooked by longline gear. Nevertheless, 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 (NMFS 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. In the Northeast, leatherbacks are known to become entangled in lobster trap gear. One hundred nineteen leatherback entanglements were reported from New York through Maine for the years 1980 - 2000, but the majority (92) were reported from 1990-2000 (NMFS 2001b) and these represented known entanglements between the months of June and October, only (NEFSC, unpublished data). Entanglement in lobster pot lines was cited as the leading determinable cause of adult leatherback strandings in Cape Cod Bay, Massachusetts (Prescott 1988; R. Prescott, pers. comm.). In addition, many of the stranded leatherbacks for which a direct cause of death could not be documented showed evidence of rope scars or wounds and abraded carapaces, implicating entanglement. Data collected by the NEFSC in 2001 also support that whelk pot gear was involved in a number of reported leatherback entanglements in Massachusetts and New Jersey waters. The Mid-Atlantic blue crab fishery is another potential source of leatherback entanglement. 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 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, NMFS 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 25260). NMFS 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 NMFS to quickly close the area or portions of the area on a short-term basis to shrimp fishermen who do not use TEDs with an escape opening large enough to exclude leatherbacks 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. For example, in November 1999 parts of Florida experienced an unusually high number of leatherback strandings. In response, NMFS required shrimp vessels operating in a specified area to use TEDs with a larger opening for a 30-day period beginning December 8, 1999 (64 FR 69416) so that leatherback sea turtles could escape if caught in the gear. Because of these high leatherback strandings occurring outside the leatherback conservation zone, the lack of aerial surveys conducted in the fall, the inability to conduct required replicate surveys due to weather, equipment or personnel constraints, and the possibility that a 2-week closure was insufficient to ensure that leatherbacks had vacated the area, NMFS published an Advanced Notice of Proposed Rulemaking in April 2000 (65 FR 17852, April 5, 2000) indicating that NMFS was considering publishing a proposed rule to provide additional protection for leatherback turtles in the shrimp fishery. NMFS did publish a proposed rule in October 2001 [66 FR 50148] that would modify the requirements for TED openings to ensure that they are wide enough to exclude leatherbacks as well as large loggerheads and green turtles. This rule has not yet been finalized.

The southeast shrimp trawl fishery is not the only trawl fishery that can 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. These trawl fisheries do not use TEDs.

Gillnet fisheries operating in the nearshore waters of the Mid-Atlantic states are likely to take leatherbacks when these fisheries and leatherbacks co-occur. However, there is very little quantitative data on capture rate and mortality. Data collected by the NMFS 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%. The NMFS NEFSC Fisheries Observer Program also had observers on the bottom coastal gillnet fishery which operates in the Mid-Atlantic, but no takes of leatherback sea turtles were observed from 1994-1998. Observer coverage of this fishery, however, was low and ranged from <1% to 5%. 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 fishermen after much effort. Five other leatherbacks were released alive from nets set in North Carolina during the spring months: one was from a net (unknown gear) set in the nearshore waters near the North Carolina/Virginia border (1985); two others had been caught in gillnets set off of Beaufort Inlet (1990); a fourth was caught in a gillnet set off of Hatteras Island (1993), and a fifth was caught in a sink net set in New River Inlet (1993). In addition to these, in September 1995 two dead leatherbacks were removed from a large (11-inch) monofilament shark gillnet set in the nearshore waters off of Cape Hatteras, North Carolina.

Poaching is not known to be a problem for nesting populations in the continental U.S. However, the NMFS 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.

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

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, NMFS will assume that the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate).

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 progress (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

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 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, and Highly Migratory Species (HMS) fisheries. All of these may occur in the action area for this consultation, although current effort for some, such as the tilefish fishery, occurs in areas other than the action area of this consultation. An Incidental Take Statement (ITS) has been issued for the take of leatherback sea turtles, amongst others, in each of the fisheries (Appendix 4). A summary of each consultation is provided but more detailed information can be found in the respective Opinions.

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.

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 and not likely to destroy 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 plan and Amendment 1 to the plan* was approved by the ASMFC in October 1998. This plan is complementary to the NEFMC FMP for herring and includes similar measures for permitting, recordkeeping/reporting, area-based management, sea sampling, Total Allowable Catch (TAC) management, effort controls, use restrictions, and vessel size limits as well as measures addressing spawning area restrictions, directed mealing, the fixed gear fishery, and internal waters processing operations (transfer of fish to a foreign processor in state waters). The ASMFC plan, implemented through regulations promulgated by member states, is expected to benefit listed species and critical habitat by reducing effort in the herring fishery.

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

Components of the *Highly Migratory Species (HMS)* Atlantic pelagic fishery for swordfish/tuna/shark in the EEZ occur within the action area for this consultation. Use of pelagic longline, pelagic driftnet, bottom longline, hand line (including bait nets), and/or purse seine gear in this fishery has resulted in the take of sea turtles and whales. The Northeast swordfish driftnet portion of the fishery was prohibited during an emergency closure that began in December 1996, and was subsequently extended. A permanent prohibition on the use of driftnet gear in the swordfish fishery was published in 1999.

NMFS' completed the most recent biological opinion on the FMP for the Atlantic highly migratory species 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. A reasonable and prudent alternative was provided to remove the likelihood that the HMS fisheries would jeoparde the continued existence of leatherback and loggerhead sea turtles. The RPA includes area closures and gear modifications to reduce the number of sea turtle takes in the HMS fisheries.

The Federal *Monkfish fishery* occurs in all waters under federal jurisdiction from Maine to the North Carolina/South Carolina border. The monkfish fishery uses several gear types that may entangle protected species. In 1999, turtles were taken in excess of the ITS as a result of gillnet entanglements. NMFS reinitiated consultation on the Monkfish FMP on May 4, 2000, in order to reevaluate the affect of the monkfish gillnet fishery on sea turtles. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures, and the ability of the RPA to avoid the likelihood of jeopardizing the continued existence of right whales. The Opinion concluded that continued implementation of the Monkfish FMP was likely to jeopardize the continued existence of the northern right whale. A new RPA was provided to avoid the likelihood that operation of the gillnet sector of the monkfish fishery would jeopardize the continued existence of northern right whales. In addition, a new ITS was provided for the take of sea turtles in the fishery. NMFS concluded consultation on May 14, 2002, on the effects on ESA listed species of emergency implementation of measures proposed for implementation under Framework Adjustment 1 to the Monkfish FMP. Framework 1 delayed implementation of Year 4 measures (elimination of the directed monkfish fishery) for one year, and set new trip limits in the monkfish Southern Fishery Management Area (SFMA). As a result of the proposed measures, sea turtles will face additional adverse affects that were not considered in the June 14, 2001, consultation on this fishery. A new ITS has been provided for the anticipated take of sea turtles in Year 4 of the monkfish fishery.

Multiple gear types are used in the *Northeast Multispecies fishery*. However, the gear type of greatest concern is sink gillnet gear that can entangle whales and sea turtles (*i.e.*, in buoy lines and/or net panels). Data indicate that sink gillnet gear has seriously injured or killed northern right whales, humpback whales, fin whales, loggerhead and leatherback sea turtles. The northeast multispecies sink gillnet fishery has historically occurred from the periphery of the Gulf of Maine to Rhode Island in water to 60 fathoms. In recent years, more of the effort in the fishery has occurred in offshore waters and into the Mid-Atlantic. Participation in this fishery has declined since extensive groundfish conservation measures have been implemented. The fishery operates throughout the year with peaks in spring, and from October through February. NMFS 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 the continued existence of these species. A new RPA was also included to avoid the likelihood that operation of the gillnet sector of the multispecies fishery would jeopardize the continued existence of right whales.

The *Red crab fishery* is a pot/trap fishery that occurs in deep waters along the continental slope. An FMP for the fishery is in development. 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 are possible where gear overlaps with the distribution of ESA-listed species, therefore an ITS for sea turtles has been provided for this fishery.

It was previously believed that the *Scallop dredge fishery* was unlikely to take sea turtles given the slow speed at which the gear operates. However, NMFS' Northeast Fisheries Science Center has documented the take of fourteen sea turtles in this fishery from 1996 through the present. Therefore, the take of sea turtles in the scallop fishery (in both dredge and net gear) is possible when turtles are present at the times and in the areas where the sea scallop fishery operates. NMFS has initiated formal section 7 consultation on this fishery.

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 have originated from the spiny dogfish fishery. NMFS, 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 jeopardizing the continued existence of 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 was likely to jeopardize the continued existence of the northern right whale. A new RPA has been provided that is expected to remove the likelihood that the continued prosecution of the gillnet sector of the spiny dogfish fishery would jeopardize the continued existence of northern right whales. In addition, a new ITS has been provided for the take of sea turtles in the fishery.

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

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring the use TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, NC and seasonally (March 16-January 14) for trawl vessels fishing between Oregon Inlet, NC and Cape Charles, VA. Developmental work is also ongoing for a TED that will work in the flynets used in the summer flounder fisheries. Based on the occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could also entangle endangered whales, particularly humpback whales. The pot gear and staked trap sectors could entangle 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 ITS is provided for loggerhead and leatherback sea turtles.

Section 7 consultation has also been conducted on 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). 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. An EFP for Jonah crab has also been issued to the Maine Department of Marine Resources to allow lobster trap fishers to fish additional (modified) lobster traps to determine their ability to exclude lobster. The purpose of the experiment is to develop a trap that will catch Jonah crab with minimal lobster bycatch. If successful, the Jonah crab fishery could be exempted from the current lobster trap limits, potentially leading to a large increase in the amount of trap gear in New England waters.

4.1.1 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 (NMFS 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, NMFS 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 (NMFS SEFSC 2001). Recently, NMFS issued a final rule (67 FR 56931), effective September 3, 2002, that closes the waters of Pamlico Sound, NC, to fishing with gillnets with a mesh size larger than 4 1/4 inch (10.8 cm) stretched mesh (''large-mesh gillnet''), on a seasonal basis, from September 1 through December 15 each year, to protect migrating sea turtles. The closed area includes all inshore waters of Pamlico Sound south of 35° 46.3' N. lat., north of 35°00' N. lat., and east of 76° 30'W. long.

A *whelk fishery* using pot/trap gear is known to occur in several parts of the action area, including Maine, Connecticut, Delaware 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 by trap limits set for the lobster fishery since many Jonah crab fishers are also 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 pot/trap fishery in Northeast waters (*e.g.*, Massachusetts and Connecticut) and finfish trap fisheries (*i.e.*, for tautogs). Residents in some states (*e.g.*, Connecticut and Massachusetts) may also obtain a personal use lobster license that allows individuals to set traps to obtain lobster for personal use.

In addition to pot/trap gear, trawl and poundnet gear can also pose a problem for sea turtles. Bottom trawl fisheries for *horseshoe crab* are suspected as 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. In addition to these, NMFS is also concerned about the take of sea turtles in the pound 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. NMFS, therefore, published an interim final rule on June 17, 2002, 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). NMFS 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, NMFS 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.

4.2.1. Naval Operations

On May 30, 2002, NMFS concluded consultation on two interrelated actions proposed by the U.S. Navy (Navy) and the National Marine Fisheries Service's Marine Mammal Conservation Division. The Navy proposed to employ the Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar on two vessels during training and testing as well as during military operations. The National Marine Fisheries Service's Marine Mammal Conservation Division proposed to amend its regulations at 50 CFR 216 governing the taking and importing of marine mammals to allow NMFS to issue to the Navy annual letters of authorization to take marine mammals incidental to the employment of SURTASS LFA sonar for a five-year period ending in 2007. The action area for proposed employment of the sonar system encompasses the Atlantic, Pacific, and Indian Oceans, Mediterranean Sea, and associated seas, including the Arabian Sea, Barents Sea, Caribbean Sea, Norwegian Sea, Sea of Okhotsk, Phillipine Sea, and Tasman Sea as well as several other more specific areas. However mitigative measures proposed by the Navy and NMFS restrict the Navy from operating SURTASS LFA sonar in a way that causes sonar sound fields to exceed 180 dB (re 1 mPa_{rms}) within 12 nautical miles (22 kilometers) of any coastline, including offshore islands, or designated offshore areas that are biologically important for marine mammals outside the 12 nautical mile (22 kilometer) zone during seasons specified for a particular area.

The biologically important area that encompasses the action area for this consultation is the 200-meter isobath off the North American Coast From 28° N to 50° N, west of 40° W Year round for the protection of right whale (western Atlantic stock), sei whale, humpback whale, northern bottlenose whale. The Opinion concluded that the SURTASS LFA sonar system is not likely to jeopardize the continued existence of threatened or endangered species under NMFS jurisdiction and not likely to destroy or adversely modify designated critical habitat. This Opinion did not include an Incidental Take Statement (ITS) because of the programmatic nature of the action, but an ITS will be included with the Opinion when a letter of authorization under the MMPA is issued.

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.

Fin whales are believed to be the most commonly struck cetacean by large vessels (Laist *et al.* 2001) but ship strikes have been identified as a significant source of mortality for the western North Atlantic right whale subpopulation (Kraus 1990) and are known to impact other endangered whales as well. Out of 27 documented right whale mortalities in the western North Atlantic from 1970 to 1991, 22% were caused by ship propellor injuries (Perry *et al.* 1999). Hamilton *et al.* (1998), using data from 1935 through 1995, estimated that an additional 6.4% of right whales exhibit signs of injury from vessel strikes.

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 (such as the Maine to Canada high speed ferry) and whale watch vessels operating in congested coastal areas pose potential risks to whales. The Bar Harbor, ME – Yarmouth, Nova Scotia high-speed ferry 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 take 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 but size ranges from 50 to 150 feet (NMFS 1998). 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.

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 PCB's, 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 designated right whale critical habitat. NMFS 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 destroy or adversely modify critical habitat under NMFS 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. Pollutant loads are usually lower in baleen whales than in toothed whales and dolphins.

However, a number of organochlorine pesticides were found in the blubber of North Atlantic right whales with PCB's and DDT found in the highest concentrations (Woodley *et al.* 1991). 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.

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 and some sea turtles will likely benefit from the measures as well.

4.4.1 ALWTRP

The ALWTRP is a major component of NMFS' 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 (*i.e.*, trap and gillnet fisheries) to levels approaching zero within five years of its implementation.

The regulatory component of the ALWTRP includes a combination of broad fishing gear modifications and time-area restrictions 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 to the regulations 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.

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, NMFS 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 NMFS authorization, has responded to numerous calls since 1984 to disentangle whales entrapped in gear, and has developed considerable expertise in whale disentanglement. NMFS 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, NMFS 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 Endangered Species Act. 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 Ship Strike Committee of the Northeast Implementation Team 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 video raises the awareness of mariners as to the plight of the right whale in the North Atlantic and solicits 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 in the areas of regulating vessel speed or routing in areas of right whale concentrations.

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 NMFS' operations. Other potential sources of sightings include the U.S. Navy, Northeast Fisheries Science Center/NOAA and independent research vessels. 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. NMFS has also been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. NMFS has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NMFS 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).* Collisions with ships are a major source of injury and death of the critically endangered northern right whale. In an effort to reduce the number of ship strikes, NOAA and the U.S. Coast Guard have developed and implemented Mandatory Ship Reporting Systems. The systems were endorsed by the International Maritime Organization – a specialized organization of the United Nations.

