UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

OCT 5 2007

Christine Godfrey, Chief
Regulatory Division
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Re: Sconset Beach Nourishment Project

Dear Ms. Godfrey,

Enclosed is the biological opinion (Opinion), issued under Section 7(a)(2) of the Endangered Species Act (ESA), for the proposed approval by the US Army Corps of Engineers (ACOE) of a permit application by the Siasconset Beach Preservation Fund to construct a large-scale beach nourishment project. This Opinion is based in part upon NOAA's National Marine Fisheries Service's (NMFS) independent evaluation of the following: Sconset Beach Nourishment Project Endangered Species Biological Assessment (BA), correspondence with the ACOE, and other sources of information. The Opinion concludes that the proposed project may adversely affect but is not likely to jeopardize the continued existence of the loggerhead sea turtle and is not likely to adversely affect Kemp's ridley, leatherback or green sea turtles or right, humpback or fin whales. NMFS has also concluded that the action will not affect hawksbill turtles or shortnose sturgeon as these species are unlikely to occur in the action area. As only one dredge cycle is currently proposed, NMFS has assessed the project's impacts on listed species for a one time dredge event.

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement. The Incidental Take Statement (ITS) accompanying this Biological Opinion, pursuant to Section 7 (b)(4) of the ESA, exempts the incidental taking of no more than two loggerhead sea turtles.

The take is anticipated to be a fresh dead loggerhead sea turtles. No take of any other species of sea turtle is exempted. NMFS anticipates that the dredging may take an additional unquantifiable number of previously dead sea turtle parts. Provided that NMFS concurs with the ACOE's determination regarding the state of decomposition, condition of the specimen, and likely cause of mortality, the take of previously dead sea turtle parts will not be attributed to the incidental take level for this action. The ITS specifies reasonable and prudent measures (RPMs) necessary to minimize and monitor take of listed species. The RPMs outlined in the ITS are non-discretionary, and must be undertaken so that they become binding conditions 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 of section 7(o)(2). Monitoring that is required by the ITS will continue to supply information on the level of take resulting from the proposed action.

This Opinion concludes consultation for the proposed approval by the US Army Corps of Engineers (ACOE) of a permit application by the Siasconset Beach Preservation Fund to construct a large-scale beach nourishment project. Reinitiation of this consultation is required if: (1) the amount of taking specified in the ITS is exceeded; (2) new information reveals effects of these actions that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) project activities are subsequently modified in a manner that causes an effect to the listed species that was not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified actions.

As you know, coordination on the effects of the proposed project on Essential Fish Habitat is ongoing. Please note that the conclusions reached in this Biological Opinion do not supersede the need to complete this ongoing coordination. We look forward to continuing to work cooperatively with your office to minimize the effect of dredging projects on listed species in the New England District. For further information regarding any consultation requirements, please contact Pat Scida at (978) 281-9208 or by e-mail (Pasquale.Scida@noaa.gov). Thank you for working cooperatively with my staff throughout this consultation process.

Sincerely,

Chris Mantzaris
for Patricia A. Kurkul
Regional Administrator

cc: Kottelly, ACOE
Williams, Collins - GCNE
Crocker - F/NER3
Boelke - F/NER4

File Code: Section 7 ACOE New England Mass. Sconset Beach Nourishment Project

PCTS: F/NER/2006/03910

NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: US Army Corps of Engineers, New England District

Activity: Siasconset Beach Preservation Fund's Sconset Beach Nourishment Project (F/NER/2006/03910)

Conducted by: National Marine Fisheries Service
Northeast Regional Office

Date Issued: 10/5/07

Approved by: Chris Mantzaris for Patricia Kurkul

This constitutes the biological opinion (Opinion) of NOAA's National Marine Fisheries Service (NMFS) on the effects of the US Army Corps of Engineers' (ACOE) issuance of a permit to the Siasconset Beach Preservation Fund for dredging at an offshore borrow site for nourishment of Sconset Beach in Nantucket, Massachusetts on threatened and endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). This Opinion is based on information provided in the Sconset Beach Nourishment Project Endangered Species Biological Assessment (BA), correspondence with the ACOE, and other sources of information. A complete administrative record of this consultation will be kept on file at the NMFS Northeast Regional Office. Formal consultation was initiated on July 1, 2007.

CONSULTATION HISTORY

The purpose of the proposed project is to protect approximately 3.1 miles of eroding coast along the eastern shoreline of Nantucket Island. Shoreline change data indicate coastline retreat on the order of 100-200 feet in many locations over the past decade. The Siasconset Beach Preservation Fund (SBPF or applicant) is proposing the current project to prevent further destruction of private property as well as existing public infrastructures, historic structures, town sewer beds and roads.

In August 2005, the applicant's consultant contacted NMFS and requested information on the presence of listed species near the project site. NMFS responded to that request in a letter dated August 30, 2005. In July 2006, the ACOE contacted NMFS regarding the potential impact of the proposed project. At that time, project details were not complete and the ACOE was unable to provide sufficient information for NMFS to conduct a Section 7 consultation. In a letter dated August 23, 2006, the ACOE requested formal consultation with NMFS on the Sconset Beach project. NMFS responded to this letter by requesting additional project details. On March 27, 2007, the ACOE published a Public Notice regarding the proposed project. At that time, NMFS contacted ACOE regarding the status of the project and ACOE indicated that it was preparing a BA assessing the likely impacts of the project on listed species.

In a letter dated June 28, 2007, ACOE again requested formal consultation on the Sconset Beach project. Included with this letter were a complete project description and a BA. ACOE has made the preliminary determination that the proposed action may adversely affect listed species.

DESCRIPTION OF THE PROPOSED ACTION

As noted above, the ACOE is proposing to issue a permit to the SBPF authorizing the removal of 2.6 million cubic yards (cy) of beach compatible sediment from a 195 acre borrow site located approximately 2.9 miles east of Nantucket in water that is 30 to 60 feet deep. The borrow area is located approximately 20 miles west of the western border of the Great South Channel critical habitat for right whales. The material will be excavated using either a cutterhead dredge or a hopper dredge. The applicant has indicated that dredge selection will depend on logistical considerations relating to the borrow site and site-specific wave conditions the contractor expects to encounter during construction. With a cutterhead dredge, material would be pumped directly to the beach. With a hopper dredge, the dredge vessel would travel to a pumpout station just offshore from the nourishment area at Sconset Beach. The sediment would then be re-fluidized and pumped onto the beach through a submerged pipeline. Project construction is scheduled to occur during the months of April to November in the year when all permits have been secured (likely in 2008). The ACOE has indicated that they will include the following special conditions in any permit issued to SBPF for the proposed project:

- All vessels utilized for the dredging and transfer of material from the borrow area shall be kept at a maximum speed of 10 knots;
- Turtle Deflector Devices shall be used by any vessel dredging material from the borrow area;
- A NMFS approved endangered species observer shall be onboard the dredge to inspect for sea turtles or sea turtle parts that may become entrained in the dredge; and,
- The "soft start or ramp up" method of noise reduction shall be used by all vessels operating in the borrow area.

