ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Action Agency:	National Marine Fisheries Service, Northeast Region Sustainable Fisheries Division
Activity:	Implementation of the Deep-Sea Red Crab, *Chaceon quinquedens*, Fishery Management Plan [Consultation N0. F/NER/2001/01245] GARFO-2001-00002
Consulting Agency:	National Marine Fisheries Service, Northeast Region Protected Resources Division
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Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*; ESA) requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. Agencies generally fulfill this obligation in consultation with either the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (FWS), or both depending on the species or critical habitat their actions may affect. When NMFS or FWS propose actions that may affect listed species or designated critical habitat, they are also required to comply with section 7 of the ESA through consultations. The Sustainable Fisheries Division of NMFS' Northeast Region (NERO) proposed to authorize the action described in this document so that division consulted formally with NMFS' Northeast Region Protected Resources Division; consultation with the FWS was not required because none of the listed species or critical habitat under their jurisdiction would be affected by the proposed action.

This document represents NMFS' biological opinion (Opinion) on the implementation of a new fishery management plan (FMP) for the Deep-Sea Red Crab (*Chaceon quinquedens*) 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 (*Caretta caretta*), and leatherback sea turtles (*Dermochelys coriacea*), in accordance with section 7 of the ESA.

Formal section 7 consultation on NMFS' implementation of the Red Crab FMP was initiated on December 14, 2001. This Opinion is based on information provided by NMFS' Office of Sustainable Fisheries, and other published and unpublished sources of information.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/2001/01245].

1.0 CONSULTATION HISTORY

The red crab fishery was an unregulated fishery until May 8, 2001, when NMFS announced emergency regulations designed to prevent overfishing. These emergency regulations were effective for a 180-day period through November 14, 2001, but were extended for a second 180-day period, effective November 15, 2001 through May 14, 2002. Informal section 7 consultation under the ESA was conducted prior to issuance of the emergency regulations; this consultation concluded that the proposed measures would not adversely affect any ESA-listed species.

Although there are no reports of threatened or endangered species being taken incidental to the red crab fishery, NMFS' Office of Sustainable Fisheries determined that implementation of an FMP for the fishery was likely to adversely affect some listed species based on a review of records of cetacean and sea turtle encounters with trap/pot gear similar to that used in the red crab fishery (especially large whale species and leatherback sea turtles with lobster trap gear). Following this determination, NMFS' Office of Sustainable Fisheries requested formal consultation with NMFS' Office of Protected Resources (on December 14, 2001).

2.0 DESCRIPTION OF THE PROPOSED ACTION

NMFS' Office of Sustainable Fisheries proposes to approve and implement a fishery management plan for a federally-permitted commercial fishery targeting deep-sea red crab outside of state waters and within the Exclusive Economic Zone (EEZ), in conjunction with measures developed by the New England Fishery Management Council (NEFMC). A comprehensive discussion of the current fishery and background for the proposed action, including a more detailed description of the proposed measures, can be found in the proposed FMP and Draft Environmental Impact Statement (DEIS). A summary of the characteristics of the fishery relevant to the analysis of its potential effects on threatened and endangered species is presented below.

2.1 Description of the Current Fishery for Red Crab

There has been a small, directed fishery for red crab off the coast of New England and the Mid-Atlantic since the 1970s. The fishery was fairly consistent through the 1980's but landings steadily increased from the mid-1990s (NEFMC 2001). Overfishing this resource is of particular concern since this family of crabs (Geryonidae) are typically slow-growing and major recruitment events are believed to occur rarely (NEFMC 2001). Faced with increasing landings and increased interest in the fishery from potential new entrants around the country, a group of fishermen approached the NEFMC in late 1999 with a request that the NEFMC manage red crab (NEFMC 2001). In November 1999, the NEFMC agreed to begin development of a new FMP for the deep-sea red crab fishery and began this process (NEFMC 2001). However, additional vessels subsequently entered the fishery prompting concerns that the stock would be overfished. In January 2001, the NEFMC requested that the Secretary of Commerce take emergency action to prevent overfishing in the red crab fishery while the NEFMC continued to develop an FMP. On May 8, 2001, NMFS announced a set of emergency regulations designed to prevent overfishing, for a 180-day period effective May 18 - November 14, 2001 (66 FR 23182). The emergency regulations were extended for a second 180-day period, effective November 15, 2001 - May 14, 2002 (NEFMC 2001).

The emergency regulations are not intended to limit access to the resource, but rather to control the overall fishing pressure and to prevent or eliminate overfishing while the NEFMC develops an FMP. These measures include:

- establishment of a Total Allowable Catch (TAC) of 2.5 million pounds;
- a trip limit of 65,000 pounds whole weight red crab or its equivalent;
- a trap limit of 600 pots;
- an incidental catch limit of 100 pounds of red crab per fishing trip;
- a requirement that any vessel choosing to fish more than the incidental catch to obtain a Letter of Authorization from NMFS, report their landings for each trip, and submit vessel trip reports; and,
- a provision that gives the NMFS Regional Administrator, NERO, the authority to close the directed fishery at any time if it is projected that the TAC will be harvested.

On August 17, 2001, the directed deep-sea red crab fishery was closed when it was determined that the TAC had been exceeded. The fishery remained closed through November 14, 2001. The emergency regulations were subsequently extended until May 14, 2002, and included a new TAC that was adjusted based on the overages from the preceding period. Other management measures remained the same.

The red crab commercial fishery has traditionally been composed of less than six vessels fishing trap gear, only. Initially there were only one or two vessels participating. The fishery appears to have remained small (approximately two vessels) through the mid-1990's. But between 1995 and 2000 there were as many as five vessels in the fishery. These vessels average 96 feet in length, fish between 480-600 crab pots and have the capacity to land an average of approximately 78,000 pounds of red crab per trip. In early 2001, two additional vessels entered the red crab fishery. These are much larger vessels, over 150 feet in overall length, and process as well as catch red crab. Both reportedly have the capacity to fish approximately 1,000 crab pots (although they may fish much less) and may be able to land the equivalent of 288,000 to 516,000 pounds of red crab per trip, depending on the butchering process used (NEFMC 2001).

In the Northeast, deep-sea red crabs are distributed along the continental shelf edge and upper slope from the Scotian Shelf and the Gulf of Maine to Cape Hatteras, occurring mostly between 200-1800 m (NEFMC 2001). Commercial fishing operations for red crab occur from southern New England through the Mid-Atlantic as far south as Norfolk Canyon in deep waters (400-800 meters) (NEFMC 2001). Red crab fishing trips range from seven to ten days (average just over 8 days) with vessels taking 28-35 trips per year. Most fishing trips in the red crab fishery target different areas. Vessels move their gear up and down the coast rather than resetting their gear in the same place. Ports reported as the primary ports for landing of red crab include three ports in Massachusetts, two ports in Rhode Island, and one port each in Maine and Virginia.

As mentioned above, the directed red crab fishery has always used trap gear although there are no regulations preventing the use of other types of gear, such as trawls which incidentally take red crab in other fisheries (*e.g.*, multispecies). The most common trap used is a wood and wire trap measuring 48" x 32" x 28". Traps are set in trawls of typically 90-120 traps per trawl. Red crab fishing vessels use between 480-600 crab pots in their fishing operations with an industry average of 560 pots. There is some amount of gear loss or damage on every trip. The reported average for pot loss or damage is just over 10 pots per trip. The average soak time of the baited traps is 22.5 hours. Traps are hauled one at a time, and the catch sorted immediately. Females and males less than 4" carapace width are returned to the water. Retained crabs are either placed in live wells for transport back to port or butchered and processed on board (NEFMC 2001).

2.2 Proposed Red Crab Fishery Management Plan

The proposed Deep-Sea Red Crab FMP contains several measures to achieve the objectives of preventing overfishing of the resource and overcapitalization of the red crab fishery. Although several alternatives (each a combination of measures) were presented in the DSEIS (NEFMC 2001) and are available for public comment, a preferred alternative has been identified. This Opinion will, therefore, focus on the measures presented in the Preferred Alternative. Five other alternatives were considered by the NEFMC. These alternatives include many of the same measures that form the Preferred Alternative but differ in terms of the principal mechanism to control effort. Non-preferred alternative 1 is the only alternative that does not include a controlled access program. This alternative would control effort through measures similar to those implemented by the emergency regulations (*e.g.*, incidental catch limits, trap limits, gear requirements and restrictions, TAC, trip limits). All other non-preferred alternatives use a controlled access program in combination with other measures such as a hard TAC with trip limits (Alternative 2), hard TAC, trip limits and trap limits (Alternative 3), target TAC with DAS (Alternative 4), and trip limits with authorized DAS (Alternative 6) (NEFMC 2001).

