Skate

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

BIOLOGICAL OPINION

Action Agency: National Marine Fisheries Service, Northeast Region

Activity: Authorization of fisheries under Skate Fishery Management Plan [Consultation No. F/NER/2003/00751]
GARFO-2003-00002

Consulting Agency: National Marine Fisheries Service, Northeast Region Protected Resources Division

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1.0 CONSULTATION HISTORY

Initiation of Consultation

This document represents the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) on the initial implementation of the Skate Fishery Management Plan (FMP) under section 7 of the Endangered Species Act of 1973, as amended (ESA).

Section 7(a) (2) of the ESA requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When the action of a federal agency may affect a protected species, that agency is required to consult with either NOAA Fisheries or the U.S. Fish and Wildlife Service (FWS), depending upon the protected species that may be affected. For the actions described in this document, the action agency is NOAA Fisheries Northeast Regional Office (NERO). NOAA Fisheries is both the action agency and the consulting agency for this intra-service Section 7 consultation given its dual authorities to implement an FMP for skate under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and to protect marine endangered and threatened species in accordance with the ESA.

The Northeast skate fishery evolved in the 1990's as skates were promoted as "underutilized species," and fishermen shifted effort from groundfish and other troubled fisheries to skates and dogfish.

On January 15, 1999, NOAA Fisheries requested information from the public on barndoor skate for possible inclusion on the list of candidate species under the ESA. On March 4, 1999, NOAA Fisheries received a petition from Green World to list the barndoor skate as an endangered or threatened species and to designate Georges Bank and other appropriate areas as critical habitat. The petitioner also requested that the barndoor skate be listed immediately, as an emergency matter. On April 2, 1999, NOAA Fisheries received a petition from the Center of Marine Conservation (CMC) to list barndoor skate as an endangered species. The second petition was considered by NOAA Fisheries as a comment on the first petition submitted by Green World. Both the petition and the comment referenced a paper in the journal *Science,* which presents data on the decline of barndoor skates (Casey and Myers, 1998). The petition and CMC comment provided the impetus to complete a benchmark stock assessment for the entire skate complex in the Northeast. NOAA Fisheries' final decision was not to list the species as endangered. However, barndoor skate remains on the candidate species list.

The Northeast skate complex was assessed in November 1999 at the 30th Stock Assessment Workshop (SAW 30) in Woods Hole, Massachusetts. The work completed at SAW 30 indicated that four of the seven species of skates were in an overfished condition: winter, barndoor, thorny and smooth. In addition, overfishing was thought to be occurring on winter skate. NOAA Fisheries therefore identified the need to develop an initial Skate FMP to end overfishing and rebuild the resources based on the conclusion presented at SAW 30. In March 2000, NOAA Fisheries informed the New England Fishery Management Council (NEFMC or Council) of its decision to designate the Council as the responsible body for the development of a management program for the seven species included in the Northeast region's skate complex. During the development of the FMP, the Skate Plan Development Team (PDT) continued to update the status determinations for the skate species based on biomass reference points used during SAW 30. Currently (through the Autumn 2001 survey), only two species remain in an overfished condition (barndoor and thorny). The overfished status of these two species necessitates development of new management measures (the first Skate FMP) to end overfishing and rebuild the resources in accordance with the MSA. Therefore, NOAA Fisheries NERO has initiated formal intra-service consultation, in accordance with section 7(a)(2) of the ESA.

NOAA Fisheries initiated consultation on March 12, 2003. The skate fishery is divided into two very different components, a directed fishery and a non-directed fishery. The non-directed or wing fishery is the larger of the two fisheries and is usually prosecuted and regulated as part of other managed fisheries (multispecies, scallop, monkfish and dogfish). Skate are also landed under a directed or bait fishery, which has not previously been regulated or managed. This Opinion only concerns itself with the effects of the directed bait fishery on protected species.

Because skates have not been managed through a federal FMP until now, very little accurate and complete fishery and ESA-protected species interaction data are available. In addition, Federal agencies proposing new actions that may affect ESA-listed species are required to complete an ESA consultation. During that consultation process, if it is determined that a proposed action "may adversely affect" a listed species, then a formal Section 7 consultation resulting in a Biological Opinion (BO) is required.

This Opinion is based on information provided by the NOAA Fisheries Office of Sustainable Fisheries, information found in ESA recovery plans, the most current stock assessment reports, observer and logbook data on fishing effort and protected resources species interactions within the U.S. Northeast skate fishery and the closely related multispecies fishery, consultation with fishery and sea turtle researchers and NOAA Fisheries personnel, published and unpublished scientific reports, and biological opinions for other relevant fisheries.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action considered in this Opinion is NOAA Fisheries' implementation of a new Skate FMP. NOAA Fisheries initiated consultation on the proposed action on March 12, 2003. To date, NOAA Fisheries has not implemented any management measures or proposed any Federal regulations pertaining to the harvest of the northeast skate complex. With the implementation of the Skate FMP, some of the following management measures have been proposed:

- A management unit that encompasses the Northeast Region, Federal Waters from Maine to Cape Hatteras, North Carolina (35°15.3' North Latitude);

- An open-access federal fishery program that will require landing permits for all vessels, operators, and dealers engaged in any aspect of the skate fishery;

- A requirement to report skate landings by individual species and skate discard by general categories (large/small);

- A prohibition on possession of barndoor, thorny and a partial ban on smooth skate in the Gulf of Maine (GOM) as defined by GOM Regulated Mesh Area Boundary;

- Overfishing definitions for each of the seven species in the Northern skate complex;

- A rebuilding program for overfished skate species;

- A baseline of management measures in other fisheries that benefit skate; and,

- A process for reviewing changes to the baseline of management measures in other fisheries that benefit skates.

The skate fishery will be based on the same opening date (May 1) as the multispecies (groundfish) fishing year as the fisheries are related and fishing occurs in similar areas and times in the Northeast.

The Council submitted the proposed specifications for the skate fishery, and proposed a possession limit for skate wings of 10,000 pounds per day (22,700 pounds whole weight) and 20,000 pounds per trip (45,000 pounds whole weight). Vessel owner/operators that fish for bait only and wish to be exempt from the wing possession limit may apply for a Letter of Authorization from NOAA Fisheries' Regional Administrator. Vessel owner/operators that fish for a combination of bait and wings and vessels that do not obtain the Letter of Authorization described above will be subject to the wing possession limit.

Supporting Administrative Measures:
The FMP for skate identifies several administrative measures that will be used to support the proposed fishery. These measures include:

- framework adjustment process
- establishment of skate monitoring committee
- annual Skate PDT meeting on adjustments that may be required to FMP review
- permit and reporting requirements for commercial vessels, operators and dealers
- other measures regarding sea samplers, and exempted fishing activities

Monitoring of skate fishing effort will be conducted through permit records, fishing vessel logbooks, and dealer reports. Many current FMPs already require permit holders to report catch on logbooks used for those other FMP fisheries, so most skate vessels would already be reporting fishing effort prior to implementation of the Skate FMP. Some degree of active effort monitoring will also be conducted through sea sampling coverage. Identification of these vessels and associated fishing effort will facilitate future analyses of impacts on listed species and improve capabilities for placing observers in the fleet.

The Skate FMP does not currently contain requirements for rigging or marking of surface gear used by fixed gear vessels, except some vessels may be subject to multispecies gear marking regulations. In addition, no gillnet tags will be required. The gillnet tagging requirement under the Multispecies FMP is part of an effort control measure involving caps on the number of gillnets which can be deployed per vessel.

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 Skate

The Northeast skate complex is comprised of seven different related skate species. The seven species of skate are distributed along the coast of the northeast U.S. from the tide line to depths exceeding 700m (383 fathoms). In the Northeast region, the center of distribution for the little and winter skates is Georges Bank (GB) and Southern New England (SNE). The barndoor skate is most common in the Gulf of Maine (GOM), on GB, and in SNE. The thorny and smooth skates are commonly found in the GOM while the clearnose and rosette skates have a more southern distribution, and are found primarily in SNE and the Chesapeake Bight.

Skates are not known to make large-scale migrations, but they do move seasonally in response to changes in water temperature, moving offshore in summer and early autumn and returning inshore during winter and spring.

Skates are harvested in two very different fisheries, one for lobster bait and one for wings for food. The fishery for lobster bait is a historical and directed fishery, involving vessels primarily from SNE ports that target a combination of little skates (>90%) and, to a much lesser extent, juvenile winter skate (<10%), and occurs primarily in federal waters. The catch of juvenile winter skates mixed in with little skates are difficult to differentiate due to their nearly identical appearance.

The fishery for skate wings evolved in the 1990's as skate were promoted as "underutilized species" and fishermen shifted effort from groundfish and other troubled fisheries to skates and dogfish. The wing fishery is largely an incidental fishery that involves a larger number of vessels located throughout the region. Vessels tend to catch skates when targeting other species like groundfish, monkfish, and scallops and land them when the price is high enough. The SNE sink gillnet fishery targets winter skates seasonally along with monkfish. Highest catch rates are in the early spring and late fall when the boats are targeting monkfish, at about a 5:1 average ratio of skates to monkfish (more skates than monkfish due to monkfish trip limits in the southern area). Little skates are also caught incidentally year-round in the gillnets and sold for bait. Gillnetters have become more dependent upon skate incidental catch due to cutbacks in their fishery mandated by both the Monkfish and Groundfish FMPs.

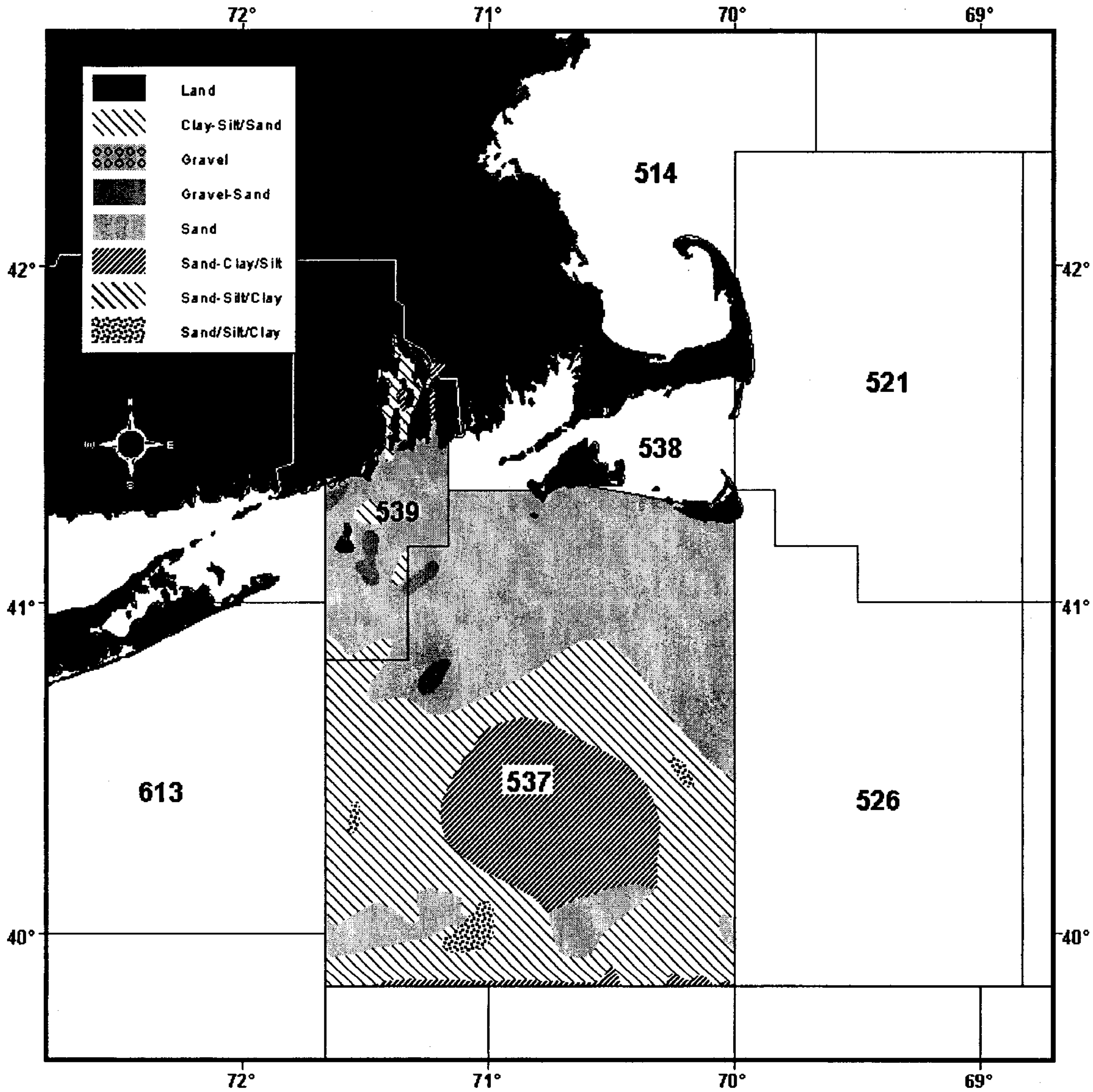
Traditionally, the main gear types in the skate fishery are mobile otter trawls, gillnet gear, hook and line and scallop dredge. The two main gear types, otter trawl and sink gillnet have accounted for about 98% of the coastwide landings from 1995 to 2000. Bottom trawling is the predominant gear type used in the skate fisheries, accounting for 94.5%. Gillnet gear accounts for only 3.5% of the skate landings. The remainder of the effort is split between hook gear and "other gear".

As mentioned previously, the gear types fished in the bait and wing fishery are very similar; bottom otter trawl and sink gillnets are the two primary gears involved. The wing fishery (60.5% of the overall fishery) is prosecuted using all of the above gear types and is primarily a bycatch /non-directed fishery from the monkfish, dogfish or multispecies fisheries. Fishers process and hold skate as incidental catch when the market price is high and landing skate is profitable. Prosecution of this part of the fishery is achieved under other FMPs as vessels are targeting other species that are already federally managed. In the wing or non-directed fishery, more than 95% of the trips that landed at least 10,000 pounds of skate wings during 1995-2000 were made by trawl vessels that landed in one port, New Bedford, Massachusetts, while 3.5% were made by trawl vessels that landed in Provincetown, Massachusetts. This formal consultation will only analyze the directed skate bait fishery since the effects to protected species as a result of the (non-directed) skate wing fishery are considered during consultation on those other FMPs.

As previously stated, the directed bait fishery is a small and discrete fishery (39% of overall fishery landings) in terms of numbers of participating vessels as compared to the wing fishery. According to the dealer weighout database, in 1999, 120 vessels landed skate bait on 1,304 trips. Twenty one (21) vessels landed 80% of the total skate bait during 1999 calender year, and most of these vessels were medium-sized (50 ft) trawl vessels from Point Judith, Rhode Island (RI). The directed skate bait fishery is dominated by between 30 - 50 RI vessels, while a smaller number of vessels from other SNE and northeast ports also participate in the fishery. The directed skate bait fishery operates throughout the year, peaks in the spring (with the increase in lobster fishing) and runs until early winter. Gillnet gear is fished at the highest level during the spring/summer and use drops in the fall and winter.

The directed bait fishery catches almost entirely skates, with little landings of other species. As noted above, most bait landings go to ports in Rhode Island. Most skate landings come from statistical areas 539 and 537, (Figure 1) off Rhode Island. Although vessel trip reports cannot be used to differentiate areas fished for directed bait versus wings, industry reports and information from the state of Rhode Island suggests that almost all directed bait landings come from these two statistical areas.

Figure 1: Principal Skate Bait Fishing Areas



Almost the entire directed bait fishery is constrained to two statistical areas, thus this fishery is not widespread around the New England and/or Mid-Atlantic region. The directed bait vessel fishery occurs primarily in federal waters less than 40 fathoms from the Southern Massachusetts/Rhode Island/Connecticut/New York state waters boundary east to the waters south of Martha's Vineyard and Nantucket out to approximately 69 degrees longitude. Effort in state waters increases seasonally to accommodate the amplified effort in the spring to fall lobster fishery. As the number of vessels targeting lobsters has increased, so has the demand for skates. Skates are the preferred bait for the Southern New England inshore and offshore lobster pot fishermen, as skate meat is tough and holds up longer in the pot than other soft bait choices. The use of skate as lobster bait has been somewhat negatively affected by the lobster fishery failure in southern New England (Lobster Area 2 in particular) due to the prevalence and spread of a viral disease affecting lobsters. With this crash in the lobster industry, a similar decline in the need for skate bait has occurred and so for the short term fishing pressure on skate has decreased.

Size is a factor that drives the dockside price for bait skate. For the directed lobster bait market, a "dinner plate" is the preferable size to be strung and placed inside lobster pots. Little and winter skates are rarely sorted prior to landing, as species identification between little skates and small winter skates is very difficult. Due to direct, independent contracts between trawlers and lobster vessels as well as limited reporting requirements, landings of skates are estimated to be under-documented. In addition, until this FMP is implemented, anyone landing skates who does not possess a federal fisheries permit is not required to submit vessel trip reports. Skate landings increased during the 1990's (6,700 mt in 1989; about 11,400 mt annually from 1990 to present). Fishermen and state fisheries managers attribute the increase in skate landings in 1990 to better reporting and documentation, rather than a significant expansion of the skate fishery. The increase in landings in the RI skate fishery are coincident with the state's implementation of a comprehensive system to document commercial fishery landings data.

As mentioned above trawls are the primary gear used to target skate, while the gillnet fishery within the directed bait fishery is very small and more defined. Each net consists of a float line and a lead line to which monofilament webbing is attached or "hung". The webbing in the fishery typically ranges from 6 to 8 inches in mesh size and is mostly 14 gauge thickness. At the end of each net the float line attaches to the lead line forming bridles to which the next net in the string is attached. The end nets of the string are anchored and attached to the surface buoy line. Polypropylene (floating) line is used between the anchor line and surface line to prevent chafing. Sink gillnet gear is designed to be fished on or near the bottom in the lower third of the water column.

The present action calls for an open permit access fishery and thus any vessel owner/operator which lands groundfish, monkfish or sea scallops can potentially apply and be granted a permit. Open access permits are available to all vessel owners/operators that wish to apply for a permit: historic participation in the fishery is not required. However, directed skate fishing (seasonal or year round) is only profitable when fished in combination with other more valuable target species. Currently, skate fishing does not require a permit or DAS and is not restricted by fishery management measures. A vessel can target skate if it also possesses other fishery permits. The vessel may target skate when multispecies DAS are used or multispecies are not available. It is believed that long-term skate fishing as a primary fishery is not financially viable to be self sustaining and will continue to be combined while targeting other species. Massachusetts, Rhode Island and New Jersey, account cumulatively for 95 percent of skate landings from 1995 through 2000 and most of these vessels are known to be involved in other fisheries, including multispecies, scallop, monkfish and dogfish.

Because skates have not been managed under an FMP previously, little quantitative information has been amassed, and very little accurate and complete fishery data are available. The present

FMP has been developed primarily to address this major issue and also the overfishing / overfished condition of two skate species (barndoor and thorny).

Based on the reference points developed at SAW 30, barndoor and thorny skate are currently considered to be "overfished". Overfishing of skate resources is of particular concern due to the nature of the species. Skates have a limited reproductive capacity, and stock size could be quickly reduced through intensive exploitation. In particular, the larger species in the northeast complex (>100 cm maximum total length: barndoor, winter and thorny skates) are thought to be relatively slow-growing, long-lived, and late maturing. These characteristics infer a relatively low natural mortality rate, and render them more vulnerable to overfishing than faster growing, shorter lived species.

NOAA Fisheries recognizes that within the skate complex two species (barndoor and thorny) necessitate development of management measures to end overfishing and rebuild these resources in accordance with the MSA. Therefore, the proposed Skate FMP is intended to assist in reducing fishing mortality on barndoor and thorny skate.

Once the Skate FMP has been effective for at least one year, (with new fishery information available), the Skate PDT will prepare Stock Assessment and Fishery Evaluation (SAFE) Report (on a biennial basis) for the Northeast skate complex. Although the SAFE Report will be completed every other year, the Skate PDT will meet at least annually to review the status of the species in the skate complex and their associated fisheries. Based on this review, the Skate PDT will provide guidance to the Skate Oversight Committee and the Council regarding the need to adjust measures in the Skate FMP to better achieve the FMP's objectives. As in other regulated federal fisheries, a process by which framework adjustments are developed and analyzed has been incorporated into the FMP process.