As noted above, a self-propelled hydraulically operated hopper dredge may be used for sediment removal. The hopper dredge is equipped with two dragheads and a hopper. When the hopper is full, the dredge transports sand to the shore for unloading via an offshore pumpout shoreline connection and subsequent placement on the beach. This type of dredge employs suction produced by high speed centrifugal pumps to excavate the sediment and dispose of it to a storage hopper. Material dislodged from the ocean floor by the suction is suspended in water in the form of a slurry and then passed through the centrifugal pump to the storage hopper. The particular type of dredge that will be employed is also referred to as a Trailer Suction Hopper Dredge. This type of dredge is a self-propelled ship suitable for operation in an ocean environment and capable of mining sand and loading a self-contained hopper while the ship is underway. Loading takes place as the ship moves at a speed of 1-3 knots. The intake end of the suction pipe is fitted with a draghead, the function of which is to strip off a layer of sediment from the seabed and entrain those sediments into the suction pipe. The time required to load the hopper is highly variable and dependent on the physical characteristics of the material being dredged, the mechanical properties and efficiency of the dredging plant and vessel, and the sea state conditions under which the dredging takes place. A suction hopper dredge is usually on-site for three to four hours during a 24 hour period, with the remaining time spent traveling and unloading sand. If used for this project, a hopper dredge would complete three to five trips per day depending on weather conditions and the distance between the excavation area and pumpout station. Sea conditions can limit hopper dredge operations at the pumpout station, where a typical maximum wave height for safe operations is limited to approximately 6 feet. The daily production rate for this project is expected to be 9,000 – 15,000 cy/day. Factoring in likely weather conditions, the applicant has estimated that total project dredging and delivery using this method could last 220 days. Project construction could be expedited by the use of more than one hopper dredge, although the use of multiple dredges is not currently being proposed.

Alternatively, a cutterhead dredge may be used for sediment removal. A cutterhead dredge operates with an actively-rotating auger surrounding a suction line. The rotating cutterhead agitates sand into a slurry which is pumped to the dredge and then through a submerged pipeline extending from the borrow site to the shore. Cutterhead dredges are capable of near-continuous discharge to a receiving shoreline, resulting in high production rates. For this project, production rates using a cutterhead dredge are expected to be 20,000 – 50,000 cy/day. Total project dredging and delivery using this method could last 80 days. Cutterhead dredges are generally limited to operating in environments where wave heights are less than 5 or 6 feet, and must be towed into safe harbor when waves are expected to exceed 8 to 9 feet.

Description of the Borrow Area

The proposed borrow area is located approximately 2.9 miles east of Nantucket Island and west of Bass Rip Shoal. The dredge footprint will encompass approximately 195 acres split between two excavation areas. Depths at the borrow area range from 30 to 60 feet and the bottom is largely sand. The borrow area has never been dredged.

Action Area

The action area is defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area for this consultation includes several areas in the Atlantic Ocean. The action area for this consultation includes the borrow site which is located approximately 2.9 miles east of Sconset Beach in Nantucket, MA. The action area for this consultation includes the borrow area and the waters between and immediately adjacent to these areas where project vessels will travel and dredged material will be transported (see Appendix A for an illustration of the action area) as well as an area extending 4000 feet in all directions from the area to be dredged to account for the sediment plume generated during dredging activities.

STATUS OF AFFECTED SPECIES

Several species listed under NMFS' jurisdiction occur off of the Massachusetts coast. Several species of listed sea turtles occur in these waters during the warmer months (April 1 – November 30; typically when water temperatures are greater than 11°C). Listed whales also occur seasonally in these waters. No critical habitat has been designated within the action area; as such, no critical habitat will be affected by this action. In Massachusetts, the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) is only known to occur in the Merrimack and Connecticut Rivers, neither of which are in the action area for this consultation (NMFS 1998b). As such, shortnose sturgeon are not likely to be present in the action area and will not be considered further in this biological opinion.

The hawksbill turtle (*Eretmochelys imbricata*) is relatively uncommon in the waters of the continental US. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America; however, there are accounts of hawksbills in south Florida and Texas. Most of the Texas records report small turtles, probably in the 1-2 year class range. Many captures or strandings are of individuals in an unhealthy or injured condition (Hildebrand 1982). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a viable population in this area. No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the NEFSC observer program. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). Many of these strandings were observed after hurricanes or offshore storms. There have been no verified observations of hawksbills in the action area. Based on this information, NMFS has determined that hawksbill sea turtles are extremely unlikely to occur in the action area. As such, the proposed action will not affect hawksbills, and this species will not be considered further in this consultation.

NMFS has determined that the action being considered in this biological opinion may affect the following endangered or threatened species under NMFS' jurisdiction:

Cetaceans	
Right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	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*[1])	Endangered/Threatened

This section will focus on the status of the various species within the action area, summarizing information necessary to establish the environmental baseline and to assess the effects of the proposed action. Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent sea turtle status reviews and stock assessments(NMFS and USFWS 1995, USFWS 1997, TEWG 2000, NMFS SEFSC 2001), Recovery Plans for the humpback whale (NMFS 1991a), right whale (NMFS 2005), fin and sei whale (NMFS 1998a), loggerhead sea turtle (NMFS and USFWS 1991) and

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[1] Pursuant to NMFS regulations at 50 CFR 223.205, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened.

leatherback sea turtle (NMFS and USFWS 1992), and the 2005 marine mammal stock assessment report (Waring et al. 2006).

Right Whale

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 (Aguilar 1986). Commercial whaling for right whales along the US Atlantic coast peaked in the 18th century, but right whales continued to be taken opportunistically along the coast and in other areas of the North Atlantic into the early 20th century (Kenney 2002). Right whales have occurred historically in all the world's oceans from temperate to subarctic latitudes (Perry et al. 1999). In both hemispheres, they are observed at low latitudes and in nearshore waters where calving takes place in the winter months, and in higher latitude foraging grounds in the summer (Clapham et al. 1999; Perry et al. 1999).

In 2000, the International Whaling Commission (IWC) reviewed the taxonomic nomenclature for right whales. Based on the results of genetic studies, the IWC formally recognized North Pacific, North Atlantic, and southern hemisphere right whales as three separate species (Best et al. 2001). In April 2003, NMFS published a final rule in the Federal Register (68 FR 17560) that amended the ESA-listing for right whales by recognizing three separate species: North Atlantic right whale (*Eubalaena glacialis*), North Pacific right whale (*Eubalaena japonica*), and southern right whale (*Eubalaena australis*). However, on January 11, 2005, another final rule was published (70 FR 1830) that removed the April 2003 final rule on the grounds that it was procedurally and substantively flawed. As a result, the ESA-listing for right whales has reverted to that in effect prior to the April 2003 rule; two species of right whales are currently listed, Northern right whales (*Eubalaena glacialis*) and southern right whales (*Eubalaena australis*). On December 27, 2006, NMFS issued two proposed rules to designate the North Atlantic right whale (71 FR 77704) and the North Pacific right whale (71 FR 77694) each separately as an endangered species. The agency is currently considering all comments received and intends to finalize the proposed rule in accordance with the time frame specified by the ESA. As only Northern right whales are likely to occur in the action area for this consultation, southern right whales will not be considered further.