The systems became operational in July 1999. When ships greater than 300 gross tons enter two key right whale habitats – one off the northeast U.S. and one off the southeast U.S.-- they are required to report to a shore-based station. 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 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 (NMFS 1991b). As part of recovery actions aimed at minimizing human-induced disturbance, NMFS published an interim final rule in February 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 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 NMFS pursuant to conservation recommendations issued with several recent section 7 consultations. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen. Staff of the Maine Department of Marine Resources (DMR) has received anecdotal reports from fishermen about leatherbacks entangled in lobster pot gear (J. Lewis, pers. comm.). One fisherman reported that he had caught two leatherbacks in the last two years in lobster gear in Maine. Both turtles were released unharmed. Another fisherman observed two leatherbacks caught in his lobster warp off of Mount Desert Island and released them alive and unharmed.

4.5.2 Regulatory Measures for Sea Turtles

4.5.2.1 Interim Final Rule for Large-Mesh Gillnets

As mentioned in Section 2.1.3.3, NMFS has recently 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 move into North Carolina and Virginia waters this spring [67 FR 13098]. Specifically, the Interim 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). These measures are effective as of March 15, 2002, and will remain in effect through 240 days after March 15, 2002. NMFS received public comment on the Interim Final Rule that it will consider prior to making a final determination on a permanent rule establishing these seasonal restrictions.

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

4.5.2.3 Proposed Rule for Larger TED Openings

On October 2, 2001, NMFS issued a proposed rule [66 FR 50148] to amend the 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, NMFS has determined that modifications to the design of TEDs need to be made to exclude leatherbacks and large, sexually mature loggerhead and green turtles. In addition, several approved TED designs do not function properly under normal fishing conditions. Therefore, NMFS is proposing to disallow these TEDs (*e.g.*, weedless TEDs, Jones TEDs, hooped hard TED, and the use of accelerator funnels). Finally, the rule proposes modifications to the trynet and bait shrimp exemptions to the TED requirements to decrease mortality of sea turtles. The public comment period for the proposed rule has ended, and NMFS is currently in the process of finalizing the rule and making any changes in the proposed rule, as necessary, to address the comments.

4.5.2.4 Proposed 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, NMFS 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, NMFS published a Temporary Rule in June 2001 [66 FR 33489] that curtailed fishing with pound net leaders 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. NMFS 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 Sea Turtle Handling and Resuscitation Techniques

NMFS has also developed specific sea turtle handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to take these measures to help prevent mortality of turtles caught in fishing or scientific research gear. However, the measures are principally developed for hard-shelled turtles and have less applicability for leatherback sea turtles which lack a hard-shell.

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

The 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 these listed species are entanglements in fishing gear and ship strikes, although we cannot identify causal relationships between specific fisheries or vessels and the capture, injury, or death of listed species. 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 NMFS, 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 also 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 (part of which is the action area) 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, although it is impossible to estimate the impact of these threats on the status and trend of the humpback whale population without more information on the population size and population ecology of the species.

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. Because of these unknowns, it is impossible to estimate the impact of the activities included in the *Environmental Baseline* on fin whales.

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 NMFS 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. 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 (NMFS 1998). 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. Because of these unknowns, it is impossible to estimate the impact of the activities included in the *Environmental Baseline* on sei whales.

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. Given the lack on information on sperm whale abundance and stock structure, it is impossible to estimate the impact of the activities included in the *Environmental Baseline* on sperm whales.

Leatherback sea 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 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, large numbers of 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. Because of these unknowns, it is impossible to estimate the impact of the activities included in the *Environmental Baseline* on leatherback turtles.

Loggerhead sea turtles. NMFS considers the northern subpopulation of loggerhead sea turtles 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). All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects, including many anthropogenic effects that occur as a result of activities outside of U.S. jurisdiction (*i.e.*, fisheries in international waters). Nevertheless, it is impossible to estimate the impact of these activities on the status and trend of the loggerhead sea turtles in the action area or the Atlantic Ocean without more information on the population size and population trend of the species. Because of these unknowns, it is impossible to estimate the impact of the activities included in the *Environmental Baseline* on loggerhead sea turtles.

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 the proposed changes to the lobster fishery are 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, NMFS assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat. The purpose of the assessment is to determine if it is reasonable to expect that the fishery will 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 or appreciably diminish the value of designated critical habitat for both the survival and recovery of threatened and endangered species in the wild. Since the proposed action is not expected to affect designated critical habitat, this Opinion will focus only on the jeopardy analysis.

5.1 Approach to the Assessment

NMFS generally approaches jeopardy analyses in three steps. The first step identifies the probable direct and indirect effects of an action on the physical, chemical, and biotic environment of the action area. The second step determines the reasonableness of expecting threatened or endangered species to experience reductions in reproduction, numbers or distribution in response to these effects. The third step determines if any reductions in a species reproduction, numbers or distribution (identified in the second step of our analysis) can be expected to appreciably reduce a listed species likelihood of surviving and recovering in the wild. A species reproduction, numbers, and distribution are interdependent. 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.

5.2 Scope of the Analyses

As described in the *Description of the Proposed Action*, the activity being considered by NMFS is the revision of the Federal lobster trap fishery to limit participation in FLMAs 3, 4 and 5 to those who have "historically" fished the area(s), and to allow some New Hampshire lobster fishers to set 400 additional traps in state waters.

Right, humpback, fin, sei and sperm whales and loggerhead 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, loggerhead sea turtles, and leatherback sea turtles are known to be taken (*i.e.*, entangled) in lobster trap/pot gear or gear comparable to lobster trap/pot gear (*e.g.*, crab pot gear). The lobster trap/pot fishery may, therefore, affect protected species as a result of vessel interactions and/or gear interactions. The following discussion provides further information on the likelihood that these effects will occur, and the reaction of right, humpback, fin, sei and sperm whales, and loggerhead and leatherback sea turtles to vessels and/or gear proposed to be used in the revised Federal lobster trap fishery.

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. As described in the *Status of the Species*, NMFS 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, NMFS 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 NMFS 1997). Nevertheless, this Opinion focuses solely on whether the direct and indirect effects of the activities proposed to occur (historical participation for FLMA's 3, 4 and 5 and conservation equivalency for New Hampshire's full-time licensed lobster fishers) can be expected to appreciably reduce the listed species likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution. NMFS 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 (NMFS 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 Proposed Action

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.

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 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 (NMFS SEFSC 2001). Strandings as a result of boat strikes were equally represented (45%) in states from Virginia through Maine and southern states (Florida's east coast through North Carolina) (NMFS SEFSC 2001). It should be noted, however, that it is not known whether all boat strikes were the cause of death or whether they occurred post-mortem (NMFS SEFSC 2001).

(2) *Factors which may contribute to the occurrence of vessel strikes* - A great majority of cetacean 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).

Vessels used in the federal lobster fishery are generally small with an average length of 39 ft (NMFS 2000); far smaller than those which are known to cause serious injury and mortality to large whales. Based on data submitted by vessel permit holders, vessels used in the Federal lobster fishery as of the 2001 fishing year range in length from 8 ft (2.4m) to 131 ft (40m) with 35 and 36 ft vessels (~ 11m) most commonly reported.

Information is lacking on the type and/or speed of vessels involved in turtle vessel strikes. However, 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 sea turtles concentrate in benthic environments from North Carolina to Cape Cod during the spring and summer foraging months. Larger loggerheads occur along the shelf edge (CeTAP 1982) where the offshore lobster fishery occurs. Benthic feeding turtles would most commonly be found in state waters, and interactions between benthic turtles and federally licensed lobster fishing vessels are most likely to occur when the vessel is traveling to and from port (or if the vessel also possesses a state lobster permit and sets traps in state waters). Although interactions could occur, the probability is considered small given the minimal overlap of federal lobster fishing vessel activity with the turtle's benthic habitat. Similarly, although loggerheads also occur in areas where the offshore lobster fishery takes place, the large size of the area fished in relation to loggerhead concentrations helps to reduce the overlap of the species with lobster vessel activity.

Leatherback turtles are primarily a pelagic species but may occur in shallower waters, presumably in search of prey. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, NC to Cape Sable, Nova Scotia found the most numerous sightings of leatherbacks from the Gulf of Maine to Long Island, and Shoop and Kenney (1992) observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. However, while there is lobster fishing effort in these areas, there have been no reported interactions between vessels used in the lobster pot/trap fishery in Federal waters and leatherback sea turtles. Given the large area fished in relation to the concentration of leatherback sea turtles in the area as well as the slower operating speed of a fishing vessel as compared to a recreational vessel, the experience of the fishing vessel operator with the area fished, and an awareness of the times and areas where this species occurs, there is not expected to be a reasonable likelihood of interactions between lobster fishing vessels and leatherback sea turtles.

(3) *Summary of Effect of Vessel Collisions* - The proposed action will not result in an increase in the number of vessels participating in the Federal lobster fishery. A reduction in effort in FLMAs 3, 4 and 5 as a result of the proposed action could reduce the risk of vessel collisions with ESA-listed right, humpback, fin, sei and sperm whales as well as loggerhead and leatherback sea turtles if historical participation and trap reductions results in vessels making fewer trips to FLMAs 3, 4 and 5. However, any reduction in vessel activity in these areas would be expected to be offset, at least in part, by a redirection of effort to other FLMAs that are not controlled by historical participation. Given the best available information, NMFS is assuming for the purposes of this Opinion that the amount of vessel activity will, overall, remain the same throughout the lobster management area. It is, therefore, unlikely that the proposed action will increase the risk of vessel interactions with a right, humpback, fin, sei or sperm whale or loggerhead or leatherback sea turtle given that: (1) the proposed action will not result in an increase in the number of vessels operating in the area (although implementing historical participation for FLMAs 3, 4, and 5 may affect the distribution of vessels; it will not change the number of vessels - see also the discussion of changes in effort as a result of the proposed action in section 5.4.2), (2) the vessels are typically operated at slower speeds than ships or some recreational vessels allowing operators more time to detect and avoid large objects such as whales and some sea turtles, and (3) there are conservation programs to alert fishers to the presence of right whales in certain areas of the action area. Finally, lobster fishing vessels are typically of moderate size with the largest vessels fishing in the deeper, offshore waters. All of these are much smaller than those vessels known to cause serious injuries and mortality to large cetaceans.

5.4.2 Effect of Trap/Pot Fishery

Lobster trap/pot gear consists of baited traps to catch the targeted species typically attached in a series of two or more traps by polypropylene (floating) groundline, and with at least one buoy line (but most often two) at the end of a series of traps to mark the location of the gear. Offshore gear includes additional line at or near the surface that connects a radar reflector highflyer to one of the buoys to aid in relocation and "visibility" of the gear. The traps rest on the bottom with the buoy line(s) rising vertically to the surface. Polypropylene line is typically used between traps because it is readily available, inexpensive and floats, thereby reducing the risk of chafing. Because the line floats, it tends to form arcs in the water column between traps.

Large whales and sea turtles cannot get caught in the trap itself since the opening is far smaller than any of these species. In addition, these species would not be expected to be attracted to the bait used in lobster traps since the bait is inconsistent with their typical prey (*i.e.*, zooplankton, jellyfish, live fish, crabs). Whales and leatherback sea turtles may, however, become entangled in buoy lines and with polypropylene line between pots.

The general scenario that leads to a whale becoming entangled in this gear begins with a whale encountering a line, it may then move along that line until it comes up against something such as a buoy. The buoy can then be caught in the whale's baleen, against a pectoral fin or on some other body part. When the animal feels the resistance of the gear, it likely thrashes, which may cause it to become further entangled in the lines asssociated with trap gear. 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 gear attached to the line is too heavy for the whale, drowning may result immediately. 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). A sustained stress response, such as repeated or prolonged entanglement in gear makes marine mammals less able to fight infection or disease, and 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 become more constricting as they grow. The majority of large cetaceans that become entangled are juveniles (Angliss and Demaster 1998).

Anecdotal evidence indicates that when leatherbacks encounter lobster pot gear, they swim in circles resulting in multiple wraps around a flipper. Long pectoral flippers along with extremely active behavior make leatherback sea turtles especially defenseless to any type of ocean debris. Records of stranded or entangled sea turtles reveal that fishing debris can wrap around the neck, flipper, or body of the sea turtle and severely restrict swimming or feeding (Balazs 1985). Drowning may occur immediately as a result of the weight of the gear or, at a later time, if trailing gear becomes lodged between rocks and ledges below the surface. Leatherbacks may also be more susceptible to drowning as compared to other sea turtles due to their unusual physiology and metabolic processes. The dive behavior of leatherbacks consists of continuous aerobic activity. When entanglement occurs, available oxygen decreases allowing anaerobic glycolysis to take over producing high levels of lactic acid in the blood (Lutcavage and Lutz 1997). Leatherbacks lack calcium which aids in neutralizing the build up of lactic acid by increasing bicarbonate levels. The softer epidermal tissue of leatherbacks may also make them more susceptible to serious injuries from entangling gear. Constriction of the neck and flippers can amputate limbs also leading to death by infection. If the turtle is cut loose with line attached, the flipper may eventually become occluded, infected and necrotic. Entangled leatherbacks are also more vulnerable to collision with boats, particularly if the entanglement occurs at or near the surface (Lutcavage *et al.* 1997).

(2) *Factors contributing to entanglement* - Several factors contribute to the likelihood of entanglement of whales and leatherback sea turtles in pot/trap gear. Baleen whales, including right, humpback, fin, and sei whales, tend to 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 may, thus, become caught in the baleen if the whale incidentally encounters the line when feeding. Buoys attached to the line for marking the location of fixed gear may further exacerbate the problem by limiting the passage of the line through the baleen. Similarly, if the whale were to incidentally catch the horizontal line that occurs between the traps in its baleen, the traps at either end of the rope section would prevent passage of the line through the mouth. The polypropylene line between traps is seen as a particular hazard to filter-feeding whales since it tends to float in arcs in the water column, making it more likely that the whale will incidentally capture the line while feeding.

Buoys used on trap/pot gear may also increase the risk of entanglement for leatherback sea turtles. The leatherback's diet is composed predominantly of jellyfish species. A number of researchers have suggested that leatherbacks may be attracted to the buoys which could appear as jellyfish, or that they may be attracted to the organisms which colonize ropes and buoys. Certain gear configurations such as longer floating lines (such as the floating polypropylene line between traps) or thinner, more flexible lines may be more likely to hold wraps on turtle flippers.

The location of the fishery in relation to the species is also a factor influencing the likelihood that a gear entanglement will occur. For example, the majority of the lobster fishery effort is concentrated in northeastern waters and peaks in the summer and early fall months when whales use New England waters for feeding and nursing young, and when sea turtles occupy the area. Whales that forage in areas of fixed pot gear are vulnerable to entanglement. Consequently, entanglement risk from lobster pot gear may occur at low levels throughout the year along the Atlantic coast, but the greatest risk occurs during the summer and fall in New England waters when whales and sea turtles and lobster trap gear are more concentrated in these waters. Similarly, leatherback entanglements in lobster gear may be more prevalent at certain times of the year when these turtles are feeding on jellyfish species in nearshore waters (*i.e.*, Cape Cod Bay) where lobster fishing gear is concentrated. The factor(s) influencing loggerhead sea turtle entanglements in lobster fishing gear are unclear. There have been four known entanglements of loggerhead sea turtles in lobster trap gear.