2.2. Requirements of the MMPA and ESA for Gillnet Fisheries

2.2.1 Modifications to Gillnet fisheries required by the ALWTRP,

Although the Atlantic Large Whale Take Reduction Plan (ALWTRP) regulations are not part of NOAA Fisheries proposal to initially manage fisheries under the Skate FMP, these regulations directly influence the prosecution of the small gillnet sector of fisheries targeting skates in the Northeast. These regulations were developed pursuant to the Marine Mammal Protection Act (MMPA) to reduce the level of take (mortality) and serious injury to whales and harbor porpoise in East Coast fisheries.

This Opinion considers the prosecution of fisheries under the Skate FMP, as modified by the existing measures established by the ALWTRP. Since NOAA Fisheries has already completed consultation on the provisions of the ALWTRP, which affects the conduct of several other federally managed fisheries, the continued implementation of the ALWTRP is considered in the Environmental Baseline section of this Opinion. The measures established by the ALWTRP that apply to gillnet fishers operating under the Skate FMP in Northeastern US waters (including, Cape Cod Bay Critical Habitat, great South Channel Critical Habitat, Stellwagen Bank/Jeffery's Ledge, and other Northeastern Gillnet Waters):

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

and for Mid-Atlantic Waters (defined as: Long Island, New York 72° 30′ W, then due south to 33° 51′ N, then west to North Carolina):

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

NOAA Fisheries has recently issued rules on Seasonal Area Management ((SAM) seasonal restrictions of specific fishing areas when right whales are present), and Dynamic Area Management ((DAM); restrictions of defined fishing areas when specified concentrations of right whales occur unexpectedly).

- SAM, is based on annual, predictable concentrations of right whales. NOAA Fisheries established two SAM areas in the Northeast. SAM West (east of Cape Cod, March 1 - April 30) and SAM East (north and east of the great south channel, May 1 - July 31).

- The DAM program is designed to protect unexpected aggregations of right whales within a defined area north of 40 degrees North latitude for a 15-day period. A DAM action is triggered by a sighting from a qualified individual or three or more right whales within a 75 square nautical mile area.

The dividing line between SAM East and West is 69° 24′ W longitude. The measures for DAM apply to areas north of 40°N latitude, and allow for establishment of a zone within which NOAA Fisheries might impose restrictions on fishing or fishing gear for a period of up to 15 days. If no restrictions are imposed, NOAA Fisheries may issue an alert to fishers and may request that fishers voluntarily remove gear from the zone, and not set additional gear within the zone for up to 15 days.

The impact of the ALWTRP on threatened and endangered species is discussed further in the *Environmental Baseline* of this Opinion (Section 4). NOAA Fisheries assumes in this Opinion that all ongoing regulatory and non-regulatory elements of the ALWTRP will continue to be implemented in the future and provide continued conservation benefits to listed whales.

2.2.2 Requirements for fisheries listed on the MMPA 2002 List of Fisheries

Section 18 of the MMPA requires NOAA Fisheries to place a commercial fishery on the List of Fisheries (LOF) in 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 requirements of Section 18.

The 2002 LOF includes the Northeast sink gillnet fishery as a Category I fishery, and the Mid-Atlantic coastal gillnet fishery is a Category II fishery. The LOF for 2003 has not yet been published. Portions of the skate gillnet fishery are included in either the Northeast sink gillnet fishery or the Mid-Atlantic coastal gillnet fishery. Participants in these fisheries must, therefore, comply with the following MMPA requirements:

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

Vessels in a Category III fishery (*e.g.*, the mixed Mid-Atlantic trawl fishery and the North Atlantic bottom trawl fishery) are not required to register with NOAA Fisheries or obtain a marine mammal authorization.

2.3 Action Area

The management unit for the Skate FMP is the skate complex along the U.S. East Coast from Maine through Cape Hatteras, NC. The action area for this consultation is therefore defined as all waters under U.S. jurisdiction from the U.S./Canadian border to Cape Hatteras, NC. However, the primary geographic area prosecuted by the Federal commercial skate directed bait fishery includes federal waters off Massachusetts and Rhode Island, with fishing activity also occurring in the waters off of Connecticut, New York, and New Jersey, and in State waters off those states. Thus, the analysis in this Opinion is of the directed stake bait fishery in Federal waters, and the directed skate fishery in state waters by federally permitted vessels.

3.0 STATUS OF THE SPECIES AND CRITICAL HABITAT

NOAA Fisheries has determined that the action being considered in the Opinion may affect the following species listed under the ESA :

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

NOAA Fisheries has determined that the action being considered in the Opinion is not likely to adversely affect shortnose sturgeon (*Acipenser brevirostrum*), the Gulf of Maine distinct population segment (DPS) of Atlantic salmon (*Salmo salar*), blue whales (*Balaenoptera musculus*), or the hawksbill sea turtle (*Eretmochelys imbricata*), all of which are listed as endangered species under the Endangered Species Act of 1973. NOAA Fisheries has also determined that the action being considered is not expected to destroy or adversely modify right whale critical habitat that occurs within the action area (Cape Cod Bay and Great South Channel). The following discussion is NOAA Fisheries rationale for these determinations.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. They can be found in rivers along the western Atlantic coast from St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (*i.e.*, south of Chesapeake Bay), while some northern populations are amphidromous (NMFS 1998). Since the activities proposed to be authorized by the Skate FMP will be conducted in Federal waters beyond where concentrations

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

of shortnose sturgeon are most likely to be found, it is highly unlikely that the action will affect shortnose sturgeon.

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

Blue whales range in the North Atlantic from the subtropics to Baffin Bay and the Greenland Sea (Aecium and Leatherwood 1985). 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, the gear type was not confirmed and no recent entanglements of blue whales have been reported from U.S. North Atlantic waters. During aerial observations for right whales in 2002 three blue whales were observed, two in early summer and one in early fall. All three blue whales were observed in the south-southeast corner of Georges Bank. Blue whales are only occasional visitors to east coast U.S. waters. 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). Since the skate directed bait fishery operates primarily in the Northeast/Southern New England area the blue whale will not be considered further in this Opinion.

The hawksbill sea turtle is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands. There are accounts of hawksbills in south Florida and a number are encountered in Texas. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (Sea Turtle Stranding and Salvage Network (STSSN) database). However, many of these strandings were observed after hurricanes or offshore storms. No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the New England Fisheries Science Center (NEFSC) observer program. Therefore, given the range of hawksbill sea turtles, and based on the lack of documented takes of hawksbill sea turtles in the skate fishery it is unlikely that the proposed action will affect hawksbill sea turtles. This species will not be considered further in this Opinion.

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

The remainder of this section will focus on the status of the various species within the action area, summarizing the information necessary to establish the environmental baseline against which the effects of the proposed action will be assessed. Additional background information on the range-wide status of these species can be found in a number of published documents, including sea turtle status reviews and biological reports (NOAA Fisheries and USFWS 1995, Marine Turtle Expert Working Group (TEWG) 1998 & 2000), recovery plans for the humpback whale (NOAA Fisheries 1991a), right whale (NOAA Fisheries 1991b), leatherback sea turtle (NOAA Fisheries and USFWS 1992), loggerhead sea turtle (NOAA Fisheries and USFWS 1991), green sea turtle (NOAA Fisheries and USFWS 1991), and Kemp's ridley sea turtle (USFWS and NOAA Fisheries 1992) the Marine Mammal Stock Assessment Reports (SAR) (Waring *et al.* 2000, Waring *et al.* 2001), and other publications (*e.g.*, Perry *et al.* 1999; Clapham *et al.* 1999; IWC 2001 *a*). A draft recovery plan for fin and sei whales is also available at http://www.nmfs.noaa.gov/prot_res/PR3/recovery.html (NMFS unpublished). An updated draft recovery plan for right whales (Silber and Clapham 2001) is available at the same web address.

3.1 Status of whales

All of the cetacean species considered in this Opinion were once the subject of commercial whaling which likely caused their initial decline. Right whales were probably the first large whale to be hunted on a systematic, commercial basis (Clapham *et al.* 1999). Records indicate that right whales in the North Atlantic were subject to commercial whaling as early as 1059. Between the 11th and 17th centuries an estimated 25,000-40,000 North Atlantic right whales are believed to have been taken. On a world-wide scale, humpbacks were the first species to be taken and 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). Sperm whales were hunted in America from the 17th century through the early 20th century. However, greater attention was paid to sperm whales as the number of larger rorquals decreased with the advent of modern whaling (Clarke 1954). All killing of sperm whales was banned by the IWC in 1988. However, at the 2000 meetings of the IWC, Japan indicated it would include the take of sperm whales in its scientific research whaling operations. Japan reported the take of 5 sperm whales from the North Pacific as a result of this research, and has proposed to issue a permit for the take of up to 10 sperm whales for the second year of the study (IWC 2001b).

All of the cetacean species considered in this Opinion were listed under the ESA at the species level; therefore, any jeopardy determinations need to be made by considering the effects of the proposed action on the entire species. This presents a unique situation for right whales for which NOAA Fisheries recognizes three major subgroups: North Pacific, North Atlantic, and Southern Hemisphere. Southern Hemisphere right whales have always been a different species, biologically, although that species was included in the right whale listing. Similarly, recently published scientific literature argues that right whales in the North Pacific Ocean are also a different species, biologically, from right whales in the North Atlantic. Therefore, right whales in the North Atlantic Ocean represent a unique genetic lineage that cannot be replaced or substituted by any of the other "right whales." Other cetaceans considered by this Opinion are similarly recognized as consisting of separate stocks or populations by the IWC (Donovan 1991) or other scientific bodies (Waring *et al.* 2001, Carretta *et al.* 2001, Angliss *et al.* 2001). This Opinion will consider the effects of the proposed action on each species as listed. Since the proposed action is most likely to directly affect those members of the species that occur within the action area, the Opinion will focus on the effects of the proposed action on the specific subpopulations or species groupings that occur in the action area and then consider the consequences of those effects on the species as they are listed under the ESA.

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

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

The sei whale population in the western North Atlantic is believed to consist of two populations; a Nova Scotian Shelf population and a Labrador Sea population (Mitchell and Chapman 1977). The Nova Scotian Shelf population includes the continental shelf waters of the northeastern United States, and extends northeastward to south of Newfoundland (Waring *et al.* 1999). This is the only sei whale population within the action area for this consultation. The population identity of North Atlantic fin whales has received relatively little attention, and it is uncertain whether the current population boundaries represent biologically isolated units (Waring *et al.* 2000). While the existence of fin whale subpopulations in the North Atlantic has been suggested from localized depletions resulting from commercial exploitation as well as from genetic studies, for the purposes of this Opinion, NOAA Fisheries will treat all western North Atlantic fin whales as a single population consistent with their treatment in the marine mammal stock assessment reports (Waring *et al.* 1999, Waring *et al.* 2000). Similarly, NOAA Fisheries currently uses the IWC population structure guidance which recognizes one population of sperm whales for the entire North Atlantic (Waring *et al.* 1999).

Consequently, this Opinion will focus on the effects of the proposed action on:
- the western North Atlantic subpopulation of right whales;
- the Gulf of Maine feeding group of humpback whales;
- fin whales and sperm whales in the North Atlantic, which will each be treated as a single population,
- the Nova Scotian group of sei whales.

3.1.1 Right Whale

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

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

A review of southern hemisphere right whales is provided in Perry *et al.* (1999). Since these right whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for southern hemisphere right whales. Southern hemisphere right whales appear to be the most numerous of the right whales. Perry *et al.* (1999) provide a best estimate of abundance for southern hemisphere right whales as 7,000 based on estimates from separate breeding areas. In addition, unlike North Pacific or North Atlantic right whales, southern hemisphere right whales have shown some signs of recovery in the last 20 years. However, like other right whales, southern hemisphere right whales were heavily exploited (Perry *et al.* 1999). In addition, Soviet catch records made available in the 1990's (Zemsky *et al.* 1995) revealed that southern hemisphere right whales continued to be targeted well into the 20th century. Therefore, any indications of recovery should be viewed with caution.

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

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

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

Data collected in the 1990's suggested that western North Atlantic right whales were experiencing a slow, but steady recovery (Knowlton *et al.* 1994). However, more recent data strongly suggest that this trend has reversed and the species is in decline (Caswell *et al.* 1999, Fujiwara and Caswell 2001).

While it is not possible to obtain an exact count of the number of western North Atlantic right whales, IWC participants from a 1999 workshop agreed that it is reasonable to state that the current number of western North Atlantic right whales is probably around 300 (+/- 10%) (IWC 2001). This conclusion was based, in large part, on a photo-id catalog comprising more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than six years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (IWC 2001) suggesting that the 396 individuals is a close approximation of the entire population. Since the 1999 IWC workshop there have been at least 72 known right whale births; one in 2000, 31 in 2001, and 22 in 2002, and 18 in 2003. In addition, one animal was seen after an absence of at least six years. However, at least five of the calves are known to have died and a sixth was not resighted with its mother on the summer foraging grounds. Although the "count" of right whales based on the original count of 396 individually identified whales, the number of observed right whale births and the known and presumed mortalities equals 342 animals, for the purposes of this Opinion, NOAA Fisheries considers the best approximation for the number of North Atlantic right whales to be 300 +/- 10% given that all mortalities are not known.

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

Factors that have been suggested as affecting right whale reproductive success and mortality include reduced genetic diversity, pollutants, and nutritional stress. However, there is no evidence available to determine their potential effect, if any, on western North Atlantic right whales. The size of the western North Atlantic subpopulation of right whales at the termination of whaling is unknown, but is generally believed to have been very small. Such an event may have resulted in a loss of genetic diversity which could affect the ability of the current population to successfully reproduce (*i.e.*, decreased conceptions, increased abortions, and increased neonate mortality). Studies by Schaeff *et al.* (1997) and Malik *et al.* (2000) indicate that western North Atlantic right whales are less genetically diverse than southern right whales. However, several apparently healthy populations of cetaceans, such as sperm whales and pilot whales, have even lower genetic diversity than observed for western North Atlantic right whales (IWC 2001). Similarly, while contaminant studies have confirmed that right whales are exposed to and accumulate contaminants, researchers could not conclude that these contaminant loads were negatively affecting right whales since concentrations were lower than those found in marine mammals proven to be affected by PCB's and DDT (Weisbrod *et al.* 2000). Finally, although North Atlantic right whales appear to have thinner blubber than right whales from the South Atlantic (Kenney 2000), there is no evidence at present to demonstrate that the decline in birth rate and increase in calving interval is related to a food shortage. These concerns were also discussed at the 1999 IWC workshop where it was pointed out that since *Calanus* sp. is the most common zooplankton in the North Atlantic and current right whale abundance is greatly below historical levels, the proposal that food limitation was the major factor seemed questionable (IWC 2001).

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

During the 2002 and 2003 (to June 2, 2003) seasons we know of five right whale mortalities, four adults and one calf, and ten known entanglements. In 2002 eight entanglements occurred. One of the mortalities was a known entangled whale, and one previously entangled whale has since been observed free of gear, leaving six entangled whales from 2002. Three of these whales (from 2002) have been re-sighted with gear during the 2003 observer season. As of July 2, 2003, two new entanglements were observed in 2003, leaving a total of eight whales entangled in 2002 and 2003 (up to July 2, 2003). This number of entanglements /deaths is of great concern given the critical status of the North Atlantic right whale subpopulation. These entanglements are being closely monitored to determine what they say about the effectiveness of present large whale take reduction measures set in place to reduce the severity and number of right whale entanglements in gillnet gear (and pot/trap gear). The eight remaining entanglements also demonstrate the complexity of resolving the entanglement problem. For example, many of the whales are entangled in line of unknown origin making it difficult to determine what activities are contributing to entanglement of right whales. In addition, it is often difficult to determine where interactions occur. For example, five of the whales were first observed entangled in Canadian waters despite substantial survey effort in U.S. waters in the Southeast and Northeast during the winter and spring/early summer months. Although previous biological opinions have taken a conservative approach and assumed all right whale entanglements occurred in U.S. waters unless there was conclusive evidence to suggest otherwise, some entanglements may be occurring in Canadian waters and are being erroneously attributed to U.S. activities.

Summary of Right Whale Status

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

Western North Atlantic right whales have a population size of approximately 300 animals (+/-10%), which poses its own risk of extinction. Based on recent reviews of the status of the right whale, its reproductive rate (the number of calves that are born in the population each year) appears to be declining, which could increase the whales' extinction risk (Caswell *et al.* 1999, Fujiwara and Caswell 2001, IWC 2001). Based on the best available data on the right whales population estimate and population trend, the western North Atlantic subpopulation of right whales is declining based on a combination of a low, estimated population size, increased mortality rate (particularly among adult, female whales), and decreased reproductive rate.

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

3.1.2 Humpback Whales

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

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

Little or no research has been conducted on humpbacks in the Northern Indian Ocean so information on their current abundance does not exist (Perry *et al.* 1999). Since these humpback whales do not occur in U.S. waters, there is no recovery plan or stock assessment report for the northern Indian Ocean humpback whales. Likewise, there is no recovery plan or stock assessment report for southern hemisphere humpback whales, and there is also no current estimate of abundance for humpback whales in the southern hemisphere although there are estimates for some of the six southern hemisphere humpback whale stocks recognized by the IWC (Perry *et al.* 1999). Like other whales, southern hemisphere humpback whales were heavily exploited for commercial whaling. Although they were given protection by the IWC in 1963, Soviet whaling data made available in the 1990's revealed that 48,477 southern hemisphere humpback whales were taken from 1947-1980, contrary to the original reports to the IWC which accounted for the take of only 2,710 humpbacks (Zemsky *et al.* 1995, IWC 1995, Perry *et al.* 1999).

North Atlantic. Humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank

and Jeffrey's Ledge (CeTAP 1982) and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999).

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

Humpback whales use the Mid-Atlantic as a migratory pathway to and from the calving/mating grounds, but it may also be an important winter feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the Mid-Atlantic have been increasing during the winter months, peaking January through March (Swingle *et al.* 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the Mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle *et al.* (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Identified whales using the Mid-Atlantic area were found to be residents of the Gulf of Maine and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding populations in the Mid-Atlantic region. Strandings of humpback whales have increased between New Jersey and Florida since 1985 consistent with the increase in Mid-Atlantic whale sightings. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley *et al.* 1995).

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

Humpback whales, like other baleen whales, may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to

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

As is the case with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales occur from commercial fishing gear entanglements and ship strikes. Sixty percent of Mid-Atlantic humpback whale mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley *et al.* 1995). Between 1992 and 2001 at least 92 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded[2]. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent --- and possibly as many as 78 percent --- of animals in the Gulf of Maine exhibit scarring caused by entanglement. These estimates are based on sightings of free-swimming animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher.

Summary of Humpback Whales Status

The best available population estimate for humpback whales in the North Atlantic Ocean is regarded as 10,600 animals, but the number of humpback whales that feed in the Gulf of Maine (the focus of this Opinion) is unknown. Anthropogenic mortality associated with ship strikes and fishing gear entanglements is significant. The winter range where mating and calving occurs is located in areas outside of the United States where the species is afforded less protection. Despite these, modeling using data obtained from photographic mark-recapture studies estimates

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[2]As of April 30, 2003, 22 additional humpback whale entanglements have been observed; five of which have been disentangled and two have shed the gear.

the growth rate of the Gulf of Maine feeding population at 6.5% (Barlow and Clapham 1997). With respect to the species overall, there are also indications of increasing abundance for the eastern and central North Pacific stocks. However, trend and abundance data is lacking for the western North Pacific stock, the Southern Hemisphere humpback whales, and the Southern Indian Ocean humpbacks. Given the best available information, changes in status of the North Atlantic humpback population are, therefore, likely to affect the overall survival and recovery of the species.

3.1.3 Fin Whale

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

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

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

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

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

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

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

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

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

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

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

3.1.4 Sei Whales

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

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

North Atlantic. Sei whales occur in deep water throughout their range, typically over the continental slope or in basins situated between banks (NOAA Fisheries 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 NOAA Fisheries management purposes (Waring *et al.* 1999).