Pacific Ocean. Very little is known of the size and distribution of the North Pacific right whale stocks. Two stocks are generally recognized: a western Pacific stock in the Sea of Okhotsk and an eastern Pacific stock. The number of right whales for each stock are considered to be very low. In the eastern Pacific, sightings have been made along the coasts of Washington, Oregon, California, and Baja California south to about 27° N (Scarff 1986; NMFS 1991b) and also in Hawaii (Herman et al. 1980; Barlow et al. 1998). However, right whales were not sighted consistently in any of these areas. In 1996, a group of 3 to 4 right whales were observed in the middle shelf of the Bering Sea, west of Bristol Bay and east of the Pribilof Islands (Goddard and Rugh 1998). 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). In 2004, the National Marine Mammal Laboratory undertook a North Pacific right whale tagging project as part of the Cetacean Assessment and Ecology Program to further investigate the presence of right whales in the eastern North Pacific (AFSC 2004). Researchers used sonobuoys to locate right whales (AFSC 2004). Two whales were located and satellite tagged (AFSC 2004). While tracking one of these whales, the scientists located 25 individual whales, more than doubling the number of known whales in the North Pacific (AFSC 2004). Although no estimate of abundance can be made at this time, all indications are that the number of eastern North Pacific right whales and, in general, all North Pacific right whales is very small.

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). Photo-identification work has shown that some of the whales observed in the eastern Atlantic were previously identified as western Atlantic right whales (Kenney 2002). This Opinion will focus on the western North Atlantic subpopulation of right whales which occurs in the action area.

Right whale life history, habitat and distribution

Western North Atlantic right whales (hereafter referred to as "right whales") generally occur from the southeast US to Canada (e.g., Bay of Fundy and Scotian Shelf) (Kenney 2002; Waring et al. 2005). Like other right whale species, they follow an annual pattern of migration between low latitude winter calving grounds and high latitude summer foraging grounds (Perry et al. 1999; Kenney 2002). Telemetry data have shown lengthy and somewhat distant excursions into deep water off of the continental shelf (Mate et al. 1997) as well as extensive movements over the continental shelf during the summer foraging period (Mate and Nieukirk 1992; Mate et al. 1997; Bowman 2003; Baumgartner and Mate 2005). Photo-identification data have also indicated excursions of animals as far as Newfoundland, the Labrador Basin, southeast of Greenland (Knowlton et al. 1992), and Norway (Best et al. 2001). In the winter, only a portion of the known right whale population is seen on the calving grounds. The winter distribution of the remaining right whales remains uncertain (Waring et al. 2005). Results from winter surveys and passive acoustic studies suggest that animals may be dispersed in several areas including Cape Cod Bay (Brown et al. 2002) and offshore waters of the southeastern US (Waring et al. 2005).

Unknowns about right whale habitat persist. For example, some female right whales have never been observed on the Georgia/Florida calving grounds but have been observed with a calf on the summer foraging grounds (Best et al. 2001). It is unknown whether these females are calving in an unidentified calving area or have just been missed during surveys off of Florida and Georgia (Best et al. 2001). The absence of some known (photo-identified) whales from identified habitats for months or years at a time suggests the presence of an unknown feeding ground (Kenney 2002). Finally, while behavior suggestive of mating is frequently observed on the foraging grounds, conception is not likely to occur at that time given the known length of gestation in other baleen whales. More likely, mating and conception occur in the winter (Kenney 2002). Based on genetics data, it has been suggested that two mating areas may exist with a somewhat different population composition (Best et al. 2001). The location of the mating area(s) is unknown.

Critical habitat for right whales has been designated in accordance with the ESA. Following a petition from the Right Whale Recovery Team, NMFS designated three critical habitat areas for right whales in 1994. These areas are: (1) portions of Cape Cod Bay and Stellwagen Bank, (2) the Great South Channel, and (3) coastal waters off of Georgia and Florida's east coast (NMFS 1994). Right whale critical habitat in Northeast waters were designated for their importance as right whale foraging sites while the southeast critical habitat area was identified for its importance as a calving and nursery area (NMFS 1994). In 2002, NMFS received a petition to revise designated critical habitat for right whales by combining and expanding the existing Cape Cod Bay and Great South Channel critical habitats in the Northeast and by expanding the existing critical habitat in the Southeast (NMFS 2003). In response to the petition, NMFS (2003) recognized that there was new information on right whale distribution in areas outside of the designated critical habitat. However, the ESA requires that critical habitat be designated based on identification of specific habitat features essential to the conservation of the species rather than just known distribution (NMFS 2003). NMFS, therefore, denied the petition to revise critical habitat as requested by the petitioner, but also outlined an approach to investigate factors that may lead to other revisions to critical habitat (NMFS 2003).

There are relatively few right whales remaining in the western North Atlantic, although the exact number is unknown. As is the case with most wild animals, an exact count cannot be obtained. However, abundance can be reasonably estimated as a result of the extensive study of this subpopulation. IWC participants from a 1999 workshop agreed that it was reasonable to state that the number of western North Atlantic right whales as of 1998 was probably around 300 (+/- 10%) (Best et al. 2001). This conclusion was principally based on a photo-identification catalog that, as of July 1999, was comprised of more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than 6 years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (Best et al. 2001), which suggests that the 396 individuals was a close approximation of the entire population.

A total of 125 right whale calves has been observed since the 1999 workshop, including a record calving season in 2000/2001 with 31 right whale births (Waring et al. 2006.). Calving numbers have been sporadic, with large differences among years. The three calving years (1997-2000) prior to the record year in 2000/2001 provided low recruitment with only 10 calves born, while the last five calving seasons (2000-2005) have been remarkably better with 31, 21, 19, 16, and 28 births, respectively (NMFS 2006). However, the subpopulation has also continued to experience losses of calves, juveniles and adults. As of December 1, 2004, there were 459 individually identified right whales in the photo-identification catalog maintained by the New England Aquarium of which 18 were known to be dead, and 330 had been sighted during the previous six years (New England Aquarium, North Atlantic Right Whale Catalog Database)[2].

As is the case with other mammalian species, there is an interest in monitoring the number of females in this right whale subpopulation since their numbers will affect the subpopulation trend (whether declining, increasing or stable). Participants at the 1999 IWC workshop reviewed the sex

2 Note that these data do not include four known dead right whales reported during the time period of January 2005 through June 2005.

composition of the right whale subpopulation based on sighting and genetics data (Best et al. 2001). Of the 385 right whales presumed alive at the end of 1998 (excludes the 11 known to have died but includes the 87 that had not been seen in at least 6 years), 157 were males, 153 were females, and 75 were of unknown sex (Best et al. 2001). Sightings data were also used to determine the number of presumably mature females (females known to be at least 9 years old) in the subpopulation and the number of females who had been observed with a calf at least once. For the period 1980-1998, there were at least 90 (presumed live) females age 9 years or greater. Of these, 75 had produced a calf during that same period (Best et al. 2001; Kraus et al. 2001). As described above, the 2000/2001 - 2004/2005 calving seasons have had relatively high calf production and have included additional first time mothers (e.g., eight new mothers in 2000/2001). These potential "gains" have been offset, however, by continued losses to the subpopulation including the death of mature females as a result of anthropogenic mortality (Cole et al. 2006). Twenty right whale mortalities were confirmed from 2000-2004 (Cole et al. 2006). Included in this number were two pregnant females and two other females of breeding age. An additional ten right whale mortalities were documented between January 2005 and October 2006. The 2005-2006 mortalities have been documented by NMFS, but have not been fully examined and verified by the ASRG process. A determination of the total levels of anthropogenic mortality and serious injury for 2005 and 2006 will be made following the ASRG's review of all of the available data and information.