(3) *Changes in Effort as a result of the Proposed Action* - The June 14, 2001, Opinion on the Federal lobster fishery considered the effects to ESA-listed species based on the lobster trap limits in place at that time. The proposed action would change those trap limits by allowing New Hampshire lobster fishers who possess a full-time state lobster permit and a Federal lobster permit to fish up to 400 additional lobster traps in New Hampshire state waters. In addition, the action would further limit lobster trap fishing in FLMAs 3, 4, and 5 to those who qualify as "historical" participants. Since lobster fishing in these areas will be limited to only those fishers who qualify as historical participants, effort in the fishery in terms of the number of traps fished is expected to be reduced in FLMAs 3, 4 and 5. However, a decrease in effort in FLMAs 3, 4 and 5 may also result in a shift in effort to other available nearshore areas that are not controlled by historical participation, and where ESA-listed species also occur. An increase in lobster trap gear in other nearshore areas could increase the risk of entanglement of ESA-listed cetaceans and sea turtles in lobster trap gear. Therefore, the proposed action may result in effects to ESA-listed species that were not considered in the June 14, 2001, Opinion.

Changes in Effort as a Result of the New Hampshire Conservation Equivalency Measure - As described in the *Description of the Proposed Action* section, the New Hampshire two-tier licensing system incorporated a moratorium on new entrants into the "full license" category who are allowed to fish up to 1200 traps in New Hampshire state waters and established a ceiling for expansion of fishing effort by limited license holders at a level of 600 traps, which is more conservative than the 800 trap limit required by the ISFMP. New Hampshire implemented its two-tier commercial lobster license system on the basis that it, potentially, would result in fewer traps in the water in comparison to a uniform 800 trap limit for New Hampshire licensed lobster fishers. The net result: approximately 18,000 fewer lobster traps area-wide in Gulf of Maine waters (state and federal waters combined of FLMA 1) fished by New Hampshire lobster fishers (NMFS 2000).

Although the 1200 and 600 trap limits apply only to New Hampshire's state waters, these trap limits affect federal waters as well because these dual permit holders must comply with the most restrictive of the laws which apply to them. Lobster fishers who possess a federal lobster permit and a New Hampshire full-time commercial lobster license can fish only 800 traps in state waters (despite New Hampshire lobster regulations that allows for 1200 traps) since federal lobster regulations currently limit these fishers to fishing only 800 traps. Conversely, federal lobster permit holders who also possess a New Hampshire limited lobster license can only fish up to 600 traps in federal water versus 800 that would be allowed if these fishers possessed only a federal lobster permit. Information provided to NMFS indicates that 48 New Hampshire lobster fishers also possess a federal lobster permit. Twenty-two of these possess New Hampshire full-time commercial lobster permit while the remainder (26) possess a limited lobster license. The proposed action would allow all New Hampshire full-time commercial permit holders to fish up to 1200 traps in New Hampshire state waters. Allowing the 22 New Hampshire lobster fishers that also possess federal lobster permits to set up to 400 additional traps will result in a potential increase of 8800 lobster traps in New Hampshire state waters. Assuming each fisher sets their additional traps in the minimum allowed 2-trap trawl with one buoy line (worst case scenario), the proposed action has the potential to add 4400 additional buoy lines to New Hampshire state waters. It would not allow for an increase in lobster trap gear in federal waters. In fact, given that 26 New Hampshire limited licensed fishers also possess a federal lobster permit, New Hampshire's two-tiered lobster licensing system has potentially resulted in a reduction of 5200 lobster traps in federal waters (26 lobster fishers x 200 traps less than the federal allocation). NMFS has assessed the impact of the proposed action on the lobster resource and determined that the potential increase of 8800 lobster traps by Federal permit holders in New Hampshire state waters will be counter-balanced by the trap reductions that have occurred as a result of New Hampshire's two-tiered licensing program. Any biological adversity to lobster resulting from the potential for some Federal lobster permit holders to fish up to a maximum of 400 more traps in New Hampshire state waters than would otherwise be allowed under existing Federal lobster regulations, would be outweighed by the greater overall reduction in the potential number of traps fished by state and Federal fishers combined under the provisions of the state's trap management program. The same may be true for ESA-listed species as well. However, in accordance with section 7(a)(2) of the ESA, the agency must assess the effects of the proposed agency action on ESA-listed species which, in this case, would allow some federal lobster fishers to fish 400 additional traps in New Hampshire's state waters. The proposed action is, therefore, expected to result in an increase in lobster trap gear in New Hampshire state waters as compared to the amount of lobster trap gear that would have been present if there were no federal action to allow the dual permit holders to fish up to 400 additional traps in New Hampshire state waters.

Although the relationship between the amount of lobster trap gear in the water and the risk of a protected species interaction with that gear has not been quantified, in general it is assumed that any increase in lobster trap gear results in an increased risk of entanglement for ESA-listed species in lines associated with lobster traps. Therefore, the proposed action could result in an increased risk of gear entanglement for ESA-listed species when they occur in New Hampshire state waters. However, as described in the *Status of the Species*, none of the cetacean species considered in this Opinion as well as loggerhead sea turtles are known to regularly occur in New Hampshire state waters. Given their preference for deeper waters, this action is not expected to affect sei whales or sperm whales. Although right whales, humpback whales and fin whales occur in New England waters primarily in the spring through fall and could occur within New Hampshire state waters, their presence in these waters is believed to be infrequent given the absence of sightings and given that foraging areas for each of these species occur outside of New Hampshire waters. Similarly, although loggerhead sea turtle strandings have occurred as far north as Maine and loggerhead sea turtles use southern New England inshore waters for foraging in the summer months, strandings of loggerhead sea turtles north of Massachusetts are infrequent, suggesting that loggerhead sea turtles do not routinely occur in inshore waters north of Massachusetts (STSSN database).

Of the species considered in this Opinion, leatherback sea turtles are the most likely to occur in New Hampshire state waters, particularly in the fall when leatherbacks have been seen in other inshore environments apparently in search of their jellyfish prey. In addition, leatherback turtle entanglements in lobster trap gear have been recorded in waters from Connecticut through Maine (Appendix 5). Although there have been no observed and/or reported entanglements of leatherback sea turtles in lobster trap gear set in New Hampshire state waters, observer effort in the fishery has been low and entanglements may have gone unreported for various reasons (*i.e.*, fishers released the turtle without further assistance, there was no awareness of the need to report a sea turtle entanglement, *etc.*). Therefore, it is reasonable to conclude that lobster trap gear set in New Hampshire state waters poses an entanglement risk for leatherback sea turtles, and that increasing the amount of gear set in state waters will increase the risk of entanglement of leatherback sea turtles in lobster trap gear.

Changes in Effort as a Result of Historical Participation in FLMA's 3, 4 and 5 - As described in the *Description of the Proposed Action* section, the management of trap fishing effort on the basis of historical participation was proposed as a means to reduce current levels of trap fishing effort on American lobster in specified areas. The premise is that this approach will result in fewer traps being fished in FLMAs 3, 4 and 5 as compared to leaving it open to all Federal lobster permit holders under existing trap limits of 1800 traps per vessel for FLMA 3 and 800 traps per vessel in FLMAs 4 and 5. Because there is some uncertainty as to the number of lobster fishers who will qualify for participation in FLMAs 3, 4 and 5, for the purposes of this Opinion, NMFS considered that the proposed action may result in one of three effects: (1) status quo, (2) a decrease in lobster trap effort in FLMA's 3, 4 and 5 (with possible shifts in trap effort to other areas), and (3) an increase in lobster trap effort in FLMA's 3, 4 and 5. NMFS considered that the proposed action might also result in changes in effort (without displacement) as a result of lobster trap fishers who do not qualify as historical participants but who choose to remain in the area by fishing with non-trap gear. However, given that the non-trap gear sector of the fishery is a bycatch fishery, it would be unlikely that any fishers would choose to remain in the area fishing with non-trap gear when it would not be economically viable to do so. Therefore, this alternative was not given further consideration.

If the proposed action were to result in no change/shifts in effort (status quo) then the effects to protected species would be the same as what was considered by NMFS for the June 14, 2001, Opinion and further analysis is unnecessary. An increase in effort in FLMAs 3, 4, or 5 would require further analysis of the effects of the proposed action on ESA-listed species. However, while NMFS recognizes that an increase in effort may occur (*i.e.*, if more fishers qualify for FLMAs 3, 4 and 5 than anticipated), this scenario currently seems remote based on the best available information (NMFS 2000). The most likely scenario is that the proposed action will result, as intended, in a reduction in effort for FLMAs 3, 4 and 5. As is the case with all section 7 consultations, if 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, NMFS will consider whether it is necessary to reinitiate consultation.

Reducing Effort in FLMA's 3, 4 and 5 - Voluntary data provided by a group of FLMA 3 participants indicate that at least 64 vessels would qualify for historical participation in FLMA 3 (NMFS 2000). NMFS obtained an alternative estimate by using available permit data, and making certain assumptions related to the trap history of the vessel. By this method, NMFS estimated that the total number of qualifiers for historical participation in FLMA 3 could range from a low of 53 vessels to a high of 117 vessels (NMFS 2000). The proposed plan for FLMA 3 includes a trap reduction schedule that will be phased in over a four-year period (Appendix 2). No qualifying permit holder for FLMA 3 would be given an initial lobster trap allocation of more than 2,656 lobster traps. Each trap allocation of more than 1,200 traps would be reduced annually on a sliding scale basis over 4 years. Trap reductions would not go below a baseline of 1,200 traps. Each initial allocation of fewer than 1,200 traps would remain at that allocation (NMFS 2000). Previous analyses (NMFS 1999) estimated that 297 vessels may be currently involved in the offshore lobster fishery (FLMA 3), fishing an average of 1,321 traps per vessel. Therefore, NMFS does anticipate a reduction of lobster trap effort in FLMA 3 as a result of the proposed action. Similarly, as described in section 2.0, NMFS estimates that 47 to 60 vessels will qualify for historical participation in FLMAs 4 and 5 (NMFS 2000). Under the current lobster program, NMFS estimates that 202 and 162 lobster permit holders could be expected to participate in FLMAs 4 and 5, respectively (NMFS 2000). Therefore, NMFS believes that the proposed action will decrease the amount of lobster trap effort in FLMAs 4 and 5.

For biological opinions, NMFS has generally assumed that a reduction in gear will likewise lead to a reduction in protected species-gear entanglements where the fishery and the species co-occur. Therefore, a reduction of lobster trap gear in FLMAs 3, 4, and 5 should reduce the entanglement risk for ESA-listed whales and sea turtles when they occur in these areas. Right whales are known to have been entangled in offshore lobster gear, and the distribution of humpback, fin, sei and sperm whales, and loggerhead and leatherback sea turtles overlaps with gear set in the offshore area as well. Therefore, a reduction of lobster trap gear in FLMA 3 should reduce the risk of entanglement in such gear for these species. Leatherbacks have been observed entangled only in inshore lobster gear but presumably could also become entangled in offshore lobster gear where they occur coincident with the fishery and would also benefit from a reduction in lobster trap gear set in FLMA 3. Historical participation for FLMA 3 is, therefore, expected to be of benefit to protected species which occur in the area through a reduction in the amount of gear fished in the area. Reducing effort in FLMAs 4 and 5 should also provide some benefit to ESA-listed species. Right whales and humpback whales use Mid-Atlantic waters as a migratory pathway to and from winter calving/nursery grounds. Although these baleen whales are believed to be at greatest risk of entanglement when fixed gear occurs in feeding areas, reducing or limiting gear concentrations in other areas may be of some risk reduction as well. To the extent that fin whales occur in these areas, limits on trap effort would also be expected to be of some benefit to this species. Sperm and sei whales are not common to the area. Therefore, these species are not expected to be affected by a limit on trap gear in FLMAs 4 and 5. With respect to turtle species, leatherbacks are known to concentrate in areas south of Long Island and off of New Jersey. Therefore, a reduction of lobster trap/pot gear in FLMAs 4 and 5 may be of benefit to leatherbacks as well. To the extent that loggerhead distribution overlaps with lobster gear set in FLMAs 4 and 5, limits on trap effort may also be of some benefit to this species.

Shifts in Effort from FLMAs 3, 4 and 5 - Despite the benefits to ESA-listed species from a reduction of lobster trap gear in FLMAs 3, 4, and 5, limiting FLMAs 3, 4 and 5 to historical participants also has the potential for displacing gear from these FLMAs to other nearshore FLMAs which are not limited to historical participants and where some of these same protected species occur. Increasing the concentration of lobster trap gear in other areas could result in increased entanglements for ESA-listed species. However, there is very limited information on the distribution of gear and the extent of effort in the Federal lobster fishery by which to assess the extent of effort displacement from FLMAs 3, 4, and 5. As mentioned previously, unlike other federal fisheries, there is no mandatory vessel trip reporting or logbook requirement for federal lobster permit holders. Only federal lobster permit holders who also possess a permit for another federally regulated fishery are required to report their lobster catch. In addition, the utility of these reports for documenting lobster fishing effort is further restricted to those permit holders who accurately note on the reports the number of traps fished on an area by area basis (Lobster DSEIS 1999). Although there are maximum trap limits and fishers must purchase tags for their traps, fishers can purchase up to the maximum number of tags but fish fewer traps. Information is not collected on how many traps are actually fished. In addition, since interactions occur as a result of the lines associated with lobster trap gear rather than the traps themselves, quantifying the risk of interaction would require knowing how many lines are associated with the lobster traps set in federal waters. But, again, this information is not collected. Despite these limitations, NMFS must nevertheless assess the effects of the proposed action on ESA-protected right, humpback, fin, sei and sperm whales, and loggerhead and leatherback sea turtles, including effort shifts as a result of the proposed action.