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

Summary of Sei Whale Status

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

3.1.5 Sperm Whale

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

North Pacific, Northern Indian Ocean, and Southern Hemisphere. Sperm whales are distributed widely in the North Pacific (Angliss *et al.* 2001). The IWC recognizes eastern and western management units for sperm whales in the North Pacific (Donovan 1991). However, for NOAA Fisheries management purposes under the MMPA, three stocks are recognized for U.S. waters of the Pacific: Alaska, California/Oregon/Washington, and Hawaii (Angliss *et al.* 2001). There is very limited data on estimates of abundance for North Pacific, Northern Indian Ocean and Southern Hemisphere sperm whales. Current and historic estimates of abundance of sperm whales in Alaska are considered unreliable (Angliss *et al.* 2001) as are estimates for the Southern Hemisphere (Perry *et al.* 1999). There are no current population abundance estimates for sperm whales in the northern Indian Ocean (Perry *et al.* 1999). A minimum estimate of 1,026 for the California/Oregon/Washington stock is used for NOAA Fisheries management purposes, however, there is no data to indicate trends in abundance of this stock (Angliss *et al.* 2001). As part of the Marine Mammal Research Program of the Acoustic Thermometry of Ocean Climate (ATOC) study, a total of twelve aerial surveys were conducted within about 25 nm of the main Hawaiian Islands in 1993, 1995 and 1998 from which an average abundance estimate was calculated (Carretta *et al.* 2001). However, this is considered an underestimate of the total number of sperm whales within the U.S. EEZ off Hawaii because areas around the Northwest Hawaiian Islands and beyond 25 nm from the main islands were not surveyed, and because sperm whales spend a large proportion of time diving, causing additional downward bias in the abundance estimate (Carretta *et al.* 2001).

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

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

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

Few instances of anthropogenic injury or mortality of sperm whales due to human impacts have been recorded in U.S. waters. Preliminary data for 2000 indicate that of ten sperm whales reported to the stranding network (nine dead and one injured) there was one possible fishery interaction, one ship strike (wounded with bleeding gash on side) and eight animals for which no signs of entanglement or injury were sighted or reported. Because of their generally more offshore distribution and their pelagic feeding habits, sperm whales are expected to be less subject to entanglement than right or humpback whales. However, injured or mortally wounded sperm whales may also be less likely to strand than nearshore cetacean species given the distance to shore. The take of sperm whales in fishing gear have been documented by NOAA Fisheries in several fisheries; primarily offshore fisheries such as the pelagic driftnet and pelagic longline fisheries. The NOAA Fisheries Sea Sampling program recorded three entanglements (in 1989, 1990, and 1995) of sperm whales in the swordfish drift gillnet fishery prior to permanent closure of the fishery in January 1999. All three animals were found alive, although injured, and released. However, at least one was still carrying gear. Opportunistic reports of sperm whale entanglements for the years 1993-1997 include three records involving fine mesh gillnet from an unknown source, longline gear, and net with trailing buoys (Waring *et al.* 2000). Observers aboard Alaska sablefish and Pacific halibut longline vessels have documented sperm whales feeding on longline caught fish in the Gulf of Alaska (Perry *et al.* 1999). Behavior similar to that observed in the Alaskan longline fishery has also been documented during longline operations off South America where sperm whales have become entangled in longline gear, have been observed feeding on fish caught in the gear, and have been reported following longline vessels for days (Perry *et al.* 1999).

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

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

3.2 Status of Sea Turtles

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

Like cetaceans, sea turtles were listed under the ESA at the species level rather than individual populations or recovery units. However, this Opinion treats the sea turtle populations in the Atlantic Ocean as distinct from the Pacific Ocean populations for the purposes of this consultation. This approach is allowable based on interagency policy on the recognition of distinct vertebrate populations (61 FR 4722). To address specific criteria outlined in that policy, sea turtle populations in the Atlantic Ocean are geographically discrete from populations in the

Pacific Ocean, with limited genetic exchange (see NOAA Fisheries and USFWS 1998a). Given the similar or greater threats faced by Pacific Ocean subpopulations, the loss of these sea turtle populations in the Atlantic Ocean would result in a significant gap and reduction in the distribution and abundance of each turtle species, which makes these populations biologically significant and would, by itself, appreciably reduce the entire species' likelihood of surviving and recovering in the wild.

With respect to western Atlantic loggerhead sea turtles, NOAA Fisheries recognizes five subgroups: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29°N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota, Florida on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year) (NOAA Fisheries SEFSC 2001). Genetic analyses conducted at these nesting sites since the listing indicate that they are distinct subpopulations (TEWG 2000). Therefore, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species likelihood of survival and recovery in the wild. Consequently, this biological opinion will treat the five nesting aggregations of loggerhead sea turtles as subpopulations whose survival and recovery is critical to the survival and recovery of the species. Loggerheads from any of these nesting sites may occur within the action area. However, the majority of the loggerhead turtles in the action area are expected to have come from the northern nesting subpopulation and the south Florida nesting subpopulation. For the purposes of this Opinion, NOAA Fisheries will therefore focus on:

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

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

3.2.1 Loggerhead Sea Turtles

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

Pacific Ocean. In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. Within the Pacific Ocean, loggerhead sea turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. Based on available information, the Japanese nesting aggregation is significantly larger than the southwest Pacific nesting aggregation. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996). More recent estimates are unavailable; however, qualitative reports infer that the Japanese nesting aggregation has declined since 1995 and continues to decline (Tillman 2000). We have no recent, quantitative estimates of the size of the nesting aggregation in the southwest Pacific, but the nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico, commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. In addition, the abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years. Loggerhead turtle colonies in the western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (*e.g.*, due to egg poaching).

Atlantic Ocean. Loggerheads commonly occur throughout the inner continental shelf from Florida through Cape Cod, Massachusetts, and may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable (NEFSC survey data 1999). Aerial surveys of loggerhead turtles north of Cape Hatteras indicate that they are most common in waters from 22 to 49 meters deep, although they range from the beach to waters beyond the continental shelf (Shoop and Kenney 1992). Like other sea turtles, loggerhead hatchlings enter the pelagic environment upon leaving the nesting beach. Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments where they opportunistically forage on crustaceans and mollusks (Wynne and Schwartz 1999). However, some loggerheads may remain in the pelagic environment for longer periods of time or move back and forth between the pelagic and benthic environment (Witzell, in prep). Loggerheads that have entered the benthic environment appear to undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles are found in Virginia foraging areas as early as April but are not usually found on the most northern foraging grounds in the Gulf of Maine until June. The large majority leave the Gulf of Maine by mid-September but some may remain in Mid-Atlantic and Northeast areas until late Fall. During November and December loggerheads appear to concentrate in nearshore and southerly areas influenced by warmer Gulf Stream waters off North Carolina (Epperly *et al.* 1995a). Support for these loggerhead movements are provided by the collected work of Morreale and Standora (1998) who showed through satellite tracking that 12 loggerheads traveled along similar spatial and temporal corridors from Long Island Sound, New York, in a time period of October through December, within a narrow band along the continental shelf before becoming sedentary for one or two months south of Cape Hatteras.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182, annually with a mean of 73,751. On average, 90.7% of these nests were of the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation the turtles making these nests belong. According to the TEWG assessment for loggerhead sea turtles (2000), there are few nesting surveys for loggerheads in Mexico. However, approximately 1000 nests were recorded for Quintana Roo beaches in 1998 (Xcaret 1999) and nesting appears to be stable or increasing (TEWG 2000).

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

Although foraging grounds contain cohorts from nesting colonies from throughout the Western North Atlantic, loggerhead subpopulations are not equally represented on all foraging grounds. In general, south Florida turtles are more prevalent on southern foraging grounds and their concentrations decline to the north. Conversely, loggerhead turtles from the northern nesting group are more prevalent on northern foraging grounds and less so in southern foraging areas (Table 1; NOAA Fisheries SEFSC 2001; Bass *et al.* 1998).

Table 1. Contribution of loggerhead subpopulations to foraging grounds

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

Yucatán	6-9%	6-9%	3%	6-9%	6-9%

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

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

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

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

The number of nests in the northern subpopulation from 1989 to 1998 ranged from 4,370 to 7,887 with a 10-year average of 6,247 nests (TEWG 2000). The status of the northern population based on the number of loggerhead nests has been classified as stable or declining (TEWG 2000). NOAA Fisheries' 2001 Stock Assessment further examined nesting trends for the northern subpopulation (NOAA Fisheries SEFSC 2001). Three estimates were provided. Two of these indicate a decline in nesting while the third suggests an increase in nesting. However, those that indicate a decline (-3% and -5%) are based on data collected from two different sites (Little Cumberland Island, Georgia (Frazer 1983) and South Carolina (TEWG 1998), respectively) prior to the implementation of TEDs.

In addition, NOAA Fisheries' 2001 Stock Assessment notes that Little Cumberland Island is a highly erosional beach and nesting at Cape Island, South Carolina (the largest South Carolina nesting site) may have been affected by raccoon predation control in the first half of the 20th century, suggesting that these sites are not representative of the overall northern subpopulation (NOAA Fisheries SEFSC 2001). A third method was employed to estimate changes in nesting activity over time for the northern subpopulation by using nesting data from selected beaches in a type of analysis known as meta-analysis. Depending on the statistical assumptions made for the meta-analysis, the pre-1990 growth rate for the northern subpopulation varies from 0 to -3% (NOAA Fisheries SEFSC 2001).

The results appear to be more optimistic for the post 1990 period for which the rate of growth is estimated to be 2.8-2.9%. However, this latter estimate is considered a best-case scenario since the data used in the analysis were limited to nesting sites where surveys were believed to have been relatively constant over time by including only the years where consistent length of beach was surveyed and survey start dates were within a two week time period. This data was unavailable for Georgia, so the assumption that survey effort was constant in this area may not be true. In addition, the analysis did not consider each nesting beaches' relative contribution to the total nesting activity (NOAA Fisheries SEFSC 2001). Given the range of results for the meta-analysis (from -3% growth to 2.9% growth), the assumptions made for the analysis, and considering previous studies conducted at specific northern nesting sites, for the purposes of this Opinion, NOAA Fisheries considers the status of the northern subpopulation based on nesting trends to be stable, at best, or declining.

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton *et al.* 1994). Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has lead to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching, and fishery interactions. In the pelagic environment loggerheads are exposed to a series of longline fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various fleets in the Mediterranean Sea (Aguilar *et al.* 1995, Bolten *et al.* 1994, Crouse 1999). In the benthic environment in waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in Federal and State waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries (see further discussion in the Environmental Baseline of this Opinion).

Summary of Status for Loggerhead Sea Turtles
The global status and trend of loggerhead turtles is difficult to summarize. In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996), but has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

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

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

3.2.2 Leatherback Sea Turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtles species; their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NOAA Fisheries 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 (NOAA Fisheries SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs will incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm ccl.

Pacific Ocean. Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila *et al.*, 1996; NOAA Fisheries and USFWS 1998b; Sarti, *et al.* 2000; Spotila, *et al.* 2000). Leatherback turtles had disappeared from India before 1930, have been virtually extinct in Sri Lanka since 1994, and appear to be approaching extinction in Malaysia (Spotila *et al.* 2000). For example, the nesting assemblage on Terengganu (Malaysia) - which was one of the most significant nesting sites in the western Pacific Ocean - has declined severely from an estimated 3,103 females in 1968 to 2 nesting females in 1994 (Chan and Liew, 1996). The size of the current nesting assemblage represents less than 2 percent of the size of the assemblage reported from the 1950s; with one or two females nesting in this area each year (P. Dutton, personal communication, 2000). Nesting assemblages of leatherback turtles along the coasts of the Solomon Islands, which supported important nesting assemblages historically, are also reported to be declining (D. Broderick, personal communication, *in* Dutton *et al.* 1999). In Fiji, Thailand, Australia, and Papua-New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest, extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 1,000 nesting females during the 1996 season (Suarez *et al.* in press). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, however, this population has come under increasing threats that could cause it to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local

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

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

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

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

Although all causes of the decline in leatherback turtle colonies have not been documented, Sarti *et al.* (1998) suggest that the decline results from egg poaching, adult and sub-adult mortalities incidental to high seas fisheries, and natural fluctuations due to changing environmental conditions. Some published reports support this suggestion. Sarti *et al.* (2000) reported that female leatherback turtles have been killed for meat on nesting beaches like Píedra de Tiacoyunque, Guerrero, Mexico. Eckert (1997) reported that swordfish gillnet fisheries in Peru and Chile contributed to the decline of leatherback turtles in the eastern Pacific. The decline in the nesting population at Mexiquillo, Mexico occurred at the same time that effort doubled in the Chilean driftnet fishery. In response to these effects, the eastern Pacific population has continued to decline, leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (*e.g.* Spotila *et al.* 1996; Spotila, *et al.* 2000).

Atlantic Ocean. Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate and tropical waters (NOAA Fisheries 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 (NOAA Fisheries and USFWS 1995). Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (9.1-11.5% increase), although it is critical to note that there was also an increase in the survey area in Florida over time (NOAA Fisheries SEFSC 2001). 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 (NOAA Fisheries SEFSC 2001). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females. Tag return data emphasize the global nature of the leatherback and the link between these South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, VA. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database).

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

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. Unlike loggerhead turtle interactions with longline gear, leatherback turtles do not ingest longline bait. Therefore, leatherbacks are foul hooked (*e.g.*, on the flipper or shoulder area) rather than mouth or throat hooked by longline gear. Nevertheless, according to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NOAA Fisheries SEFSC 2001). Since the U.S. fleet accounts for only 5-8% of the hooks fished in the Atlantic Ocean, adding up the under-represented observed takes of the other 23 countries actively fishing in the area would likely result in annual take estimates of thousands of leatherbacks over different life stages. Leatherbacks also make up a significant portion of takes in the Gulf of Mexico and South Atlantic areas, but are more often released alive. The Hawaii based pelagic longline fishery is known to take leatherback sea turtles as well (McCracken 2000).

Leatherbacks are susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. 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 (NOAA Fisheries 2001b) and these represented known entanglements between the months of June and October, only (NEFSC, unpublished data). Entanglement in lobster pot lines was cited as the leading determinable cause of adult leatherback strandings in Cape Cod Bay, Massachusetts (Prescott 1988; R. Prescott, pers. comm.). In addition, many of the stranded leatherbacks for which a direct cause of death could not be documented showed evidence of rope scars or wounds and abraded carapaces, implicating entanglement. Data collected by the NEFSC in 2001 also support that whelk pot gear was involved in a number of reported leatherback entanglements in Massachusetts and New Jersey waters. The Mid-Atlantic blue crab fishery is another potential source of leatherback entanglement. In North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm.). A third leatherback was reported entangled in a crab pot buoy in Pamlico Sound off of Ocracoke. This turtle was disentangled and released alive; however, lacerations on the front flippers from the lines were evident (D. Fletcher, pers. comm.). In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries as documented on stranding forms. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 were due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm.). Since many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast shrimp fishery are also common. The National Research Council Committee on Sea Turtle Conservation identified incidental capture in shrimp trawls as the major anthropogenic cause of sea turtle mortality (NRC 1990). Leatherbacks are likely to encounter shrimp trawls working in the nearshore waters off the Atlantic coast as they make their annual spring migration north. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. Therefore, the NOAA Fisheries has used several alternative measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25260). NOAA Fisheries established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. It allows NOAA Fisheries to quickly close the area or portions of the area on a short-term basis to shrimp fishermen who do not use TEDs with an escape opening large enough to exclude leatherbacks when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates.

Other emergency measures may also be used to minimize interactions between leatherbacks and the shrimp fishery. For example, in November 1999 parts of Florida experienced an unusually high number of leatherback strandings. In response, the NOAA Fisheries 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, NOAA Fisheries published an Advanced Notice of Proposed Rulemaking in April 2000 (65 FR 17852, April 5, 2000) indicating that NOAA Fisheries was considering publishing a proposed rule to provide additional protection for leatherback turtles in the shrimp fishery. NOAA Fisheries published a final rule effective April 15, 2003 (50 CFR Parts 222, 223 and 224) that would modify the requirements for TED openings to ensure that they are wide enough to exclude leatherbacks as well as large loggerheads and green turtles.

The southeast shrimp trawl fishery is not the only trawl fishery that can interact with leatherback sea turtles. In October 2001, a Northeast Fisheries Center Observer documented the take of a leatherback in a bottom otter trawl fishing for *Loligo* squid off of Delaware. These trawl fisheries do not use TEDs.

Gillnet fisheries operating in the nearshore waters of the Mid-Atlantic states are likely to take leatherbacks when these fisheries and leatherbacks co-occur. However, there is very little quantitative data on capture rate and mortality. Data collected by the NOAA Fisheries NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54% to 92%. NOAA Fisheries NEFSC Fisheries Observer Program also had observers on the bottom coastal gillnet fishery which operates in the Mid-Atlantic, but no takes of leatherback sea turtles were observed from 1994-1998. Observer coverage of this fishery, however, was low and ranged from <1% to 5%. In North Carolina, a leatherback was reported captured in a gillnet set in Pamlico Sound at the north end of Hatteras Island in the spring of 1990 (D. Fletcher, pers. comm.). It was released alive by fishermen after much effort. Five other leatherbacks were released alive from nets set in North Carolina during the spring months: one was from a net (unknown gear) set in the nearshore waters near the North Carolina/Virginia border (1985); two others had been caught in gillnets set off of Beaufort Inlet (1990); a fourth was caught in a gillnet set off of Hatteras Island (1993), and a fifth was caught in a sink net set in New River Inlet (1993). In addition to these, in September 1995 two dead leatherbacks were removed from a large (11-inch) monofilament shark gillnet set in the nearshore waters off of Cape Hatteras, North Carolina.

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

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

It is important to note that, like marine debris, fishing gear interactions and poaching are problems for leatherbacks throughout their range. Entanglements are common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line and crab pot line. Leatherbacks are reported taken by the many other nations, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland that participate in Atlantic pelagic longline fisheries (see NOAA Fisheries SEFSC 2001, for a complete description of take records). Leatherbacks are known to drown in fish nets set in coastal waters of Sao Tome, West Africa (Castroviejo *et al.* 1994; Graff 1995). Gillnets are one of the suspected causes for the decline in the leatherback sea turtle population in French Guiana (Chevalier *et al.*1999), and gillnets targeting green and hawksbill turtles in the waters of coastal Nicaragua also incidentally catch leatherback turtles (Lagueux *et al.*1998). Observers on shrimp trawlers operating in the northeastern region of Venezuela documented the capture of six leatherbacks from 13,600 trawls (Marcano and Alio 2000). An estimated 1,000 mature female leatherback sea turtles are caught annually off of Trinidad and Tobago with mortality estimated to be between 50-95% (Eckert and Lien 1999). However, many of the turtles do not die as a result of drowning, but rather because the fishermen butcher them in order to get them out of their nets (NOAA Fisheries SEFSC 2001). In Ghana, nearly two thirds of the leatherback sea turtles that come up to nest on the beach are killed by local fishermen.

Summary of Leatherback Status
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, NOAA Fisheries will assume that the Atlantic population of leatherback sea turtles is declining (the conservative estimate) or stable (the optimistic estimate).

3.2.3 Kemp's Ridley Sea Turtles

The Kemp's ridley is the most endangered of the worlds sea turtle species. The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). Estimates of the adult female nesting population reached a low of 300 in 1985.

Conservation efforts by Mexican and U.S. agencies have aided this species by eliminating egg harvest, protecting eggs and hatchlings, and reducing at-sea mortality through fishing regulations. From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. Current totals exceed 3000 nests per year, allowing cautious optimism that the population is on its way to recovery (TEWG 2000).

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

Like loggerheads, Kemp's ridleys are affected by water temperature. 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. Kemp's ridley's consume a variety of crab species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). 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).

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

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

Kemp's ridleys may also be affected by large-mesh gillnet fisheries. In the spring of 2000, a total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all of the carcasses washed ashore.

Summary of Status for Kemp's Ridleys

The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% per year. Current totals exceed 3000 nests per year (TEWG 2000). It has been suggested that Kemp's ridley sea turtles mature much sooner (6-7 years) but there is some doubt that these figures are accurate given the disparity with age at sexual maturity for other carnivorous sea turtles, namely loggerheads (USFWS and NOAA Fisheries 1992). Anthropogenic impacts to the Kemp's ridley population are similar to those discussed above. Despite these, there is cautious optimism that Kemp's ridley sea turtles are increasing.

3.2.4 Green Sea Turtle

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

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

While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtles life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages (Bjorndal 1985). At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet but may also consume jellyfish, salps, and sponges (Bjorndal 1997). Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). In North Carolina, green turtles are known to occur in estuarine and oceanic waters and to nest in low numbers along the entire coast. The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of Chesapeake Bay and as far north as Long Island Sound (Musick and Limpus 1997).

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

As with the other sea turtle species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality. Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. A preliminary sea sampling data summary (1994-1998) shows the following total take of green turtles: 1 (anchored gillnet), 2 (pelagic driftnet), and 2 (pelagic longline).

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

4.0 ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in progress (50 CFR 402.02). The environmental baseline for this Opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation generally fall into the following three categories: vessel operations, fisheries, and recovery activities associated with reducing those impacts.