Data collected in the 1990s suggested that right whales were experiencing a slow but steady recovery (Knowlton et al. 1994). However, Caswell et al. (1999) used photo-identification data and modeling to estimate survival and concluded that right whale survival decreased from 1980 to 1994. Modified versions of the Caswell et al. (1999) model as well as several other models were reviewed at the 1999 IWC workshop (Best et al. 2001). Despite differences in approach, all of the models indicated a decline in right whale survival in the 1990s relative to the 1980s with female survival, in particular, affected (Best et al. 2001; Waring et al. 2005). In 2002, NMFS' NEFSC hosted a workshop to review right whale population models to examine: (1) potential bias in the models and (2) changes in the subpopulation trend based on new information collected in the late 1990s (Clapham et al. 2002). Three different models were used to explore right whale survivability and to address potential sources of bias. Although biases were identified that could negatively affect the results, all three modeling techniques resulted in the same conclusion; survival, particularly of females, has continued to decline (Clapham et al. 2002). Based on the information currently available, for the purposes of this BO, NMFS believes that the western North Atlantic right whale subpopulation numbers 300 (+/- 10%) and is declining.

While modeling work suggests a decline in right whale abundance as a result of reduced survival, particularly for females, some researchers have also suggested that the subpopulation is being affected by a decreased reproductive rate (Best et al. 2001; Kraus et al. 2001). Kraus et al. (2001) reviewed reproductive parameters for the period 1980-1998 and found that calving intervals increased from 3.67 years in 1992 to 5.8 years in 1998. In addition, as of 1999, only 70% of presumably mature females (females aged 9 years or older) were known to have given birth (Best et al. 2001).

Factors that have been suggested as affecting the right whale reproductive rate include reduced genetic diversity, pollutants, and nutritional stress. However, there is currently no evidence available to determine their potential effect, if any, on 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 whale reproductive success since concentrations were lower than those found in marine mammals proven to be affected by PCBs and DDT (Weisbrod et al. 2000). Finally, although North Atlantic right whales seem 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. are 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). Nevertheless, a connection among right whale reproduction and environmental factors may yet be found. Modeling work by Caswell et al. (1999) and Fujiwara and Caswell (2001) suggests that the North Atlantic Oscillation (NAO), a naturally occurring climactic event, does affect the survival of mothers and the reproductive rate of mature females, and it also seems to affect calf survival (Clapham et al. 2002). Further work is needed to assess the magnitude and manner in which the NAO may affect right whale reproductive success.

Threats to right whale recovery
There is general agreement that right whale recovery is negatively affected by anthropogenic mortality, primarily due to collisions with vessels and entanglement in fishing gear. Right 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. Of the 50 dead right whales reported since 1986, at least 19 were killed by vessel collisions, and at least six were killed by fishing gear entanglements (Moore et al. 2005). Also during this period, there were 61 confirmed cases of whales carrying fishing gear, including the six mortalities (Kraus et al. 2005). Death is suspected in 12 cases, because of an animal's subsequent disappearance and/or the extremely poor health condition observed at the time of last sighting. Another eight animals are still entangled; their fate is uncertain. Thirty-three animals either shed the gear or were disentangled, and the remaining cases involved unidentifiable individuals (Kraus et al. 2005). Of the 20 verified right whale mortalities from 2000-2004, three were due to entanglement and six were due to ship strike (Cole et al. 2006). An additional ten right whale mortalities were documented between January 2005 and October 2006 (NMFS unpublished data). The 2005-2006 mortalities have been documented by NMFS, but have not been fully examined and verified by the ASRG process. A determination of the total levels of anthropogenic mortality and serious injury for

2005 and 2006 will be made following the ASRG's review of all of the available data and information.

These reported numbers represent an absolute minimum number of the right whale mortalities for this period. Given the range and distribution of right whales in the North Atlantic, it is highly unlikely that all carcasses have been observed. In addition, the incidence of mortality from ship strikes and entanglements is underrepresented because, of the carcasses that are observed, many cannot be retrieved for necropsy or further analysis. Of the carcasses retrieved, many are too decomposed or damaged to provide the evidence necessary to determine whether a ship strike or entanglement may have occurred. Nonetheless, considerable effort has been made to examine right whale carcasses for the cause of death. Moore et al. (2005) provide information on the examination of 30 right whale carcasses during the period of 1970-2002. Of the 30 animals examined, ship strike was identified as the cause of death or probable cause of death for 14 (9 adults/juveniles; 4 calves; 1 unknown) and entanglement in fishing gear was identified as the cause of death for 4 (all adults/juveniles) (Moore et al. 2005). A cause of death was undeterminable for 12 animals, 8 of which were calves (Moore et al. 2005).

Ship strikes and entanglements are not always fatal to right whales. Scarification analysis of living animals provides additional information on the frequency of right whale interactions with vessels and rope/line. 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). Based on photographs of catalogued animals from 1935 through 1995, Hamilton et al. (1998) 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. Right whales may suffer long term effects of such interactions even when they survive the initial interaction. For example, some right whales that have been entangled were subsequently involved in ship strikes (Hamilton et al. 1998) suggesting that the animal may have become debilitated by the entanglement to such an extent that it was less able to avoid a ship. A necropsy of a right whale found dead in 2005 suggests that the animal died of an infection after the scars from a previous ship strike interaction opened up during her first pregnancy.

The number of right whale deaths due to entanglement and ship strike is of great concern given the critical status of the North Atlantic right whale population. In spite of efforts to address these concerns, including fishing gear restrictions under the ALWTRP, the disentanglement program, and education and outreach activities, right whales continue to be impacted by ship strikes and entanglements.

Right Whale Status and Trends

Although no estimate of abundance can be made at this time, all indications are that the number of North Pacific right whales is very small. In 2004, researchers located and identified a total of 25 individual right whales in the eastern North Pacific (AFSC 2004). While this represents more than double the previous number of known whales in the eastern North Pacific (AFSC 2004), it demonstrates the very low numbers of North Pacific right whales.

As noted above, in the Atlantic there are an estimated 300 right whales (+/- 10%) (Best et al. 2001). The 2000/2001 - 2004/2005 calving seasons have had relatively high calf production and have included additional first time mothers. These potential "gains" have been offset, however, by continued losses to the subpopulation including the death of mature females as a result of anthropogenic mortality (Cole et al. 2006).

Sixty-three right whale mortalities were reported from Florida to the Canadian Maritimes during the period from 1970-July 1, 2005 (Moore et al. 2004; Cole et al. 2006; Kraus et al. 2005). This represents an absolute minimum number of the right whale mortalities for this period. Given the range and distribution of right whales in the North Atlantic, it is highly unlikely that all carcasses will be observed. Ship strikes and fishing gear entanglements were identified as the primary cause of death for many of these. Scarification analysis indicates that some whales do survive encounters with ships and fishing gear. However, the long-term consequences of these interactions are unknown.