(a) Approach to the Assessment - To assess how lobster trap effort might be shifted, NMFS considered how many fishers currently select to fish in FLMAs 3, 4 and 5 (based on the number of selections for these areas from valid federal fishing permits as of November 13, 2001), and compared that to the number of fishers who selected to fish exclusively in either FLMA 3, 4,or 5. NMFS then considered where the remaining fishers were likely to transfer their fishing effort by considering what other FLMAs had been selected. Finally, NMFS qualitatively assessed the impact to protected species of the potential shift in effort to these other FLMAs. There are, however, several important qualifiers to this approach. First, NMFS recognizes that this approach will likely overestimate the number of fishers who actually set lobster traps in FLMAs 3, 4, and 5 since a fisher can select any number of FLMAs without any obligation to fish in the area. Although NMFS has previously estimated the number of lobster trap fishers that currently fish in FLMAs 3, 4, and 5, (NMFS 2000, NMFS 1999) for the purposes of this Opinion, NMFS chose not to use the estimates in assessing how effort might be shifted for the following reasons. First, the estimate for FLMA 3 (estimated as 297 fishers) is based on permits data from 1997 and an assumption that only lobster trap fishers with vessels greater than 50 feet in length will participate in the offshore lobster trap fishery. This assumption may not always hold true (*i.e.*, in portions of the Gulf of Maine where the offshore area occurs closer to shore and is therefore more accessible to smaller vessels). Secondly, NMFS' estimates of the maximum number of lobster trap fishers who might currently fish for lobster in FLMAs 4 and 5 (202 and 162, respectively) are based on the number of vessels that use ports from New York to North Carolina as their primary port, and the assumption that vessels will fish lobster gear in areas closest to their home port. In making this estimate, vessels with home ports in New Jersey were counted twice; once each for FLMA 4 and FLMA 5. Vessels with home ports in the remaining states (NY, DE, MD, VA, and NC) were counted only once with vessels home ported in New York counted as FLMA 4 lobster fishers, and vessels home ported in Delaware through North Carolina as FLMA 5 lobster fishers. Given these assumptions, and since for the purposes of this Opinion NMFS is interested in the total number of vessels that may set lobster traps in FLMAs 3, 4 and 5 (whether for all or only part of the year), NMFS instead chose to use the number of selections for FLMAs 3, 4, and 5 as recorded in the permits database as of November 13, 2001, rather than the previous estimates. A second qualifier to NMFS' approach for assessing how effort might be shifted from FLMAs 3, 4, and 5 is that the approach will likely underestimate the number of fishers who will qualify as historical participants. For the purposes of this assessment, NMFS is assuming that all of the fishers that exclusively selected FLMAs 3, 4, or 5 will qualify as a historical participant in the selected area. Based on the November 13, 2001, permits data, 40 fishers selected FLMA 3, alone, 38 fishers selected FLMA 4 alone, and 41 fishers selected FLMA 5 alone. NMFS estimates that the total number of qualifiers for historical participation in FLMA 3 will range from a low of 53 vessels to a high of 117 vessels, and will range from 47 to 60 vessels for FLMAs 4 and 5 (NMFS 2000). Therefore, it is very possible that more fishers than estimated by the permit selections data will qualify for the historical participation programs in FLMAs 3, 4, and 5. However, since NMFS has no way of determining at this time which FLMA 3, 4, and/or 5 fishers will qualify as historical participants, in order to assess how effort in the fishery might be shifted as a result of being displaced from FLMAs 3, 4, and/or 5, NMFS assumed that the fishers that selected only one area will qualify in that area as historical participants, and then considered where the remaining fishers (of which some relatively small number are also expected to qualify as historical participants) selected to fish. NMFS recognizes that it is taking a "worst case scenario" approach in assessing how effort might be shifted from FLMAs 3, 4, and 5 but believes this approach is appropriate given the limitations of our knowledge of the lobster fishery and the status of the species considered in this Opinion, and believes it is consistent with direction to provide the "benefit of the doubt" to threatened and endangered species, and to avoid Type II errors (concluding that actions had no effect on listed species or critical habitat when, in fact, there was an effect). Finally, NMFS is also assuming that the selections for FLMAs 3, 4 and 5 as of November 13, 2001, are generally representative of the number of fishers who select these areas. Since November reflects a halfway point in the lobster fishing year, NMFS believes that the majority of lobster fishers would have renewed their permits by that time.

(b) Assessment of Potentially Displaced Effort - As of November 13, 2001, of the 2,473 active (*i.e.*, renewed for the 2001 fishing year) lobster permits using trap gear only, there were 819 selections for FLMA 3, 268 selections for FLMA 4 and 192 selections for FLMA 5, representing a total of 986 vessels (since some vessel owners selected combinations of FLMAs 3, 4, and 5, the number of permit holders affected are less than the total number of selections). The majority of the fishers that selected FLMA 3, 4, and/or 5, selected multiple areas. Only 40 fishers selected FLMA 3, alone while 38 and 41 fishers selected only FLMA 4 or FLMA 5, respectively. As described above, since NMFS has no way of determining at this time which FLMA 3, 4, and/or 5 fishers will qualify as historical participants, in order to assess how effort in the fishery might be shifted as a result of being displaced from FLMAs 3, 4, and/or 5, NMFS assumed that the fishers that selected only one area will qualify in that area as a historical participant, and then considered where the remaining fishers (of which some relatively small number are also expected to qualify as historical participants) selected to fish. In particular, NMFS focused on those fishers that selected only one other area in addition to FLMA 3, 4, and/or 5 (Table 1).

Table 1. Federal lobster trap fisher selections for FLMAs 3, 4, and 5 in combination with other FLMAs based on permits data as of November 13, 2001.

Additional Area Selected	FLMA 3	FLMA 4	FLMA 5
And FLMA 1	272	0	1
And FLMA 2	2	1	0
And FLMA 2/3	71	0	0
And FLMA 3	N/A	15	13
And FLMA 4	15	N/A	18
And FLMA 5	13	18	N/A
And FLMA 6	0	8	0
And FLMAOC	6	0	0
And 2 or more other FLMA's (including FLMA 1)	244	80	64
And 2 or more other FLMA's (excluding FLMA1)	156	108	55
TOTAL	779	230	151

Of the remaining 779 fishers who selected FLMA 3 plus one other area, the majority selected FLMA 1. This is not surprising given the location of the resource and the predominance of the lobster fishing industry in Gulf of Maine waters. In fact, FLMA 1 is the most commonly selected area, overall, with 1,105 fishers of the total 2,473 selecting FLMA 1 alone. Therefore, it is expected that as a result of the proposed action, effort will be shifted from FLMA 3 into other FLMA's, primarily FLMA 1. Unlike FLMA 3, fishers that selected FLMA 4 and/or FLMA 5 do not appear to have a preference for any one other area. Although FLMA 3 was the most commonly selected area when only one other area was selected, by far the majority of selections for FLMAs 4 and 5 involved multiple selections of other nearshore areas. This makes it more difficult to determine where effort from non-qualifying FLMA 4 and 5 fishers will be displaced, but does suggest that the effort is more likely (as compared to FLMA 3) to be displaced amongst multiple nearshore lobster areas. Since FLMAs 4 and 5 will also be restricted to qualifying historical participants, effort is not expected to be shifted from FLMA 3 to FLMAs 4 and 5 or vice versa.

(c) Effect of Effort Shifts Upon ESA-listed Species - FLMA 1 is an area frequented by ESA-listed species (*e.g.*, right, humpback and fin whales and leatherback sea turtles) that are known to become entangled in lobster trap gear. Leatherback sea turtles are typically considered a pelagic species but do occur in nearshore waters, apparently in search of their jellyfish prey. One hundred leatherback sea turtle entanglements in lobster trap gear were recorded for Massachusetts and Maine waters during the 15 year period from 1986-2000. The Cape Cod Bay right whale critical habitat lies within FLMA 1 as does a portion of SAM West. Both are known concentration areas for foraging right whales. Right whales are also known to occur in FLMAs 2, 2/3, and the Outer Cape (AOC). Some portion of the Great South Channel (GSC) right whale critical habitat lies within FLMAs 2, 2/3 and the AOC, although the majority of the GSC lies within FLMA 3. A portion of SAM West, a known foraging area for right whales, lies within FLMA AOC. Humpback whales and fin whales are also known to occur within FLMAs 2, 2/3, and the AOC, and humpback whales are frequently sighted on Stellwagen Bank which lies within FLMA 1.

Sperms whales, sei whales and loggerhead sea turtles would be less affected by shifts in lobster trap gear to nearshore areas as compared to right whales, humpback whales, fin whales and leatherback sea turtles for the following reasons. Sperm whales are typically found in deeper, offshore waters and increased lobster gear in nearshore FLMAs is not likely to affect sperm whales. Sei whales also frequent deep waters. Therefore, this species is also less likely to be affected by a shift in effort to nearshore areas as compared to other cetacean species (*i.e.*, right, humpback and fin whales). Loggerhead sea turtles occur seasonally in New England waters (summer through fall) but loggerheads are not typically found north of Cape Cod (CeTAP 1982; NEFSC survey data 1999; STSSN database). Therefore, shifts in effort to FLMA 1, in particular, are not expected to affect loggerhead sea turtles.

(4) *Factors that reduce the risk of entanglement in trap/pot gear* - As described previously, the amount of lobster gear currently being fished cannot be quantified. For the same reasons, NMFS cannot quantify the amount of gear that will be displaced from FLMAs 3, 4 and 5 or where and how much of this gear will be fished in nearshore FLMAs. Given the many limitations of our knowledge of the federal lobster fishery, and based on the number of fishers anticipated to qualify for FLMAs 3, 4, and 5, and the alternative areas selected by potentially displaced fishers, NMFS can only anticipate that some amount of gear currently being fished in FLMAs 3, 4, and 5 will be displaced and moved into other FLMAs, primarily FLMA 1. However, several factors may help to mediate the displacement of effort, particularly from FLMA 3. First, fishers displaced from FLMA 3 may not move their gear to a nearshore FLMA if there is a concern for increased gear conflicts or the fisher cannot identify a new area in which to set the gear. Secondly, the lobster resource is a mobile resource. Eighty percent of the fishery occurs in state waters reflecting the prevalence of the species in inshore waters. Lobsters begin to move into deeper waters as water temperatures cool in the fall. Therefore, lobster fishers who fish FLMA 3 and another nearshore area may do so to take advantage of the lobster resource once they move into deeper offshore waters, and may not direct on lobster in FLMA 3 for the entire fishing year. If displaced from FLMA 3 by the proposed action, these "seasonal" offshore fishers are less likely to move their gear into a

nearshore FLMA if the lobsters are not there in sufficient quantities to make fishing the area profitable. As described above, unlike fishers that selected FLMA 3, fishers that selected FLMAs 4 or 5 did not appear to favor any other nearshore area. Instead, fishers selected multiple areas. This suggests that FLMA 4 and 5 fishers that do not exclusively fish these areas are more likely to disperse their fishing effort amongst the remaining nearshore areas; most likely those closest to FLMA's 4 and 5 since trips to further areas (*i.e.*, FLMA 1) would be more costly. This should help to prevent further concentration of gear in areas where ESA-listed species such as right whales, humpback whales, fin whales, and leatherback sea turtles are most likely to occur. Issues listed above for FLMA 3 displaced fishers (*i.e.*, displaced fishers may not move their gear to another nearshore FLMA if there is a concern for increased gear conflicts or the fisher cannot identify a new area in which to set the gear) also apply to non-qualifying FLMA 4 and FLMA 5 lobster trap fishers.

Management measures are also in place to address the risk that lobster trap gear poses to ESA-listed species. As described in Section 2.1, the lobster trap fishery must comply with all requirements of the ALWTRP. The purpose of the ALWTRP, in part, is to reduce serious injury and mortality of large whales (right, humpback, fin, and minke) in trap/pot gear. The June 14, 2001, Opinion for the lobster trap/pot fishery provided a multi-component Reasonable and Prudent Alternative to avoid the likelihood that the lobster trap fishery would result in jeopardy to right whales. The primary components of the RPA (gear modifications, DAM and SAM) have been implemented through rulemaking as part of the ALWTRP. Further gear modifications are anticipated based on the results of on-going gear testing.

Modifications for lobster gear are expected to benefit ESA-listed right, humpback, fin, sei and sperm whales by reducing lines in the water and requiring weak links at the buoy lines. Reducing the number of lines in the water provides a direct and immediate reduction in entanglement risk for large cetaceans. Weak links at the buoy lines are expected to reduce the likelihood of entanglement by increasing the probability that a line sliding through a whale's mouth will break away quickly at the buoy before the whale begins to thrash and becomes more entangled in the gear. Requiring these lines to be knotless at the weak link is expected to help passage of the line through the baleen. Testing on baleen obtained from whale carcasses has shown that knots hinder the passage of line through the baleen.

Dynamic and Seasonal Area Management are directed at right whales and may have some benefit for humpback and fin whales as well when they occur in the same areas as right whales. As mentioned above, a portion of SAM West lies within FLMA 1 and the AOC. Regulations for SAM West require additional modifications for lobster gear set in these waters from March 1 to April 30 (when right whales occur in the area). The gear requirements for SAM West will help to reduce the entanglement risk of lobster gear that may be shifted to the area as a result of the proposed action, or may discourage fishers from setting gear in SAM West where right whales occur. In addition, regulations developed for DAM (applicable north of 40°N) will further help to reduce the entanglement risk for right whales occurring in FLMAs 1, 2, 2/3, 6, and the AOC by further regulating the use of lobster gear within a DAM zone when such a zone is triggered. In addition to these new measures, the whale disentanglement program, another ALWTRP component, has been successful in disentangling many whales.

Although not directed at sea turtles, some of the ALWTRP management measures can also be of benefit to loggerhead and leatherback sea turtles in reducing the risk of entanglement in lobster trap gear. For example, measures that reduce the amount of line in the water will also benefit sea turtles. Measures that restrict or prohibit the use of lobster trap gear in areas where loggerhead and/or leatherback sea turtles also occur are of benefit to these species as well. Management measures that affect the breaking strength of lines (*i.e.*, weak links at the buoy) are not, however, expected to reduce the risk of entanglement for sea turtles in lobster trap gear since it is unlikely that these sea turtles can apply sufficient force to break weak links that were designed for large whales. There is no formal disentanglement program for sea turtles, although disentanglements of leatherback sea turtles from lobster trap gear have been successfully handled in the past by fishermen and designated state authorities.

(5) *Summary of Effects of Gear Entanglement* - The proposed New Hampshire conservation equivalency measure will result in an increase in lobster trap gear as compared to what there would have been absent the proposed action. Leatherback sea turtles may be affected by this action. Although there have been no known observed or reported entanglements of leatherback sea turtles in lobster trap gear within New Hampshire state waters, observer effort in the fishery has been low and entanglements may have gone unreported for various reasons (*i.e.*, fishers released the turtle without further assistance, there was no awareness of the need to report a sea turtle entanglement, *etc.*). In addition, leatherback sea turtle entanglements in lobster trap gear are known to occur in state waters for every other New England and northern Mid-Atlantic state (Appendix 5). Therefore, it is reasonable to conclude that lobster trap gear set in New Hampshire state waters also poses an entanglement risk for leatherback sea turtles, and that increasing the amount of gear set in state waters will increase the risk of entanglement. In addition, there are no existing management measures to help minimize this risk. There are no formal disentanglement programs for leatherback sea turtles entangled in lobster trap gear, and gear modifications (*e.g.*, weak links) intended to reduce serious injuries and mortality to large whales (*e.g.*, right, humpback, fin, and minke) from lobster trap gear are expected to be ineffective for the much smaller leatherback sea turtle. The Seasonal Area Management Areas do not occur within New Hampshire state waters. Therefore, restrictions on the use of lobster gear in these areas is not of benefit to leatherback sea turtles when they occur in New Hampshire state waters. Dynamic Area Management could be applied to New Hampshire state waters but since DAM is based on concentrations of right whales, and right whales are not expected to concentrate in New Hampshire state waters in sufficient numbers to trigger a DAM, it is unlikely that it would be necessary to apply DAM to New Hampshire's state waters.