4.1 Fishery Operations

4.1.1 Federal Fisheries

Several commercial fisheries in the action area employ gear that has been known to capture, injure, and kill cetaceans and/or sea turtles. Several federally-regulated fisheries that use gillnet, longline, trawl, seine, dredge, and pot gear have been documented as unintentionally capturing or entangling whales and sea turtles. In some cases, the entangled whales and turtles are harmed, injured, or killed as a result of the interaction. Formal ESA section 7 consultation has been conducted on the American Lobster, Summer Flounder, Scup and Black Sea Bass, Monkfish, Atlantic Mackerel/Squid/Atlantic Butterfish, Atlantic Bluefish, Spiny Dogfish, Red Crab, Tilefish, Northeast Multispecies, Atlantic Herring, Atlantic Sea Scallop, and Highly Migratory Species (HMS) fisheries. An Incidental Take Statement (ITS) has been issued for the take of sea turtles, 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.

Serious injuries and mortality of endangered whales have occurred as a result of interactions with gear used in the *American lobster pot fishery*. NOAA Fisheries is addressing the interaction between the lobster trap fishery and endangered whales in the ALWTRP. NOAA Fisheries 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 was not likely to jeopardize the continued existence of any ESA-listed species under NOAA Fisheries 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 jeopardizing northern right whales. A new RPA was provided that was expected to remove the risks that continued implementation of the American Lobster regulations posed to northern right whales. The RPA consisted of several measures but primary amongst these are Seasonal Area Management ((SAM); seasonal restrictions of specific fishing areas when right whales are present), Dynamic Area Management ((DAM); restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly), and gear modifications to reduce the amount of floating line in the water. Consultation on the American lobster pot fishery was reinitiated in 2002 to consider the effects of implementation of historical participation for parts of the Federal lobster management area, and implementation of a conservation equivalency measure for state-permitted New Hampshire lobster fishers who also held a federal lobster permit. This consultation concluded, on October 31, 2002, that the proposed action was not likely to jeopardize the continued existence of any ESA-listed species under NOAA Fisheries jurisdiction but was expected to result in the take of one additional leatherback sea turtle biennially.

The *summer flounder, scup and black sea bass fishery* are prosecuted using mobile trawl, and fixed gillnet and pot/trap gear; gear types which are known to interact with whales and sea turtles. The summer flounder trawl fishery has a known history of sea turtle entanglement. As a result, summer flounder trawls are required to be fitted with a TED when fishing in the southern part of the fishery from North Carolina/South Carolina border north to Cape Charles, VA. On October 18, 2002, consultation on the continued implementation of the FMP was reinitiated due to NOAA Fisheries concerns over the pot/trap gear used to prosecute a large part of the black sea bass fishery and a smaller more dedicated pot/trap fishery for scup that may be a likely cause of interaction and entanglement with endangered large whales (right whales in particular). A reasonable and prudent alternative is being developed.

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 catch bluefish. Whales and turtles can become entangled in the buoy lines of the gillnets or in the net panels.

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

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

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

NOAA Fisheries completed the most recent biological opinion on the FMP for the Atlantic highly migratory species fisheries for swordfish, tuna, and shark on June 8, 2001. The Opinion concluded that the pelagic longline and bottom longline fisheries for shark could capture as many as 1,417 pelagic, immature loggerhead turtles each year and could kill as many as 381 of them. The Opinion concluded that these fisheries would be expected to capture 875 leatherback turtles each year, killing as many as 183 of them. After considering the status and trends of populations of these two species of sea turtles, the impacts of the various activities that constituted the baseline, and adding the effects of this level of incidental take in the fisheries, the Opinion concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. A reasonable and prudent alternative was provided to remove the likelihood that the HMS fisheries would jeopardize the continued existence of leatherback and loggerhead sea turtles. The RPA includes area closures and gear modifications to reduce the number of sea turtle takes in the HMS fisheries.

The Federal *Monkfish fishery* occurs in all waters under federal jurisdiction from Maine to the North Carolina/South Carolina border. The monkfish fishery uses several gear types that may entangle protected species. In 1999, turtles were taken in excess of the ITS as a result of gillnet entanglements. NOAA Fisheries reinitiated consultation on the Monkfish FMP on May 4, 2000, in order to reevaluate the affect of the monkfish gillnet fishery on sea turtles. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures, and the ability of the RPA to avoid the likelihood of jeopardizing the continued existence of right whales. The Opinion concluded that continued implementation of the Monkfish FMP was likely to jeopardize the continued existence of the northern right whale. A new RPA was provided to avoid the likelihood that operation of the gillnet sector of the monkfish fishery would jeopardize the continued existence of northern right whales. In addition, a new ITS was provided for the take of sea turtles in the fishery. Consultation was reinitiated on the Monkfish FMP on March 7, 2002, to consider the effects of Framework Adjustment 1 measures on ESA-listed species which proposed to defer for one year the measure to reduce monkfish DAS to zero. NOAA Fisheries concluded consultation on May 14, 2002, and determined that as a result of the proposed measures, sea turtles will face additional adverse affects that were not considered in the June 14, 2001, consultation on this fishery. A new ITS was provided for the anticipated take of sea turtles in Year 4 of the monkfish fishery. NOAA Fisheries has subsequently proposed to eliminate the default measure that would have reduced DAS to zero for the 2003 fishing year (beginning May 1, 2003) and is also proposing increased trip limits for the SFMA. NOAA Fisheries concluded on February 12 2003, that the new proposed measures may adversely affect ESA-listed species and reinitiated section 7 consultation for the continued implementation of this FMP. Consultation was concluded on April 24, 2003, and a new ITS for sea turtles has been provided.

The *Red crab fishery* is a pot/trap fishery that occurs in deep waters along the continental slope. An FMP for the fishery is in development. There have been no recorded takes of ESA-listed species in the red crab fishery. However, given the type of gear used in the fishery, takes are possible where gear overlaps with the distribution of ESA-listed species, therefore an ITS for sea turtles has been provided for this fishery.

It was previously believed that the *Scallop dredge fishery* was unlikely to take sea turtles given the slow speed at which the gear operates. However, NOAA Fisheries, NEFSC documented captures of sea turtles in scallop dredge gear following the re-opening of the Hudson Canyon and Virginia Beach Scallop Closed Areas in 2001. Section 7 consultation was initiated on this fishery and concluded on February 24, 2003, that the fishery may adversely affect sea turtles. An ITS has been provided.

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

The 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 fishery in March 2001. An ITS is provided for loggerhead and leatherback sea turtles.

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. Sea turtles can be incidentally captured in all gear sectors of this fishery. Turtle takes in 2000 included one dead and one live Kemp's ridley. Since the ITS issued with the August 13, 1999, Opinion anticipated the take of only one Kemp's ridley (lethally or non-lethally), the incidental take level for the dogfish FMP was exceeded. In addition, a right whale mortality occurred in 1999 as a result of entanglement in gillnet gear that may have originated from the spiny dogfish fishery. NOAA Fisheries, therefore, reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardizing the continued existence of right whales, and the affect of the spiny dogfish gillnet fishery on sea turtles. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures. The Opinion (issued on June 14, 2001) concluded that continued implementation of the Spiny Dogfish FMP was likely to jeopardize the continued existence of the northern right whale. A new RPA was provided that is expected to remove the likelihood that the continued prosecution of the gillnet sector of the spiny dogfish fishery would jeopardize the continued existence of northern right whales. In addition, a new ITS was provided for the take of sea turtles in the fishery.

Section 7 consultation has also been conducted on the issuance of an Exempted Fisheries Permit (EFP) for the collection of horseshoe crabs from the Carl N. Shuster, Jr. Federal Horseshoe Crab Reserve (in Federal waters off of the mouth of Delaware Bay). The EFP for the collection of horseshoe crabs was issued in October 2001 and includes an ITS for loggerhead sea turtles.

Horseshoe crabs collected under this permit are used for data collection on the species and to obtain blood for biomedical purposes. An EFP for Jonah crab has also been issued to the Maine Department of Marine Resources to allow lobster trap fishers to fish additional (modified) lobster traps to determine their ability to exclude lobster. The purpose of the experiment is to develop a trap that will catch Jonah crab with minimal lobster bycatch. The Biological Opinion concluded that proposed activities under the Jonah crab EFP were likely to jeopardize the continued existence of the western north Atlantic right whale, and may adversely affect but were not likely to jeopardize the continued existence of humpback whales, fin whales, or leatherback sea turtles. A Reasonable and Prudent Alternative (RPA) was provided to avoid the likelihood that the Jonah crab experimental fishery will jeopardize the continued existence of the endangered right whale. An ITS as well as non-discretionary Reasonable and Prudent Measures RPM) and discretionary Conservation Recommendations were also included to address the anticipated take of leatherback sea turtles.

Calving season for right whales occurs in the southeast and large numbers of females with calves and juvenile males are located in a small geographical area at a time when a large gillnet fishery occurs. NOAA Fisheries has issued a final rule governing straight sets of gillnets off the southeast coast during the right whale calving season. The rule prohibits straight sets at night in a restricted area off the Georgia and Florida coasts. The final rule was published in the Federal Register (67: 59471 ; September 23, 2002). Copies can be found on the web site of the Atlantic Large Whale Take Reduction Team (http://www.nero.nmfs.gov/whaletrp/).

4.1.2 Non-Federally Regulated Fisheries

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

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

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 and whales are present. Various *crab fisheries* using pot/trap gear also occur in federal and state waters such as horseshoe crab, green crab, blue crab, and Jonah crab. Effort in the latter is currently limited by trap limits set for the lobster fishery since many Jonah crab fishers are also lobster fishers and Jonah crabs are collected using lobster gear. However, there is interest in developing a separate fishery. If the Jonah crab fishery were to develop apart from 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 tautog). Residents in some states (*e.g.*, Connecticut and Massachusetts) may also obtain a personal use lobster license that allows individuals to set traps to obtain lobster for personal use.

In addition to pot/trap gear, trawl and poundnet gear can also pose a problem for sea turtles. Bottom trawl fisheries for *horseshoe crab* are suspected as taking sea turtles off of Delaware (Spotila *et al.* 1998). Leatherbacks are also known to have been taken in trawls operating in Rhode Island state waters, and are suspected as having been taken in trawl gear operating in Mid-Atlantic state waters. In addition to these, NOAA Fisheries is also concerned about the take of sea turtles in the pound net fishery in Virginia. Pound nets with large-mesh leaders set in the Chesapeake Bay have been observed to (lethally) take turtles as a result of entanglement in the pound net leader. NOAA Fisheries, therefore, published an interim final rule on June 17, 2002, that included seasonal gear requirements for the use of such leaders in the Chesapeake Bay to address sea turtle interactions with Virginia pound nets (67 FR 41196).

4.2 Vessel Activity

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

4.2.1. Naval Operations

On May 30, 2002, NOAA Fisheries concluded consultation on two interrelated actions proposed by the U.S. Navy (Navy) and NOAA Fisheries. The Navy proposed to employ the Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar on two vessels during training and testing as well as during military operations. NOAA Fisheries proposed to amend its regulations at 50 CFR part 216 governing the taking and importing of marine mammals to allow NOAA Fisheries to issue to the Navy annual letters of authorization to take marine mammals incidental to the employment of SURTASS LFA sonar for a five-year period ending in 2007. The action area for proposed employment of the sonar system encompasses the Atlantic, Pacific, and Indian Oceans, Mediterranean Sea, and associated seas, including the Arabian Sea, Barents Sea, Caribbean Sea, Norwegian Sea, Sea of Okhotsk, Philippine Sea, and Tasman Sea as well as several other more specific areas. However mitigation measures agreed to by the Navy and NOAA Fisheries restrict the Navy from operating SURTASS LFA sonar in a way that causes sonar sound fields to exceed 180 dB (re 1 mPa_{rms}) within 12 nautical miles (22 kilometers) of any coastline, including offshore islands, or designated offshore areas that are biologically important for marine mammals outside the 12 nautical mile (22 kilometer) zone during seasons specified for a particular area. The biologically important area that encompasses the action area for this consultation is the 200-meter isobath off the North American Coast From 28° N to 50° N, west of 40° W Year round for the protection of right whale (western Atlantic stock), sei whale, humpback whale, northern bottlenose whale. The Opinion concluded that the SURTASS LFA sonar system is not likely to jeopardize the continued existence of threatened or endangered species under NOAA Fisheries jurisdiction and not likely to destroy or adversely modify designated critical habitat. This Opinion did not include an Incidental Take Statement (ITS) because of the programmatic nature of the action, but an ITS will be included with the Opinion when a letter of authorization under the MMPA is issued. Litigation between the federal government and the Natural Resources Defense Council began (mid June and continues as of 15 July, 2003) over the long term use of SURTASS LFA and its possible affects on marine mammals worldwide.

4.3 Other Activities

4.3.1 Pollution

In feeding areas of the northeast such as the Massachusetts Bay area, the dominant circulation patterns make it probable that pollutant inputs into Massachusetts Bay will affect Cape Cod Bay's right whale critical habitat. Sources of pollutants in the Gulf of Maine and other coastal regions include atmospheric loading of pollutants such as PCB's, storm water runoff from coastal towns, cities and villages, runoff into rivers emptying into bays, groundwater discharges and sewage treatment effluent, and oil spills. A present concern, not yet completely defined, is the possibility of habitat degradation in Massachusetts and Cape Cod Bays due to the Massachusetts Bay Disposal Site (MBDS) located 9.5 miles east of Deer Island. The MBDS began discharging secondary sewage effluent into Massachusetts Bay in 2000 about 16 miles from designated right whale critical habitat. NOAA Fisheries concluded in a 1993 biological opinion that the discharge of sewage at the MBDS may affect, but is not likely to jeopardize, the continued existence of any listed or proposed species or destroy or adversely modify critical habitat under NOAA Fisheries jurisdiction. However, scientific uncertainties remain about the potential unforeseen impacts to the marine ecosystem, the food chain, and endangered species. Therefore, post-discharge monitoring is being conducted by the Massachusetts Water Resources Authority. The Center for Costal Studies, Provincetown, MA have been conducting outfall discharge monitoring studies to investigate if habitat degradation in Cape Cod Bay was occurring or if the food chain was being degraded or altered in any way. While this does not appear to have happened, scientists at the center will continue to evaluate the situation (Jamus Collier pers. comm.). The Center for Coastal Studies is developing a comprehensive research paper presenting their results.

4.4 Reducing Threats to ESA-listed Whales

A number of activities are in progress that may ameliorate some of the threats summarized in the *Environmental Baseline* pose to endangered whales in the action area of this consultation. These include education / outreach activities, gear modifications, time-area closures, disentanglement, and measures to reduce ship and other vessel impacts to protected whales. 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.

Lobster and gillnet gear are known to entangle endangered large whales. Regulations introduced in Massachusetts waters requiring modifications to lobster and gillnet fishing came into effect January 1, 2003. The purpose of the new requirements is to reduce the risk of right whale entanglements in an area that has a known congregation of right whales each year. From January 1 through April 30, single lobster pots are banned, and ground lines must be either sinking or neutrally buoyant. Buoy lines must also be mostly sinking line and must include a weak link. From May 1 through December 31, lobstermen must use at least two of the following gear configurations: buoy lines 7/16-inch diameter or less, a weak link at the buoy of 600 pounds breaking strength, sinking buoy lines, and sinking or neutrally buoyant ground lines.

4.4.1 ALWTRP

The MMPA requires NOAA Fisheries to develop a plan to reduce mortalities and serious injuries to marine mammals incidentally taken in commercial fisheries to levels less than the potential biological removal (PBR), approaching a zero mortality and serious injury rate. The Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed to meet this requirement of the MMPA. It primarily focuses on right whales, but is also expected to reduce entanglements of humpback, fin, and minke whales. However, the benefits to humpback, fin and minke whales may be limited because the plan concentrates on right whale distribution to determine area closures, but many gear modifications are required fishery-wide. In general, humpback whales inhabit northern waters at the same time as right whales but the spatial overlap may depend on prey distribution. As a result of right whale entanglement events over the past four or five years, NOAA Fisheries has developed and has continued to revise the ALWTRP with additional gear regulations. The ALWTRP applies to gillnet and lobster trap/pot gear.

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 ALWTRP is a "work-in-progress", and revisions are made to the regulations as new information and technology becomes available. The last update to the ALWTRP regulations included SAM (Interim Final Rule) effective March 1, 2002, DAM (Final Rule) effective February 11, 2002, and a range of additional gear modifications affecting lobster gear in NE and Mid-Atlantic (effective February 11, 2002) and restrictions on gillnets in the South Atlantic (effective October 23, 2002). 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 marine mammal-gear interactions while allowing for fishing activities. The gear research and development program follows two approaches: (a) reducing the number of lines in the water without shutting down fishery operations, and (b) devising lines that are weak enough to allow whales to break free and at the same time strong enough to allow continued fishing. This aspect of the ALWTRP is also important in that it incorporates the knowledge and participation of the fishing industry for developing and testing modified and experimental gear.

4.4.1.2 Whale Disentanglement Network

In recent years, NOAA Fisheries has increased funding for the Whale Disentanglement Network; purchasing equipment caches to be located at strategic spots along the Atlantic coastline, supporting training for fishers and biologists, purchasing telemetry equipment, etc. This has resulted in an expanded capacity for disentanglement along the Atlantic seaboard including offshore areas. The Center for Coastal Studies (CCS), under NOAA Fisheries authorization, has responded to numerous calls since 1984 to disentangle whales entangled in gear, and has developed considerable expertise in whale disentanglement. NOAA Fisheries has supported this effort financially since 1995. Memoranda of Understanding developed with the USCG ensure its participation and assistance in the disentanglement effort. Hundreds of Coast Guard and Marine Patrol workers have received training to assist in disentanglements. As a result of the success of the disentanglement network, NOAA Fisheries believes that many whales that may otherwise have succumbed to complications from entangling gear have been freed and survived the ordeal.

4.4.1.3 Northeast Recovery Implementation Team

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

The Ship Strike Committee of the NEIT 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 and a program run by MDMF (operated within state waters) serve as two forms 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 NOAA Fisheries operations. Other potential sources of sightings include the U.S. Navy, Northeast Fisheries Science Center/NOAA and independent research vessels. The NOAA Fisheries 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 primary tools to reduce the threats to all protected species. For example, outreach efforts for fishermen under the ALWTRP are fostering a more cooperative relationship between all parties interested in the conservation of threatened and endangered species. NOAA Fisheries has also been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. NOAA Fisheries has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue these outreach efforts in an attempt to increase the survival of protected species through education on proper release techniques.

4.4.3 Other Measures to Reduce Ship and Vessel Impacts

Other on-going activities to benefit right whales, in particular, include the *Mandatory Ship Reporting System (MSR).* 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 Fisheries and the U.S. Coast Guard have developed and implemented Mandatory Ship Reporting System. The system was adopted and implemented through the International Maritime Organization.

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

4.5 Reducing Threats to Sea Turtles

4.5.1 Sea Turtle Stranding and Salvage Network (STSSN)

There is an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts which not only collects data on dead sea turtles, but also rescues and rehabilitates live stranded turtles. Data collected by the STSSN are used to monitor stranding levels and identify areas where unusual or elevated mortality is occurring. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of the small subpopulation of northern nesting loggerheads. These states also tag live turtles when encountered (either via the stranding network through incidental takes or in-water studies). Tagging studies help provide an understanding of sea turtle movements, longevity, and reproductive patterns, all of which contribute to our ability to reach recovery goals for the species.

Unlike cetaceans, there is no organized, formal program for at-sea disentanglement of sea turtles. However, recommendations for such programs are being considered by NOAA Fisheries pursuant to conservation recommendations issued with several recent section 7 consultations. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen.

4.5.2 Regulatory Measures for Sea Turtles

4.5.2.1 Final Rule for Large-Mesh Gillnets

In March 2002, NOAA Fisheries published new restrictions for the use of gillnets with larger than 8 inch (20.3 cm) stretched mesh, in Federal waters (3-200 nautical miles) off of North Carolina and Virginia. These restrictions were published in an Interim Final Rule under the authority of the ESA (67 FR 13098) and were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened species of sea turtles in areas where sea turtles are known to concentrate. Following review of public comments submitted on the Interim Final Rule, NOAA Fisheries published a Final Rule on December 3, 2002, that establishes the restrictions on an annual basis. As a result, gillnets with larger than 8 inch stretched mesh are not allowed in Federal waters (3-200 nautical miles) north of the North Carolina/South Carolina border at the coast to Oregon Inlet at all times; north of Oregon Inlet to Currituck Beach Light, NC from March 16 through January 14; north of Currituck Beach Light, NC to Wachapreague Inlet, VA from April 1 through January 14; and, north of Wachapreague Inlet, VA to Chincoteague, VA from April 16 through January 14. Federal waters north of Chincoteague, VA are not affected by these new restrictions although NOAA Fisheries is looking at additional information to determine whether expansion of the restrictions are necessary to protect sea turtles as they move into northern Mid-Atlantic and New England waters. These measures are in addition to the HPTRP measures that prohibit the use of large-mesh gillnets in southern Mid-Atlantic waters (territorial and federal waters from Delaware through North Carolina out to 72° 30'W longitude) from February 15-March 15, annually.