The preferred management strategy for the Red Crab FMP is a controlled access program with Days-At-Sea (DAS) allocations, a target TAC and trip limits. It would include the following measures:

- retention of male crabs only (4" carapace width or larger);
- prohibitions on the full processing of crabs at sea, and claw-snapping;
- an incidental mutilation allowance;
- a limit of 600 traps per vessel;
- a prohibition on the use of parlor traps;
- establishment of the annual TAC based on the target yield (Optimum Yield);
- differential trip limits (initially will be set at 65,000 pounds - the particular approach for setting the differential trip limits in the directed red crab fishery will not be selected until after public hearings);

- qualification criteria for the directed fishery (vessels must demonstrate that their average annual landings of red crabs during the three years prior to the control date were greater than 250,000 pounds);
- vessel transfer and upgrading restrictions;
- equal allocation of DAS based on the estimated average landings per fishing day and the target TAC; and
- maximum DAS carry-over of 10 DAS or 10% of the total allocated DAS, whichever is less.
- permit requirements for vessels and dealers;
- an incidental catch limit of 500 pounds per trip for vessels not permitted in the directed fishery;
- definition of a management unit where the northern and western boundaries will be the U.S. coastline, the eastern boundary will be the Hague Line and the EEZ, and the southern boundary will be Cape Hatteras, North Carolina;
- a fishery-based fishing year (start date to be determined after receiving input from public hearings);
- a definition of "overfishing" for red crab and identification of conditions for determining when red crab is overfished;
- setting of Optimum Yield;
- designation of Essential Fish Habitat;
- an annual specification process for Optimum Yield, TAC, DAS, *etc.*, as well as a framework adjustment process for certain adjustments to the FMP;
- proration of certain measures (*i.e.*, TAC and DAS) if the FMP is approved in the middle of the fishing year;
- identification of other factors necessary to calculate MSY (calculated to be 6.24 million pounds); and,
- gear restrictions, including specified size for escape vents, maximum trap size, trap tags/gear markings, a prohibition on non-trap gear; and compliance with the gear modification requirements in accordance with the Atlantic Large Whale Take Reduction Plan (ALWTRP), including new gear modifications recently approved through rulemaking (67 FR 1300) .

Within the action area for this consultation (this area is described in subsection 2.4; next page), the ALWTRP measures applicable to red crab fishing gear are:

- knotless weak links at the buoy with specified maximum breaking strength
- 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 marking requirements; and,
- no wet storage of gear.

In addition, the NMFS recently issued new rules (67 FR 1133 and 67 FR 1142) for Seasonal Area Management ((SAM); seasonal restrictions of specific fishing areas when right whales are present), and Dynamic Area Management ((DAM);restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly). The new requirements are effective March 1, 2002, and February 8, 2002, respectively. However, the current red crab fishery is not expected to be affected by gear restrictions imposed for SAM since red crab fishing gear is set in areas outside of the SAM area, and DAM is applicable to areas north of 40° N latitude, only, where very little red crab fishing effort occurs.

2.3 Requirements for Northeast 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 Trap/Pot fisheries in Category II. Fishers fishing for red crab using trap/pot gear must abide by the requirements for a Category II fishery. These are:

- Owners of vessels or gear engaging in a Category II 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 II fishery must report all incidental injuries or mortalities of marine mammals that occur during commercial fishing operations to NMFS;
- Fishers participating in a Category II 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 help identify the number and severity of interactions that do occur so action can be taken to reduce the likelihood of additional interactions.

2.4 Action Area

The action area for this consultation is the proposed management unit for the deep-sea red crab FMP. The northern and western boundaries of the management unit will be the U.S. coastline and the eastern boundary will be the Hague Line (the Atlantic boundary between the U.S. and Canada) and the seaward boundary of the EEZ. Four alternatives were considered by the NEFMC in setting the southern boundary of the management unit. Cape Hatteras, North Carolina was selected as the preferred alternative. For the purposes of this Opinion, NMFS will use Cape Hatteras, North Carolina as the southern boundary of the action area since it is the preferred alternative, and since it is the most encompassing of the alternatives considered.

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
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered

NMFS has determined that the action being considered in the Opinion is not expected to affect shortnose sturgeon (*Acipenser brevirostrum*), Gulf of Maine Atlantic salmon (*Salmo salar*), Kemp's ridley sea turtles (*Lepidochelys kempii*), green sea turtles (*Chelonia mydas*), hawksbill sea turtles (*Eretmochelys imbricata*) or 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 adversely affect critical habitat that has been designated for right whales, which occurs within the action area (Cape Cod Bay and Great South Channel). The following discussion summarizes 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 activities proposed to be authorized by the FMP will be conducted in Federal waters beyond where concentrations of shortnose sturgeon are most likely to be found, it is highly unlikely that the action will affect shortnose sturgeon.

The wild population of Atlantic salmon found in rivers and streams from the lower Kennebec River north to the U.S.-Canada border are listed as threatened 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. The numbers of returning wild Atlantic salmon within the Gulf of Maine are perilously small with total run sizes of approximately 150 spawners occurring in 1999 (Baum 2000). Since the activities proposed to be authorized by the FMP will be conducted in Federal waters beyond where concentrations of ESA-listed Atlantic salmon are most likely to be found, it is highly unlikely that the proposed action will affect Atlantic salmon.

Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath *et al.* 1987; Musick and Limpus 1997). As water temperatures along the coast increase, Kemp's ridleys move farther north, as far as Cape Cod. These Mid-Atlantic and Northeast waters appear to be important foraging habitat for juvenile Kemp's ridleys. In the fall, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These juveniles join others from North Carolina sounds to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly *et al.* 1995a; Epperly *et al.* 1995b). Although the foraging range of the Kemp's ridley overlaps with the action area of this consultation, no takes of ridleys in red crab trap gear have been observed or reported and none are expected given the depth at which the gear operates, and the Kemp's ridleys preference for coastal (nearshore), benthic habitat. Therefore, this species will not be considered further in this Opinion.

Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz 1999). Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. In North Carolina, green turtles are known to occur in estuarine and oceanic waters and to nest in low numbers along the entire coast. The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of Chesapeake Bay and as far north as Long Island Sound (Musick and Limpus 1997). However, like Kemp's ridleys, green sea turtles appear to prefer benthic habitat. Therefore, given the depth at which the red crab fishery operates, and based on the lack of documented takes of green sea turtles in the red crab fishery, it is unlikely that the proposed action will affect green sea turtles. This 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, it is unlikely that the proposed action will affect hawksbill sea turtles. This species will not be considered further in this Opinion.

This Opinion will also not consider the effects to blue whales which are not typically found in the action area. They are more 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). 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, there was an unusual influx of blue whales into U.S. waters that year and no recent entanglements of blue whales have been reported from the U.S. Atlantic. Therefore, given the low likelihood of this species in the action area, this species will not be considered further in this Opinion.

Critical habitat for right whales has been designated for Cape Cod Bay, Great South Channel, and coastal Florida and Georgia (outside of the action area for this Opinion). Cape Cod Bay and Great South Channel were designated critical habitat for right whales due to their importance as spring/summer foraging grounds for this species. Although the physical and biological processes shaping acceptable right whale habitat are poorly understood, there is no evidence to suggest that operation of the red crab 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. 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 in review), and other publications (*e.g.*, Perry *et al.* 1999; Clapham *et al.* 1999; IWC *in press*). 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 also available at the same web address.

3.1 Status of whales

All of the cetacean species considered in this Opinion were once the subject of commercial whaling which likely caused their initial decline. Right whales were probably the first large whale to be hunted on a systematic, commercial basis (Clapham *et al.* 1999). Records indicate that right whales in the North Atlantic were subject to commercial whaling as early as 1059. Between the 11th and 17th centuries an estimated 25,000-40,000 North Atlantic right whales are believed to have been taken. World-wide, humpback whales were often the first species to be taken and frequently hunted to commercial extinction (Clapham *et al.* 1999). 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 2001).

All of the cetacean species considered in this Opinion were listed under the ESA at the species level, not at the population level; therefore, any jeopardy determinations need to made by considering the effects of the proposed action on the entire species. Nevertheless, for the purposes of this section 7 consultation, the Opinion will focus on the effects of the proposed action on the specific subpopulations or species groupings that occur in the action area before considering the consequences of those effects on the species as they are listed under the ESA. With respect to right whales, 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." 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 subunits as recovery units whose survival and recovery is critical to the survival and recovery of the species. Consequently, this Opinion will focus on the western North Atlantic recovery unit of right whales which occurs in the action area.

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.

In contrast, the population structure 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). 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). In summary, for the purposes of this Opinion, NMFS will focus on:

- the western North Atlantic recovery unit 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 Western North Atlantic Right Whale

North Atlantic right whales generally occur west of the Gulf Stream and are most commonly associated with cooler waters (21°C). 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 offshore (IWC in press). 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 in press). 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 in press). 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 have 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) have been sighted in recent years (IWC in press) suggesting that the 396 individuals is a close approximation of the entire population[1]. The sightings data and genetics

[1]Since the 1999 IWC workshop there have been at least 32 right whale births (1 in 2000 and 31 in 2001). Four of the 2001 calves are known to be dead and another was not resighted with its mother on the summer foraging grounds. 3 adult right whales are known to have died and 2 are suspected of having died since the 1999 IWC workshop. For the purposes of this Opinion, NMFS considers the best approximation for the number of North Atlantic right whales to be 300 +/- 10% based on the count of known animals minus known and suspected dead animals [(396+32)-(11+7)-(87+3)].

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 in press). 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 population 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 in press). 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's (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 in press).

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.