A number of different modeling exercises using the extensive data collected on this subpopulation have come to the same conclusion; right whale survival continues to decline (Clapham et al. 2002). Based on recent reviews of the status of the right whales, their reproductive rate (the number of calves that are born in the population each year) appears to be declining, which could increase the whales' extinction risk (Caswell et al. 1999, Fujiwara and Caswell 2001, IWC 2001). Based on the information currently available, for the purposes of this Opinion, NMFS believes that the western North Atlantic right whale subpopulation numbers 300 (+/- 10%) and is declining.

Humpback Whale
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).

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 occur within the North Pacific Basin (Perry et al. 1999, Carretta et al. 2001). NMFS recognizes three management units within the US 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 (Carretta 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). 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 US 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 (Zemsky et al. 1995, IWC 1995, Perry et al. 1999).

Six separate feeding areas are utilized in northern waters during the summer months (Waring et al. 1999). Humpbacks 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 the associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999). 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. Since feeding is the primary activity of humpback whales in New England waters, their distribution is correlated to prey species and abundance. For example, humpback whales were few in nearshore Massachusetts waters in the 1992-93 summer seasons, but when sand lance became more abundant in the Stellwagen Bank area in 1996 and 1997, humpback abundance also increased (Waring et al. 2005).

In winter, whales from the six feeding areas 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. 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 from 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).

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).

Threats to Humpback Whales

As is the case with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales are 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). 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. From 2000 through 2004, at least 74 humpback whale entanglements (8 fatal; 11 serious injuries) and 11 ship strikes (7 fatal) were confirmed (Cole et al. 2006). Since 2004, an additional 24 new entanglements and 3 indications of ship strike have been preliminarily reported; however, numbers from 2005-present are awaiting confirmation by the NEFSC. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined.

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. 2005). However, there is no evidence that humpback whales were adversely affected by these trophic changes.

Humpback Whales Status

The best available population estimate for humpback whales in the North Atlantic Ocean is regarded as 10,600 animals. 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 US where the species is afforded less protection. Modeling using data obtained from photographic mark-recapture studies estimates the growth rate of the Gulf of Maine feeding population at 6.5% (Barlow and Clapham 1997). With respect to the species as a whole, 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.

Fin Whale

Fin whales inhabit a wide range of latitudes between 20-75° N and 20-75° S (Perry *et al.* 1999). The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic ice pack (NMFS 1998a). The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays Clark (1995) reported a general southward flow pattern of fin whales in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indes. The overall distribution may be based on prey availability as this species preys opportunistically on both invertebrates and fish (Watkins et al. 1984). Fin whales feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments.

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

NMFS has designated one population of fin whale in US waters of the North Atlantic (Waring *et al.* 1998). This species is commonly found from Cape Hatteras northward. A number of researchers have suggested the existence of fin whale subpopulations in the North Atlantic based on local depletions resulting from commercial overharvesting (Mizroch and York 1984) or genetics data (Bérubé *et al.* 1998). Photoidentification studies in western North Atlantic feeding areas, particularly in Massachusetts Bay, have shown a high rate of annual return by fin whales, both within years and between years (Seipt *et al.* 1990) suggesting some level of site fidelity. In 1976, the IWC's Scientific Committee proposed seven stocks (or populations) for North Atlantic fin whales. These are: (1) North Norway, (2) West Norway-Faroe Islands, (3) British Isles-Spain and Portugal, (4) East Greenland-Iceland, (5) West Greenland, (6) Newfoundland-Labrador, and (7) Nova Scotia (Perry *et al.* 1999). However, it is uncertain whether these boundaries define biologically isolated units (Waring *et al.* 2005).

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 US 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). Fin whales feed by filtering large volumes of water for their prey through their baleen plates.

Threats to fin whale recovery

The major known sources of 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. From 2000-2004, the NEFSC has confirmed 9 entanglements (3 fatal; 1 serious injury) and 5 ship strikes (all fatal) (Cole et al. 2006). Since 2004, there have been an additional 2 new entanglements and 4 indications of ship strike reported (NMFS unpublished data), although these numbers are awaiting confirmation by the NEFSC. Fin whales are believed to be the most commonly struck cetacean by large vessels (Laist *et al.* 2001). In addition, hunting of fin whales continued well into the 20th century. Fin whales were given total protection in the North Atlantic in 1987 with the exception of a subsistence whaling hunt for Greenland (Gambell 1993, Caulfield 1993). However, Iceland reported a catch of 136 whales in the 1988/89 and 1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry *et al.* 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995. Fin 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.

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

Information on the abundance and population structure of fin whales worldwide is limited. NMFS recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. 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.

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 US 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 was derived from surveys over a limited portion of the western North Atlantic. The 2005 SAR indicates that there are insufficient data at this time to determine population trends for the fin whale.

Loggerhead Sea Turtle
Loggerhead Sea Turtle
Loggerhead sea turtles are found in temperate and subtropical waters and inhabit pelagic waters, continental shelves, bays, estuaries and lagoons. Loggerhead sea turtles are the most abundant species of sea turtle in U.S. waters, commonly occurring throughout the inner continental shelf from Florida through Cape Cod, Massachusetts, and may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable (NEFSC survey data 1999). The loggerhead was listed rangewide as threatened under the ESA on July 28, 1978.

Loggerhead sea turtles are generally grouped by their nesting locations. Nesting is concentrated in the north and south temperate zones and subtropics. Loggerheads generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (National Research Council 1990). The largest known nesting aggregations of loggerhead sea turtles occur on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). However, the status of the Oman nesting beaches has not been evaluated recently (Meylan et al. 1995).

Pacific Ocean. In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10-20 years. Loggerhead sea turtles in the Pacific are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten *et al.* 1996). More recent information suggests that nest numbers have increased somewhat over the period 1998-2004 (NMFS and USFWS 2007). However, this time period is too short to make a determination of the overall trend in nesting (NMFS and USFWS 2007). Genetic analyses of female loggerheads nesting in Japan indicates the presence of genetically distinct nesting colonies (Hatase *et al.* 2002). As a result, Hatase *et al.* (2002) suggest that the loss of one of these colonies would decrease the genetic diversity of loggerheads that nest in Japan, and recolonization of the site would not be expected on an ecological time scale.

In Australia, long-term census data has been collected at some rookeries since the late 1960's and early 1970's, and nearly all the data show marked declines in nesting populations since the mid-1980's (Limpus and Limpus 2003). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including gillnet, longline, and trawl fisheries in the western and/or eastern Pacific Ocean (NMFS and USFWS 2007). In Australia, where turtles are taken in bottom trawl and longline fisheries, efforts have been made to reduce fishery bycatch (NMFS and USFWS 2007).

Indian Ocean. Loggerhead sea turtles are distributed throughout the Indian Ocean, along most mainland coasts and island groups (Baldwin *et al.* 2003). In the southwestern Indian Ocean, loggerhead nesting has shown signs of recovery in South Africa where protection measures have been in place for decades. However, in other southwestern areas (*e.g.*, Madagascar and Mozambique) loggerhead nesting aggregations are still affected by subsistence hunting of adults and eggs (Baldwin *et al.* 2003). The largest known nesting aggregation of loggerheads in the world occurs in Oman in the northern Indian Ocean. An estimated 20,000-40,000 females nest at Masirah, the largest nesting site within Oman, each year (Baldwin *et al.* 2003). All known nesting sites within the eastern Indian Ocean are found in Western Australia (Dodd 1988). As has been found in other areas, nesting numbers are disproportionate within the area with the majority of nesting occurring at a single location. This may, however, be the result of fox predation on eggs at other Western Australia nesting sites (Baldwin *et al.* 2003). Throughout the Indian Ocean, loggerhead sea turtles face many of the same threats as in other parts of the world including loss of nesting beach habitat, fishery interactions, and turtle meat and/or egg harvesting.