4.5.2.2 Seasonal Restrictions for Summer Flounder Trawls

As mentioned in Section 4.1.1 significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring TEDs in trawl nets fished in the area of greatest turtle bycatch off the North Carolina and part of the Virginia coast from the North Carolina/South Carolina border to Cape Charles, VA. These measures are attributed with significantly reducing turtle deaths in the area. In addition, NOAA Fisheries has recently issued a final rule (67 FR 56931), effective September 3, 2002, that closes the waters of Pamlico Sound, NC, to fishing with gillnets with a mesh size larger than 4 1/4 inch (10.8 cm) stretched mesh (''large-mesh gillnet''), on a seasonal basis, from September 1 through December 15 each year, to protect migrating sea turtles. The closed area includes all inshore waters of Pamlico Sound south of 35° 46.3' N. lat., north of 35°00' N. lat., and east of 76° 30'W. long.

4.5.2.3 Final Rule for Larger TED Openings

On February 21, 2003, NOAA Fisheries issued a final rule to amend regulations protecting sea turtles to enhance their effectiveness in reducing sea turtle mortality resulting from shrimp trawling in the Atlantic and Gulf Areas of the southeastern United States. TEDs have proven to be effective at excluding sea turtles from shrimp trawls; however, NOAA Fisheries has determined that modifications to the design of TEDs need to be made to exclude leatherbacks and large and sexually mature loggerhead and green turtles. In addition, several approved TED designs do not function properly under normal fishing conditions. Therefore, NOAA Fisheries will disallow these TEDs (*e.g.*, weedless TEDs, Jones TEDs, hooped hard TED, and the use of accelerator funnels). Finally, the rule will require modifications to the trynet and bait shrimp exemptions to the TED requirements to decrease mortality of sea turtles.

4.5.2.4 Interim Final Rule for Virginia Pound Nets

Existing information indicates that pound nets with large mesh and stringer leaders as used in the Chesapeake Bay incidentally take sea turtles. Based on the available information, NOAA Fisheries determined that fishing with this gear is likely a cause of the stranding of sea turtles in the Chesapeake Bay. To address incidental take of sea turtles in pound net leaders and possibly the high and increasing level of sea turtle strandings, NOAA Fisheries published a Temporary Rule in June 2001 (66 FR 33489) that curtailed fishing with pound net leaders measuring 8 inches or greater (20.3 cm) and pound net leaders with stringers in mainstream waters of the Chesapeake Bay and its tributaries for a 30-day period beginning June 19, 2001. NOAA Fisheries subsequently published an Interim Final Rule in 2002 that further addresses the take of sea turtles in large-mesh pound net leaders and stringer leaders used in the Chesapeake Bay and its tributaries (67 FR 41196, June 17, 2002). On July 16, 2003, NOAA Fisheries published a temporary final rule requiring removal of pound net leaders from the Virginia waters of the Chesapeake Bay through July 30, 2003 in order to further protect sea turtles (68 FR 41942).

4.5.2.5 HMS Sea Turtle Protection Measures

As described in *Section 4.1.1* above, NOAA Fisheries' completed the most recent biological opinion on the FMP for the Atlantic HMS fisheries for swordfish, tuna, and shark on June 8, 2001 and concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. An RPA was provided to avoid jeopardy to leatherback and loggerhead sea turtles as a result of operation of the HMS fisheries. This RPA has been implemented in part through rulemaking. A final rule published July 9, 2002, (67 FR 45393) implements measures that close the northeast distant statistical reporting area (NED) to vessels that have been issued, or are required to have, Federal HMS limited access permits and use pelagic longline gear. In addition to the closure, the final rule implements gear modifications designed to reduce the mortality rate of captured sea turtles, year-round and in all fishing areas. These include: (1) deploying gear so that hooked or entangled turtles have sufficient slack to reach the surface and avoid drowning, and (2) a requirement to use only corrodible, non-stainless steel hooks. Additional gear requirements were implemented as part of a related Interim Final Rule published March 30, 2001 (66 FR 17370) that requires pelagic longline vessels that have been issued a Federal HMS permit to carry on board line clippers and dipnets that meet NOAA Fisheries design and performance standards. Federally permitted pelagic longline fishers are required to use line cutters and dipnets in the manner specified by the regulations to cut fishing line as close as possible to hooked or entangled turtles in order to facilitate the release of turtles with a minimum of injury.

4.5.2.6 Sea Turtle Handling and Resuscitation Techniques

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

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

The previous discussions summarized the numerous hazards that endangered whales and threatened and endangered sea turtles are exposed to in the action area. The hazards that appear to be having the greatest impact on these listed species are entanglements in fishing gear and ship strikes. Other phenomena with anthropogenic causes, like water pollution and the disruption of marine food chains, may contribute to the status and trend of listed species in the action area, although the specific impacts of these phenomena on those listed species remains unknown. Nevertheless, we can summarize the aggregate impact of the environmental baseline on listed species in the action area:

Right whales. The western North Atlantic subpopulation of right whales continues to decline toward extinction. The action area for this consultation includes right whale foraging grounds in the Gulf of Maine, SNE and waters used by right whales when traveling to and from foraging areas in the U.S. and Canada, and to the southeast nursery/calving grounds. As discussed in the *Status of the Species* section of this Opinion, the death of right whales in collisions with ships and entanglements in fishing gear are the greatest hazards to this species (Caswell *et al.* 1999, Silber *et al.* 2002). Of the 45 right whales whose deaths were recorded between 1970 and 1990, 16 deaths (35.6%) resulted from injuries caused by collisions with ships, 13 deaths (28.9%) were neonates who apparently died from perinatal complications or natural causes, 2 deaths (4.4%) were related to fishing gear, and 14 deaths (31.1%) were of unknown causes (Silber et al. 2002). Fujiwara and Caswell (2001) have concluded that the death of female whales, particularly reproductive females, appears to pose the greatest demographic risk of extinction to right whales

Preceding subsections of this *Environmental Baseline* summarized the efforts NOAA Fisheries, the States, the Coast Guard, and other agencies have implemented to prevent right whales from being injured or killed in interactions with vessels or fishing gear. Despite these efforts, the available evidence suggests that the western Atlantic subpopulation of right whales cannot sustain the number or rate of deaths that result from the various fisheries, vessel traffic, and any other possible sources (*e.g.*, pollution) that were summarized in the *Environmental Baseline*. If the impacts of these activities continue at current rates, they are likely to result in the extirpation of the western Atlantic subpopulation of right whales. Given the low population size of right whales in the eastern Atlantic Ocean, the extirpation of right whales in the western Atlantic Ocean would render this entire species effectively extinct in the North Atlantic.

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

Fin whales. Although the fin whale population in the western North Atlantic Ocean probably numbers more than 2,362 animals, the status and trend of fin whales in the Atlantic Ocean remains unknown. Fishing gear appears to pose less of a threat to fin whales in the North Atlantic Ocean than it does for North Atlantic right or humpback whales. However, more fin whales are struck by large vessels than right or humpback whales (Laist *et al.* 2001) and fin whales may be killed by whalers in the North Atlantic.

Sei whales. There are insufficient data to determine trends of the Nova Scotian sei whale population. Because there are no abundance estimates within the last 10 years, a minimum population estimate cannot be determined for NOAA Fisheries management purposes (Waring *et al.* 1999). Few instances of injury or mortality of sei whales due to entanglement or vessel strikes have been recorded in U.S. waters. This may be related to the sei whales preference for deep water throughout their range, typically over the continental slope or in basins situated between banks (NMFS 1998). Given the lack of information on sei whale abundance and population trends, it is impossible to quantify the impact of these threats on the status and trend of the sei whale population without more information on the population size and population ecology of the species.

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

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

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

Leatherback turtles. The size of the leatherback turtle population in the Atlantic Ocean is uncertain, the number of leatherback turtles at some nesting sites has increased while they have decreased at other sites and it is difficult to produce a composite estimate from the available data. However, the population of leatherback sea turtles in the Atlantic Ocean does not appear to be increasing; it is either declining or stable depending on whether we accept conservative or optimistic estimates, respectively. Fishing gear associated with fisheries in State, Federal and international waters; poaching, development and erosion on their nesting beaches, and ingesting marine debris are the primary threats to leatherback turtles in the Atlantic Ocean. In and near the action area, leatherback turtles are captured and injured or killed in interactions with fishing gear that includes salmon nets, herring nets, gillnets, trawl line, and crab pot line. Nevertheless, it is impossible to estimate the impact of these activities on the status and trend of the leatherback turtles in the action area or the Atlantic Ocean without more information on the population size and population trend of the species. Because of these unknowns, it is impossible to quantify the cumulative impact of all of the activities included in the *Environmental Baseline* on leatherback turtles.

Loggerhead Sea Turtles. NOAA Fisheries recognizes five subpopulations of loggerhead sea turtles in the western Atlantic based on genetic studies. Turtles from three of these subpopulations - the northern subpopulation, the south Florida subpopulation, and the Yucatán subpopulation - are expected to occur within the action area of this consultation. Based on nesting data from several sources (Frazer 1983, TEWG 1998, TEWG 2000, and NOAA Fisheries SEFSC 2001), nest rates for the south Florida subpopulation have increased at a rate of 3.9 - 4.2% since 1990 (approximately 83,400 nests in 1998). Similarly, although the Yucatán subpopulation is much smaller (approximately 1052 nests as of 1998), nesting rates are at least stable and may be increasing. However, NOAA Fisheries considers the northern subpopulation to be stable, at best, or declining. Results from analysis of nuclear DNA suggests that the high proportion of males produced by the northern subpopulation are an important source of males throughout the southeast U.S., lending even more significance to the critical nature of the small northern subpopulation (NOAA Fisheries SEFSC 2001).

Fishing gear associated with fisheries in State, Federal and international waters; poaching, development and erosion on their nesting beaches, and ingesting marine debris are the primary threats to loggerhead turtles in the Atlantic Ocean. In and near the action area, loggerhead turtles are captured and injured or killed in interactions with fishing gear that includes pound net leaders, whelk pots, gillnets, pelagic longlines, trawls, and scallop dredges. Injuries and mortalities may also occur as a result of entrainment in power plant intakes or as a result of dredging for channel maintenance and beach nourishment projects within the action area. Nevertheless, it is impossible to estimate the impact of all these activities on the status and trend of the loggerhead sea turtles in the action area or the Atlantic Ocean without more information on the population size and population trend of the species. In addition, although NOAA Fisheries SEFSC (2001) summarized what is known about the effects of human activities on loggerhead and populations, 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.)*. Because of these unknowns, it is impossible to quantify the cumulative impact of all of the activities included in the *Environmental Baseline* on loggerhead sea turtles. Nevertheless, the northern subpopulation of loggerhead turtles appears to have a high risk of significant, future declines as a result of the various activities that threaten the adult females in its population. In contrast, the south Florida and Yucatán subpopulations of loggerhead turtles appears to be stable despite the various activities that threaten the adult females and the nesting beaches in these subpopulations.

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 activities they conduct, authorize or fund do not jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. This Opinion examines the likely effects of the proposed action on listed species within the action area to determine if the skate directed bait fishery, as authorized in the FMP, is likely to jeopardize the continued existence of listed species. This analysis is done after careful review of the listed species status and the factors that affect the survival and recovery of that species, as described above.

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

5.1 Approach to the Assessment

NOAA Fisheries generally approaches jeopardy analyses in three steps. The first step identifies the probable direct and indirect effects of an action on the physical, chemical, and biotic environment of the action area. The second step determines the reasonableness of expecting threatened or endangered species to experience reductions in reproduction, numbers or distribution in response to these effects. The third step determines if any reductions in a species reproduction, numbers or distribution (identified in the second step of our analysis) can be expected to appreciably reduce a listed species likelihood of surviving and recovering in the wild. A species reproduction, numbers, and distribution are interdependent. Reducing a species reproduction will reduce its population size (if mortality rate exceeds birth/recruitment rates); 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; (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 "errors". 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). This approach to 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

Almost the entire directed bait fishery is constrained to two statistical areas, thus the directed skate bait fishery is not widespread around the New England and/or Mid-Atlantic region. The vast majority of the directed skate bait fishery occurs in two statistical areas 537 and 539, off of Rhode Island and Massachusetts waters, with smaller landings from the waters off of New York and New Jersey. The effects of the proposed action on ESA-listed cetaceans and sea turtles were analyzed by considering the known effects of the skate fishery on the status of the species, and taking into account the likely response of the species to the proposed action.

As discussed in the *Description of the Proposed Action*, the activity being considered by NOAA Fisheries is the initial implementation of the Skate FMP. Right, humpback, fin, sei, sperm, and blue whales and loggerhead, green, Kemp's ridley, and leatherback sea turtles are known to suffer injuries and mortality as a result of vessel strikes. In addition, right whales, humpback whales, fin whales, sperm whales, loggerhead, green, Kemp's ridley and leatherback sea turtles are known to be captured or entangled in trawl and/or gillnet gear. Since the Skate FMP will allow for the continued operation of the directed skate fishery, this action may adversely affect ESA-listed cetaceans and sea turtles due to vessel interactions and/or gear interactions as a result of the skate fishery. The following discussion provides further information on the likelihood that adverse effects will occur, and the degree of impact to right, humpback, fin, sei and sperm whales, and loggerhead, green, Kemp's ridley, and leatherback sea turtles from fishing gear and/or vessels proposed to be used in the directed skate fishery managed under the skate FMP.

Different gear types are reported to take skate, based on NOAA Fisheries' limited data. The two principal types, trawls and to a much lesser extent gillnets, historically account for the majority of commercial skate bait landings (98%). Of the gear types used, gillnet gear have resulted in the most endangered (mammal) species takes. Data indicate that gillnet gear like that used in this fishery has seriously injured right, humpback and fin whales, and loggerhead and leatherback sea turtles. For example, Waring et al. (1997) reports that 17 serious injuries or mortalities of humpback whales from 1991 to 1996 were fishery interactions (not necessarily skate gear), the majority of which were attributable to some kind of monofilament gear, similar to that used in the skate gillnet fishery. However, it is often difficult to assess gear found on stranded animals or observed on animals at sea and assign it to a specific fishery. Only a fraction of the takes are observed, and the catch rate represented by the majority of takes, which are reported opportunistically, (*i.e.*, not as part of a random sampling program), is unknown. Consequently, documented takes are underestimated and the total level of interaction cannot be determined through extrapolation. The dominant gear sector in the fishery is otter trawl gear, and marine mammal entanglement in this gear type has been low compared to gillnet gear. The 2002 NOAA Fisheries LOF, places each commercial fishery into one of three categories based upon the level of serious injury and mortality of marine mammals that occurs incidental to that fishery. Many of the trawl fisheries are placed in Category III, and the proposed 2003 LOF has the skate otter trawl fishery in this Category. Category III is the least likely to have marine mammal interaction and is expected to have a remote likelihood of interacting with that gear type.

Therefore, the primary gear type used in the skate fishery is not likely to interact with large whales. Unlike whales, turtles can and have been know to interact with trawl gear. Takes in the monkfish, multispecies and spiny dogfish fisheries have been observed and recorded. The gear used in the skate fishery are configured and fished in a similar manner and are used at similar areas and times as the fisheries previously named. Therefore, entanglement in skate gear is reasonably certain to occur when the fishery operates in times and areas used by ESA listed species.

5.3 Information Available for Assessment

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

5.4 Effects of the Skate Bait Fishery

5.4.1 Effect of Vessels

(1) *Effect of Vessel Collisions* - All whales are potentially subject to collisions with ships (Clapham et al. 1999). Of the 11 species of cetaceans known to be hit by ships, fin whales are struck most frequently; while right whales, humpback whales and others are hit commonly (Laist et al. 2001). In some areas, one-third of all fin whale and right whale strandings appear to involve ship strikes (Laist et al. 2001). Of the 45 right whale mortalities recorded between 1970 and 1999, 16 (35.6%) were determined to be the result of ship strikes (Knowlton and Kraus 2001). Ship strike injuries to whales take two forms: (1) propeller 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 propeller wounds or no apparent injury, depending on the severity of the incident.

Interactions between vessels and sea turtles occur and can take many forms from the most severe (death or bisection of an animal or penetration to the viscera), to severed limbs or cracks to the carapace which can also lead to mortality directly or indirectly. Sea turtle stranding data for the U.S. Gulf of Mexico and Atlantic coasts, Puerto Rico, and the U.S. Virgin Islands show that between 1986 and 1993, about 9% of living and dead stranded sea turtles had propellor or other boat strike injuries (Lutcavage et al. 1997). According to 2001 STSSN stranding data, at least 33 sea turtles (loggerhead, green, Kemp's ridley and leatherbacks) that stranded on beaches within the action area of this consultation (Maine through North Carolina) were struck by a boat. This number underestimates the actual number of boat strikes that occur since not every boat struck turtle will strand, every stranded turtle will not be found, and many stranded turtles are too decomposed to determine whether the turtle was struck by a boat. 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 (NOAA Fisheries SEFSC 2001).

(2) *Factors which may contribute to the occurrence of vessel strikes* - A majority of whales ship strikes seem to occur over or near the continental shelf; probably reflecting the concentration of vessel traffic and whales in these areas (Laist et al. 2001). Other factors which may contribute to a whale being struck include the amount of time spent at the surface, the use of habitats in the vicinity of major shipping lanes, and the speed at which the animal travels (Clapham et al. 1999). However, while it appears that all sizes and types of vessels can hit whales, the most severe or lethal injuries are caused by ships 80 m or longer, and vessels traveling 14 kn or faster (Laist et al. 2001). The massive nature of most blunt trauma and propeller 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 skate directed bait fishery are commercial fishing vessels typical of those used in other commercial fishing operations. The typical vessels involved in the fishery are medium-sized (45-60 feet) trawl vessels; far smaller than the vessels known to pose the most risk of serious injury and mortality to large whales. Current closures established under the MMPA or MSA (implemented under the ALWTRP and co-related FMPs) have reduced fishing vessel operations in key areas in the northeastern states. Existing take prohibitions and right whale approach regulations also appear to be effective deterrents. In addition, these fishing vessels typically operate at slower speeds (vessels steam typically at 8 to 9 knots and fish at 3 knots) than what is observed by large ships, ferry services, or other vessels (recreational etc.).

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. Within the action area of this consultation, loggerhead, green, and Kemp's ridley sea turtles inhabit benthic environments from North Carolina to Cape Cod during the spring and summer foraging months and into the fall, and larger loggerheads can also occur along the shelf edge (CeTAP 1982). Benthic feeding turtles (including juvenile green and Kemp's ridley turtles) would most commonly be found in state waters (off of MA, RI, NY). During the warmer months in the Northeast juvenile sea turtles appear to spend much of their time foraging along the bottom in shallower embayments occurring in areas where water depth was between 16 and 49 feet (Morreale and Standora 1990; 1991; 1998). For the most part, turtles in the summer foraging mode spend most of their time in slow moving or still waters, usually in bays and harbors, and were most often associated with areas containing sandy substrates (Morreale and Standora 1989, 1990, 1991). Interactions between these juvenile species and federally licensed skate fishing vessels are most likely to occur when the vessel is slow moving and traveling to and from port (or if the vessel also possesses state fishing permits and sets gear in state waters). Although interactions could occur, it is unlikely given the minimal overlap of skate fishing vessel activity with the distribution of sea turtles, which in shallower state waters would be spending a significant amount of time near the bottom. Juvenile developmental stages of green and Kemp's ridley turtles have important foraging grounds in the Mid-Atlantic and Northeast region. Both species may be observed during the warmer months as far north as Long Island and Cape Cod. Like loggerheads both species are affected and limited in their range by water temperatures. Although loggerhead, Kemp's ridley, and green turtles may occur in areas where the offshore skate fishery takes place, the large size of the area fished in relation to skate concentrations helps to reduce the overlap of the sea turtle species with fishing activity.