Summary of Right Whale Status
The right whales prevalence for coastal habitat, its proximity to major shipping lanes, and the mechanism by which it feeds (filtering large volumes of water) likely make it more susceptible to fishing gear entanglements and ship strikes as compared to other cetacean species. In addition, right whales also forage in Canadian waters where the species is afforded less protection, and where fishing gear and large ship traffic is also prevalent. For purposes of this Opinion, the NMFS considers the current size of the western North Atlantic right whale recovery unit to be approximately 300 animals (+/- 10%). Based on recent reviews of the status of right whales (Caswell *et al.* 1999, IWC in press, Knowlton and Kraus 2001), the NMFS also considers that the current trend indicates a decline in calving (for unknown reasons), and high anthropogenic mortality occurring from at least two sources (ship strikes and fishing gear entanglement). Recently, the mortality of mature, reproductively active females appears to have increased, although modeling suggests that population declines resulting from these mortalities could be reversed by preventing the deaths of two, female right whales per year (Fujiwara and Caswell 2001). However, there is no evidence that the decline of this recovery unit has been reversed, particularly given the continuing level of observed anthropogenic interactions. Therefore, for the purposes of this Opinion, NMFS considers the western North Atlantic recovery unit of right whales to be declining.

3.1.2 Gulf of Maine Humpback Whales

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 & 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 population 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. 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
NMFS considers the best estimate for the entire North Atlantic humpback population to be 10,600 but the size of the Gulf of Maine feeding population of humpback whales (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 at 6.5% (Barlow and Clapham 1997).

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). 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 and, after a 12 month gestation, a single calf is born (Mizroch *et al.* 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.

The 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 *et al.* 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 latest (2001- in draft) 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. This is currently an underestimate: we know too little about population structure, and the estimate derives from surveys over a limited portion of the western North Atlantic. There is also not enough information to estimate population trends.

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). 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. In addition to the uncertainty of its population size, there are also uncertainties as to the population structure and population trends. The species does appear to be less affected by fishing gear as compared to right and humpback whales. However, of these three, it is the most commonly struck by large vessels (Laist *et al.* 2001). Some level of whaling for fin whales in the North Atlantic may still occur. Physical maturity may not be reached until 20-30 years (Aguilar and Lockyer 1987).

3.1.4 Nova Scotian 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).

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 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. For purposes of this Opinion, NMFS considers the status of the Nova Scotian population of sei whales to be unknown.

3.1.5 Sperm Whale

Sperm whales inhabit all ocean basins, from equatorial waters to the polar regions (Perry *et al.* 1999). In the western North Atlantic they range from Greenland to the Gulf of Mexico and the Caribbean. 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). In the U.S. EEZ, sperm whales are distributed in a distinct seasonal cycle; concentrated east-northeast of Cape Hatteras in winter and shifting northward in spring when whales are found throughout the Mid-Atlantic Bight. Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring *et al.* 1999). 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 due to human impacts 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. For purposes of this Opinion, NMFS considers the status of sperm whales in the action area to be unknown.

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.

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 (Federal Register 61: 4722-4725). 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). The loss of sea turtle populations in the Atlantic Ocean would result in a significant gap in the distribution of each turtle species, which makes these populations biologically significant. Finally, the loss of these sea turtle populations in the Atlantic Ocean would dramatically reduce the distribution and abundance of these species and would, by itself, appreciably reduce the entire species' likelihood of surviving and recovering in the wild.

Like cetaceans, sea turtles were listed under the ESA at the species level rather than individual populations or recovery units. However, while the loggerhead sea turtle was considered to be a single population in the North Atlantic at the time of listing under the ESA, genetic analyses conducted at nesting sites since the listing indicate the existence of distinct subpopulations (TEWG 2000). These are: (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). 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.

As described above, this Opinion treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations for the purposes of this consultation. 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. In the Pacific Ocean, major nesting grounds are generally located in temperate and subtropical regions, with scattered nesting in the tropics. Loggerhead sea turtles are the most abundant species of sea turtle in U.S. waters, commonly occurring 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).

Pacific Ocean. 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. 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 can also be 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 of 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. 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. With each female producing an average of 4.1 nests in a nesting season, the average number of nesting females per year in the northern subpopulation was 1,524. 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 population based on the number of loggerhead nests has been classified as stable or declining (TEWG 2000). Although nesting data from 1990 to the present for the northern loggerhead subpopulation suggests that nests have been increasing annually (2.8 - 2.9%) (NMFS SEFSC 2001), there are confidence intervals about these estimates that include no growth[2]. Adding to concerns for the long-term stability of the northern subpopulation, genetics data has shown that, unlike the much

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[2] Meta-analyses conducted by NMFS' Southeast Fisheries Science Center to produce these estimates were unweighted analyses and did not consider a beach's relative contribution to the total nesting activity of a subpopulation. Consequently, the results of these analyses must be interpreted with caution.

larger south Florida subpopulation which produces predominantly females (80%), the northern subpopulation produces predominantly males (65%; NMFS SEFSC 2001).

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. Loggerheads appear to concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters off North Carolina during November and December (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.

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 in 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)

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. 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.

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. Although nesting data from 1990 to the present for the northern loggerhead subpopulation suggests that nests have been increasing annually (2.8 - 2.9%) (NMFS SEFSC 2001), there are confidence intervals about these estimates that include no growth. In addition, over half of the hatchlings produced are males (NMFS SEFSC 2001). 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). Over 80% of the hatchlings produced are females. 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 probably 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 like 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. The habitat requirements for post-hatchling leatherbacks are virtually unknown (NMFS and USFWS 1992).

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 this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suarez 1999); unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region where observers report that nesting assemblages are well below abundance levels that were observed several decades ago (for example, Suarez 1999).

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

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches located on the Pacific coast of Mexico support as many as half of all leatherback turtle nests. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 during 1998-99 and 1999-2000 (Sarti *et al.* 2000). Spotila *et al.* (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila *et al.* (2000) estimated that the colony could fall to less than 50 females by 2003-2004.

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

Although all causes of the declines in leatherback turtle colonies have not been documented, Sarti *et al.* (1998) suggest that the 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 are 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 adults 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 and captures in trawl gear. 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. 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). However, 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 (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. 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, the 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 the NMFS to quickly close the area or portions of the area to shrimp fishermen who do not use TEDs with an escape opening large enough to exclude leatherbacks on a short-term basis when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates.

Other emergency measures may also be used to minimize the 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, the 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 17852-17854, April 5, 2000) indicating that NMFS was considering publishing a proposed rule to provide additional protection for leatherback turtles in the shrimp fishery. Subsequently, NMFS requested all shrimp trawlers along the east coast of Florida to the Georgia/Florida border to voluntarily use TEDs modified to release leatherback sea turtles through the end of March 2000 (December 11, 2000 NR00-061). This request had the effect of protecting leatherbacks that tend to stay in the area during the winter Florida shrimp season until the start of the spring migration. Turtle excluder devices are also required in the Mid-Atlantic winter trawl fishery for summer flounder in waters south of Cape Charles, Virginia; however, these small TEDs can not exclude leatherback sea turtles. Although not documented, it is suspected that this and other trawl fisheries may take turtles north of Cape Charles where TEDs are not required.

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) on drift gillnet fisheries in offshore fisheries from Maine to Florida 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 the fishermen after much effort. Five other leatherbacks were released alive from nets set in North Carolina during the spring months: one was from a net (unknown gear) set in the nearshore waters near the North Carolina/Virginia border (1985); two others had been caught in gillnets set off of Beaufort Inlet (1990); a fourth was caught in a gillnet set off of Hatteras Island (1993), and a fifth was caught in a sink net set in New River Inlet (1993). In addition to these, in September 1995 two dead leatherbacks were removed from a large (11-inch) monofilament shark gillnet set in the nearshore waters off of Cape Hatteras, North Carolina.

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
The global status and trend of leatherback turtles is difficult to summarize. In the Pacific Ocean, the abundance of leatherback turtles on nesting colonies has declined dramatically over the past 10 to 20 years: nesting colonies throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females 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 process (50 CFR 402.02). The environmental baseline for this Opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation generally fall into the following three categories: vessel operations, fisheries, and recovery activities associated with reducing those impacts.

4.1 Fishery Operations

Several commercial fisheries use gear that is known to take cetaceans and sea turtles. Federally regulated gillnet, longline, trawl, seine, dredge, and pot fisheries have all been documented as interacting with whales and/or sea turtles. 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, Tilefish, and Atlantic Herring fisheries. An Incidental Take Statement (ITS) has been issued for the take of leatherback sea turtles, amongst others, in each of the fisheries (Appendix 1). A summary of each consultation is provided but more detailed information can be found in the respective Opinions.