The proposed revisions to the Federal lobster fishery for historical participation are expected to reduce effort in FLMAs 3, 4 and 5. A reduction of effort in FLMA 3 will benefit right whales, humpback whales, fin whales, sei whales, sperm whales, leatherback sea turtles, and loggerhead sea turtles by reducing the amount of gear in the water that poses an entanglement risk to these species. A reduction of gear in FLMA 3 may be particularly beneficial to right whales which forage in the area (*i.e.*, in and around the GSC right whale critical habitat and in SAM East) since foraging behavior appears to increase the risk of entanglement for baleen whales. Reduction of effort in FLMAs 4 and 5 is also expected to be of some benefit to right whales, humpback whales, fin whales and leatherback sea turtles since their distribution also overlaps with these FLMAs. However, restricting FLMAs 3, 4, and 5 to historical participants is also expected to shift effort from these FLMAs to other nearshore areas where right whales, humpback whales, fin whales, and leatherback sea turtles also occur. An increase in lobster trap gear in the other nearshore areas as a result of effort shifts from FLMAs 3, 4, and 5 could increase the risk of entanglement for these species in lobster trap gear. Permits data as of November 13, 2001, suggests that lobster fishers who do not qualify as historical participants for FLMAs 4 and/or 5 are most likely to redistribute their effort to other nearshore areas, probably those closest to their home port. This could result in increased gear in FLMAs 2, 2/3, 6, and the AOC. Parts of FLMAs 2 and 2/3 lie within the Great South Channel right whale critical habitat and portions of the AOC lies within SAM West; an area where right whales seasonally concentrate for foraging. Lobster trap fishers are also expected to shift their effort to some extent from FLMA 3 to other nearshore areas, most likely FLMA 1. However, although right whale, humpback whale, and fin whale distribution overlaps with FLMAs 1, 2, 2/3, 6 and the AOC, management measures are in place to address the risk of lobster trap gear in these areas during the times that these species, particularly right whales, are present. In addition, some of these measures are also expected to be of benefit to leatherback sea turtles by reducing lines in the water in areas where leatherback sea turtles also occur.

The amount of additional gear proposed to be added to nearshore FLMAs as a result of effort shifts from FLMAs 3, 4, and 5 is unquantifiable, and there is no data relating the risk of entanglement for large whales and sea turtles in trap/pot gear to the concentration of the gear. For the purposes of this Opinion, NMFS is assuming that any vertical line or groundline poses an entanglement risk to right, humpback, fin, sei and sperm whales, and loggerhead and leatherback sea turtles. However, NMFS does not expect an increased take of ESA-listed cetaceans or sea turtles beyond what was anticipated for the fishery in the June 14, 2001, Opinion based on the following:

- effort in the Federal lobster trap fishery, overall, will be reduced as a result of the proposed revisions to the Federal lobster fishery for historical participation;
- the amount of lobster trap gear fished in FLMA 3 will be reduced which will reduce the risk of entanglement in such gear;
- the amount of lobster trap gear fished in FLMAs 4 and 5 will be reduced which will reduce the risk of entanglement in such gear for right whales, humpback whales, fin whales, loggerhead sea turtles, and leatherback sea turtles which are known to migrate through these areas or otherwise occur in the areas at certain times of the year;
- NMFS anticipates that some non-qualifying, displaced fishers will choose not to move their lobster traps into a nearshore FLMA given concerns for gear conflicts and the availability of lobster in nearshore areas at certain times of year, and;
- existing management measures reduce serious injuries and mortality of large whales in lobster trap gear. Some of these are expected to be of benefit to leatherback and loggerhead sea turtles as well by reducing the amount of line in the water.

Therefore, since: (1) trap effort is expected to be reduced in FLMA's 3, 4, and 5, (2) the shift in effort by non-qualified fishers is expected to be less than the level of effort reduction in FLMA's 3, 4, and 5, and (3) existing management measures should help to reduce the risk of interaction between ESA-listed whales and sea turtles from gear that is displaced from FLMA's 3, 4, and 5, then, based on the best currently available information, NMFS does not expect that the risk of entanglement of ESA-listed cetaceans or sea turtles will increase above what was anticipated for the fishery in the June 14, 2001, Opinion as a result of the historical participation program in FLMAs 3, 4, and 5.

NMFS also does not anticipate an increased risk of entanglement of ESA-listed cetaceans or loggerhead sea turtles as a result of the conservation equivalency program for New Hampshire given the limited overlap of these species with New Hampshire state waters and existing management measures that modify operation of lobster trap gear. NMFS is, however, concerned about a potential increase in entanglements of leatherback sea turtles in New Hampshire state waters as a result of the conservation equivalency measure that will increase the amount of lobster trap gear in New Hampshire state waters. The lack of management measures to address leatherback entanglements in lobster trap gear in this area leaves this species vulnerable to such interactions.

5.4.2.1 Estimating the Number of Leatherback Sea Turtles Taken in Trap Gear as a Result of Conservation Equivalency for New Hampshire

The June 14, 2001, Opinion on the lobster fishery anticipated that up to four (4) leatherback sea turtles a year will be taken by entanglement in the federal waters portion of this fishery as a result of interactions with lobster traps. The anticipated takes were calculated based on the number of known leatherback entanglements in lobster trap gear in state waters from 1995-2000 (Appendix 5) multiplied by 20% (the estimated percentage of the lobster trap fishery that occurs in federal waters), plus one additional take based on strandings data. The ITS provided with the June 14, 2001, Opinion did not include the number of takes anticipated to occur in state waters since the agency action affected the federal portion of the fishery, only.

The proposed action would add to the effects of lobster trap gear on leatherback sea turtles as a result of the addition of lobster trap gear to New Hampshire state waters. As a result, additional takes by entanglement of leatherback sea turtles in lobster trap gear are expected. As mentioned above, there have been no known takes of leatherback sea turtles in lobster trap gear set in New Hampshire state waters. However, NMFS believes that it is reasonable to expect takes of leatherback sea turtles in lobster gear set in New Hampshire state waters given that leatherback entanglements in lobster trap gear have been observed/reported for all other states from New York through Maine.

Determining the level of take of leatherback sea turtles in lobster trap gear set in New Hampshire waters is difficult given the lack of data on the relationship between the concentration of lobster trap gear and the level of entanglement risk for leatherback sea turtles. However, data is available on the number of turtle entanglements observed in other states. Using data from 1995-2000 (years when reporting of leatherback entanglements had improved) the average number of leatherback entanglements for the states of Maine through New York (excluding New Hampshire for which there is no data), ranged from 9 - 0.66 observed or reported leatherback turtle entanglements per year. Massachusetts and Rhode Island reported the highest number of leatherback entanglements. This disproportionate number of entanglements may be the result of a higher level of reporting in those states but, more likely, is a reflection of the annual occurrence of leatherback sea turtles in certain areas of Massachusetts (*e.g.*, Cape Cod Bay) and Rhode Island (*e.g.*, Narragansett Bay) in the fall. The number of leatherback entanglements in Massachusetts and Rhode Island waters is, therefore, considered dissimilar to what occurs in New Hampshire waters. For the purposes of this Opinion, NMFS is assuming that the annual number of leatherback sea turtle lobster gear entanglements occurring in New Hampshire state waters is comparable to the number of leatherback turtle-lobster gear entanglements observed and/or reported for Maine and New York waters (0.66 observed/reported entanglements per year). NMFS recognizes that applying the Maine and New York leatherback entanglement data to New Hampshire may overestimate the number of leatherback entanglements that occur in New Hampshire given that: (1) New Hampshire state waters cover less area than either New York or Maine state waters, (2) New Hampshire has fewer state permitted lobster fishers as compared to Maine and New York, and (3) New Hampshire's two-tiered lobster license system implemented as of Year 2000 has resulted in a reduction of lobster trap fishing gear in New Hampshire state waters. Nevertheless, NMFS believes it is appropriate to use the Maine and New York entanglement data to estimate the number of leatherback entanglements in lobster trap gear set in New Hampshire state waters since the number of reported/observed leatherback entanglements underestimates the total number of entanglements that occur, and the proposed action will potentially increase the amount of lobster gear set in New Hampshire state waters (up to 8800 additional traps based on 22 permits holders fishing an additional 400 traps each in New Hampshire state waters) . Finally, as described in the June 14, 2001, Opinion, in the absence of more specific information, NMFS estimates that 20% of leatherback entanglements that are seen in state waters actually occur in federal waters given that approximately 20% of the total lobster trap fishing effort occurs in federal waters. Therefore, the take of leatherback sea turtles in lobster gear set in New Hampshire state waters is anticipated to be 0.52 turtles per year under the current management measures. Since a "part" of a turtle cannot be taken, NMFS anticipates the take of one leatherback turtle for every two years that the fishery operates.

6.0 CUMULATIVE EFFECTS

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.

State Water Fisheries - Commercial fishing activities in state waters are likely to take several protected species. Approximately 80% of the fishery for American lobsters occurs in state waters and many Atlantic states permit coastal gillnetting. However, it is not clear to what extent state-water fisheries may affect listed species differently than the same fisheries operating in Federal waters. Further discussion of state water fisheries is contained in the Environmental Baseline section. The Atlantic Coast Cooperative Statistics Program (ACCSP), a cooperative state-Federal marine and coastal fisheries data collection program, is expected to provide information on takes of protected species in state fisheries and systematically collect fishing effort data. The data will be useful in monitoring impacts of fisheries on ESA listed species. The Commonwealth of Massachusetts developed a conservation plan for right whales in state waters that addresses state fishery interactions. This is expected to reduce the impacts of fixed gear fisheries on right whales in Massachusetts state waters.

Noise Pollution - The potential effects of noise pollution, on marine mammals and sea turtles, range from minor behavioral disturbance to injury and death. The noise level in the ocean is thought to be increasing at a substantial rate due to increases in shipping and other activities, including seismic exploration, offshore drilling and sonar used by military and research vessels. Because under some conditions low frequency sound travels very well through water, few oceans are free of the threat of human noise. While there is no hard evidence of a whale population being adversely impacted by noise, scientists think it is possible that masking, the covering up of one sound by another, could interfere with marine mammals ability to communicate for mating. It is still unclear, however, how noise affects marine organisms. Only a few species of marine mammals have been observed to change behavior when exposed to low level sounds.

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 and the *Cumulative Effects* section describe measures that may ameliorate some of 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 action is not expected to increase the risk of lobster vessel collisions with ESA-listed cetaceans or sea turtles since: (1) the proposed action will not result in an increase in the number of vessels operating in the area, (2) vessels are much smaller than those known to cause serious injury and mortality to large whales, and (3) the vessels will be operated by experienced fishers familiar with the area and, presumably, aware of the risk (to both the animal and vessel) of approaching any of these large marine species.

The proposed action is expected to result in a reduction of effort as a result of limiting participation in FLMAs 3, 4 and 5 and requiring trap reductions over a four-year period for FLMA 3. Protected species known to become entangled in lobster trap gear, namely right, humpback, and fin whales as well as leatherback sea turtles, are expected to benefit from trap gear reductions in FLMAs 3, 4, and 5. Historic participation in FLMAs 3, 4, and 5 may also result in a shift in effort to nearshore areas. However, additional takes of ESA-listed cetaceans and sea turtles are not expected given that the overall effort in the fishery will decrease and there are management measures in place to reduce the number and severity of large whale entanglements in lobster gear. Some of these management measures are expected to be of benefit to sea turtles as well, such as by reducing the amount of line in the water. Sperm whales, and sei whales are not expected to occur in sufficient numbers in affected nearshore areas such that an increase in lobster gear in these areas will result in the addition of adverse affects to these species.

The proposed action for conservation equivalency for New Hampshire would result in the addition of lobster trap gear in New Hampshire waters. As a result, additional takes of leatherback sea turtles in lobster trap gear are expected. There have been no known takes of leatherback sea turtles in New Hampshire state waters. However, NMFS believes takes do occur given that entanglements of this species in lobster trap gear are known to occur in state waters from New York to Maine. Based on the number of leatherback entanglements observed/reported in Maine and New York, NMFS anticipates that approval of the proposed conservation equivalent measure will result in the take of up to one leatherback sea turtle (lethal or non-lethal take) biennially.

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 conservation equivalency for federal lobster fishers who also possess a full-time commercial New Hampshire lobster license will directly affect leatherback sea turtles as a result of entanglement in lobster trap gear set in New Hampshire waters. 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 leatherback sea turtles in lobster trap gear, the proposed measure that would allow federal lobster fishers who also possess a full-time commercial New Hampshire lobster license to fish up to 400 additional lobster traps each in New Hampshire waters can be expected to result in the capturing, injuring, or killing of one leatherback sea turtle biennially, incidental to the use of trap gear in the fishery.

7.1.2 Leatherback Sea Turtles

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. However, the mortality rate of adult, female leatherback turtles has increased over the past ten years, decreasing the potential number of nesting females. Nevertheless, given the small number of additional leatherback turtles anticipated to be taken in the lobster trap fishery, this level of take is not expected to appreciably reduce the number of leatherback sea turtles in the western North Atlantic.

The status of leatherback sea turtles range-wide is of concern. The largest known nesting aggregation of leatherback turtles in the Atlantic Ocean occurs in French Guiana (NMFS SEFSC 2001). This may be the largest nesting aggregation of leatherback turtles in the world and has been declining at about 15% per year since 1987. Spotila *et al.*(1996) have estimated the French Guiana/Suriname nesting female population at 5,100-9,500 per year, and Caribbean populations at 1,400 to 1,800 nesters per year. The Pacific population of leatherback turtles has declined precipitously and is of grave concern. Leatherback survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. Although the extent of impacts to this species are of concern, given that the loss of up to nine (four takes annually as anticipated by the June 14, 2001, Opinion plus an additional take biennially as a result of the conservation equivalency measures for New Hampshire) leatherback sea turtles biennially from the Atlantic population is not expected to reduce the numbers of this population, the proposed action is not expected to appreciably reduce the numbers, distribution, or reproduction of the species overall. Therefore, the lobster fishery may adversely affect leatherback sea turtles but is not expected to 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, sperm whales, loggerhead and leatherback sea turtles, the environmental baseline for the action area, and the effects of the proposed action, it is NMFS' biological opinion that the federal lobster trap fishery as modified by the proposed action is not likely to jeopardize the continued existence of any of these species. Critical habitat for right whales has been designated within the action area, but the action is not likely to affect that critical habitat. Therefore, the proposed action is not likely to destroy or adversely modify designated critical habitat.

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 NMFS action is found to be consistent with section 7(a)(2) of the ESA, section 7(b)(4) of the ESA requires NMFS 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), pursuant to section 7(o) of the ESA.

Anticipated Amount or Extent of Incidental Take

The anticipated take of loggerhead and leatherback sea turtles as provided in the June 14, 2001, Lobster Opinion is:

- 2 takes (lethal or non-lethal) of loggerhead sea turtles annually; and,
- 4 takes (lethal or non-lethal) of leatherback sea turtles annually.

NMFS anticipates the incidental injury or mortality of one additional leatherback sea turtle, biennially, as a result of the use of additional lobster trap gear in New Hampshire waters by federal lobster permit holders who also possess a New Hampshire full-time commercial lobster license. Therefore, the ITS provided in the June 14, 2001, Lobster Opinion is amended as follows:

- 2 takes (lethal or non-lethal) of loggerhead sea turtles **annually**; and,
- 9 takes (lethal or non-lethal) of leatherback sea turtles, **biennially**.

Anticipated Impact of Incidental Take

In the accompanying Opinion, NMFS has determined that this level of anticipated take is not likely to jeopardize the continued existence of leatherback sea turtles.