Mediterranean Sea. Nesting in the Mediterranean is confined almost exclusively to the eastern basin (Margaritoulis *et al.* 2003). The greatest number of nests in the Mediterranean are found in Greece with an average of 3,050 nests per year (Margaritoulis *et al.* 2003). There is a long history of exploitation for loggerheads in the Mediterranean (Margaritoulis *et al.* 2003). Although much of this is now prohibited, some directed take still occurs (Margaritoulis *et al.* 2003). Loggerheads in the Mediterranean also face the threat of habitat degradation, incidental fishery interactions, vessel strikes, and marine pollution (Margaritoulis *et al.* 2003). Longline fisheries, in particular, are believed to catch thousands of juvenile loggerheads each year (NMFS and USFWS 2007).

Atlantic Ocean. Ehrhart *et al.* (2003) provided a summary of the literature identifying known nesting habitat of Atlantic loggerheads as well as known foraging areas within the Atlantic. Briefly, nesting occurs on island and mainland beaches on both sides of the Atlantic and both north and south of the Equator (Ehrhart *et al.* 2003). In both the eastern and western Atlantic, waters as far north as 41° - 42°N are used for foraging by juveniles as well as adults (Shoop and Kenney 1992; Ehrhart 2003).

There are at least five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29° N; (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990; TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS SEFSC 2001). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. Genetic analyses conducted at these nesting sites indicate that they are distinct subpopulations (TEWG 2000).

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. 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 with a smaller portion from the Yucatan subpopulation. As such, in this Opinion NMFS will consider effects of the action on loggerheads from the northern subpopulation, the south Florida subpopulation and the Yucatan subpopulation.

A recent analysis of 82 loggerhead sea turtles that stranded from Virginia to Massachusetts[3] determined that the turtles originated from three nesting areas using maximum likelihood stock analysis programs: 1) south Florida (57% ± 14%); 2) northern subpopulations (25% ± 10%); and, 3) Yucatan, Mexico (16% ± 7%) (Rankin-Baransky et al. 2001). Similarly, a study by Bass et al. (2004) examined a total of 295 loggerhead sea turtles that were collected from pound nets in Pamlico Sound, North Carolina during the years of 1995, 1996 and 1997. Bass et al. (2004) used both maximum likelihood and Bayesian stock analysis programs to estimate the relative stock contributions, as maximum likelihood approaches can be biased by the many rare haplotypes in source populations of sea turtles. Bass et al. (2004) reported that the Bayesian approach that incorporated into the model the relative population sizes of sea turtles populations (referred to as Bayesian Model 3 in Bass et al. 2004) appeared to provide the most realistic estimates of stock composition, as maximum likelihood and other Bayesian analyses provided either inflated or very conservative estimates. Using the Bayesian stock analysis with relative populations sizes incorporated into the model, the analysis indicated that 80% of the sea turtles foraging in the

3 However, the majority (N=51, 62%) of the sampled turtles were obtained from the most north point of the study (Barnstable County, Massachusetts)

Pamlico Sound originated from the south Florida nesting subpopulation, 12% were from the northern subpopulation, 6% from the Yucatan, and 2% were from other rookeries. Thus, these two studies (Rankin-Baransky et al. 2001 and Bass et al. 2004) 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, south Florida, and Yucatan subpopulations vary along the coast.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. Loggerheads mate in late March-early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988).

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

A number of stock assessments (Heppell *et al.* 2003; NMFS SEFSC 2001; TEWG 2000; 1998) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. In the absence of comprehensive population surveys, nesting beach survey data has been used to index the status and trends of loggerhead subpopulations (TEWG 2000; USFWS and NMFS 2003). Nesting beach surveys count the number of loggerhead nests laid per season. From this, the number of reproductively mature females in the subpopulation is estimated based on the presumed remigration interval and the average number of nests laid by a female loggerhead sea turtle per season. The trend in the estimated number of reproductively mature females over time has been used in the past as an index of the status and trend of the loggerhead subpopulation, overall (TEWG 2000; USFWS and NMFS 2003). However, there are many caveats to using nest count data for indexing the status and trend of a turtle subpopulation or population. First, the detection of nesting trends (in the number of nests laid and the estimated number of reproductively mature females from those nest counts) requires consistent data collection methods over long periods of time (USFWS and NMFS 2003). In 1989, a statewide sea turtle Index Nesting Beach Survey (INBS) program was developed and implemented in Florida. There are currently 33 nesting beaches in the INBS program (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). As of 2006, 27 of the 33 beaches had reached the mandatory minimum of 10-years participation for their data to be included in trend evaluations (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). Nesting recorded by the INBS program on the 27 beaches represented an average of 65% of all annual nesting by loggerheads in the state for the period 2001-2005 (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). Standardized daily survey programs have been implemented in Georgia, South Carolina, and North Carolina as well (USFWS and NMFS 2003). As is the case with the Florida INBS program beaches, additional years of data are needed for many of the Georgia, South Carolina, and North Carolina beaches before their data can be used in trend analyses (Dodd 2003). In Mexico, nesting survey effort overall has been inconsistent among the Yucatán nesting beaches and no trend can be determined for this subpopulation given the currently available data (Zurita *et al.* 2003).

A second caveat for the use of nesting data is that the number of nests laid are a function of the number of reproductively mature females in the population. Therefore, the trend in the number of reproductively mature females in the subpopulation, based on annual nest counts, may not reflect the trend of mature males or of females and males that are not reproductively active (*i.e.*, juveniles) (Ross 1996; Zurita *et al.* 2003; Hawkes *et al.* 2005). Without knowing the proportion of males to females and the age structure of the population, it is impossible to extrapolate the data from nesting beaches to the entire population (Meylan 1982; Zurita *et al.* 2003). Adding to the difficulties associated with using loggerhead nesting trend data as an indicator of subpopulation status is the late age to maturity for loggerhead sea turtles. Data from tag returns, strandings, and nesting surveys suggest estimated ages of maturity ranging from 20-38 years (NMFS SEFSC 2001). Given the late age to maturity, there is a greater risk that the factors affecting the survival of the loggerhead age classes have changed over the last couple of decades and the number of nesting females today is not a reflection of the number of juvenile females that are likely to reach maturity and nest in the future.