The *American lobster pot fishery*. Serious injuries and mortality of endangered whales have occurred as a result of interactions with lobster trap gear. NMFS reinitiated consultation on the lobster fishery on May 4, 2000, as a result of new entanglements of right whales in fixed gear, information on the status of the northern right whale and changes to the ALWTRP measures which modified operation of the lobster fishery. Previous consultations on this fishery had concluded that the fishery would not result in jeopardy to any ESA-listed species under NMFS jurisdiction provided the fishery operated in accordance with measures developed under the ALWTRP. The Opinion concluded on June 14, 2001, that the lobster trap fishery as modified by the existing ALWTRP did not avoid the likelihood of jeopardy for northern right whales. A new RPA was provided that is expected to remove the threat of jeopardy to northern right whales as a result of the continued implementation of the American Lobster FMP. The RPA is composed of several measures but primary amongst these are Seasonal Area Management ((SAM); seasonal restrictions of specific fishing areas when right whales are present), Dynamic Area Management ((DAM); restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly), and gear modifications. The new requirements are effective March 1, 2002, February 8, 2002, and February 11, 2002, respectively; prior to the time when right whale concentrations are expected in Mid-Atlantic and Northeast waters.

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 as well as to consider new information on the status of the northern right whale, and changes to the ALWTRP measures which modified operation of the monkfish gillnet fishery. The June 14, 2001, Opinion concluded that continued implementation of the Monkfish FMP was likely to jeopardize the existence of the northern right whale. A new RPA was provided that is expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the monkfish fishery. This RPA also includes SAM and DAM as described above for the lobster fishery, and gear modifications specific to the gillnet fishery. In addition, a new ITS has been provided for the take of sea turtles in the 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. NMFS reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, following the take of a Kemp's ridley sea turtle in excess of the ITS as well as to consider new information on the status of the northern right whale, and changes to the ALWTRP measures which modified operation of the spiny dogfish gillnet fishery. The June 14, 2001, Opinion concluded that continued implementation of the Spiny Dogfish FMP was likely to jeopardize the existence of the northern right whale. A new RPA was provided that is expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the spiny dogfish fishery. This RPA also includes SAM and DAM as described above for the lobster fishery, and gear modifications specific to the gillnet fishery. In addition, a new ITS has been provided for the take of sea turtles in the fishery.

Multiple gear types are used in the *Northeast Multispecies fishery*. However, the gear type of greatest concern is sink gillnet gear that can capture 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, and 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. Nevertheless, there remains a concern for the take of ESA-listed species in this fishery. In 1999 a right whale mortality occurred as a result of entanglement in gillnet gear that may (but was not determined to be) have originated from the multispecies fishery. NMFS, therefore, reinitiated consultation on the Multispecies FMP on May 4, 2000, in order to reevaluate the ability of the existing RPA to avoid the likelihood of jeopardy to right whales, and the affect of the multispecies 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 on June 14, 2001, that continued implementation of the Multispecies FMP was likely to jeopardize the existence of the northern right whale. The Opinion also concluded that operation of the fishery may adversely affect loggerhead, Kemp's ridley and green sea turtles but would not jeopardize these species. A new RPA has been provided that is expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the multispecies fishery. This RPA also includes SAM, DAM, and gear modifications specific to the multispecies gillnet fishery. These RPA measures are being implemented through rulemaking as described above for the Lobster Opinion. A new ITS for the take of sea turtles in the fishery with Terms and Conditions to minimize sea turtle takes was also provided in the June 14, 2001, Opinion.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Based on occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales, particularly humpback whales. The pot gear and staked trap sectors could also entangle whales and 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 TEDs in nets in the area of greatest bycatch off the North Carolina and part of the Virginia coast. NMFS is considering a more geographically inclusive regulation to require TEDs in trawl fisheries that overlap with sea turtle distribution to reduce the impact from this fishery. Developmental work is also ongoing for a TED that will work in the flynets used in the summer flounder fisheries. Portions of the summer flounder, scup and black sea bass gillnet sector are subject to the ALWTRP and HPTRP since they contribute to the northeast sink gillnet sector (an MMPA Category I fishery) and Mid-Atlantic coastal gillnet fishery (an MMPA Category II fishery). Black sea bass and scup fixed pots are considered lobster traps under the ALWTRP and are also subject to the ALWTRP regulations.

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. Gillnet sectors of this fishery are subject to the requirements of the ALWTRP and the HPTRP as appropriate. 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. An ITS has been issued for the taking of sea turtles and shortnose sturgeon in this fishery.

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. The bluefish fishery is subject to the ALWTRP and HPTRP measures to reduce the risk of entanglement to marine mammals from gillnet gear.

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.

The affects of implementation of the *Atlantic Herring* FMP on ESA-listed right whales, humpback whales, fin whales, sei whales, sperm whales, blue whales, loggerhead, leatherback, Kemp's ridley and green sea turtles, and shortnose sturgeon was completed on September 17, 1999, and concluded that the federal herring fishery was not likely to jeopardize the continued existence of threatened or endangered species or adversely modify designated critical habitat. Since much of the herring fishery occurs in state waters, the fishery is managed in these waters under the guidance of the ASMFC . A new *Atlantic herring 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.

In addition to the above, other federally-regulated fisheries may take sea turtles or cetaceans. 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, the NMFS, Northeast Fisheries Science Center has documented the take of sea turtles in this fishery, and NMFS has initiated formal consultation on the scallop FMP.

4.1.3 Non-Federally Regulated Fisheries

There is limited information on non-federally regulated fisheries occurring in the action area. Several trap/pot 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.

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 Jonah crab fishers use 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 fish traps to obtain lobster for personal use.

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.

4.3 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 North Atlantic right whale population (Kraus 1990) and are known to impact other endangered whales as well. Out of 27 documented right whale mortalities in the 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 also contribute to the potential for impacts. 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); crossing the Bay of Fundy (through right whale summer foraging grounds) in less than half the time as traditional car ferries. The operation of this vessel and other high-speed craft such as high-speed whale watching boats may adversely affect 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 interaction 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 about 16 miles-from identified right whale critical habitat in 2000. 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 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 Activities Designed to Reduce Threats to 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 restrictions 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 ESA. The NEIT provides advice and expertise to address the issues affecting right whale and humpback whale recovery, and is comprised of representatives from federal and state regulatory agencies and private organizations, and is advised by a panel of scientists with expertise in right and humpback whale biology. NEIT activities include: (a) a food web study to provide a better understanding of whale prey resource requirements and the activities that might affect the availability of plankton resources to feeding right whales in the Gulf of Maine, and (b) development of 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 the NMFS operations. Other potential sources of sightings include the U.S. Navy, Northeast

Fisheries Science Center/NOAA and independent research vessels. Canada funded a small number of flights in 2000 in the Bay of Fundy and is expected to do the same this year. The Northeast Fisheries Science Center (NEFSC) conducts aerial surveys, on an annual basis, for cetacean population assessment in the North Atlantic. The principal purpose of the survey effort is to provide an estimation of abundance and determination of population structure of cetaceans. Survey efforts are directed to provide photo identification of right whales in known critical habitat areas and to research other areas of right whale aggregation in the North Atlantic. Aerial survey efforts by the NEFSC have provided initial reports of entangled large whales and provided support for disentanglement efforts. Sighting information from these flights is forwarded to the SAS for fax on demand distribution to mariners.

4.4.2 Education and Outreach Activities

Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. For example, outreach efforts for fishermen under the ALWTRP are fostering a more cooperative relationship between all parties interested in the conservation of threatened and endangered species. 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 array 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 compare them with fishing activity in order to determine whether additional restrictions on fishing operations are needed. 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.

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

The potential for vessels, military activities, fisheries, *etc.* to adversely affect right, humpback, fin, sei and sperm whales as well as loggerhead and leatherback sea turtles remains throughout the action area of this consultation. Recovery actions have been undertaken as described and continue to evolve. However, activities to benefit sea turtles within the action area do not specifically address the activities that cause take (*e.g.*, the stranding network rehabilitates injured sea turtles but does not reduce the chance that further interactions will occur). Activities to benefit cetaceans are in progress but it may be years before a measurable level of benefit to the species is apparent. In addition, these recovery activities may be less effective at reducing the risk of non-regulated fisheries, affecting changes to international shipping, and addressing the disparity for protecting these ESA-listed species when they occur outside of U.S. jurisdiction. Finally, the continuation of many of these activities relies on annual funding which cannot always be guaranteed.

Quantifying the effects of all human impacts on ESA-listed species is difficult. For example, NMFS SEFSC (2001) summarized what is known about the effects of human activities on leatherback populations. However, it was not possible to quantify the total number of turtles affected since some effects cannot be quantified and, for those which can be quantified, values are not directly comparable (some represent estimates, some are observed, observations are at different levels of effort, *etc* .). Nevertheless, even without quantified data, it is obvious that thousands of sea turtles of all species are being taken annually from various activities with varying levels of associated mortality. This means that many of the factors contributing to their original listing have not yet been alleviated, particularly fishing-related mortality; a priority recovery activity. Therefore, minimizing takes of sea turtles in all fishery-related activities is still imperative.

Similarly, while we cannot quantify the effects of all human activities on right whales, humpback whales, fin whales, sei whales and sperm whales, it is apparent that these species continue to be affected by two primary anthropogenic activities; fishing gear entanglements and ship strikes. The extent to which ship strikes and fishing gear entanglements impede the recovery of these species depends, in part, on their current status. For the right whale, minimizing all mortality is vital for this critically endangered species. The Gulf of Maine humpback whale population appears to be increasing. However, the exact population size is undeterminable at this time and the level of fishing gear entanglements, based on scarification analysis, is high. A population estimate cannot be provided for fin, sei, or sperm whales given the lack of information currently available. It is, therefore, prudent to minimize all known activities that result in serious injury or mortality to these species.