Leatherback turtles are primarily a pelagic species but may occur in shallower waters, presumably in search of prey. A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, NC to Cape Sable, Nova Scotia found the most numerous sightings of leatherbacks from the Gulf of Maine to Long Island, and Shoop and Kenney (1992) observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. However, while there is skate fishing effort (year round, falls away in the winter) in these areas, there have been no reported interactions between vessels used in the skate fishery action area and leatherback sea turtles (with limited observer coverage). Leatherback sea turtle migrate to the area (Skate action area) in late June and the impetus to migrate occurs in late September and is likely to be mediated by an abrupt temperature decline around this time (Morreale and Standora 1994). Given the main area fished (waters in and around MA, RI and NY) in relation to the distribution (in spatial and temporal terms) of leatherback sea turtles in the area as well as the slow operating speed of fishing vessels and lack of reported collisions, there is not a reasonable likelihood of interactions between skate fishing vessels and leatherback sea turtles.

(3) *Summary of Effect of Vessel Collisions* - As previously described, the directed skate bait fishery operates in federal waters from the North Carolina border to Maine (U.S.-Canadian border), while the great majority of the fishery is concentrated in SNE. Within state waters a significant fishery for skate also exists. Fishermen, whether in state or federal waters, need to steam to and from their desired fishing destination.

Vessel interactions with protected species are expected to be more likely in areas where vessels and protected species both concentrate. Right whales, humpback, fin, sei and sperm whales use different parts of the action area throughout the year. Most of the effort for the commercial skate fisheries occurs from spring through early fall in SNE. Overlap of vessels used in these fisheries with right and humpback whales may occur during the fall and spring when right and humpback whales travel between northern foraging grounds and southern calving areas. Overlap of the fishery with humpback whales may also occur in the spring through fall. Fin whales are more ubiquitous in their distribution, and less is known about their winter distribution than for right and humpback whales. In the North Atlantic, the single most important area for this species appears to be from Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain et al. 1992). Sei and sperm whales overlap with the action area at different times during the year. Both sei and sperm whales are primarily deep water species and so typically inhabit waters further off shore than the majority of the fishers. Few instances of anthropogenic injury or mortality of sperm whales due to human impacts have been recorded in U.S. waters. Vessel and ship strikes are not known to impact sei whales in the U.S. Atlantic, possibly because sei whales typically inhabit waters further offshore than most commercial fishing operations. Therefore, few instances of injury or mortality of sperm and sei whales due to vessel strikes are expected in the action area.

The vessels operating in the skate directed bait fishery also operate in areas known to be utilized by sea turtles for foraging and migration. Vessel interactions could occur wherever sea turtle and fishing effort distribution overlap.

Despite the potential for vessel strikes during operation of the fisheries in state and Federal waters, there have been no reports of interactions between skate fishing vessels in the action area and ESA-listed whales or sea turtles. Although this may be due to a lack of reporting of events that do occur, it may also be a reflection of the slower operating speed (and smaller size) of skate vessels compared to, for example, recreational vessels (and car/passenger ferries) and/or the distribution of skate vessels in relation to whale and sea turtle distribution. Due to the slow operational speed of skate fishing vessels, the distribution of the fishery and a proportion of the fishing occurring in areas or at times when cetaceans and/or sea turtles are not likely to be present (*e.g.*, Massachusetts fisheries in January to May/June when turtles are not expected), NOAA Fisheries believes the likelihood of any vessel participating in the proposed activity striking a right, humpback, fin, sei, or sperm whale or loggerhead, Kemp's ridley, green or leatherback sea turtle in the action area is very low.

5.4.2 Effects of Fishing Gear

(1) *Effects of Gear Entanglement* - The directed bait skate fishery is presently prosecuted using bottom otter trawls and to a much lesser extent gillnets. Both of these gear types have been known to interact with marine mammals and sea turtles. As described above, the majority of vessel owners/operators involved in the directed skate fishery also participate in other more profitable commercial trawl and gillnet fisheries (monkfish, groundfish, dogfish and scallops) from which they acquire the majority of their income.

The two main directed skate gear types (trawl and gillnet) are the primary gear types used in other NE fisheries and both gear types have had observed sea turtle interactions in many of the NE fisheries. Drowning due to forced submergence is the most obvious threat to sea turtles (leatherbacks, loggerheads, Kemp's ridleys and greens), but constriction of a sea turtle's neck and flippers can amputate limbs also leading to death by infection or to impaired foraging or swimming ability. 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).

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 and sea turtles 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). Sei and sperm whales (mysticete whales) are typically deeper water species and as such are unlikely to be present in any numbers in the area of the skate bait fishery.

Gillnets

Gillnets are panels of net anchored in some form, with a top rope, referred to as the head rope or floating line, and a bottom rope, referred to as the lead line. As the name implies, floats are attached to floating line while the lead line is weighted to help maintain the vertical profile of the gillnet in the water column. Multiple net panels are typically attached together in series to form a net-string. Buoy lines attached to each end of a net string rise to the surface to mark the location of the gear. Gillnets fish by presenting a wall of netting in which fish are incidentally snagged or entangled. In some areas, fishers either choose or are required to reduce the vertical profile of their gillnets by using "tie-downs". Tie-downs refer to twine used between the floatline and the lead line as a way to create a pocket or bag of netting to trap fish. Fishers may use tie-downs in order to better entangle bottom species (monkfish or flounder) in the gillnet or to reduce vertical profile of the net to minimize species entanglements (to reduce harbor porpoise interactions).

Gillnets can pose a serious risk to sea turtles, and sea turtles occur through all or most of the area in which skate gillnet gear is set (inshore and offshore). Gillnet gear poses a risk to all four major turtle species found on the east coast (leatherback, loggerhead, Kemp's ridleys and greens). Loggerhead turtle abundance is relatively high from Cape Hatteras north to Long Island throughout continental shelf waters (NOAA Fisheries 1994). While loggerhead, Kemp's ridleys and green turtles are also sighted in inshore waters of the Mid-Atlantic and the Northeast, leatherback turtles are sighted more frequently offshore, but may follow jellyfish into nearshore waters (NOAA Fisheries 1994). Turtles occurring in the inshore waters off Virginia tend to stay from May through November, and turtles generally occur in New York inshore waters from June until October, while further north in and around Cape Cod waters turtles may be observed and seen inshore from June to September/October (NOAA Fisheries 1994). Peak skate landings by gillnet gear occur in spring and summer.

The directed skate fishery occurs year round, peaks in late spring and remains high throughout the summer, while landings fall away during the fall and winter. All four species of sea turtle that are present on the east coast of the U.S. may be found throughout the area fished (skate directed bait fishery). Their presence in SNE (center of the skate bait fishery) overlaps with the peak of the fishing season. As the fishery subsides (late summer) the sighting frequency of sea turtles also falls. The species that spend more time inshore (loggerhead, green and Kemp's ridleys) are the dominant species that are most likely to interact with the directed skate bait fishery; leatherbacks are more frequently sighted offshore.

Records of stranded or entangled sea turtles reveal that fishing line can wrap around the neck, flipper, or body of the sea turtle and severely restrict swimming or feeding (Balazs 1985). A sea turtle who encounters gillnet gear may become snagged or caught up in the netting. Gillnets are so effective at catching sea turtles, they were commonly used in the historical sea turtle fishery. Drowning may occur immediately as a result of forced submergence 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. Anecdotal evidence indicates that when leatherbacks encounter vertical line or buoy line, 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. Leatherbacks lack calcium which aids in the neutralizing of lactic acid that builds up by increasing bicarbonate levels. 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). Therefore, especially when caught, the stored oxygen is likely to be used up quickly (NOAA Fisheries 2000a). The softer epidermal tissue of leatherbacks may make them more susceptible to serious injuries from entangling gear.

Gillnets pose an entanglement risk to whales just as they do to sea turtles. For whales, the cause of the entanglement and the effects of the entanglement are much the same as those that occur from pot/trap gear. Whales can and do become entangled in the buoy lines or the anchor lines of the gillnets, and may also become entangled in the net panels. A whale that encounters the vertical "wall" of the gillnet may become wrapped in the net if it thrashes in its attempt to get away from the gear. It is surmised that when the 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 baleen or mysticete 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, 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.

Trawls

Bottom trawls are typically cone-shaped nets which are towed on the bottom. Large, rectangular doors attached to the two cables keep the net open while deployed. At the bottom of an otter trawl mouth is the footrope or ground rope that can bear many heavy (tens to hundreds of kilograms) steel weights (bobbins) that keep the trawl on the seabed. In addition, bottom trawls may be constructed with large (up to 40 cm diameter) rubber discs or steel bobbins (rockhoppers) that ride over structures such as boulders and coral heads that might otherwise snag the net. Some trawls are constructed with tickler chains that disturb the seabed to flush shrimp or fishes into the water column to be caught by the net. The constricted posterior netting of a trawl is called the cod end.

Given their large size and mobility, right whales, humpback whales and fin whales are not expected to be caught in trawl gear. Incidental take of sea turtles in otter trawls, however, has been extensively documented. A detailed summary of the impacts of the Mid-Atlantic winter trawl fishery for summer flounder and the U.S. shrimp trawl fishery can be found in the TEWG reports (1998, 2000). Turtle takes have also been observed in the North Carolina flynet trawl fishery for Atlantic croaker.

As turtles rest, forage, or swim on or near the bottom, trawls pulled across the bottom can sweep over and capture them. Sea turtles are air-breathing reptiles, and, although they are able to conduct lengthy voluntary dives, if they are captured in a skate trawl and unable to surface, they will eventually die. Sea turtles forcibly submerged in any type of restrictive gear eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage et al. 1997). A study examining the relationship between tow time and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or comatose turtles rising from 0% for the first 50 minutes of capture to 70% after 90 minutes of capture (Henwood and Stuntz 1987). However, metabolic changes that can impair a sea turtles ability to function can occur within minutes of a forced submergence. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, the story is quite different in forcibly submerged turtles, where oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz 1997).

Forced submergence of Kemp's ridley sea turtles in shrimp trawls resulted in an acid-base imbalance after just a few minutes (times that were within the normal dive times for the species) (Stabenau et al. 1991). Conversely, recovery times for acid-base levels to return to normal may be prolonged. Henwood and Stuntz (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles captured in shrimp trawls for less than 30 minutes to return to normal. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. Physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles, would be expected to exacerbate the harmful effects of forced submergence from trawl capture (NRC 1990).

(2) *Factors contributing to interactions between ESA-listed species and skate fishing gear* - Several factors likely contribute to the risk of entanglement of right, humpback, fin, sei and sperm whales, and sea turtles in skate bait fishing gear. The magnitude of the effect varies depending upon the species and the gear type (*e.g.,* trawls and gillnet gear).

All of the species considered in this Opinion occur in the action area where skate trawl and gillnet gear is set or operated. Overlap of skate bait gillnet gear with right and humpback whales may occur during the spring, summer and fall when right whales and humpback whales are resident (in critical habitat) in these areas, are traversing between northern foraging grounds or moving between foraging grounds and southern nursing areas. An example of this is the overlap of the bait fishery with humpback whales while the whales are traveling to a known wintering ground off of Virginia.

Interactions between whales and skate gear may occur where fishing effort overlaps with whale distribution. In New England the skate fishing effort is concentrated from spring through fall, but occurs year round. Therefore, operation of the skate fishery has the potential for overlapping with right, humpback, and fin whale distribution. Emphasis is placed on these species because their feeding behavior and distribution patterns make them more susceptible to interactions with floating surface lines and buoys in other fisheries using gillnet gear. Despite efforts to reduce these interactions recent documented entanglements have continued.

As previously stated only 3.5 % of the total skate effort uses gillnet gear in the directed or bait fishery (39.5 % of the overall fishery); however, gear interactions can occur if gear is concentrated in high-use area/times for endangered whales. The fishery information database for the skate fishery is lacking in many areas. One of the major reasons for the development of the management measures is to fill this knowledge gap. While fishery landing information for the directed bait fishery is limited for the purposes of this consultation that the current available information is the best available and the effects analysis is based on this information. The majority of the skate directed bait fishery effort (gillnet and trawl) is concentrated in northeastern and SNE waters and the potential for whale interactions increases during the spring and early fall, when right, humpback and fin whales use New England for feeding and nursing young. The potential for interactions between whales and the northeast skate fishery is reduced in the late fall and winter months as use of gillnet gear drops off as the overall fishery declines and the whales migrate south. Consequently entanglement risk from skate gillnet gear may occur at low levels throughout the year along the Atlantic coast, but the greatest risk occurs during the spring and summer foraging/nursery events in the Gulf of Maine/SNE.

The skate directed bait fishery is active at the same times and in areas as those exhibited by the dogfish, monkfish and groundfish fishery. As such, entanglement potential and problems arising from the skate bait fishery may be similar in nature to the above named fisheries. For example, the skate directed bait gillnet fishery is active in Stellwagen Bank in the summer. Stellwagen Bank is a high-use area for both humpback and fin whales in the summer months.

Factors which appear to influence a whale's susceptibility to gear entanglements are a species' physical characteristics (i.e., baleen whales versus toothed whale) and habitat. Polypropylene (floating) lines between the buoy line and anchor line have been identified as a serious entanglement risk to large whales. Floating line can become entangled in baleen when the animal is moving through the water with the mouth gaped for feeding. Knots in the line further hinder the ability of the line to pass through the baleen. In addition, anchors on the gear offer resistance against which the whale may struggle and result in further entanglement of the fishing gear across the mouth and/or body of the whale. In contrast, sperm whales that feed by grasping prey with their teeth appear to be more susceptible to hook and line gear. Fish hooked on such gear may attract sperm whales in some cases. A whale trying to snatch fish off the hook may itself become hooked or entangled in the line/cable to which the hooks are attached.

The degree of overlap of fishing gear with a species range also has an important influence on whether a whale becomes entangled. Three to four percent of the total skate effort is gillnet and almost all skates caught with gillnets are landed as wings (non-directed fishery) and so much of this fishing effort has already been consulted on and accounted for in other managed fisheries. Right whales and humpback whales are more frequent users of inshore and nearshore waters where sink gillnet gear is set as compared to fin, sei or blue whales. Therefore, right and humpback whales may be at greater risk for entanglement in sink gillnet gear than these other baleen species.

The depth at which whales feed may also influence their risk for entanglement. Evidence exists that right whales feed on zooplankton through the water column (to a depth of 600 feet or more), and in shallow waters may feed near the bottom. This is relevant in that sink gillnets are fished on the bottom. Therefore, because of their method of feeding and their overlap with the sink gillnet fishery, right whales appear susceptible to entanglement in both the float lines and nets of sink gillnet gear, and to be more susceptible to such gear than other species of whales.

The primary gear types used in the skate fishery are listed under Category I (Northeast Sink Gillnet) and III (North Atlantic Bottom Trawl) of the 2002 List of Fisheries for the taking of marine mammals by commercial fishing operations under section 118 of the MMPA. Category I fisheries are those fisheries for which there is documented information indicating a "frequent" incidental mortality and injury of marine mammals in the fishery. Some of the skate gillnet fisheries are in this category, including sink gill net fishing for skate in areas where other Northeastern sink gillnetting fisheries occurs. In Category III there is information indicating a "remote likelihood" of incidental taking of a marine mammal in the fishery or, in the absence of information indicating the frequency of incidental taking of marine mammals, other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, and species distribution of marine mammals in the area suggest there is a "remote likelihood" of an incidental take in the fishery. The skate trawl fishery is listed as a Category III fishery. There have been no recorded takes of ESA-listed marine mammals in this fishery.

The skate fishery is most likely to affect ESA-listed species through gear interactions as this fishery utilizes gear that may take listed sea turtles, including otter trawls and sink gillnets. As the skate complex fishery has been unregulated in the past, the fishery has only had sporadic observer coverage at best. Observed directed trips have occurred in otter trawl and sink gillnets targeting skate only off SNE and mid-Atlantic (Appendix 3 and 4). From 1994 to September 2002, in the gillnet sector a total of 27 hauls were observed from 15 different fishing trips. These trips occurred primarily in spring and fall and were located off the coasts of New Jersey and New York. No turtles were taken in any of the 27 observed hauls. Otter trawls are the principal gear type used to catch skates. From 1994 through September 2002, 30 hauls were observed targeting skate on 8 trips in the Mid-Atlantic trawl fishery (Appendix 3). These trips occurred year-round and were located primarily off the coast of Rhode Island. No turtles were taken in any of the observed tows. While there have been no documented takes due to skate gear (otter trawls and gillnets), there have been in other fisheries with similar gear, and the potential for interactions in the directed skate fishery does exist.

2. (A) Gillnet Fisheries

As previously stated, gillnet gear used to target skate is identical to gear used in the multispecies, dogfish and monkfish fisheries. Only 3.5% of the fishing effort in the directed skate bait fishery is generated by sink gillnet gear. Fishing effort is highest in the spring and summer when whales are most likely to be present. Sink gillnet gear has been documented to entangle right whales, humpback whales and fin whales. Of the gear types used, sink gillnets have resulted in the most endangered species takes. Data indicate that the gillnet gear like that used in the skate fishery has seriously injured right, humpback and fin whales. Waring et al. (1997) reports that 17 serious injuries or mortalities of humpback whales from 1991 to 1996 were fishery interactions but not necessarily from skate gillnet gear. Documented takes are normally underestimated and the total level of interaction cannot be determined through extrapolation. The sink gillnet gear sector in the fishery is a very small percentage (3.5%) of the overall skate bait directed fishery, however, entanglement in gillnet gear is possible when the fishery operates in times and areas used by ESA protected species. The gillnet sector of the bait fishery and the vessels involved also participate in other managed fisheries (monkfish, multispecies and dogfish). As such, they are required to be compliant with whale gear improvements and with ALWTRP gillnet gear improvements.

As previously stated, sink gillnets have the potential to take listed sea turtles. This sector of the fishery would be most likely to interact with loggerhead, Kemp's ridley, and green sea turtles as these species are likely to be found near the bottom. Sea turtles may become entangled in either the buoy lines of the gillnets at the surface or at depth or the nets themselves at depth. Turtles are unlikely to be able to break off sections of the gear and may not be able to stay at the surface while entangled (entangled gear becomes too heavy/cumbersome). While turtles are vulnerable to forced submergence, some turtles have been recovered alive from sink gillnet gear.

Peak skate fishing landings by the small gillnet gear fishery occur in late spring and summer months and falls off through the fall and winter. The SNE skate gillnet fishery use 6.5 inch (gillnet mesh regulation size differ depending on the area fished) stretched mesh gillnet. This gear type has been found to take sea turtles.

From 1994 to 1999, there were two loggerheads observed taken in the Northeast sink gillnet fishery, but these takes did not occur in the skate fishery. Many of the skate gillnet fishers also participate in the multispecies, monkfish and dogfish fisheries and these are prosecuted at the same time/place as the directed skate bait fishery. Gillnets are set and fished in much the same manner across many of these fisheries. Turtles are known to get caught in gillnet gear based on observer records and have been observed in dogfish, monkfish and to a lesser extent in the multispecies fishery. Twenty-one turtles have been observed taken in the monkfish sink gillnet fishery from 1996-2001. The multispecies gillnet fishery has also been observed (with low observer coverage - three percent) to take sea turtles (on average one or less per year), this low take number may be in part due to the low observer coverage. While none of these takes were by trips targeting skate, it does exemplify that sea turtle takes could occur with similar gillnet gear.

The skate bait gillnet effort, while representing only 3.5 % of the total skate directed effort may be an underestimate of effort (Skate SAFE Report 2000). Even if gillnet gear effort doubled, however, the fishing effort is still small compared to other gillnet fisheries that occur in the same areas and at the same times. No additional fishing effort is expected due to the implementation of this FMP. In addition to the discreet gillnet fishery effort, the endangered species observer coverage in the skate fishery program noted that there was no species interaction (albeit with low observer coverage). These gillnet observer trips were conducted between 1994 and 2000 (Appendix 2) and were concentrated in New York and New Jersey and observed during the spring and fall season. In addition, there have been low observed takes in the much larger but closely related multispecies sink gillnet fishery. Sink gillnet fishing effort occurs in the summer when sea turtles may be present in the areas fished and this gear type has been found to entangle turtles. Sea turtles are not present in the action area all year round as they are temperature dependent and the numbers of turtles present after September fall away sharply as they move south. Thus, sea turtle species are segregated spatially and temporally for parts of the year, reducing the opportunity for protected species-gear interactions. The limited observer data from the skate fishery as well as other sink gillnet fisheries, considered with the seasonal segregation mention described above and the low level of sink gillnet effort in the skate bait fishery suggest that incidental takes of sea turtles with this gear type are likely to occur, albeit infrequently.

2. (B) Trawl Fishery

The highest proportion of effort and landings in the skate fishery is from otter trawl (94.5%) vessels, based upon landings from 1995 to 2000. Reports from 1995 through 2000 found skate trawl fishing to be highest in April, with May and June slightly lower. Whales (especially right and humpback whales) are present in the action area and their arrival coincides with trawl skate fishing. There has been no previous whale-trawl gear interaction in the NE, however, and skate trawl fishing is not expected to interact with large endangered whales.