Nesting survey data is important, however, in that it provides information on the relative abundance of nesting, the estimated number of reproductively mature females in each subpopulation, and the contribution of each subpopulation to loggerhead nesting in the western Atlantic, overall. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from

53,014 to 92,182, annually with a mean of 73,751 (TEWG 2000). Nests for the south Florida subpopulation make up the majority of all loggerhead nests counted along the U.S. Atlantic and Gulf coasts. Annual total nests for the south Florida nesting group have ranged from 48,531 - 83,442 over the past decade (USFWS and NMFS 2003). The northern subpopulation is the second largest loggerhead nesting assemblage within the United States but much smaller than the south Florida nesting group (USWFS and NMFS 2003). The total nests for this subpopulation have ranged from 4,370 - 7,887, annually, for the period 1989-1998 (USWFS and NMFS 2003). The remaining three subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations. Annual total nests for the Florida Panhandle subpopulation ranged from 113-1,285 nests for the period 1989-2002 (USFWS and NMFS 2003). The Yucatán nesting group was reported to have had 1,052 nests in 1998 (TEWG 2000). Nest counts for the Dry Tortugas subpopulation ranged from 168-270 during the 9-year period from 1995-2003.

As is evident from the information above, the south Florida subpopulation is the largest known loggerhead nesting assemblage in the Atlantic and one of only two loggerhead nesting assemblages worldwide that has greater than 10,000 females nesting per year (USFWS and NMFS 2003; USFWS Fact Sheet). However, in 2006, information was presented at an international sea turtle symposium (Meylan *et al.* 2006) and in a letter to NMFS (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006) that the south Florida loggerhead subpopulation was experiencing a decline in nesting. A trend analysis of the nesting data collected for Florida's INBS program showed a decrease in nesting of 22.3% in the annual nest density of surveyed shoreline over the 17-year period and a 39.5% decline since 1998 (letter to NMFS from the Director, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, October 25, 2006). It is unclear at this time whether the decline in nesting for Florida loggerhead subpopulations reflects a decline in the subpopulation as well.

Unlike nesting beach data, in water studies of sea turtles typically sample both sexes and multiple age classes. As is the case with nesting data, there are caveats for using results from in water studies to assess sea turtles abundance and the trend of turtle populations, overall (Allen 2000). Nevertheless, these can be useful for gaining information on the species away from the nesting beach. As was described in a 1999 report of the IUCN/SSC Marine Turtle Specialist Group, although sea turtles spend at most 1& of their lives in or on nesting beaches, approximately 90% of the literature on sea turtle biology is based on nesting beach studies (Bjorndal 1999). In water studies have been conducted in some areas of the western Atlantic and provide some data by which to assess the relative abundance of loggerhead sea turtles and changes in abundance over time (Maier *et al.* 2004; Morreale *et al.* 2004; Mansfield 2006). Maier *et al.* (2004) used fishery-independent trawl data to establish a regional index of loggerhead abundance for the southeast coast of the United States (Winyah Bay, South Carolina to St. Augustine, FL) during the period 2000 – 2003. A comparison of loggerhead catch data from this study with historical values suggested that in-water populations of loggerhead sea turtles along the southeastern United States appear to be larger, possibly an order of magnitude higher than they were 25 years ago (Maier *et al.* 2004). However, reduced catch rates in the smaller size classes was also noted over the four year time period (Maier *et al.* 2004). In contrast to the Maier *et al.* study, Morreale *et al.* (2004) observed a decline in the incidental catch of loggerhead sea turtles in pound net gear fished around Long Island, NY during the period 2002-2004 in comparison to the period 1987-1992. No changes in size distribution were noted but only two loggerheads were captured from 2002-2004 and these were comparable in size to the larger turtles captured during the 1987-1992 period (Morreale *et al.* 2004). Using aerial surveys, Mansfield (2006) also found a decline in the densities of loggerhead sea turtles in Chesapeake Bay over the period 2001-2004 compared to aerial survey data collected in the 1980's. Significantly fewer turtles ($p<0.05$) were observed in both the spring (May-June) and the summer (July-August) of 2001-2004 compared to aerial surveys in the 1980's (Mansfield 2006). A comparison of median densities from the 1980's to the 2000's suggested that there had been a 63.2% reduction in densities during the spring residency period and a 74.9% reduction in densities during the summer residency period (Mansfield 2006).

NMFS has convened a new loggerhead TEWG to review all available information on Atlantic loggerheads in order to determine what can be said about the status of this species in the Atlantic. A final report from the TEWG is anticipated at the end of 2007.

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. A 5-year status review of loggerhead sea turtles recently completed by NMFS and the USFWS provides a summary of natural as well as anthropogenic threats to loggerhead sea turtles (NMFS and USFWS 2007). Amongst those of natural origin, hurricanes are known to be 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 led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (*e.g.*, raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Sea turtles, including loggerhead sea turtles, are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation; marine pollution; underwater explosions; hopper dredging; offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching, and fishery interactions.

In the pelagic environment loggerheads are exposed to a series of longline fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various fleets in the Mediterranean Sea (Aguilar *et al.* 1995; Bolten *et al.* 1994; Crouse 1999). Globally, the number of loggerhead sea turtles captured in pelagic longline fisheries is significant (Lewison *et al.* 2004). The effects of the U.S. tuna and swordfish longline fisheries on loggerhead sea turtles have been assessed through section 7 consultation on the Highly Migratory Species Fishery Management Plan (HMS FMP). In short, NMFS estimates that 1,905 loggerheads will be captured in the pelagic longline fishery (no more than 339mortalities) for each 3-year period (NMFS 2004).

In the benthic environment in waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries. Perhaps the most well documented U.S. fishery with respect to interactions with sea turtles, including loggerheads, is the U.S. shrimp fishery. Turtle Excluder Devices (TEDs) have proven to be effective at excluding Kemp's ridley sea turtles and some age classes of loggerhead and green sea turtles from shrimp trawls. However, it was apparent that TEDs were not effective at excluding large benthic immature and sexually mature loggerheads (as well as large greens) from shrimp trawls (Epperly and Teas 2002). Therefore, on February 21, 2003, NMFS issued a final rule that required increasing the size of TED escape openings to allow larger loggerheads (and green sea turtles) to escape from shrimp trawl gear. As a result of the new rules, annual loggerhead mortality from capture in shrimp trawls is expected to decline from an estimated 62,294 to 3,947 turtles assuming that all TEDs are installed properly and that compliance will be 100% (Epperly *et al.* 2002).

Power plants can also pose a danger of injury and mortality for benthic loggerheads. In Florida, thousands of sea turtles have been entrained in the St. Lucie Nuclear Power Plant's intake canal over the past couple of decades (Bresette *et al.* 2003). From May 1976 - November 2001, 7,795 sea turtles were captured in the intake canal (Bresette *et al.* 2003). Approximately 57% of these were loggerheads (Bresette *et al.* 2003). Procedures are in place to capture the entrained turtles and release them. This has helped to keep mortality below 1% since 1990 (Bresette *et al.* 2003). The Oyster Creek Nuclear Generating Station in New Jersey is also known to capture sea turtles although the numbers are far less than those observed at St. Lucie, FL. As is the case at St. Lucie, procedures are in place for checking for the presence of sea turtles and rescuing sea turtles that are found within the intake canals. Based on past levels of impingement, the distribution of the species, and the operation of the facility, NMFS anticipates that no more than two loggerheads will be taken each year as a result of the operation of the Oyster Creek Nuclear Generating Station (NMFS 2005).

Summary of Status for Loggerhead Sea Turtles

In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland), New Caledonia, New Zealand, Indonesia, and Papua New Guinea. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin have declined dramatically over the past 10 to 20 years by the combined effects of human activities (impacts to the nesting beaches, fisheries bycatch and directed take) (NMFS and USFWS 2007).