Given the current status of threatened and endangered species in the action area, and the magnitude of known and suspected mortalities affecting these species, it is reasonable to assume that the combined effects of factors existing in the environmental baseline hinder the recovery of all of the species considered in this Opinion. For the purposes of this consultation, NMFS will consider that:

- the western North Atlantic recovery unit of right whales is declining;
- the Gulf of Maine feeding group of humpback whales is increasing;
- the status of the fin whale population is unknown;
- the status of the sperm whale population is unknown;
- the status of the Nova Scotian population of sei whales is unknown;
- the northern subpopulation of loggerhead sea turtles is declining (the conservative estimate) or stable (the optimistic estimate)
- the southern Florida subpopulation of loggerhead sea turtles is probably increasing (the optimistic estimate); and
- the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate)

5.0 EFFECTS OF THE PROPOSED ACTION

Pursuant to Section 7(a)(2) of the ESA (16 USC 1536), federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This biological opinion examines the likely effects of the proposed action on listed species within the action area to determine if implementation of the red crab FMP is likely to jeopardize the continued existence of listed species. This analysis is done after careful review of the listed species status and the factors that affect the survival and recovery of that species, as described above.

In this section of a biological opinion, NMFS assesses the direct and indirect effects of the proposed action on threatened and endangered species. The purpose of the assessment is to determine if it is reasonable to expect that the fishery can be expected to have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of surviving and recovering in the wild by reducing their reproduction, numbers, or distribution. Since the proposed action is not expected to affect designated critical habitat, this Opinion will focus only on the jeopardy analysis.

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, including the effects on individuals of threatened or endangered species. The second step determines the reasonableness of expecting threatened or endangered species to experience reductions in reproduction, numbers or distribution in response to these effects. The third step determines if any reductions in a species reproduction, numbers or distribution (identified in the second step of our analysis) will appreciably reduce a listed species likelihood of surviving and recovering in the wild. A species reproduction, numbers, and distribution are interdependent. Reducing a species reproduction will reduce its population size; reducing a species population size will usually reduce its reproduction, particularly if those reductions decrease the number of adult females or the number of young that recruit into the breeding population; and reductions in a species reproduction and population size normally precede reductions in a species distribution.

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

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

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

5.2 Scope of the Analyses

As discussed in the *Description of the Proposed Action*, the activity being considered by NMFS is the implementation of a new FMP for the deep-sea red crab fishery. The Preferred Alternative includes a controlled access program with Days-At-Sea (DAS) allocations, a target Total Allowable Catch (TAC), trip limits, and permitting requirements. Five other alternatives were considered by the NEFMC. These alternatives include many of the same measures that form the Preferred Alternative but differ in terms of the principal mechanism to control effort. Non-preferred alternative 1 is the only alternative that does not include a controlled access program. For the purposes of this Opinion, NMFS is considering the effects to ESA-listed species of the Preferred Alternative, only. If a different alternative is selected for the FMP, NMFS will consider the new information and determine whether it is necessary to reinitiate consultation.

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Right whales, humpback whales, fin whales, sei whales, sperm whales, loggerhead sea turtles, and leatherback sea turtles are known to suffer injuries and mortality as a result of vessel strikes, and some of these are also known to be taken in trap/pot gear. Implementation of the red crab fishery may, therefore, affect protected species as a result of vessel interactions and/or gear interactions that occur as a result of operation of the fishery. 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 Federally-regulated red crab 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. 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 as a result of implementation of an FMP for red crab 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.* in review), scientific literature (Laist *et al.* 2000; Perry *et al.* 1999; Clapham *et al.* 1999; IWC 2001 *in press*), and data collected by the STSSN. Other sources of information are cited below.

5.4 Effects of the Implementation of the Deep-Sea Red Crab FMP

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* - For cetaceans, a great majority of ship strikes seem to occur over or near the continental shelf; probably reflecting the concentration of vessel traffic and whales in these areas (Laist *et al.* 2001). Other factors which may contribute to a whale being struck include the amount of time spent at the surface, the use of habitats in the vicinity of major shipping lanes, and the speed at which the animal travels (Clapham *et al.* 1999). North Atlantic right whales qualify in all three categories (Clapham *et al.* 1999).

Based on an assessment of 58 collisions between whales and vessels ocean-wide, it appears that all sizes and types of vessels can hit whales. However, the most severe or lethal injuries are caused by ships 80 m or longer, and vessels traveling 14 kn or faster (Laist *et al.* 2001). The massive nature of most blunt trauma and propellor injuries observed on dead ship-struck whales also suggests that most, if not all, lethal collisions are caused by large ships rather than small vessels (Laist *et al.* 2001). The vessels used in the deep-sea red crab fishery are medium to large sized fishing vessels in the range of 72-150 feet (22-46 m) in length; far less than the size of vessels known to pose the most likely risk of serious injury and mortality to large whales. The largest of these are the catcher-processor vessels that entered the fishery in 2001. Vessels typically used in the fishery are at the lower end of that range.

Information is lacking on the type 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). Although little is known about a sea turtle's reaction to vessel traffic, it is generally assumed that turtles are more likely to avoid injury from slower-moving vessels since the turtle has more time to maneuver and avoid the vessel.

(3) *Summary of Effect of Vessel Collisions* - Vessel interactions with protected species are expected to be more likely in areas where vessels and protected species both concentrate. Most of the effort for the red crab fishery occurs along the Continental Shelf edge from 41°N at the Hague line to approximately 36°N at a point east of Cape Hatteras. Based on the CeTAP surveys (1982) fin whales, sperm whales, and loggerhead sea turtles regularly occur in the area where red crab vessels operate (CeTAP 1982). However, as previously described, there are currently only 7-8 vessels in the red crab fishery and the proposed FMP under the Preferred Alternative is expected to limit the fishery to these same (or fewer) vessels. In addition, vessels fish their gear across a large area, and travel to and from seven principal landing ports, extending from Maine to Virginia.

Therefore, given the best available information, it is deemed unlikely that any vessel participating in the proposed activity will strike a right whale, humpback whale, fin whale, sei whale, sperm whale, or loggerhead or leatherback sea turtle in the action area other than by random chance given that: (1) vessels are much smaller than those known to cause serious injury and mortality to large whales, (2) there is limited overlap of protected species and vessel activity considering the small number of vessels expected to participate in the activity, and (3) the vessels will be operated by experienced fishers familiar with the area, and the presence of these species.

5.4.2 Effect of Trap/Pot Fishery

(1) *Effects of entanglement* - The red crab fishery uses pot/trap gear similar to that used in the offshore lobster trap/pot fishery. This gear consists of baited traps to catch the targeted species, fished in groups of 90-120 traps attached in series by line, and with at least one buoy line (or more often two) at the end of a series of traps to mark the location of the gear. Additional line at or near the surface 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.

Right whales, humpback whales, fin whales, sei whales, sperm whales, and leatherback sea turtles cannot get caught in the trap itself as the trap is smaller than any of these species. In addition, right, humpback, fin, sei whales, sperm whales, loggerhead and leatherback sea turtles would not be expected to be attracted to the bait used in red crab traps since the bait is inconsistent with their typical prey (*i.e.*, zooplankton, jellyfish, live fish, crabs). Whales and sea turtles may, however, become entangled in lines associated with pot/trap gear (*e.g.*, buoy lines, groundlines).

It is surmised that when the whale encounters a line, it may move along that line until it comes up against something such as a buoy. The buoy can then be caught in the baleen (in the case of whales), against a flipper or on some other body part. When the animal feels the resistance of the gear, it likely thrashes, which may cause it to become entangled in the lines. For large whales, there are generally three areas of entanglement: 1) the gape of the mouth, 2) around the flippers, and 3) around the tail stock. If the line is attached to gear too heavy for the whale to move, drowning may result. 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 may 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. The circumstances surrounding entanglement of loggerheads in the lines associated with lobster trap gear or lobster trap-like gear are unknown. Loggerheads are known to become entangled in the "bridles" of conch pots. However, these traps are of a different design than lobster or red crab pots which do not include a "bridle". Regardless, 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). Constriction of the neck and flippers can amputate limbs leading to death by infection. If the turtle is cut loose with line attached, the flipper may eventually become occluded, infected and necrotic. Entangled sea turtles can also be more vulnerable to collision with boats, particularly if the entanglement occurs at or near the surface (Lutcavage *et al.* 1997). 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 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.

(2) *Factors contributing to entanglement* - Several factors likely 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 in its baleen the horizontal line that occurs between traps, the traps at either end 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. An attraction to bait used in pots or an attraction to the prey species itself has been suggested as a contributor to the entanglement of loggerhead sea turtles in conch and crab pots. However, there is no information to suggest that loggerheads are attracted to the bait or prey of red crab or similarly configured lobster pots. Previous entanglements of loggerheads in lobster pot gear are more likely a reflection of the high concentration of this gear in some areas where loggerhead sea turtles occur. Certain gear configurations such as longer floating lines (such as the floating polypropylene line between traps) or thinner, more flexible lines associated with some trap fisheries (*e.g.*, lobster) may also be more likely to hold wraps on turtle flippers once an entanglement occurs.