Between 1994 - 2000, the skate fishery has had no observed documented sea turtle interactions (a total of 45 trips with 126 hauls, less than 0.0001 % of total trips). As such, most of the discussion will focus on the documented takes and impacts of the co-related monkfish, groundfish, dogfish etc. fisheries, but note that the skate fisheries could also impact sea turtles wherever their distributions overlap.

Given the distribution of sea turtles and skate fishing effort, the likelihood of catching sea turtles in trawl gear would be expected to be greatest off of Massachusetts, Rhode Island, New York, and New Jersey between summer and late fall months when annual fishing effort in the directed skate fishery is at its peak. As noted previously, the limited number of skate trawl bycatch observer trips conducted between 1994 through 2000 had no documented takes (Appendix 2 and 3). The skate observed trawl trips (Appendix 3) were concentrated in Rhode Island waters and were observed throughout the year. It is important to note that some of this observer effort took place at a time when sea turtles are expected to be in SNE waters. The observer data is very limited and confined to specific years. As such, the lack of turtle takes in a very small sample size of observed trips should be interpreted cautiously; and the lack of observed takes does not necessarily mean that turtles are not taken during normal skate fishing practices (trawls and gillnets).

Because trawl effort is likely to occur in the lower part of the water column, this gear sector may interact with loggerhead, Kemp's ridley and green turtles but is unlikely to take leatherback turtles. Capture of turtles in trawls does not always result in mortality; the duration and speed of tows are factors related to the mortality rate.

With respect to sea turtle interactions with trawl gear, the primary factor is the occurrence of sea turtles where trawl gear is operating. Skate trawl fishing occurs throughout the year, peaks between early spring and late fall and then falls off during the winter. A vessel is considered fishing for skate when 50% of its landings for a trip consist of skate. Based on landings by state, skate trawl fishing effort is concentrated in waters off of Rhode Island and Massachusetts, and to a lesser extent Connecticut, New York, and New Jersey. Turtles are typically found in trawl fishing areas when the water warms in the summer through early fall.

Little is known about the incidental take of sea turtles in the comparable multispecies otter trawl fishery as there have been few observed takes documented. From 1989 to approximately 1992, NOAA Fisheries observers have reported on nearly 8,000 otter trawl hauls from the Gulf of Maine to Long Island (which encompasses all multispecies fishery areas). The observer effort has been distributed across all months, averaging over 130 hauls per month for four years. No turtles were reported captured on observed trawls within the multispecies fishing area.

The best information available is data on observed takes, which suggests that some fisheries using trawl gear may take sea turtles and that some of these interactions are lethal. However, studies suggest that turtles are not likely to be traveling or foraging along the bottom where lethal trawl takes would probably occur. In New York waters, time spent on the surface increased with water depth. In water depths greater than 15 meters, young Kemp's ridleys were found to spend the majority of their time in the upper portions of the water column (Morreale and Standora 1990). In southern New England, loggerheads have been observed incidentally taken in offshore drift gillnet and surface longline fisheries, while thousands of hours of observed bottom trawls in similar areas have not yielded any sea turtle takes. Nevertheless, based on the observed takes in other otter trawl fisheries, it is likely that turtles could also be taken in trawls for skate.

(3) *Actions to reduce the risk of entanglement* - As described previously in the Environmental Baseline, the skate gillnet fishers are presently required to comply with requirements of the ALWTRP. The purpose of the ALWTRP, in part, is to reduce serious injury and mortality of large whales (right, humpback, fin, sei, sperm and minke) in fixed gear (trap/pot gear and gillnet gear). New measures to protect right whales (incorporated in the lobster FMP regulations), and

other large whales from serious injury and mortality in fixed gear fisheries were first required in the June 14, 2001, Opinion for the lobster trap/pot fishery, and the multispecies gillnet fishery. These measures include but are not restricted to additional gear modifications, Dynamic Area Management (DAM) (restrictions for areas as necessary when concentrations of right whales and fixed gear co-occur), and Seasonal Area Management (SAM) (seasonal restrictions for areas where right whales and fixed gear co-occur). The most recent and expanded ALWTRP amendments became effective on March 1st (SAM) and February 8th (DAM), 2002.

Fishers must also comply with the HPTRP that prohibits the setting of gillnets in certain areas for selected time periods. These closures include a prohibition on the use of gillnet gear west of 72°30' in southern Mid-Atlantic waters (Maryland, Delaware, Virginia and North Carolina) February 15 through March 15. Although the closure is meant to prevent harbor porpoise takes in gillnet gear, it should also be of benefit to sea turtles by reducing gillnet effort where sea turtles occur during this time period off of North Carolina.

(4) *Summary of effects of gear entanglement* - Gear used in the skate fisheries are of a type known to interact with right whales, humpback whales, fin whales, sei whales and loggerhead, Kemp's ridley, green, and leatherback sea turtles. The present action, the implementation of the Skate FMP will not increase fishing effort and may lead to a slight decrease in effort due to the introduction of permit requirements. The FMP requirements introduce several new administrative and procedural fisheries requirements which could also restrict skate fishing. However, the fisheries and protected species are segregated spatially and temporally for parts of the year, reducing the opportunity for protected species-gear interactions, and conservation measures have been taken to further reduce the likelihood that protected species-gear interactions will occur in the skate fisheries. In addition, the vessels involved in the gillnet fishery have to comport to the multispecies regulated mesh areas (GOM, SNE and Mid-Atlantic) and restrictions on gear introduced via the ALWTRP. These measures require modifications to gillnet gear (50 CFR Part 648.80 and 50 CFR Part 229.32) at times of the year to minimize the likelihood and severity of interactions between large whales and gillnet gear.

Right, humpback, fin, sei and sperm whales are not likely to get caught in trawl gear. Given that entanglement of these species have occurred in gillnet gear used in other fisheries, it is possible they may be taken in this gear when used in the skate fisheries. None of the right, humpback, fin, sei or sperm whale entanglements to date have been positively identified in gear as being from the skate fisheries. While gear consistent to that used in the skate gillnet fishery has been associated with previous right whale, humpback whales and fin whales entanglements, no additional adverse affects to these species are expected as a result of the introduction of the Skate FMP, given the current ALWTRP measures.

Sea turtles are known to be taken in gillnet fisheries, (Appendix 1) including the monkfish, dogfish and the NE sink gillnet fishery, and can also be taken in the skate trawl fishery given that it occurs in times and areas where sea turtles also occur. Given the present action will allow for the continuation of the directed skate fishery, and given that documented takes of sea turtles have been observed in co-related fisheries, takes of sea turtles in the skate fishery are expected to occur. Similarly, sea turtle interactions with monkfish and multispecies gillnet gear have occurred in federal waters (e.g., off of New York, New Jersey and Maryland) and are likely to occur in the skate fishery.

While leatherbacks are typically considered a pelagic species, they are seen in New England inshore waters at certain times of the year and concentrations have also been observed south of Long Island. There have also been reports of entangled loggerheads in gillnet gear over the past 20 years, as loggerheads can inhabit nearshore waters. Leatherback and loggerhead distribution, therefore, overlap with skate fisheries in certain areas and at certain times of the year suggesting that takes in such gear are likely. Given that there have been observed takes of leatherbacks and loggerheads in monkfish, multispecies and other gillnet gears, this Opinion assumes that these species interact and are likely being taken in this gear type in the closely related skate fishery.

Given the limited data on observed takes of sea turtles in the skate directed gillnet fisheries, the distribution of the gillnet effort, the amount of effort in the fishery using this gear type, and the observed takes in the closely related monkfish, dogfish and multispecies fisheries, the skate directed gillnet fishery is likely to interact with sea turtles.

Trawl gear poses the greatest risk (in terms of effort) to sea turtles considered in this Opinion, particularly loggerhead and Kemp's ridleys, although green sea turtles have also been observed interacting in trawl fisheries (multispecies, summer flounder trawls). Summer flounder trawls have been found to take turtles (mainly off North Carolina and Virginia), and have also recorded takes in SNE. Sea turtle distribution overlaps with skate fishing effort throughout SNE and the mid-Atlantic, and it is probable that takes are occurring in the more northern waters when effort and sea turtles overlap.

5.4.3 Estimating the Number of Turtles Taken in Skate Gear

Observer data (endangered bycatch) from the skate trawl fishery is presented in Appendices 2 and 3. All trips targeted skate as the primary species, and no takes of sea turtles were observed, although the amount of observer coverage was very low. There is still a large amount of skate effort in the locations and seasons where sea turtles occur, and the gear types used in the skate fishery (otter trawls and gillnets) have been documented to take turtles in other fisheries.

Takes of sea turtles in the skate fishery are expected to occur given the take of sea turtles in comparable trawl and gillnet gear used in other fisheries in the areas and at the time when the skate fishery also operates. While there have been no observed takes in the directed skate fishery, NOAA fisheries believes that there is still a reasonable likelihood of take of sea turtles in gillnet and trawl gear when used in the directed skate fishery. NOAA Fisheries, therefore, expects the take of one loggerhead, leatherback, green, or Kemp's ridley sea turtle (one turtle only of any of these four species) annually in the directed skate fishery. While NOAA Fisheries recognizes that this may be an underestimate due to low observer coverage in this and other similar fisheries, we do not have any information that a higher level of take is reasonably certain to occur.

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.

Sources of human-induced mortality or harassment of cetaceans or turtles in the action area include incidental takes in state-regulated fishing activities, vessel collisions, ingestion of plastic debris, and pollution. The combination of these activities may affect populations of ESA-listed species, preventing or slowing a species' recovery.

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.

Marine Debris - Debris from many sources can be devastating in its effects on marine mammals and turtles. Plastics, in all forms are found in the marine environment and as on land have no real biological breakdown life expectancy and so remain as pollutants for long periods. In a marine ecosystem debris can be as simple as discarded plastic bags, containers, fishing line or lost gear mislaid or thrown overboard from pleasure boats, commercial and sports fishing vessels or it may simply arrive as excess garbage from a land source. It can entangle turtles and induce drowning or turtles can ingest pieces and induce mortality via complex physiological problems.

Vessel Interactions - 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 all other endangered whales, specifically humpback, fin and sperm whales. Fin whales are believed to be the most commonly struck cetacean by large vessels (Laist *et al.* 2001). Shipping traffic to and from east coast ports can pose a serious risk to cetaceans. Records from 1970 through 1993 report that eight right whale mortalities in the U.S. were due to ship collisions (Waring *et al.*, 1999). Between 1993 and 1997 the reported mortality and serious injury was six right whales (Waring *et al.*, 1999). Since 1997, one U.S. right whale mortality was attributed to a ship strike. 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. Right whale collisions with ships occur perhaps because their coastal migration and feeding paths cross heavily traveled shipping lanes more than whale species that travel further out to sea.

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

In southeastern waters, shipping channels associated with Jacksonville and Port Everglades, Florida bisect the area that contains the most concentrated whale sightings within right whale critical habitat. These channels and their approaches serve three commercial shipping ports and two military bases. The commercial ports are growing and the port of Jacksonville is undergoing major expansions.

Various initiatives have been planned or undertaken to expand or establish high-speed watercraft service in the northwest Atlantic. The Bar Harbor, Maine to Yarmouth, Nova Scotia high-speed ferry conducted its first season of operations in 1998. The ferry makes regular runs during Nova Scotia's busy tourist season, which coincides with peak concentrations of right whale feeding on summering grounds. The 91-meter (300-foot) catamaran travels at speeds up to 90 km/h (48 knots); crossing the Bay of Fundy 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. These waters (Bay of Fundy) are part of the summer foraging grounds for right whales, there is some risk of an interaction between the high speed catamaran and right whales; given the catamaran's size and speed, it would probably seriously injure any whale it struck. There are several other smaller (approximately 125 ft) and slightly slower (40 mph) high-speed ferries operating in the New England area, including a ferry between Boston and Provincetown, Massachusetts (cutting across Stellwagen Bank), and a new ferry that began service between Quonset Point, Rhode Island and Martha's Vineyard in June 2003. These ferries pass through waters that are summer feeding areas for whales (especially the Boston-Provincetown ferry).

NOAA Fisheries and other member agencies of the Northeast Implementation Team will continue to monitor the development of the high-speed vessel industry and its potential threat to listed species and critical habitat.

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. Because most of the whales involved in vessel interaction are juveniles, areas of concentration for young or newborn animals are particularly vulnerable (Laist *et al.* 2001). 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.

Pollution - 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. Turtles are relatively hardy species and are not easily affected by changes in water quality or increased suspension of sediments in the water column. However, if these changes persist, they can cause habitat degradation and if the changes cause large habitat destruction and eventually foraging difficulties, this may lead to long term avoidance or complete abandonment of the polluted area by the affected species (Ruben and Morreale 1999).

Chemical pollutants are introduced to the marine environment in many forms and via many paths. Such pollutants can cause more long term individual and specie difficulties, such as reproductive success and survivability. Direct effects from pollutants are more easy to assess, while long term indirect effects are more difficult to understand, assess and may be relatively unclear. A good example may be fibropapilloma virus which has struck and killed many sea turtles over the past number of years (NOAA Fisheries 1999). If pollutants are not the direct cause, then it may be an indirect cause as it may weaken the animals immune response to point where viruses that would otherwise be fended off are now able to penetrate defenses so that the animal succumbs to the viral attack.

Commercial vessel traffic/shipping presents 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. The most recent being a large oil spill from a tanker of over 90,000 tons of crude oil that leaked into Buzzards Bay, Massachusetts causing a major oil slick and pollution to some of the major shellfisheries in the NE. However, most 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.

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 offshore drilling and sonar used by military and research vessels (Simmonds and Hutchinson, 1996). 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. Noise associated with shipping (mapping) is a major concern about shipping, but only a few species of marine mammals have been observed to demonstrate behavioral changes to low level sounds (Canada - Nova Scotia Offshore Petroleum Board). At this time, the only usable threshold used by scientists to predict adverse effects is 180 dB. Although this is not a conclusive fact, researchers believe that 180 dB impulse can trigger the onset of tissue damage for many species of marine mammals. Concerns about noise in the action area of this consultation include increasing noise due to increasing commercial shipping and recreational vessels.

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 affecting listed species. Portions of the *Environmental Baseline* section describe measures that may ameliorate some of the negative effects of these natural and human-related phenomena.

This section of the Opinion examines the net effects (taking into consideration any on-going actions that may ameliorate negative effects) of the proposed Skate FMP 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, and (b) determine if any reductions in reproduction, numbers or distribution would be expected to reduce appreciably the species' likelihood of surviving and recovering in the wild.

As discussed above, based on the best available scientific information, right whales, humpback whales, fin whales, sei whales and sperm whales and sea turtles occurring in the action area for this consultation are not likely to be adversely affected by vessel strikes resulting from operation of the vessels used in the skate fisheries. Although interactions could occur, the probability is considered small given that the typical skate vessel length is in the range of 45-60 feet; far less than the size of vessels known to pose the most likely risk of serious injury and mortality to large whales. In addition, these vessels typically operate at slower speeds than what is observed by large ships, ferry services, or other vessels.

Although sea turtle's reaction to vessel traffic is not completely understood , it is generally assumed that turtles are more likely to avoid injury from slower-moving vessels (skate vessels) since the turtle has more time to maneuver and avoid the vessel. In the Northeast, with the exception of a few leatherback (which utilize offshore waters), the turtles in nearshore waters are small juvenile (loggerhead, Kemp's ridley and green). Given the main area fished (waters in and around MA, RI and NY) in relation to the spatial and temporal distribution of sea turtles in the skate action area as well as the slow operating speed of fishing vessels and lack of reported collisions, skate bait directed vessel traffic is not likely to adversely affect or interact with sea turtles.

The use of trawl gear and gillnet gear used in the skate fisheries is not expected to affect blue, sei and sperm whales given that these species and the gear used are separated spatially for many months of the year, and conservation measures already in place are expected to reduce the likelihood of interactions where protected marine mammals and gear used in the skate fisheries do co-occur.

Right whales, humpback whales and fin whales are vulnerable to entanglement in skate gillnet gear while foraging in areas of concentrated fishing effort. As gillnet fishing effort and these species overlap in both temporal and spatial distribution, this type of gear is likely to adversely affect right whales, humpback whales and fin whales.

The skate directed bait fishery is likely to take sea turtles, particularly in trawl gear and to a lesser extent in gillnet gear where the fisheries and the species co-occur (in the SNE area).

In the *Approach to the Assessment* section of this Opinion, it was noted that the jeopardy analysis proceeds in three steps:(1) identification of the probable direct and indirect effects of an action on the listed species in 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 will directly affect loggerhead, leatherback, Kemp's ridley, and green sea turtles as a result of entrapment in trawl gear or entanglement in gillnet gear used in the skate directed bait fishery. Endangered whales (right, humpback and fin whales), are not anticipated to be directly affected due to the skate gillnet or trawl gear section of the fishery. No takes of right, humpback, fin, sei or sperm whales are anticipated. Therefore, the proposed action is not expected to reduce the reproduction, numbers, or distribution of right, humpback, fin, sei or sperm whales. No other direct or indirect effects to endangered and threatened species are expected as a result of the activity.

7.1. Effects on Whales

The directed skate bait fishery uses a type of gear, primarily sink gillnet, which are known to cause serious injury and mortality to whales. While only approximately 3.5 percent of the directed skate fishery is conducted using gillnet, interactions between whales and gillnet gear may occur whenever both are present in the same area, and more is likely to occur if gear is concentrated in high-use areas/times for endangered whales. Skate fishing effort is concentrated primarily in Southern Massachusetts and Rhode Island in the spring and summer, and to a lesser degree in the fall and winter when effort in the lobster fishery declines and the need to supply the bait industry is less intensive. As the majority of the effort is concentrated in northeastern waters when right, humpback and fin whales are present, risk of gear interactions increases during the spring through early fall for these species. Interactions with whales may also occur in the fall and winter, as right and humpback whales can be found transiting in the mid-Atlantic to winter calving grounds off the Florida coast. Blue, sei and sperm whales do not frequent inshore waters and therefore are not likely to encounter skate gear.

While there is the potential for takes in the skate fishery, interactions may be reduced with the introduction of new FMP management requirements such as the need for a Letter of Authorization for bait only vessels, mandatory reporting of landings by species and sea sampling and initiating a skate permit requirement to fish for skate species. These recent changes to the FMP will curb and manage any future increase that could arise in the fishery, and as a result, the amount of gear in the water may be decreased during the stock rebuilding period for the species that have been designated as overfished. NOAA Fisheries anticipates that once the directed skate fishery is rebuilt, the fishery may be prosecuted at reduced levels compared to the unregulated fishery prior to the FMP implementation. Regardless, any changes to the proposed action will stimulate reinitiation of consultation. Although the FMP may result in a reduction in entanglement risk represented by vessels targeting skate, it is not possible to predict whether vessels using gillnet gear will shift to other regulated or unregulated fisheries. Furthermore, as long as gillnets are used to harvest skate, there remains a potential for entanglement during skate fishery operations.

Right, humpback and fin whales are vulnerable to entanglement in skate fishing gear while foraging in areas of concentrated effort. Entanglements of fin whales have been documented but are considered to occur at an insignificant level approaching zero mortality and serious injury rate. While takes of fin whales are possible this level of take is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of fin whales. Humpback whale entanglements in gillnet gear has also been documented. An estimated average of four to six entanglements of humpback whales a year occur in the southern Gulf of Maine. At least 16 possible fishery related interactions occurred in 2000, which is a concern to resource managers. The ALWTRP is anticipated to benefit humpback whales even though the plan is focused on right whales. However, it should be noted that humpback whales do not directly overlap the same foraging areas that right whales frequent and may be overlooked when area/time closures for right whales are implemented. Broadly applied gear modifications, if proven "whale safe" should provide comparable protection to all whales in the action area (further research and testing is ongoing). Although the total fishery related mortality and serious injury for this stock is considered to be significant, current data strongly suggest that the humpback whale population is steadily increasing despite human-related effects. While takes of humpback whales are possible, this level of take is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of this species.