Reasonable and Prudent Measures and Terms and Conditions

The Reasonable and Prudent Measures and Terms and Conditions provided with the June 14, 2001, Lobster Opinion to minimize the take of sea turtles in the lobster trap fishery remain in effect. These are:

Sea Turtles - NMFS has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles:

1. NMFS shall provide guidance to lobster 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. NMFS' NERO must send a letter to all lobster permit holders that details the accepted protocol for handling turtle that are captured in the fishery.

2. NMFS shall notify all lobster permit holders within 30 days of the beginning of each fishing year of their responsibility to report protected species interactions in the manner agreed to at NERO implementation meetings.

3. NMFS shall evaluate observer information from the lobster fishery, including the percentage of observer coverage, and any other relevant information. NMFS NERO shall also review vessel trip reports submitted by fishers and with these pieces of information 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

In order to be exempt from the prohibitions of section 9 of the ESA, NMFS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Sea Turtles:

1. NMFS' Northeast Regional Sustainable Fisheries Division shall monitor incidental take of sea turtles in this fishery by scheduling observer coverage during the months when turtles are more likely to be present in the area covered by the lobster fishery in Federal waters. Specific gear of concern for sea turtles in the lobster fishery is fixed lobster trap gear.

2. NMFS' Northeast Regional Sustainable Fisheries Division shall continue to distribute information on acceptable techniques for resuscitating and handling sea turtles that are found in 50 CFR part 223.206(d)(1), as follows by September, 2001 (and annually after that):

   "Resuscitation must be attempted on sea turtles that are comatose or inactive but not dead by placing the turtle on its breastplate (plastron) and elevating its hindquarters several inches for a period of 1 hour up to 24 hours. The amount of the elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Sea turtles being resuscitated must be shaded and kept wet or moist. Those that revive and become active must be released over the stern of the boat only when trawls are 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."

   In addition to the techniques outlined above, NMFS shall require all vessels, permitted for Federal lobster fishing, to post the sea turtle handling guidelines inside the wheelhouse (to ensure that the owner passes it on to the captains and that it can be referred to as needed).

   NMFS' Northeast Regional Sustainable Fisheries Division shall inform lobster permit holders that disentanglement of turtles from lines takes priority over transferring catch from traps to vessels. Turtles that are captured alive shall be released uninjured from fishing lines in a manner that minimizes the likelihood of further entanglement or entrapment. Simply cutting lines and leaving entangled gear on the sea turtle is strongly discouraged. If a sea turtle is cut loose with the line attached, the flipper may eventually become occluded, necrotic and infected, and this could lead to mortality. NMFS shall inform lobster permit holders that sea turtles must be disentangled as quickly and carefully and must not be dropped onto the deck.

3. NMFS' Northeast Regional Sustainable Fisheries Division shall monitor incidental takes of listed species in the lobster fishery using a combination of observer programs and mandatory reporting and observations (Vessel Trip Reports). The overall monitoring program shall be designed to (1) detect the adverse effects of the fisheries on listed species, (2) determine actual levels of incidental take in the fisheries, (3) determine when the level of anticipated incidental take is exceeded, and (4) determine the effectiveness of any reasonable and prudent measures and their implementing terms and conditions to minimize the effect of the take on listed species. NMFS' Northeast Regional

Sustainable Fisheries Division shall provide an annual report containing this information, including estimated numbers of each turtle species taken as well as an overall estimate of total sea turtle take.

4. Takes of ESA-listed sea turtles must be reported to the NMFS Northeast Regional Protected Resources Division within 24 hours of returning from the trip in which the incidental take occurred. The reports shall include a description of the animal's condition at the time of release.

5. When it has been determined that 50% of the incidental take level for any of the sea turtle species is reached, NMFS' Northeast Regional Sustainable Fisheries Division shall enter discussions with NMFS' Protected Resources program to identify options for reducing additional sea turtle takes.

6. Each reported entanglement must be evaluated by NMFS in terms of gear characteristics, location, and outcome of the situation and documented accordingly.

7. All available information collected shall be evaluated by NMFS on an annual basis 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.

NMFS anticipates no more than two (2) loggerhead sea turtles will be taken annually, and no more than nine (9) leatherback sea turtles will taken biennially as a result of the federal lobster fishery. A take is counted as any sea turtle that is either captured alive and released, or captured and dead. The extent of incidental take of sea turtles in the lobster fishery may be determined by the number of observed takes, the number of takes calculated to have occurred based on the number of observed takes and the percentage of observer coverage, the number of reported takes, the number of turtles found stranded where the cause of the stranding can be attributed to the lobster fishery, 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, during operation of the lobster fishery, this level of incidental take is met or exceeded, the additional level of take would represent new information requiring reinitiation of 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 June 14, 2001, Opinion provided Conservation Recommendations (#'s 1-14 restated below). In addition to these, the following additional measures (#'s 15-18) are recommended regarding incidental take and leatherback sea turtle conservation:

1. NMFS 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. In order to better understand sea turtle populations and the impacts of incidental take in lobster fisheries, NMFS should support (*i.e.*, fund, advocate, promote) in-water abundance estimates of sea turtles to achieve more accurate status assessments for these species and improve our ability to

monitor them.

3. Once reasonable in-water estimates are obtained, NMFS should also support population viability analyses or other risk analyses of the sea turtle populations affected by the lobster fishery. This will help improve the accuracy of future assessments of the effects of different levels of take on sea turtle populations.

4. NMFS should consider incorporating reporting requirements for listed species into the fishery management plans.

5. NMFS, 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 order to minimize the risks associated with ghost gear, NMFS should assist the USCG in notifying all Atlantic fisheries permit holders of the importance of bringing gear back to shore to be properly discarded. In conjunction with the USCG, fishery councils/commissions, and other appropriate parties, NMFS 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. NMFS should assist the USCG in developing and implementing a program to encourage the fishing industry and other marine operators to bring ghost gear in to port for re-use and recycling. In order to maximize effectiveness of gear marking programs, NMFS should work with the USCG and fishery councils/commissions to develop and implement a lost gear reporting system to tie in with the ghost gear program and consider incorporating this system into future revisions of the appropriate management plans.

7. NMFS 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. NMFS 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.

9. As 'whale safe' gear is developed NMFS should continue to cooperate with the Canadian Government to compare research findings and facilitate implementation in both countries of the most promising technology. In addressing the threat to right whales in gear entanglements, measures that focus only on incidental takes reductions in the U.S. may be insufficient. To achieve comprehensive

right whale take reductions in the north Atlantic fisheries, measures must be found that can be implemented by all fishing fleets in the entire Gulf of Maine. Fishing tactics and modified gear configurations - technical solutions - that allow lobster and gillnet vessels from all fleets to continue to catch target species effectively are likely to be effective solutions, regardless if the gear is set in U.S. or Canadian waters. Continued cooperation between the U.S. and Canada is also encouraged on disentanglement efforts.

10. NMFS should evaluate the effectiveness of the ALWTRP on other large whales that may be affected by fishing gear. The ALWTRP focuses largely on right whales but it has been assumed that other large whales will benefit from measures such as gear modifications. In light of the significant number of humpback whale entanglements, every effort should be made to determine what additional measures are needed to protect humpbacks from serious injury or mortality.

11. NMFS should monitor fishing effort trends (spatial and temporal) to provide consistent oversight of fishing effort trends as they relate to protected species. The data should be provided to resource managers in a GIS format to be used to evaluate the spatial and temporal overlap of fishing effort and right whale concentrations. NMFS should have focused evaluations of the potential effects of amendments/adjustments to the FMP in terms of shifting effort to different areas or into different fisheries.

12. NMFS should review the report from the ship strike workshop (April 11-12, 2001) including recommendations for future actions. NMFS should consider the management options proposed by the ship strike committee of the Northeast right whale implementation team, which may include any or all of the following:

- Routing vessels around areas where there is a high risk of collision between right whales and ships.
- Restricting vessel speed through areas where there is a high risk of collision between right whales and ships.
- Measures such as dedicated visual observers or active sonar systems that might enable vessels to detect and avoid right whales.
- Measures such as acoustic and or visual alarms that might encourage right whales to avoid ships.

13. NMFS shall consider expanding existing critical habitats to accurately reflect what is known about areas used by right whales, including historic distribution.

14. Recent survey data, in conjunction with historic right whale sighting data, suggest that all three existing Critical Habitat areas may need to be revised to accurately reflect what is known about areas used by right whales. New data collected and analyzed by the NEFSC from aerial survey efforts has verified largely opportunistic data from historic sightings regarding the connection between the CCB area, the GSC area and the northern edge of Georges Bank. The implication is that, rather than being separate right whale habitat, they are one connected habitat that flows from west to east during the high use period from January through June. NMFS should consider expansion of critical habitat if it is determined that these areas require special management considerations or protection.

15. NMFS should provide information to lobster fishers on what lobster fishers should do when a sea turtle is found entangled in lobster trap gear (*i.e.*, who to contact, how to approach, etc.).

16. NMFS should work with the ASMFC and other pertinent parties (e.g., state agencies) to collect better information on where lobster gear is being fished, and how much gear is being fished.

17. NMFS should investigate gear modifications that would reduce the number and severity of interactions between leatherback sea turtles and lobster trap gear.

18. NMFS should investigate the feasibility of an "early warning system" to detect when jellyfish concentrations may occur in inshore and nearshore areas where lobster trap gear is also prevalent as an aid to identifying when leatherback entanglements will occur.

11.0 REINITIATION STATEMENT

This concludes formal consultation on the proposed implementation of conservation equivalency for New Hampshire, and historical participation for FLMAs 3, 4, and 5 of the Federal American Lobster regulations. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. If the amount or extent of incidental take is exceeded, NMFS shall immediately reinitiate formal consultation on the Federal lobster fishery.

LITERATURE CITED

Agler, B.A., R.L., Schooley, S.E. Frohock, S.K. Katona, and I.E. Seipt. 1993. Reproduction of photographically identified fin whales, *Balaenoptera physalus*, from the Gulf of Maine. J. Mamm. 74:577-587.

Aguilar, A. and C. Lockyer. 1987. Growth, physical maturity and mortality of fin whales (*Balaenoptera physalus*) inhabiting the temperate waters of the northeast Atlantic. Can. J. Zool. 65:253-264.

Aguilar, R., J. Mas, and X. Pastor. 1995. Impact of Spanish swordfish longline fisheries on the loggerhead sea turtle, *Caretta caretta*, population in the western Mediterranean. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-361:1-6.

Angliss, R.P. and D.P. DeMaster. 1998. Differentiating serious and non-serious injury of marine mammals taken incidental to commercial fishing operations: Report of the serious injury workshop 1-2 April 1997, Silver Spring, Maryland. NOAA Technical Memorandum NMFS-OPR-13. January, 1998.

Angliss, R.P., D.P. DeMaster, and A.L. Lopez. 2001. Alaska marine mammal stock assessments, 2001. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-124, 203 p.

Balazs, G.H. 1985. Impact of ocean debris on marine turtles: entanglement and ingestion. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-54:387-429.

Barlow, J., and P. J. Clapham. 1997. A new birth-interval approach to estimating demographic parameters of humpback whales. Ecology, 78: 535-546.

Bass, A.L., S.P. Epperly, J.Braun, D.W. Owens, and R.M. Patterson. 1998. Natal origin and sex ratios of foraging sea turtles in Pamlico-Abermarle Estuarine Complex. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-415.

Bérubé, M., A. Aguilar, D. Dendanto, F. Larsen, G. Notarbartolo di Sciara, R. Sears, J. Sigurjónsson, J. Urban-Ramirez, and P.J. Palsbøll. 1998. Population genetic structure of North Atlantic and Mediterranean Sea fin whales, *Balaenoptera physalus* (Linnaeus1758): analysis of mitochondrial and nuclear loci, and comparison to the Sea of Cortez fin whale population. Molec. Ecol. 15:585-599.

Best, P.B. 1979. Social organization in sperm whales, *Physeter macrocephalus*, pp. 227-289. In: H.E. Winn and B.L. Olla (eds.), Behavior of marine animals, Vol. 3: Cetaceans. Plenum Press, New York.

Bolten, A.B., K.A. Bjorndal, and H.R. Martins. 1994. Life history model for the loggerhead sea turtle (*Caretta caretta*) populations in the Atlantic: Potential impacts of a longline fishery. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SWFSC-201:48-55.

Bolten, A.B., J.A. Wetherall, G.H. Balazs, and S.G. Pooley (compilers). 1996. Status of marine turtles in the Pacific Ocean relevant to incidental take in the Hawaii-based pelagic longline fishery. U.S. Dept. of Commerce, NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-

230.

Boulon, R., Jr., 2000. Trends in sea turtle strandings, U.S. Virgin Islands: 1982 to 1997. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-436:261-263.

Carretta, J.V., J. Barlow, K.A. Forney, M.M. Muto, and J. Baker. 2001. U.S. Pacific marine mammal stock assessments, 2001. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-317, 280p.

Castroviejo, J., J.B. Juste, J.P. Del Val, R. Castelo, and R. Gil. 1994. Diversity and status of sea turtle species in the Gulf of Guinea islands. Biodiversity and Conservation 3:828-836.

Caswell, H., M. Fujiwara, and S. Brault. 1999. Declining survival probability threatens the North Atlantic right whale. Proc. Nat. Acad. Sci. 96: 3308-3313.

Caulfield, R.A. 1993. Aboriginal subsistence whaling in Greenland: the case of Qeqertarsuaq municipality in West Greenland. Arctic 46:144-155.

Cetacean and Turtle Assessment Program (CeTAP). 1982. Final report or the cetacean and turtle assessment program, University of Rhode Island, to Bureau of Land Management, U.S. Department of the Interior. Ref. No. AA551-CT8-48. 568 pp.

Chan, E.H., and H.C. Liew. 1996. Decline of the leatherback population in Terengganu, Malaysia, 1956-1995. Chelonian Conservation and Biology 2(2):192-203.

Chevalier, J. and Girondot, M. 1998. Nesting dynamics of marine turtles in French Guiana during the 1997 nesting season. Bull. Soc. Herp. Fr., 85-86: 5-19.

Chevalier, J., X. Desbois, and M. Girondot. 1999. The reason for the decline of leatherback turtles *(Dermochelys coriacea)* in French Guiana: a hypothesis p.79-88. In Miaud, C. and R. Guyétant (eds.), Current Studies in Herpetology, Proceedings of the ninth ordinary general meeting of the Societas Europea Herpetologica, 25-29 August 1998 Le Bourget du Lac, France.

Chevalier, J., S. Lochon, J.L. Swinkels, S. Ferraroli, and M. Girondot. in press. Drifnet Fishing in the Maroni Esturary: The Major Reason for the Leatherback Turtle's Decline in the Guianas. Proceedings from the 20th Annual Sea Turtle Symposium on Sea Turtle Biology and Conservation.

Clapham, P.J. 1992. Age at attainment of sexual maturity in humpback whales, *Megaptera novaengliae.* Can. J. Zool. 70:1470-1472.

Clapham, P.J. and C.A. Mayo. 1990. Reproduction of humpback whales (*Megaptera novaengliae*) observed in the Gulf of Maine. Rep. Int. Whal. Commn. Special Issue 12: 171-175.

Clapham, P.J., S.B. Young, and R.L. Brownell. 1999. Baleen whales: Conservation issues and the status of the most endangered populations. Mammal Rev. 29(1):35-60.