The location of the fishery in relation to the listed species is also a factor influencing the likelihood that a gear entanglement will occur. As described previously, commercial fishing operations for red crab occur from southern New England through the Mid-Atlantic as far south as Norfolk Canyon in deep waters (400-800 meters) (NEFMC 2001), from approximately 41°N at the Hague line to 36°N at a point east of Cape Hatteras, North Carolina. Right, humpback fin, sei, and sperm whales may all occur in the area but fin and sperm whales occur in the greatest concentrations, and occur in the area throughout the year. Right whales, humpback whales, and sei whales are not known to concentrate in the area. In addition, given the depths at which red crab gear is set, baleen whales (*i.e.*, fin whales) would be more likely to become entangled in buoy lines that rise to the surface rather than lines between traps which occur at 400-800 m. All of the line used for red crab gear may pose an entanglement risk for sperm whales given the greater depths at which they feed as compared to baleen whales. Surface lines associated with red crab gear may also present an entanglement risk for leatherback and loggerhead sea turtles that occur in the area, particularly in the spring for both species as well as in the fall for leatherbacks and the summer for loggerheads when they are typically more numerous in the action area.

3) *Actions to reduce the risk of entanglement in trap/pot gear* - As described previously in Section 2.2, gear requirements for the proposed FMP include compliance with the ALWTRP; a plan to reduce serious injury and mortality of large whales (right, humpback, fin, and minke) in trap/pot gear. ALWTRP gear requirements include gear marking, no wet storage of gear, use of weak links in buoy lines, and a specified breaking strength for weak links. In addition, the NMFS recently issued new rules for Seasonal Area Management (seasonal restrictions of specific fishing areas when right whales are present), and Dynamic Area Management (restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly) that were developed in accordance with the ALWTRP. The new requirements are effective March 1, 2002, and February 8, 2002, respectively. However, the current red crab fishery is not expected to be affected by gear restrictions imposed for SAM since red crab fishing gear is set in areas outside of the SAM area. In addition, Dynamic Area Management is applicable to areas north of 40° N latitude, only, where very little red crab fishing effort occurs.

The whale disentanglement program, another ALWTRP component, has been successful in disentangling many whales. The Disentanglement Program reduces the likelihood that entanglements will result in serious injury or mortality, although not all whales can be disentangled and scarification analysis of right and humpback whales suggests that many entanglements are not detected.

Finally, the large size of red crab trawls (90-120 traps per trawl) helps to minimize the amount of line in the water, specifically vertical buoy lines. This should be of some benefit to all ESA-listed species that occur in the area where red crab gear is set. Conversely, the loss of red crab gear (ghost gear) in the fishery poses a risk to ESA-listed species since it continues to present an entanglement risk to ESA-listed species, and results in increased gear in the water as fishers replace lost gear. It should be noted, however, that while not frequently reported, gear loss is not atypical and likely occurs at some level in all fisheries, particularly fixed gear fisheries.

(4) *Summary of Effects of Gear Entanglement* - Red crab gear occurs in an area used by several ESA-listed species, primarily fin whales, sperm whales, loggerhead sea turtles and leatherback sea turtles. Right, humpback and sei whales may also occur in the area. Gear is configured and set in a manner comparable to lobster gear; a gear type known to be an entanglement risk to cetaceans and sea turtles.

There are 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 assumes that any vertical line or floating groundline poses an entanglement risk to right, humpback, fin, sei, and sperm whales, and loggerhead and leatherback sea turtles when distribution of these species overlap with distribution of trap gear. Given the limited overlap of right whales, humpback whales, and sei whales with the area where red crab gear occurs, the Deep-Sea Red Crab FMP is not expected to result in takes of these ESA-listed species as a result of entanglement in trap gear. To the extent that these species do occur in the area where red crab gear is set, the depth at which red crab gear is set, the relatively low concentration of gear in the action area (maximum 600 traps per vessel; up to 8 vessels in the fishery and trawl sizes of 90 -120 traps per trawl), and the existing ALWTRP measures for trap gear should help to further reduce the likelihood that interactions between red crab gear and right, humpback, and sei whales will occur.

Fin whale and sperm whale distribution overlaps with the distribution of red crab gear year round. Loggerhead and leatherback sea turtles may be found in the area where red crab gear is set throughout the year but are most likely to occur in the area during the summer and spring/fall, respectively. As described above, the current red crab fishery is a small fishery of 7-8 vessels. Effort in the fishery is expected to be further limited (*i.e.* fewer vessels, trap limits, TAC). In addition, management measures proposed and in place to reduce the effects of trap gear on protected species should be of benefit to fin and sperm whales (and perhaps also leatherback sea turtles) in reducing the likelihood of interactions with red crab gear, or the severity of interactions that do occur. Other on-going activities, such as disentanglement may help to reduce the severity of an entanglement but does not reduce the chance that entanglement will occur. Nevertheless, given that there is a reasonable likelihood that the distribution of these species will overlap with the distribution of gear used in the red crab fishery, and given that the gear is known to be an entanglement risk to these species causing serious injury and mortality, it is NMFS' opinion that fin whales, sperm whales, leatherback sea turtles, and loggerhead sea turtles may be taken in the red crab fishery as a result of entanglement with trap gear used in the fishery. NMFS realizes that this is a conservative view given the level of effort in the fishery. However, NMFS also believes that this approach is consistent with NMFS' directive 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)], and to avoid Type II errors.

5.4.3 Estimating the Number of Whales and Turtles Taken in Trap/Pot Gear

(1) *Observed take* - There have been no reported takes of ESA-listed species in the deep-sea red crab fishery. There has also been no observer effort in this fishery since it has been an unregulated fishery. Fin whales, loggerhead sea turtles and leatherback sea turtles have been observed entangled in other pot/trap gear including lobster and other crab gear. Identifying gear associated with entanglements is a problem for all species considered in this Opinion. In the case of cetaceans, often the only gear observed or recovered is line. There is currently no way of determining the origin of line that is used in a variety of marine applications, including that used for trap/pot gear. Of the 74 confirmed entanglements for 1997-2000 (includes right whales, humpback whales, fin whales, minke whales and unknown whale species) the gear involved in the entanglement (*i.e.*, pot gear, gillnet gear, trawl gear) was identified in 26 cases. Many more whales bear the scars of entanglements for which there is no information on the type of gear that caused the scarring. Similarly, although a high percentage of stranded leatherbacks show evidence of abrasions on the flippers and neck consistent with entanglement related injuries, it is not possible to accurately determine the level of take attributable to pot/trap fisheries. Therefore, only documented incidents of entangled fin whales, sperm whales, and leatherback sea turtles with trap/pot gear on them have been considered in estimating the anticipated take level for these species in the red crab fishery. In addition, only documented incidents of entangled whales reported for 1997-2000, and of leatherback sea turtles reported for 1995-2000 have been considered in estimating the anticipated take levels given the higher level of reporting in these time periods as compared to previous years. Finally, since NMFS is directed to take a precautionary approach in biological consultations in favor of ESA-listed species and avoid Type II errors, the following assumptions were made:

a) all entanglements of unknown origin could have potentially occurred in the action area, including entanglements first observed in Canadian waters; and,

b) the risk of entanglement in lobster or other trap/pot gear is assumed to be the same as the risk of entanglement in red crab trap gear where the distribution of the species and red crab gear overlap.

(2) *Sea Turtle Incidental Take Levels* - It is very difficult to establish the rate of interactions between sea turtles and red crab gear. As mentioned above, there has been no observer coverage in the red crab fishery, and there has been very little observer coverage in the comparable offshore lobster fishery. The Northeast Fisheries Science Center observed a total of 41 multi-day trips (1948 hauls) in the offshore lobster fishery from May 1994 through December 2000. Seventy-five percent of the coverage was in statistical areas 464, 465, 515, 525, and 562 (some red crab fishing effort occurs in the latter two areas). No incidental take of marine turtles was observed during this period.

From 1983-1997, there have been a total of 4 reported loggerheads entangled in lobster gear. Leatherback entanglements in inshore lobster pot gear, particularly gear set in state waters, have been reported in greater numbers. A total of 119 leatherbacks were reported entangled in lobster gear from New York through Maine from all sources for the years 1980-2000 (Appendix 2). Ninety-two (92) of these events took place from 1990-2000. All of the reported incidents were observed between the months of June and October. Unlike cetaceans, there is no formal disentanglement network for leatherback sea turtles. Therefore the number of leatherback entanglements (and disentanglements) is likely under reported. In addition, leatherback entanglements that occur in offshore areas are less likely to be observed.

The June 14, 2001 Biological Opinion for American Lobster concluded that operation of the fishery was expected to result in the annual take of two loggerhead (lethal or non-lethal), and four leatherbacks (lethal or non-lethal) annually. These numbers were based on a calculation of the average number of leatherback entanglements in lobster gear from 1995-2000 from Maine to New York, and then adjusted, considering that 80% of the lobster fishery effort occurs in state waters and 20% in federal waters. Therefore, the ITS for leatherbacks in the federal lobster fishery was calculated as: ITS = average number of observed/reported leatherback entanglements X 20%. Given the limited information on loggerhead entanglements in the lobster fishery, the anticipated take level for loggerhead sea turtles was estimated to be 50% of the anticipated take of leatherback sea turtles.