In view of the northern right whale's apparent decline and high probability of extinction if the population decline continues, any entanglement that causes serious injury and mortality reduces appreciably the likelihood of survival and recovery of this species. Documented entanglements underestimate the extent of the entanglement problem since all entanglements are unlikely to be observed. Consequently the total level of interaction between fisheries and right whales is unknown. As mentioned previously, the Northeast gillnet fishery is a Category I fishery under the MMPA LOF, and is required to comply with all ALWTRP measures, including gear modifications, SAM and DAM. Gillnet gear modifications introduced as part of the overall ALWTRP gear measures will reduce the number and severity of right whales entanglements in this type of gear (introduced in early 2001). These gillnet gear modifications are continually evaluated and presently provide much improved whale conservation protection. The directed skate bait fishery (39.5%, of overall skate fishery) is comprised mainly of trawl gear with a very small gillnet gear deployment (3.5% of the directed skate bait fishery). The small directed skate gillnet fishery may continue to pose a risk of entanglement to northern right whales (and humpback and fin whales) while gear is deployed. But the improved gear modifications and other measures implemented under the ALWTRP will reduce the number and severity of right whale entanglements such that the fishery is not likely to jeopardize or reduce appreciably the likelihood of survival and recovery of this species.

7.2. Effects on Sea Turtles

Skate fishing effort is concentrated primarily in Southern New England (Massachusetts and Rhode Island predominantly) and to a much lesser extent in New York / New Jersey in the spring and summer, and to a lesser degree in the fall and winter. Interactions with sea turtles may occur when fishing effort overlaps with sea turtle distribution. This could occur in the summer and early fall, as turtles can be found in northeastern waters from June to November.

The skate fishery is most likely to affect ESA-listed species through gear interactions as this fishery utilizes gear that may take listed sea turtles, including otter trawls and sink gillnets. As the skate complex fishery has been unregulated in the past, the fishery has only had sporadic observer coverage at best. The limited number of observed directed skate trips (shown in Appendices 2 and 3) have not had any documented endangered or threatened species interactions. While there have been no documented takes due to skate gear (otter trawls and gillnets), there have been in other fisheries with similar gear, that set their gear in a similar way, and that operate in similar areas; therefore, interactions in the directed skate fishery are likely.

This Opinion will analyze the impacts to sea turtles from takes in the skate fishery over the next five years. There is no reason to believe at this time that effort in the skate fishery will change over that time period, as new FMP regulations (e.g., trip limit) and the poor state of the lobster industry may limit any short term future growth.

Over the next five years, loggerhead, leatherback, Kemp's ridley, and green sea turtles will continue to be captured, entangled, or hooked by fisheries other than the skate fishery considered in this Opinion. An unknown number of turtles may also be injured or killed from non-fishery related effects such as direct harvest, vessel collisions, dredge entrainment, or ingestion of debris. Adverse effects to sea turtle habitat, including loss of nesting sites or degradation of nesting or foraging areas, are also expected to continue. Since quantitative data on the extent of these impacts to turtle populations are lacking, a reliable estimation of cumulative effects cannot be provided.

Based on information provided in the *Effects of the Action* section of this Opinion, NOAA Fisheries estimates that continuation of the directed skate fishery (all gear types), as proposed, will result in the annual take of one loggerhead, leatherback, green, or Kemp's ridley sea turtle (one turtle only of any of these four species). No incidental take of hawksbill sea turtles is expected to occur in the skate fishery. Based on the current status, basic uncertainties in that status, and the anticipated continuation of current levels of injury and mortality described in the environmental baseline and cumulative effects section of this Opinion, and previous takes given the historic observer coverage, this level of take is not expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the sea turtle populations considered in this opinion by reducing the numbers, distribution, or reproduction of the species.

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 as declining or stable at best (TEWG 2000). Nesting also occurs outside of the United States and loggerheads originating from the Yucatán subpopulation have been found in U.S. Mid-Atlantic and southern New England waters. According to the TEWG assessment for loggerhead sea turtles (2000), approximately 1000 nests were recorded for Quintana Roo beaches in 1998 (Xcaret 1999) and nesting appears to be stable or increasing.

NOAA Fisheries anticipates that the directed skate fishery (all gear types) will result in the lethal or non-lethal take of up to one loggerhead, leatherback, green, or Kemp's ridley sea turtle (one turtle only of any of these four species) annually. As such, up to five loggerheads may be taken over a five year period (from a combination of the gillnet and trawl sectors and if no other turtle species were captured in that time period) as a result of the continued operation of the fishery as currently proposed, with all of these captures being lethal or non-lethal. Based on genetic studies (Bass *et al.* 1998; Rankin-Baransky *et al.* 2001), loggerhead sea turtles within the action area are expected to originate from the south Florida, northern, and Yucatán subpopulations. Results from these studies indicate that the proportion of loggerhead sea turtles originating from each of these subpopulations varies within the action area. The Bass *et al.* study (1998) found that the northern and south Florida subpopulations each contributed about 46% of the loggerheads sampled on foraging grounds from Cape Hatteras, NC through Virginia while loggerheads originating from the Yucatán nesting group contributed 6-9%. Rankin-Baransky *et al.* (2001) determined that the south Florida, northern, and Yucatán subpopulations represented 59% (± 14%), 25% (± 10%), and 16% (± 7%), respectively, of 79 turtles that stranded on beaches from Virginia to Massachusetts. However, neither of the studies included good sampling coverage of loggerhead turtles in Mid-Atlantic waters from Maryland through New York where the distribution of sea turtles and monkfish fishing effort overlap at certain times of the year. The Bass *et al.* study did not include samples north of Virginia while the majority of samples (51 of 79 samples) for the Rankin-Baransky *et al.* study were obtained from beaches within a single Massachusetts county. Therefore, the proportion of south Florida, northern, and Yucatán subpopulation loggerheads in Mid-Atlantic waters north of Virginia is essentially unknown.

Based on information provided in this Opinion, NOAA Fisheries therefore anticipates the possible take of up to one loggerhead turtle annually as a result of the continued operation of the skate fishery (lethal or non-lethal). Up to five loggerheads may be taken over a five-year period as a result of the continued operation of the fishery as currently proposed, with (the caveat) that all of these captures may result in mortalities. Based on the origin of turtles as reported by Bass *et al.* (1998), NOAA Fisheries anticipates that 2.3 of the five lethal takes will be loggerheads originating from the northern subpopulation (5 lethal takes x 0.46 (the proportion of turtles anticipated to originate from the northern subpopulation)), an additional 2.3 will be removed from the south Florida subpopulation (5 lethal takes x 0.46 (the proportion of turtles anticipated to originate from the south Florida subpopulation)), and less than one are expected to be lethal takes of loggerheads originating from the Yucatán subpopulation (5 lethal takes x 0.09 (the proportion of turtles anticipated to originate from the Yucatán subpopulation)). Since a part of a turtle cannot be taken, NOAA Fisheries is interpreting these numbers to mean that over the course of the five-year period, the 5 lethal takes of loggerhead sea turtles from these three subpopulations may occur in any combination but with no more than 3 being from the northern subpopulation and no more than 1 from the Yucatán subpopulation.

Loggerhead survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. It can be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal over the next five years of up to three loggerhead sea turtles from either the south Florida and northern loggerhead subpopulations, and up to one loggerhead sea turtle from the Yucatán subpopulation would be expected to reduce the number of loggerhead sea turtles from these subpopulations as compared to the number of loggerheads that would have been present in the absence of the proposed action. However, nest rates for the south Florida loggerhead subpopulation have increased at a rate of 3.9-4.2% per year since 1990 (approximately 83,400 nests in 1998) despite natural and anthropogenic losses to the population (including operation of the monkfish fishery). Similarly, although the Yucatán subpopulation is much smaller (approximately 1052 nests as of 1998), nesting rates are at least stable and may be increasing. In contrast, nesting rates suggest that the northern subpopulation is declining or stable at best. Despite this, the total number of nesting and non-nesting adult females in the northern subpopulation is estimated at 3,810 adult females (TEWG 1998, 2000). Even if NOAA Fisheries were to assume that all of the 3 turtles removed from the northern subpopulation as a result of operation of the skate fishery over the course of the next 5 years were immature females, it is unlikely that the loss will affect the reproduction or distribution of a subpopulation that numbers in the thousands.

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

7.2.2 Kemp's Ridley Sea Turtles

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

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

Kemp's ridley survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. It could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to five Kemp's ridleys over the next five years from the Atlantic population would be expected to reduce the number of Kemp's ridley sea turtles in the action area as compared to the number of Kemp's ridleys that would have been present in the absence of the proposed action. However, the number of Kemp's ridley nests is increasing at 11.3% per year and current totals exceed 3000 nests per year despite natural and anthropogenic losses to the population (including operation of the monkfish fishery). Therefore, the loss of up to five Kemp's ridleys over the next five years as a result of the operation of the skate fishery is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

7.2.3 Green Sea Turtles

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

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

The survivability of green sea turtles is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. It could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to five green sea turtles (if no other turtle species were entangled, from the above list) over the next five years from the Atlantic green sea turtle population would be expected to reduce the number of green sea turtles in the action area as compared to the number of green sea turtles that would have been present in the absence of the proposed action. However, despite natural and anthropogenic losses to the population (including operation of the skate fishery), green turtle nesting in the Atlantic shows a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989. Therefore, the loss of up to five green sea turtles over the next five years from the Atlantic population as a result of the operation of the skate fishery is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

7.2.4 Leatherback Sea Turtle

Recent information suggests that Western Atlantic populations of leatherback sea turtles declined from 18,800 nesting females in 1996 (Spotila *et al.* 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm.). While the mortality rate of adult, female leatherback turtles has increased over the past ten years, decreasing the potential number of nesting females, the number of leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s. In the 1990's the number of nesting females in the Caribbean Islands was estimated at 1,437-1,780 leatherbacks per year (Spotila *et al.* 1996)

There is no information at this time to show that leatherback sea turtles have been caught in skate gillnet or trawl gear. Nevertheless, NOAA Fisheries is taking a precautionary approach based on information of leatherback captures in other gillnet and trawl fisheries, including the *Loligo* squid bottom trawl fishery which captured and released alive a leatherback sea turtle off of New Jersey in 2001. NOAA Fisheries anticipates that the continued implementation of the skate fishery may result in the annual take of up to one leatherback sea turtle. Over the course of a five-year period, this could result in the capture of up to five leatherback sea turtles with the possibility of all five of these entanglements resulting in death. Since a part of a turtle cannot be taken, NOAA Fisheries is estimating that up to five leatherback sea turtles could die as a result of capture in skate gillnet and trawl gear over the next five years.

As described above, it could be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of up to five leatherback sea turtle over the next five years would be expected to reduce the number of leatherback sea turtles in the action area as compared to the number of leatherback sea turtles that would have been present in the absence of the proposed action. However, despite natural and anthropogenic losses to the population (including operation of the skate fishery) the number of leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s), and the number of nesting females exceeds 1,000 animals.

The status of leatherback sea turtles range-wide is of concern. The Pacific population of leatherback turtles has declined precipitously and is of grave concern. Leatherback survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. Although the extent of impacts to this species are of concern, given that leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s and the population numbers in the thousands (based on the number of nesting females) the loss of up to five leatherback sea turtles from the Atlantic population over the next 5 years as a result of the operation of the skate fishery is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

8.0 CONCLUSION

After reviewing the current status of right, humpback, fin, minke, sei and sperm whales, and loggerhead, leatherback, Kemp's ridley and green turtles, the environmental baseline for the action area, the effects of the current skate fishery and the cumulative effects, it is NOAA Fisheries' biological opinion that the skate FMP, as proposed to be implemented, is not likely to jeopardize the continued existence of any listed marine mammals and sea turtles, including right whales, humpback whales, fin whales, blue whales, sei whales, sperm whales or loggerhead, leatherback, Kemp's ridley and green sea turtles.

9.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as "to harass, harm, pursue, hunt, shoot, capture, or collect, or to attempt to engage in any such conduct." Incidental take is defined as take that is incidental to, and not the purpose of, the execution of an otherwise lawful activity. Under the terms of Sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS).

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

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

Anticipated Amount or Extent of Incidental Take

NOAA Fisheries anticipates that the continued operation of the skate fisheries may result in the injury or mortality of sea turtles. Based on reported takes in other fisheries using similar gear types and operating in fishing in similar locations as well as the distribution of the sea turtle species, NOAA Fisheries anticipates that the skate fishery will take one loggerhead, leatherback, green, or Kemp's ridley sea turtle (one turtle only of any of these four species) annually.

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

Anticipated Impact of Incidental Take

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

Reasonable and Prudent Measures

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

1. NOAA Fisheries must provide adequate guidance to fishers participating in the skate fisheries as this is a newly managed fishery and must make them aware of the presence of sea turtles in the area, and must provide adequate guidance to all fishers such that any sea turtle incidentally taken is handled with due care, observed for activity, and returned to the water.

2. NOAA Fisheries must continue to evaluate observer coverage and information from the skate fisheries, and other fisheries using similar gear and fishing in similar areas and times,

including the percentage of observer coverage, and any other relevant information before the start of each fishing year 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, NOAA Fisheries must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To comply with # 1 above, NOAA Fisheries must provide all participating fishers with a copy of the proposed sea turtle resuscitation and handling techniques (66 FR 32787) 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. To comply with # 1 above, NOAA Fisheries shall require all vessels participating in the fisheries 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. To comply with # 2 above, all available information collected on sea turtle takes in the skate fisheries shall be evaluated by NOAA Fisheries 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. In the event that incidental take is exceeded, consultation must be reinitiated.

NOAA Fisheries anticipates that the continued operation of the skate fisheries may result in the injury or mortality of sea turtles. Based on data from observer reports for these fisheries NOAA Fisheries anticipates that takes of 1 loggerhead sea turtle (lethal or non-lethal); and 1 green sea turtle, leatherback sea turtle or Kemp's ridley sea turtle (lethal or non-lethal) may occur annually. A take is counted as any sea turtle that is either taken alive and released, or dead.

The extent of incidental take of sea turtles in the skate fisheries 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 skate fisheries, 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 reinitiation of consultation and review of the reasonable and prudent measures that have been provided.

10.0 CONSERVATION RECOMMENDATIONS

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

1. NOAA Fisheries should research ways to better monitor the skate fisheries' effects on listed species as presently the skate fishery is an under observed fishery and a better understanding of protected species interaction is needed.

2. NOAA Fisheries should provide the resources needed to properly observe the skate fishery.

3. In order to better understand possible interactions between skate fisheries and sea turtle populations and the impacts of incidental take in skate fisheries, NOAA Fisheries should

support (i.e. fund, advocate, promote) in-water abundance estimates of sea turtles to achieve more accurate status assessments (primary need on initiating FMP) for these species and improve our ability to monitor them.

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

5. NOAA Fisheries should consider incorporating reporting requirements for listed species into the fishery management plans.

6. A significant amount of ghost gear is generated from fixed gear fisheries, occasionally due to conflict with mobile gear fisheries, other vessel traffic, storms, or oceanographic conditions. Mobile gear also occasionally contributes to the quantity of ghost gear. There is potential that this gear could adversely affect both listed species and their habitat. In order to minimize the risks associated with ghost gear, NOAA Fisheries should assist the USCG in notifying all Atlantic fisheries permit holders of importance of bringing gear back to shore to be discarded properly. In conjunction with the USCG, fishery councils/commissions, and other appropriate parties, NOAA Fisheries should review current regulations that concern fishing gear or fishing practices that may increase or decrease the amount of ghost gear to determine where action is necessary to minimize impacts of ghost gear. NOAA Fisheries should assist the USCG in developing and implementing a program to encourage 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, NOAA Fisheries should work with the USCG and fishery councils/commissions to develop and implement a lost gear reporting system to tie in with ghost gear program and consider incorporating this system into future revisions of the appropriate management plans.

7. NOAA Fisheries should expand education and outreach and establish a recognition program to promote incentives to assist in prevention (of takes/interactions) 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.

8. As 'whale safe' gear is developed NOAA Fisheries should continue to cooperate with the Canadian Government to compare research findings and facilitate implementation in both

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

9. NOAA Fisheries should evaluate the effectiveness of the ALWTRP on other large whales that may be affected by fishing gear. The ALWTRP focuses largely on right whales but it has been assumed that other large whales will benefit from measures such as gear modifications. Every effort should be made to determine what additional measures are needed to protect other whales from serious injury or mortality.

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

11. NOAA Fisheries should review and consider the following management options proposed by the ship strike committee of the Northeast right whale implementation team as the majority of large whale mortalities are due to ship strike :

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

12 NOAA Fisheries should consider reviewing existing right whale critical habitat and any new information about the nature and location of physical and biological features that are essential to the conservation of right whales and may require special management, as well as any new information on right whale distribution.

13 NOAA Fisheries should develop a strategic plan to address bycatch of listed marine mammals on a gear basis, similar to the plan currently under development for sea turtles.

Since the sea turtle plan is focused on reducing entanglements in Atlantic fisheries, these efforts should be closely coordinated.

11.0 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed action for the initial implementation of a Skate FMP. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In the event that the amount or extent of take is exceeded, the Northeast Region's Sustainable Fisheries Division must immediately request reinitiation of formal consultation.

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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 NOAA Fisheries implementation of the Bluefish, Herring, Multispecies, Mackerel/Squid/Butterfish, Red Crab, Sea Scallop, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, Tilefish, and Highly Migratory Species fishery management plans as well as for the American Lobster Fishery operating in Federal waters, the Exempted Fishery Permits for horseshoe crab and Jonah crab. Takes are represented as anticipated annual take unless otherwise noted.

FISHERY	SEA TURTLE SPECIES			
	Loggerhead	**Leatherback**	**Kemp's Ridley**	**Green**
Bluefish	6-no more than 3 lethal	None	6 lethal or non-lethal	None
Herring	6-no more than 3 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
HMS [1]	402	438	35 total (Kemp's ridleys, green or hawksbill)	
	Plus 3 in any combination of loggerhead, leatherback, green , Kemp's ridleys and hawksbill			
Lobster	2 lethal or non-lethal	4 lethal or non-lethal	None	None
Mackerel/Squid/ Butterfish	6-no more than 3 lethal	1 lethal or non-lethal	2 lethal or non-lethal	2 lethal or non-lethal
Multispecies	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Red Crab	1 lethal or non-lethal	1 lethal or non-lethal	None	None
Sea Scallop (dredge)	88 - no more than 25 lethal	None	7 - no more than 2 lethal	1 lethal or non-lethal
Sea Scallop (trawl)	1 (either loggerhead, leatherback, Kemp's ridley or green) - lethal or non-lethal			
Spiny Dogfish	3-no more than 2 lethal	1 lethal or non-lethal	1 lethal or non-lethal	1 lethal or non-lethal
Summer Flounder/Scup/ Black Sea Bass	19-no more than 5 lethal (total - either loggerheads or Kemp's ridley)	None	see loggerhead entry	2 lethal or non-lethal
Tilefish	6 -no more than 3 lethal or having ingested the hook	1 lethal or non-lethal take (includes having ingested the hook)	None	None
Horseshoe Crab EFP	43 - non-lethal only	1 (either leatherback, green or Kemp's ridley) - non-lethal only		
Jonah Crab EFP	None	6 lethal or non-lethal over a 3-year period	None	None

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

Appendix 2. Summary of observed skate trips* in the Mid-Atlantic trawl fishery January 1994 - September 2002.

YEAR	MONTH	STATISTICAL AREA	TOTAL TRIPS	TOTAL HAULS	TURTLE BYCATCH
1994		NO TRIPS OBSERVED			
1995	9	539, 611	3	7	0
	10	539, 611	1	3	0
	11	539	3	8	0
1996	8	621	1	1	0
	12	539	1	3	0
1997		NO TRIPS OBSERVED			
1998		NO TRIPS OBSERVED			
1999		NO TRIPS OBSERVED			
2000	6	539, 611, 613	3	11	0
	8	539, 611	2	10	0
	10	537, 539, 611	3	11	0
	11	539	4	14	0
2001	1	539, 611	2	6	0
	3	539, 611	4	12	0
	5	539, 611	1	5	0
	6	611	1	4	0
	9	539	1	4	0
2002		NO TRIPS OBSERVED			
Totals			**30**	**99**	**0**

* Only those hauls specifically targeting skate are listed.

Appendix 3. Summary of observed skate trips* in the Mid-Atlantic gillnet fishery January 1994- September 2002.

YEAR	MONTH	STATISTICAL AREA	TOTAL TRIPS	TOTAL HAULS	TURTLE BYCATCH
1994		NO TRIPS OBSERVED			
1995	12	612,621	1	4	0
1996		NO TRIPS OBSERVED			
1997	11	612,615	2	8	0
	12	612	1	1	0
1998	4	615,614	2	4	0
	5	615	1	1	0
	10	615	1	1	0
1999	4	613	3	3	0
	5	613,614,615	3	4	0
2000	12	615	1	1	0
2001	1	615	1	3	0
	12	612	1	1	0
2002		NO TRIPS OBSERVED			
Totals			**15**	**27**	**0**

* Only those hauls specifically targeting skate are listed