Clark, C.W. 1995. Application of U.S. Navy underwater hydrophone arrays for scientific research on whales. Reports of the International Whaling Commission 45: 210-212.

Clarke, M.R. 1962. Stomach contents of a sperm whale caught off Madeira in 1959. Norsk Hvalfangst-tidende 51(5):173-191.

Clarke, M.R. 1980. Cephalapoda in the diet of sperm whales of the Southern Hemisphere and their bearing on sperm whale biology. Discovery Rep. 37:1-324.

Clarke, R. 1954. Open boat whaling in the Azores: the history and present methods of a relic history. Discovery Rep. 26:281-354.

Crouse, D.T. 1999. The consequences of delayed maturity in a human-dominated world. American Fisheries Society Symposium. 23:195-202.

Dutton, P.H., B.W. Bowen, D.W. Owens, A. Barragan, and S.K. Davis. 1999. Global phylogeography of the leatherback turtle (*Dermochelys coriacea*). Journal of Zoology 248:397-409.

Eckert, S.A. 1997. Distant fisheries implicated in the loss of the world's largest leatherback nesting population. Marine Turtle Newsletter. No 78. p.2-7.

Eckert, S.A. 1999. Global distribution of juvenile leatherback turtles. Hubbs Sea World Research Institute Technical Report 99-294.

Eckert, S.A. and J. Lien. 1999. Recommendations for eliminating incidental capture and mortality of leatherback sea turtles, *Dermochelys coriacea*, by commercial fisheries in Trinidad and Tobago. A report to the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). Hubbs-Sea World Research Institute Technical Report No. 2000-310, 7 pp.

Epperly, S.P., J. Braun, A.J. Chester, F.A. Cross, J. Merriner, and P.A. Tester. 1995a. Winter distribution of sea turtles in the vicinity of Cape Hatteras and their interactions with the summer flounder trawl fishery. Bull. Mar. Sci. 56(2):519-540.

Ernst, C.H. and R.W. Barbour. 1972. Turtles of the United States. Univ. Press of Kentucky, Lexington. 347 pp.

Fritts, T.H. 1982. Plastic bags in the intestinal tracts of leatherback marine turtles. Herpetological Review 13(3): 72-73.

Fujiwara, M. and H. Caswell. 2001. Demography of the endangered North Atlantic right whale. Nature 414: 537-541.

Gambell, R. 1993. International management of whales and whaling: an historical review of the regulation of commercial and aboriginal subsistence whaling. Arctic 46:97-107.

Goff, G.P. and J.Lien. 1988. Atlantic leatherback turtle, *Dermochelys coriacea*, in cold water off Newfoundland and Labrador. Can. Field Nat.102(1):1-5.

Graff, D. 1995. Nesting and hunting survey of the turtles of the island of São Tomé. Progress Report July 1995, ECOFAC Componente de São Tomé e Príncipe, 33 pp.

Hain, J.H.W., M.J. Ratnaswamy, R.D. Kenney, and H.E. Winn. 1992. The fin whale, *Balaenoptera physalus*, in waters of the northeastern United States continental shelf. Reports of the International Whaling Commission 42: 653-669.

Hamilton, P.K., M.K. Marx, and S.D. Kraus. 1998. Scarification analysis of North Atlantic right whales (*Eubalaena glacialis*) as a method of assessing human impacts. Final report to the Northeast Fisheries Science Center, NMFS, Contract No. 4EANF-6-0004.

Hamilton, P.K., and C.A. Mayo. 1990. Population characteristics of right whales (*Eubalaena glacialis*) observed in Cape Cod and Massachusetts Bays, 1978-1986. Reports of the International Whaling Commission, Special Issue No. 12: 203-208.

International Whaling Commission [IWC]. 1986. Right whales: past and present status. Reports of the International Whaling Commission, Special Issue No. 10; Cambridge, England.

International Whaling Commission [IWC]. 2001a. Report of the workshop on the comprehensive assessment of right whales: A worldwide comparison. Reports of the International Whaling Commission. Special Issue 2.

International Whaling Commission [IWC]. 2001b. The IWC, Scientific Permits and Japan. Posted at http://www.iwcoffice.org/sciperms.htm.

International Whaling Commission [IWC]. 1992. Report of the comprehensive assessment special meeting on North Atlantic fin whales. Reports of the International Whaling Commission 42:595-644.

Kenney, R.D. 2000. Are right whales starving? Electronic newsletter of the Center for Coastal Studies, posted at www.coastalstudies.org/entanglementupdate/kenney1.html on November 29, 2000. 5pp.

Kenney, R.D., M.A.M. Hyman, R.E. Owen, G.P. Scott, and H.E. Winn. 1986. Estimation of prey densities required by Western North Atlantic right whales. Mar. Mamm. Sci. 2(1): 1-13.

Knowlton, A.R. and S.D. Kraus. 2001. Mortality and serious injury of northern right whales (*Eubalaena glacialis*) in the western North Atlantic Ocean. J. Cetacean Res. Manage.

Knowlton, A. R., J. Sigurjonsson, J.N. Ciano, and S.D. Kraus. 1992. Long-distance movements of North Atlantic right whales (*Eubalaena glacialis*). Mar. Mamm. Sci. 8(4): 397-405.

Knowlton, A.R., S.D. Kraus, and R.D. Kenney. 1994. Reproduction in North Atlantic right whales (*Eubalaena glacialis*). Can. J. Zool. 72: 1297-1305.

Kraus, S.D. 1990. Rates and Potential Causes of Mortality in North Atlantic Right Whales (*Eubaleana glacialis*). Mar. Mamm. Sci. 6(4):278-291.

Lageux, C.J., C. Campbell, L.H. Herbst, A.R. Knowlton and B. Weigle. 1998. Demography of marine turtles harvested by Miskitu Indians of Atlantic Nicaragua. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-412:90.

Laist, D.W., A.R. Knowlton, J.G. Mead, A.S. Collet, M. Podesta. 2001. Collisions between ships and whales. Marine Mammal Science 17(1):35-75.

Leatherwood, S., and R.R. Reeves. 1983. The Sierra Club handbook of whales and dolphins. Sierra Club Books, San Francisco, California. 302 pp.

Lutcavage, M.E., P. Plotkin, B. Witherington, and P.L. Lutz. 1997. Human impacts on sea turtle survival, p 387-409. In P.L. Lutz and J.A. Musick, (eds), The Biology of Sea Turtles, CRC Press, Boca Raton, Florida. 432 pp.

Malik, S., M. W. Brown, S.D. Kraus and B. N. White. 2000. Analysis of mitochondrial DNA diversity within and between North and South Atlantic right whales. Mar. Mammal Sci. 16:545-558.

Marcano, L.A. and J.J. Alio-M. 2000. Incidental capture of sea turtles by the industrial shrimping fleet off northwestern Venezuela. U.S. department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-436:107.

Mate, B.M., S.L. Nieukirk, and S.D. Kraus. 1997. Satellite monitored movements of the North Atlantic right whale. J. Wildl. Manage. 61:1393-1405.

McCracken, M.L. 2000. Estimation of sea turtle take and mortality in the Hawaiian longline fisheries. Southwest Fisheries Science Center Administrative Report H-00-06. 30pp.

Milton, S.L., S. Leone-Kabler, A.A. Schulman, and P.L. Lutz. 1994. Effects of Hurricane Andrew on the sea turtle nesting beaches of South Florida. Bulletin of Marine Science, 54-3:974-981.

Mitchell, E., and D.G. Chapman. 1977. Preliminary assessment of stocks of northwest Atlantic sei whales *(Balaenoptera borealis)*. Reports of the International Whaling Commission, Special Issue No. 1:117-120.

Mizroch, S.A. and A.E. York. 1984. Have pregnancy rates of Southern Hemisphere fin whales, *Balaenoptera physalus*, increased? Reports of the International Whaling Commission, Special Issue No. 6:401-410.

Morreale, S.J. and E.A. Standora. 1998. Vying for the same resources: potential conflict along migratory corridors. Proceedings of the Seventeenth Annual Sea Turtle Symposium. U.S. Dep. Commer. NOAA Tech Memo. NMFS-SEFSC-415. 294pp.

Mrosovsky, N. 1981. Plastic jellyfish. Marine Turtle Newsletter 17:5-6.

Murphy, T.M. and S.R. Hopkins. 1984. Aerial and ground surveys of marine turtle nesting beaches in the southeast region. United States Final Report to NMFS-SEFSC. 73pp.

Musick, J.A. and C.J. Limpus. 1997. Habitat utilization and migration in juvenile sea turtles. Pp. 137-164 In: Lutz, P.L., and J.A. Musick, eds., The Biology of Sea Turtles. CRC Press, New York. 432 pp.

National Research Council. 1990. Decline of the Sea Turtles: Causes and Prevention. Committee on Sea

Turtle Conservation. Natl. Academy Press, Washington, D.C. 259 pp.

NMFS. 1991a. Final recovery plan for the humpback whale (*Megaptera novaeangliae*). Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 105 pp.

NMFS. 1991b. Final recovery plan for the North Atlantic right whale (*Eubalaena glacialis*). Prepared by the Right Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 86 pp.

NMFS. 1998. Unpublished. Draft recovery plans for the fin whale (*Balaenoptera physalus*) and sei whale (*Balaenoptera borealis*). Prepared by R.R. Reeves, G.K. Silber, and P.M. Payne for the National Marine Fisheries Service, Silver Spring, Maryland. July 1998.

NMFS. 1999. Federal Lobster Management in the Exclusive Economic Zone. FINAL Environmental Impact Statement and Regulatory Impact Review. National Marine Fisheries Service Northeast Region. April 28, 1999. 166 pp.

NMFS 2000. Federal Lobster Management in the Exclusive Economic Zone. DRAFT Supplemental Environmental Impact Statement, Regulatory Impact Review and Initial Regulatory Flexibility Analysis. National Marine Fisheries Service Northeast Region. November 2000. 77pp.

NMFS 2001. Biological Opinion. Authorization of fisheries under the Federal Lobster Regulations. June 14, 2001.

NMFS Southeast Fisheries Science Center. 2001. Stock assessments of loggerheads and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. U.S. Department of Commerce, NMFS, Miami, FL, SEFSC Contribution PRD-00/01-08; Parts I-III and Appendices I-IV. NOAA Tech. Memo NMFS-SEFSC-455, 343 pp.

NMFS and U.S. Fish and Wildlife Service (USFWS). 1991a. Recovery plan for U.S. population of loggerhead turtle. National Marine Fisheries Service, Washington, D.C. 64 pp.

NMFS and USFWS. 1992. Recovery plan for leatherback turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C. 65 pp.

NMFS and USFWS. 1995. Status reviews for sea turtles listed under the Endangered Species Act of 1973. National Marine Fisheries Service, Silver Spring, Maryland. 139 pp.

NMFS and USFWS. 1998. Recovery Plan for the U.S. Pacific Population of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, Maryland.

Payne, P.M., D.N. Wiley, S.B. Young, S. Pittman, P.J. Clapham, and J.W.Jossi. 1990. Recent fluctuations in the abundance of baleen whales in the southern Gulf of Maine in relation to changes in selected prey. Fish. Bull. 88 (4): 687-696.

Perry, S.L., D.P. DeMaster, and G.K. Silber. 1999. The great whales: History and status of six species listed as endangered under the U.S. Endangered Species Act of 1973. Mar. Fish. Rev. Special Edition. 61(1): 59-74.

Prescott, R.L. 1988. Leatherbacks in Cape Cod Bay, Massachusetts, 1977-1987, p 83-84 In: B.A. Schroeder (comp.), Proceedings of the Eighth Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFC-214.

Pritchard, P.C.H. 1982. Nesting of the leatherback turtle, *Dermochelys coriacea*, in Pacific, Mexico, with a new estimate of the world population status. Copeia 1982:741-747.

Rebel, T.P. 1974. Sea turtles and the turtle industry of the West Indies, Florida and the Gulf of Mexico. Univ. Miami Press, Coral Gables, Florida.

Richardson, T.H. and J.I. Richardson, C. Ruckdeschel, and M.W. Dix. 1978. Remigration patterns of loggerhead sea turtles *Caretta caretta* nesting on Little Cumberland and Cumberland Islands, Georgia. Mar. Res. Publ, 33:39-44.

Robbins, J., and D. Mattila. 1999. Monitoring entanglement scars on the caudal peduncle of Gulf of Maine humpback whales. Report to the National Marine Fisheries Service. Order No. 40EANF800288. 15 pp.

Sarti, L., S.A. Eckert, and N.T. Garcia. 1998. Estimation of the nesting population size of the leatherback sea turtle, *Dermochelys coriace*a, in the Mexican Pacific during the 1997-98 nesting season. Final Contract Report to National Marine Fisheries Service; La Jolla, California.

Sarti, L., S.Eckert, P.Dutton, A. Barragán, and N. García. 2000. The current situation of the leatherback population on the Pacific coast of Mexico and central America, abundance and distribution of the nestings: an update. Pp. 85-87 *in* Proceedings of the Nineteenth Annual Symposium on Sea Turtle Conservation and Biology, 2-6 March, 1999, South Padre Island, Texas.

Schaeff, C.M., Kraus, S.D., Brown, M.W., Perkins, J.S., Payne, R., and White, B.N. 1997. Comparison of genetic variability of North and South Atlantic right whales (Eubalaena), using DNA fingerprinting. Can. J. Zool. 75:1073-1080.

Schevill, W.E., W.A. Watkins, and K.E. Moore. 1986. Status of *Eubalaena glacialis* off Cape Cod. Reports of the International Whaling Commission, Special Issue No. 10: 79-82.

Schultz, J.P. 1975. Sea turtles nesting in Surinam. Zoologische Verhandelingen (Leiden), Number 143: 172 pp.

Seipt, I., P.J. Clapham, C.A. Mayo, and M.P. Hawvermale. 1990. Population characteristics of individually identified fin whales, *Balaenoptera physalus*, in Massachusetts Bay. Fish. Bull. 88:271-278.

Shoop, C.R. and R.D. Kenney. 1992. Seasonal distributions and abundance of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetol. Monogr. 6: 43-67.

Silber, G.K. and P.J. Clapham. 2001. Updated recovery plan for the western North Atlantic right whale (DRAFT - June 2001). 104 pp.

Spotila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 1996. Worldwide population decline of *Demochelys coriacea*: are leatherback turtles going extinct? Chelonian Conservation and Biology 2(2): 209-222.

Spotila, J.R., R.D. Reina, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 2000. Pacific leatherback turtles face extinction. Nature. 405(6786):529-530.

Suarez, A. 1999. Preliminary data on sea turtle harvest in the Kai Archipelago, Indonesia. Abstract appears in the 2 nd ASEAN Symposium and Workshop on Sea Turtle Biology and Conservation, held from July 15-17, 1999, in Sabah, Malaysia.

Suárez, A., P.H. Dutton, and J. Bakarbessy. In press. Leatherback *(Dermochelys coriacea)* nesting on the north Vogelkop coast of Irian Jaya, Indonesia. Proceedings of the 19th Annual Sea Turtle Symposium.

Swinkels, J.L. and L.H.G. van Tienen. in press. The Leatherback on the Move? Promising News from Suriname. Proceedings from the 20th Annual Sea Turtle Symposium on Sea Turtle Biology and Conservation.