Although there are many similarities between the lobster fishery and the red crab fishery, there are also some distinct differences. First, although the exact level of effort in the lobster fishery cannot be quantified, it is clearly much greater than effort in the considerably smaller red crab fishery. For example, there are currently 7-8 vessels in the red crab fishery, fishing up to 600 traps as compared to 2,501 currently active federal lobster permits (*i.e.*, permits renewed for the 2001 fishing year as of January 23, 2002) with each permitted vessel allowed to fish up to 800 or 1800 traps depending on the area fished. State-only licensed lobster trap fishers contribute additional lobster trap gear to the water. There is no state water fishery for red crab since commercial sized crabs do not exist in state waters. Reported takes of leatherbacks in lobster gear have been limited to takes of this species in gear set in state waters in summer and fall months. These takes likely reflect increased concentrations of leatherbacks in inshore waters during these months (probably for feeding). Survey of the Continental Shelf for leatherbacks found that leatherback density was greater in the New York Bight as compared to the shelf edge in the spring, summer and fall, and in the Gulf of Maine in the summer (CeTAP 1982). In addition, it is estimated that 80% of the lobster trap fishery occurs in state waters. Therefore, lobster trap gear is heavily concentrated in (some) state waters whereas red crab gear is not set in state waters. Considering that red crab gear is less concentrated than lobster gear, and leatherbacks are less concentrated in areas where red crab gear occurs as compared to where leatherback entanglements in lobster gear have been reported/observed, the level of take of leatherback sea turtles in the red crab fishery is anticipated to be less than 4 turtles annually. Given the small size of the red crab fishery, the large area over which gear is deployed, and the seasonal occurrence of leatherbacks in the area, NMFS considers the take of leatherback sea turtles unlikely. However, as takes of this species are possible in the red crab fishery, and given that we know documented entanglements underestimate the actual level of entanglement occurring, NMFS anticipates that the red crab fishery may result in the lethal or non-lethal take of one (1) leatherback sea turtle annually.

Based on data from the CeTAP study (1982), concentrations of loggerheads in the area where red crab gear is set are greater than leatherback concentrations. This suggests that take of this species in the red crab fishery may be more likely than for leatherback sea turtles. However, observed/reported takes of loggerhead sea turtles in the lobster trap fishery are far less than for leatherback sea turtles, suggesting that the mechanisms which contribute to leatherback entanglements in lobster gear are not the same for loggerheads. For example, loggerheads may be less attracted to buoys and organisms which colonize buoy lines as compared to leatherback sea turtles given the dietary differences between the species. NMFS, therefore, considers the take of loggerhead sea turtles in the red crab fishery unlikely. Nevertheless, as takes of this species are possible, and given that we know documented entanglements underestimate the actual level of entanglement occurring, NMFS anticipates that the red crab fishery may result in the lethal or non-lethal take of one (1) loggerhead sea turtle annually.

(3) *Cetacean Incidental Take Levels* - Incidental take for cetaceans cannot currently be authorized under a section 7 consultation given that these species are also protected by the MMPA. However, the anticipated level of incidental take of fin whales and sperm whales as a result of the red crab fishery is calculated here in order to determine whether this level of take will result in jeopardy to either of these species. Reports of entangled fin whales documented thus far in 2001 were not considered in estimating the anticipated level of incidental take since analyses of entangling gear, where recovered, are on-going.

A review of 26 records of stranded or floating (dead or injured) fin whales for the period 1992 through 1996 showed that three had formerly been entangled in fishing gear. Five additional fin whales were reported entangled in 1998-1999 in Canada. One of these was identified by Canadian officials as being entangled in Canadian crab pot gear. For the years 1997-2000, 1 of 4 fin whale entanglements purportedly occurred as a result of trap/pot gear. Therefore, this suggests that less than one (1) fin whale may be entangled per year in gear used in the red crab fishery. Although many entangled whales may be freed of gear (either by their own actions or with the assistance of the disentanglement network), given the limited survey coverage in the action area, the limited observer coverage in the fishery, that gear is not continuously tended, and the logistical difficulties of disentanglement efforts in offshore areas, NMFS is taking the risk averse approach and assumes that any entanglement of a fin whale as a result of the red crab fishery may result in mortality.

There is very limited information on entanglement of sperm whales in fishing gear. Known entanglements include an interaction with longline gear, and with net gear (including pelagic driftnet). No sperm whale entanglements in offshore lobster gear have been reported. However, NMFS believes that the paucity of information on sperm whale entanglements in fishing gear is, at least in part, a reflection of their generally offshore distribution where entanglements are less likely to be observed. NMFS, therefore, considers the take of sperm whales in the red crab fishery as unlikely but possible. Given that we know documented entanglements underestimate the actual level of entanglement occurring, NMFS anticipates that the red crab fishery may result in the take of less than one sperm whale annually. NMFS is taking the risk averse approach and assumes that any entanglement of a sperm whale as a result of the red crab fishery may result in mortality given the limited survey coverage in the action area, the limited observer coverage in the fishery, that gear is not continuously tended, and the logistical difficulties of disentanglement efforts in offshore areas.

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 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, vessel interactions with protected species are expected to be more likely in areas where vessels and protected species both concentrate. Most of the effort for the red crab fishery occurs along the Continental Shelf edge from 41°N at the Hague line to approximately 36°N at a point east of Cape Hatteras. Based on the CeTAP surveys (1982) fin whales, sperm whales, and loggerhead sea turtles regularly occur in the area where red crab vessels operate (CeTAP 1982). However, as previously described, there are currently only 7-8 vessels in the red crab fishery and the proposed FMP under the Preferred Alternative is expected to limit the fishery to these same (or fewer) vessels. In addition, vessels fish their gear across a large area, and travel to and from seven principal landing ports, extending from Maine to Virginia. Therefore, based on the most current information available, right whales, humpback whales, fin whales, sei whales, sperm whales, loggerhead and leatherback sea turtles occurring in the action area for this consultation are not expected to be affected by vessel strikes resulting from operation of the red crab fishery given that: (1) vessels are much smaller than those known to cause serious injury and mortality to large whales, (2) there is limited overlap of protected species and vessel activity considering the small number of vessels expected to participate in the activity, and (3) the vessels will be operated by experienced fishers familiar with the area, and the presence of these species. The use of trap/pot gear in the red crab fishery is, however, expected to affect fin whales, sperm whales, loggerhead and leatherback sea turtles as a result of gear entanglements that may result in mortality or serious injury. Although NMFS considers the take of these species in the red crab fishery to be unlikely, takes are possible given that distribution of these species overlap with the distribution of gear used in the fishery, and all of these species (with the exception of sperm whales) are known to have been taken in comparable lobster pot gear. Although measures to reduce the occurrence and severity of entanglements exist (*e.g.*, the disentanglement network, gear modifications) they do not completely remove the opportunity for entanglements to occur.

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 the Deep-Sea Red Crab FMP will directly affect fin whales, sperm whales, loggerhead and leatherback sea turtles as a result of entanglement in red crab trap gear. No other direct or indirect effects to ESA-listed species are expected as a result of the activity.

7.1 Integration and Synthesis of Effects on Cetaceans

Based on past patterns of take of fin and sperm whales in trap/pot gear, the red crab fishery can be expected to capture, injure, or kill less than one fin whale and/or one sperm whale annually incidental to the use of trap/pot gear in the fishery. Since a "part" of a whale cannot be taken, NMFS anticipates that one fin whale and/or one sperm whale may be captured, injured or killed annually as a result of trap/pot gear used in the red crab fishery.

7.1.1 Fin Whales

The latest (2001- in draft) stock assessment report provides the best estimate of abundance for western North Atlantic fin whales of 2,814 (CV = 0.21) (Waring *et al.*, in draft). The minimum population estimate for the western North Atlantic fin whale is 2,362. This is currently an underestimate: we know too little about population structure, and the estimate derives from surveys over a limited portion of the western North Atlantic. There is also not enough information to estimate population trends. In general, known mortalities of fin whales are less than those recorded for right and humpback whales. This may be due in part to the more offshore distribution of fin whales where they are either less likely to encounter entangling gear, or are less likely to be noticed when gear entanglements or vessel strikes do occur. Given that the estimate for western North Atlantic fin whales is believed to be conservative, the loss of one fin whale as a result of trap gear used in the red crab fishery is not expected to reduce the numbers of fin whales in the western North Atlantic.

Although there is no current range-wide estimate for fin whales, available information suggests that fin whales number over 100,000. Given that the species, as a whole, appears to be minimally affected by the effects of ship strikes and fishing gear entanglements, that there is no large-scale harvest of fin whales, and the loss of one fin whale as a result of trap gear used in the red crab fishery is not expected to reduce the numbers of the western North Atlantic population of fin whales, the proposed action is not expected to appreciably reduce the numbers, distribution, or reproduction of this species. Therefore, the red crab fishery may adversely affect fin whales but is not expected to reduce the species' likelihood of surviving and recovering in the wild.