Swingle, W.M., S.G. Barco, T.D. Pitchford, W.A. McLellan, and D.A. Pabst. 1993. Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. Mar. Mamm. Sci. 9: 309-315.

Tillman, M. 2000. Internal memorandum, dated July 18, 2000, from M. Tillman (NMFS- Southwest Fisheries Science Center) to R. McInnis (NMFS - Southwest regional office).

Turtle Expert Working Group (TEWG). 1998. An assessment of the Kemp's ridley (*Lepicochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409. 96 pp.

Turtle Expert Working Group (TEWG). 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the wester North Atlantic. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-444, 115 pp.

Vargo, S., P. Lutz, D. Odell, E. Van Vleep, and G. Bossart. 1986. Final report: Study of effects of oil on marine turtles. Tech. Rep. O.C.S. study MMS 86-0070. Volume 2. 181 pp.

Wallace, N. 1985. Debris entanglement in the marine environment. In Proceedings of the workshop on the fate and impact of marine debris, 27-29 November, 1984, Honolulu, Hawaii, July, 1985. R.S. Shomura and H.O. Yoshida, editors. NOAA-TM-NMFS-SWFC-54.

Waring, G.T., D.L. Palka, P.J. Clapham, S. Swartz, M. Rossman, T. Cole, K.D. Bisack, and L.J. Hansen. 1998. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 1998. NOAA Technical Memorandum NMFS-NE-116.

Waring, G.T., D.L. Palka, P.J. Clapham, S. Swartz, M. Rossman, T. Cole, L.J. Hansen, K.D. Bisack, K. Mullin, R.S. Wells, D.K. Odell, and N.B. Barros. 1999. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 1999. NOAA Technical Memorandum NMFS-NE-153.

Waring, G.T., J.M. Quintal, S.L. Swartz (eds). 2000. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2000. NOAA Technical Memorandum NMFS-NE-162.

Waring, G.T., J.M. Quintal, S.L. Swartz (eds). 2001. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2001. NOAA Technical Memorandum NMFS-NE-168.

Watkins, W.A., and W.E. Schevill. 1982. Observations of right whales (*Eubalaena glacialis*) in Cape Cod waters. Fish. Bull. 80(4): 875-880.

Weisbrod, A.V., D. Shea, M.J. Moore, and J.J. Stegeman. 2000. Organochlorine exposure and bioaccumulation in the endangered Northwest Atlantic right whale (*Eubalaena glacialis*) population. Environmental Toxicology and Chemistry, 19(3):654-666.

Wiley, D.N., R.A. Asmutis, T.D. Pitchford, and D.P. Gannon. 1995. Stranding and mortality of humpback whales, *Megaptera novaengliae*, in the mid-Atlantic and southeast United States, 1985-1992. Fish. Bull., U.S. 93:196-205.

Winn, H.E., C.A. Price, and P.W. Sorensen. 1986. The distributional biology of the right whale (*Eubalaena glacialis*) in the western North Atlantic. Reports of the International Whaling Commission, Special Issue No. 10:129-138.

Witzell, W.N. In preparation. Pelagic loggerhead turtles revisited: Additions to the life history model? 6pp.

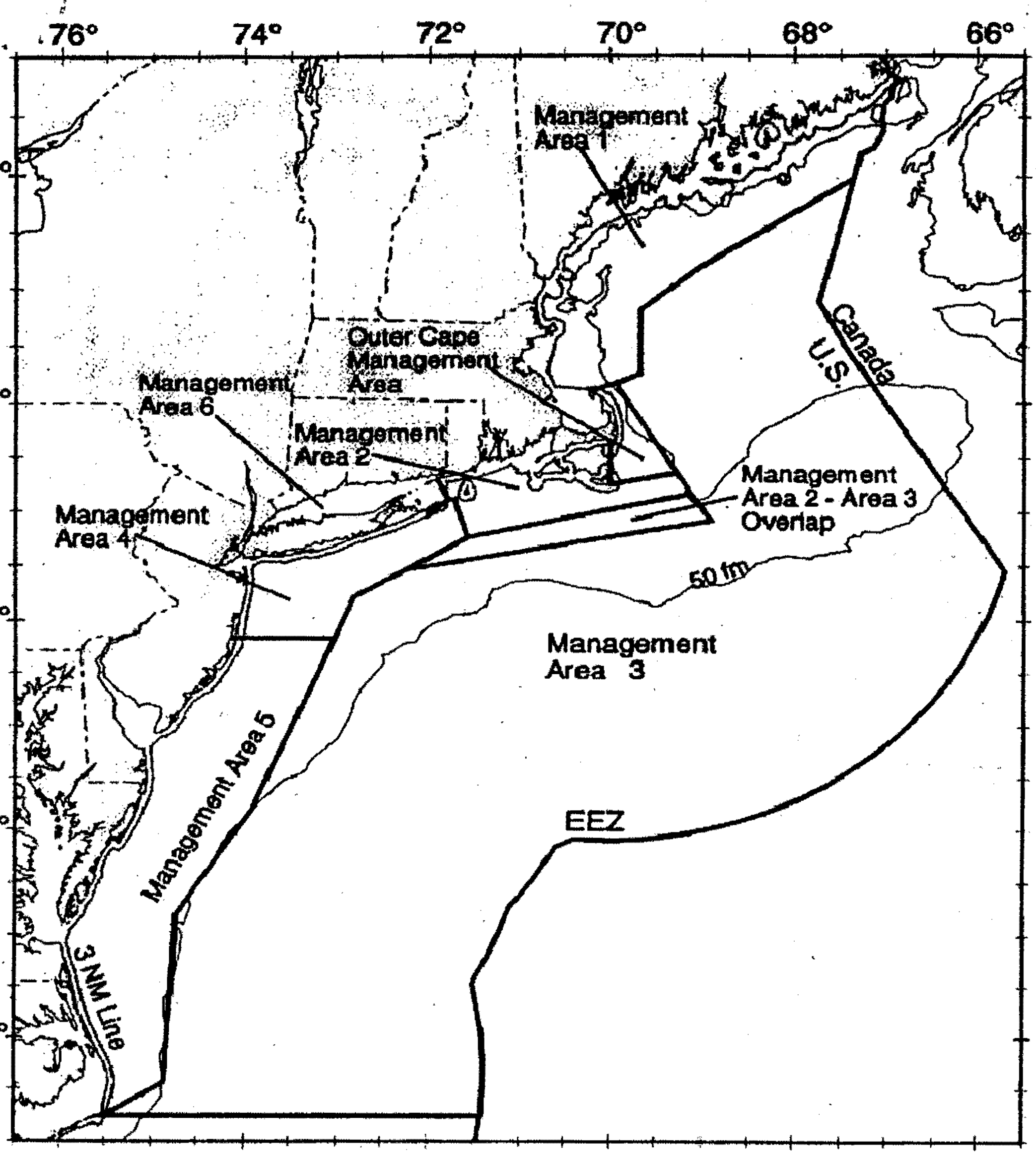
Woodley, T.H., Brown, M.W., Kraus, S.D., and Gaskin, D.E. 1991. Organochlorine levels in North Atlantic right whale (Eubalaena glacialis) blubber. Arch. Environ. Contam. Toxicol. 21:141-145.

Wynne, K. and M. Schwartz. 1999. Guide to marine mammals and turtles of the U.S. Atlantic and Gulf of Mexico. Rhode Island Sea Grant, Narragansett. 115pp.

Zug, G. R. and J.F. Parham. 1996. Age and growth in leatherback turtles, *Dermochelys coriacea*: a skeletochronological analysis. Chelonian Conservation and Biology. 2(2): 244-249.

Appendix 1.

American lobster Management Areas established for the purpose of regional lobster management.



NOAA Fisheries
Northeast Regional Office
Gloucester, MA

Appendix 2. Area 3 Trap Reduction Schedule (NMFS 2000)

Number of Traps Approved by the Regional Administrator	**Trap Allocation by Fishing Year***			
	2002	**2003**	**2004**	**2005 and beyond until changed**
1200-1299	1200	1200	1200	1200
1300-1399	1200	1200	1200	1200
1400-1499	1290	1251	1213	1200
1500-1599	1388	1337	1297	1276
1600-1699	1467	1423	1380	1352
1700-1799	1548	1498	1452	1417
1800-1899	1628	1573	1523	1482
1900-1999	1705	1644	1589	1549
2000-2099	1782	1715	1654	1616
2100-2199	1856	1782	1715	1674
2200-2299	1930	1849	1776	1732
2300-2399	2003	1905	1836	1789
2400-2499	2076	1981	1896	1845
2500-2599	2197	2034	1952	1897
2600-2699	2218	2107	2008	1949
2700-2799	2288	2169	2063	2000
2800-2899	2357	2230	2117	2050
2900-2999	2425	2291	2171	2100
3000-3099	2493	2351	2225	2150
3100-3199	2575	2422	2288	2209
≥3200	2656	2493	2351	2267

* Trap allocations below 1,200 will not be subject to further reductions.

Appendix 3. New observed entanglements and mortalities of right whales for calendar year 2002 (as of 10/23/02).

Entanglements	Right Whale ID #	Date/Location First Observed Entangled	Date Last Observed Not Entangled	Gear[1] Description	Gear ID'd	Last Confirmed Sighting and Status of Entanglement
	1424	02/12/02 - U.S., FL	09/17/01	Line	N	06/18/02 - in U.S. waters & still entangled
	3120	04/07/02 - U.S., NC	12/23/01	Line & buoy	Y[2]	08/24/02 - in Canadian waters & partially disentangled
	3107	07/06/02 - Canada		Line & buoy	Y[3]	Disentangled 09/01/02 in Canadian waters. Seen 09/30/02 east of Cape Cod, MA & found dead on Nantucket, MA on 10/12/02
	1427	07/12/02 - U.S., NJ	2001	Line & buoy	N	07/23/02 - in U.S. waters & still entangled
	2320	08/04/02 - Canada	08/02/02	Line	N	Has not been resighted
	2040	08/10/02 - Canada	02/04/02	Line	N	09/17/02 - in Canadian waters & free of gear (gear shed)
	1815	08/22/02 - Canada	09/20/01	Line	N	Has not been resighted
	ID?	08/30/02 - Canada	need ID	Line	N	09/25/02 - in Canadian waters & still entangled
Mortalities	Right Whale ID #	Date/Location Carcass Observed	Description			
	ID?	06/10/02 - U.S, MA	Year 2002 female calf -No obvious signs of ship strike or entanglement. Advanced decomposition.			
	ID?	07/15/02 - Canada	Some evidence of a ship strike but advanced decomposition			
	ID?	08/22/02 - U.S., NJ	Advanced decomposition - some evidence of a ship strike			
	ID?	09/03/02 - U.S., VA	Advanced decomposition - carcass was not recovered.			
	ID?	09/06/02 - U.S., VA	Advanced decomposition			
	3107	10/12/02 - U.S., MA	1 year old female (Year 2001 calf) - previously entangled - see above			

[1] - animals may be entangled in more than one piece or type of line.
[2] - some line and a buoy were removed from this whale. This gear has been identified by the owner as lobster gear

(last set in Maine state waters in October 2001). Other line of unknown origin remains on the whale.
[5] - gear identified as being consistent with inshore lobster gear.

Appendix 4. The anticipated Incidental Take of loggerhead, leatherback, Kemp's ridley and green sea turtles as currently determined in the most recent Biological Opinion's for NMFS implementation of the Bluefish, Herring, Multispecies, Mackerel/Squid/Butterfish, Monkfish, Red Crab, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Tilefish fishery management plans.

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
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
Monkfish (5/1/02-4/30/02, only)	2 lethal or non-lethal	2 non-loggerhead turtles (green, leatherback, or Kemp's ridley); lethal or non-lethal		
Red Crab	1 lethal or non-lethal	1 lethal or non-lethal	None	None
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 takes -no more than 3 lethal or having ingested the hook	1 lethal or non-lethal take (includes having ingested the hook)	None	None

Appendix 5. Reports of Leatherback Sea Turtles Entangled In or Stranded with Lobster Pot Gear by State.

State	Year	Stranded with gear or evidence of gear	Reported entangled in lobster pot gear	Comments
MA[1]	1990-1994		24	reported to MAWBWS
	1995-2000		45	reported to MAWBWS
	1984-1987		17	reported to MAWBWS; 13 alive & 4 dead
MA[2]	2000		1	reported caught in 4 sets of lobster pots; no rescue
	1997		1	reported entangled in lobster gear; no rescue
	1996		1	reported laboring in lobster gear; no rescue
	1995		1	reported entangled with line around neck
	1995		1	unsuccessful disentanglement attempt
	1995		1	loops of warp around neck; live animal freed of gear
	1995		1	dead animal entangled in lobster gear
	1995		1	report of entangled animal; unable to respond
	1995		1	entangled around front flipper; live animal freed of gear
ME	1999		1	animal reported on 9/2/99 entangled in lobster trap line with 4 buoys attached off S. Portland; successfully disentangled by MALAT; rope burns on neck and left flipper. Same animal reported in same location in new gear on 9/4/99 and disentangled by MALAT again [3].
	1997		1	live; disentangled off Jonesport [3a]
	1997		1	live; disentangled off Schoodic Point [4]
	1995		1	live; disentangled off Isle of Haul [4]
	1986		1	live; disentangled off Mt. Desert Rock [4]
NY[5]	2000		1	dead; gear wrapped around front flippers & towed in by USCG from Shinnecock Inlet
	1999		1 species unconfirmed; consistent w/ loggerhead	live; entangled animal released by USCG 13 miles east of Verrazano Bridge
	1995	1		dead; from Jones Beach wrapped in line and lobster pot around front flippers
	1995		1	live; disentangled off Shinnecock Inlet

NY[6]	1992		1	dead; entangled in lobster gear
	1988		2	live; reported entangled in lobster gear
	1987		5	2 live entangled; 3 dead entangled
	1986		1	dead; entangled in lobster gear
	1980		1	dead; entangled in lobster gear
CT/RI[7]	1987-2000	12		1 leatherback in Fairfield, CT was trailing a lobster pot & had line wrapped around & deeply cutting into both flippers & neck
	1996		1	USCG report of entangled animal
	1995		3	USCG report of entangled animals
	1995		1	USCG successfully disentangled
	1994		1	disentangled by fisherman
	1992		1	report of entangled animal

[1] Pers. Comm. Robert Prescott, Massachusetts Audubon Society Wellfleet Bay Wildlife Sanctuary, Wellfleet, MA.
[2] Pers. Comm. Ed Lyman, Center for Coastal Studies, Provincetown, MA
[3] Pers. Comm. Greg Jakush, Marine Animal Lifeline Assessment Team, Biddeford, ME
[3a] Pers. Comm. Sean Todd, College of the Atlantic, ME.
[4] Pers. Comm. Bob Bowman, Center for Coastal Studies, Provincetown, MA
[5] Pers. Comm. Robert DiGiovanni, Riverhead Foundation for Marine Research, NY
[6] Sadove, S. et al. 1992 Okeanos Ocean Research Foundation Annual Report, Marine Mammal and Sea Turtle Stranding Program
[7] Pers. Comm. Robert Nawojchik, Mystic Aquarium, CT.
[8] McAlpine, D.et al. 2001. Status and conservation of marine turtles in Canadian waters. Unpublished report submitted to Department of Fisheries and Oceans.