7.1.2 Sperm Whales

The latest (2001 - in draft) SAR gives a best estimate of abundance for sperm whales of 4,702 (CV=0.36). The minimum population estimate for the western North Atlantic sperm whale is 3,505 (CV=0.36). Because the estimates for sperm whales were based on survey data that was not corrected for dive-time, these estimates are likely downwardly biased and underestimate actual abundance of sperm whales (Waring *et al.*, in draft). There are few known anthropogenic mortalities of sperm whales. Because of their general offshore distribution, sperm whales are less likely to be impacted by humans and those impacts that do occur are less likely to be recorded (Waring *et al.* 2000). Given that the estimate for the western North Atlantic population of sperm whales is believed to be conservative, the loss of one sperm whale annually as a result of trap gear used in the red crab fishery is not expected to reduce the numbers of sperm whales in the western North Atlantic.

There are no currently reliable estimates for sperm whale abundance range-wide, but available information suggests they number in the hundreds of thousands. Given that the species, as a whole, appears to be minimally impacted by anthropogenic effects of ship strikes and fishing gear entanglements, that there is no large-scale commercial fishery for sperm whales, and the loss of one sperm whale as a result of trap gear used in the red crab fishery is not expected to reduce the numbers of the western North Atlantic population of sperm whales, the proposed action is not expected to appreciably reduce the numbers, distribution, or reproduction of this species. Therefore, the red crab fishery may adversely affect sperm whales but is not expected to reduce the species' likelihood of surviving and recovering in the wild.

7.2 Integration and Synthesis of Effects on Sea Turtles

Based on past patterns of take of loggerhead and leatherback sea turtles in trap/pot gear, the red crab fishery can be expected to capture, injure, or kill less than one loggerhead and/or one leatherback sea turtle incidental to the use of trap/pot gear in the fishery. Since a "part" of a sea turtle cannot be taken, NMFS anticipates that one loggerhead and/or one leatherback sea turtle may be captured, injured or killed annually as a result of trap/pot gear used in the red crab fishery.

7.2.1 Loggerhead Sea Turtles

As described in the *Status of the Species* section, the threatened loggerhead sea turtle is the most abundant of the sea turtles listed as threatened or endangered in U.S. waters. In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. The southeastern U.S. nesting aggregation is the second largest and represents about 35 percent of the nests of this species. From a global perspective, this U.S. nesting aggregation is critical to the survival of this species. The status of the northern loggerhead subpopulation is, however, of concern. There are only an estimated 3,800 nesting females in the northern loggerhead subpopulation and the status of this northern population, based on number of loggerhead nests, has been classified declining or stable at best (TEWG 2000). Another factor which may add to the vulnerability of the northern subpopulation is that NMFS scientists estimate that the northern subpopulation produces predominantly males (65%). In contrast, the much larger south Florida subpopulation produces predominantly females (80%) (NMFS SEFSC 2001).

NMFS considers the take of loggerhead sea turtles in the red crab fishery to be unlikely. Nevertheless, as takes of this species are possible, and given that we know documented entanglements underestimate the actual level of entanglement occurring, NMFS anticipates that the red crab fishery may result in the lethal or non-lethal take of one (1) loggerhead sea turtle annually.

A study of the nesting origin of foraging loggerhead sea turtles found that the northern loggerhead population and the south Florida population each contributed about 46% of the loggerheads found on foraging grounds north of Cape Hatteras. 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 in northern foraging grounds and less so in southern foraging areas (NMFS SEFSC 2001; Bass *et al.* 1998). Therefore, of those loggerhead takes that do occur in the red crab fishery, there is roughly an equal chance that they will have originated from the south Florida subpopulation as the northern subpopulation. Given the anticipated level of take of loggerhead sea turtles in the red crab fishery, and that half of the takes that might occur would be expected to originate from the (growing) south Florida subpopulation, the take of loggerhead sea turtles in the red crab fishery are not expected to reduce the numbers of loggerhead sea turtles in either the northern loggerhead or south Florida subpopulations.

Loggerheads are faced with anthropogenic effects from a multitude of sources throughout their range, such as fishing gear interactions, poaching, vessel strikes, marine debris and pollution. Although the extent of impacts to this species are of concern, given that the loss of one loggerhead sea turtle annually from either the northern nesting group or South Florida nesting group is not expected to reduce the numbers of these nesting groups, the proposed action is not expected to appreciably reduce the numbers, distribution, or reproduction of the species overall. Therefore, the red crab fishery may adversely affect loggerhead sea turtles but is not expected to reduce the species' likelihood of surviving and recovering in the wild.

7.2.2 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 leatherback turtles anticipated to be taken in the red crab 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 the 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 one leatherback sea turtle annually 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 red crab 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 implementation of the Deep-Sea Red Crab FMP, it is the NMFS biological opinion that the red crab fishery, as currently proposed in the Preferred Alternative, is not likely to jeopardize the continued existence of these ESA-listed 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

NMFS considers the take of loggerhead and leatherback sea turtles in the red crab fishery to be unlikely. However, as takes of these species are possible given their occurrence where red crab trap gear is present, and based on past entanglement reports of these species in other trap/pot gear, NMFS anticipates that the red crab fishery may result in the lethal or non-lethal take of one (1) loggerhead and/or one (1) leatherback sea turtle annually.

NMFS is not including an incidental take authorization for ESA-listed whales at this time because the incidental take of endangered whales cannot be authorized under the provisions of section 101(a)(5) of the Marine Mammal Protection Act or its 1994 Amendments. Following issuance of such regulations or authorizations, NMFS may amend this Biological Opinion to include an incidental take allowance for these species, as appropriate.

Anticipated Impact of Incidental Take

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

Reasonable and Prudent Measures

NMFS has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of loggerhead and leatherback sea turtles in the red crab fishery:

1. NMFS shall provide guidance to red crab trap 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 ensure that a letter is sent to all participants of the red crab fishery that details the accepted protocol for handling loggerhead and leatherback turtles that are captured in the fishery, and provides the contact names and numbers of experienced disentanglement personnel to assist fishers as needed.

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

Terms and Conditions

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. These terms and conditions are non-discretionary.

1. NMFS must provide all participating fishers with a copy of the proposed sea turtle resuscitation and handling techniques [66 FR 32787] and instruct fishers in the resuscitation and handling of sea turtles as follows:

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

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

2. NMFS shall require all vessels participating in the the red crab fishery to post the sea turtle handling guidelines and a turtle identification key in an accessible area of the vessel (*i.e.*, inside the wheelhouse) to ensure that the operator of the vessel is aware of the necessary procedures in the event that a turtle is caught.

3. NMFS shall require all vessels participating in the red crab fishery to report any sea turtles takes to the NMFS NERO Assistant Regional Administrator of Protected Resources Division (telephone 978-281-9116, fax 978-281-9394) within 24 hours of returning from the trip in which the incidental take occurred, including a description of the animals condition at the time of release. This information is in addition to the requirement to report sea turtles takes on the Vessel Trip Reports.

4. 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 that the implementation of the Deep-Sea Red Crab FMP may result in the injury or mortality of sea turtles. NMFS anticipates that 1 loggerhead or 1 leatherback sea turtle take (lethal or non-lethal) may occur annually. A take is counted as any loggerhead or leatherback sea turtle that is either taken alive and released, or dead. The extent of incidental take of loggerhead and leatherback sea turtles in the red crab 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 red crab 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 this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiating consultation and review of the reasonable and prudent measures that have been provided.

10.0 CONSERVATION RECOMMENDATIONS

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

1. 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 the extent of trap/pot fisheries, NMFS should collect information on other pot/trap fisheries, particularly non-regulated fisheries, including information on the level of effort in each fishery and the participants in each fishery.

3. NMFS should support population viability analyses or other risk analyses of the sea turtle populations affected by trap/pot fisheries. This will help improve the accuracy of future assessments of the effects of different levels of take on sea turtle populations.

4. 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.

5. 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.

6. 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.

7. 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.

11.0 REINITIATION STATEMENT

This concludes formal consultation on the implementation of a new FMP for Deep-Sea Red Crab. 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; (4) a new species is listed or critical habitat designated that may be affected by the action; or (5) the RPA is deemed to have failed. If the amount of incidental take is exceeded, NMFS shall immediately reinitiate formal consultation on the deep-sea red crab FMP.

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Appendix 1. 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, American Lobster, Monkfish, Multispecies, Monkfish, Mackerel/Squid/Butterfish, and Spiny Dogfish 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
Lobster	2 lethal or non-lethal	4 lethal or non-lethal	None	None
Mackerel/Squid/ Butterfish	6-no more than 3 lethal	1 lethal or non-lethal	2 lethal or non-lethal	2 lethal or non-lethal
Monkfish - through 4/30/02	6-no more than 4 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
through 4/30/03	3-no more than 2 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
after 4/30/03	None	None	None	None
Multispecies	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Spiny Dogfish	3-no more than 2 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Summer Flounder	15 lethal or non-lethal	3 lethal or non-lethal	3 lethal or non-lethal	3 lethal or non-lethal

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

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[2] Pers. Comm. Ed Lyman, Center for Coastal Studies, Provincetown, MA
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[4] Pers. Comm. Bob Bowman, Center for Coastal Studies, Provincetown, MA
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