Loggerhead sea turtles also occur in the Indian Ocean and Mediterranean Sea. Nesting beaches in the southwestern Indian Ocean at Tongaland, South Africa have been protected for decades and sea turtle nesting shows signs of increasing (Baldwin *et al.* 2003). However, other southwestern Indian Ocean beaches are unprotected and both poaching of eggs and adults continues in some areas. The largest nesting aggregation of loggerhead sea turtles in the world occurs in Oman, principally on the island of Masirah. Oman does not have beach protection measures for loggerheads (Baldwin *et al.* 2003). Sea turtles in the area are affected by fishery interactions, development of coastal areas, and egg harvesting. In the eastern Indian Ocean, nesting is known to occur in western Australia. All known nesting sites within the eastern Indian Ocean are found in Western Australia (Dodd 1988). As has been found in other areas, nesting numbers are disproportionate within the area with the majority of nesting occurring at a single location (Baldwin *et al.* 2003).

There are at least five western Atlantic loggerhead subpopulations (NMFS SEFSC 2001; TEWG 2000; Márquez 1990). Cohorts from all of these, are expected to occur within the action area of this consultation (Bass *et al.* 2004). The south Florida nesting group is the largest known loggerhead nesting assemblage in the Atlantic and one of only two loggerhead nesting assemblages worldwide that have greater than 10,000 females nesting per year (USFWS and NMFS 2003; USFWS Fact Sheet). The northern subpopulation is the second largest loggerhead nesting assemblage within the United States. The remaining three subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations with nest counts ranging from roughly 100 - 1,000 nests per year.

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

Based on its 5-year status review of the species, NMFS and the USFWS (2007) determined that loggerhead sea turtles should not be delisted or reclassified. The Recovery Plan for loggerhead sea turtles is currently being revised and, as described above, NMFS has convened a new loggerhead TEWG to review all available information on Atlantic loggerheads in order to determine what can be said about the status of this species in the Atlantic. A final report from the TEWG is anticipated at the end of 2007.

Leatherback sea turtle

Leatherback sea turtles are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic and Pacific Oceans, the Caribbean Sea, and the Gulf of Mexico (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtles species; their large size and tolerance of relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NMFS and USFWS 1995). In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). By 1995, this global population of adult females had declined to 34,500 (Spotila *et al.* 1996). The most recent population size estimate for the North Atlantic alone is a range of 34,000-94,000 adult leatherbacks (TEWG 2007).

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

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest, extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 1,000 nesting females during the 1996 season (Suarez *et al.* 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, however, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (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 (e.g., 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. An analysis of the Costa Rican nesting beaches indicates a decline in the past 15 years of monitoring (1989-2004) with approximately 1,504 females nesting in 1988-89 to an average of 188 females nesting in 2000-2001 and 2003-2004 (NMFS and FWS 2007c). A similar dramatic decline has been seen on nesting beaches in Pacific Mexico, with tens of thousands of nest laid on the beaches in the 1980s and a total of only 120 nests on the four primary index beaches combined in the 2003-2004 season.

Commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries are known to capture, injure or kill leatherback turtles in the eastern Pacific Ocean. Although all causes of the declines in Pacific leatherback turtle colonies have not been documented, the Pacific population has continued to decline leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (*e.g.,* Spotila *et al.* 2000; Spotila *et al.* 1996).

Indian Ocean. Leatherbacks nest in several areas around the Indian Ocean. These sites include Tongaland, South Africa (Pritchard 2002), and the Andaman and Nicobar Islands (Andrews *et al.* 2002). Population trends for the South Africa beaches are difficult to interpret due to fluctuations in nesting (NMFS and FWS 2007c). Intensive survey and tagging work in 2001 provided new information on the level of nesting in the Andaman and Nicobar Islands (Andrews *et al.* 2002). Based on the survey and tagging work, it was estimated that 400-500 female leatherbacks nest annually on Great Nicobar Island alone (Andrews *et al.* 2002). The number of nesting females using the Andaman and Nicobar Islands combined was estimated around 1000 (Andrews and Shanker 2002). Some nesting also occurs along the coast of Sri Lanka although in much smaller numbers than in the past (Pritchard 2002).

Atlantic Ocean. The 2007 TEWG report identified seven leatherback populations or groups of populations in the Atlantic: Florida, North Caribbean, Western Caribbean, Southern Caribbean, West Africa, South Africa, and Brazil. The TEWG reports an increasing or stable trend for all of these populations with the exception of the Western Caribbean and West Africa. Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate and tropical waters (NMFS and USFWS 1992). A 1979 aerial survey of the outer Continental Shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in water depths ranging from 1-4151 m but 84.4% of sightings were in waters less than 180 m (Shoop and Kenney 1992). Leatherbacks were sighted in waters within a sea surface temperature range similar to that observed for loggerheads; from 7-27.2°C (Shoop and Kenney 1992). However, leatherbacks appear to have a greater tolerance for colder waters in comparison to loggerhead sea turtles since more leatherbacks were found at the lower temperatures as compared to loggerheads (Shoop and Kenney 1992). This aerial survey estimated the leatherback population for the northeastern US at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina). However, the estimate was based on turtles visible at the surface and does not include those that were below the surface out of view. Therefore, it likely underestimates the leatherback population for the northeastern US Estimates of leatherback abundance of 1,052 turtles (C.V.= 0.38) and 1,174 turtles (C.V.= 0.52) were obtained from surveys conducted from Virginia to the Gulf of St. Lawrence in 1995 and 1998, respectively (Palka 2000). However, since these estimates were also based on sightings of leatherbacks at the surface, the author considered the estimates to be negatively biased and the true abundance of leatherbacks may be 4.27 times the estimates (Palka 2000). Studies of satellite tagged leatherbacks suggest that they spend a 10% - 41% of their time at the surface, depending on the phase of their migratory cycle (James *et al.* 2005a). The greatest amount of surface time (up to 41%) was recorded when leatherbacks occurred in continental shelf and slope waters north of 38° N (James *et al.* 2005a).

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

Leatherbacks are predominantly a pelagic species and feed on jellyfish (*i.e.*, *Stomolophus, Chryaora*, and *Aurelia* (Rebel 1974)), and tunicates (salps, pyrosomas). Leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. For example, leatherbacks occur annually in Cape Cod Bay and Vineyard and Nantucket Sounds in Massachusetts during the summer and fall months.

The Florida Statewide Nesting Beach Survey program has documented an increase in leatherback nesting numbers from 98 nests in 1988 to between 800 and 900 nests in the early 2000s (NMFS and FWS 2007c). An analyis of Florida's Index Nesting Beach Survey sites from 1989-2006 shows a substantial increase in leatherback nesting in Florida during this time, with an annual growth ofrate of approximately 1.17 (TEWG 2007).

The largest leatherback rookery in the western Atlantic remains along the northern coast of South America in French Guiana and Suriname. More than half the present world leatherback population is estimated to be nesting on the beaches in and close to the Marowijne River Estuary in Suriname and French Guiana (Hilterman and Goverse 2004). Nest numbers in Suriname have shown an increase and the long-term trend for the Suriname and French Guiana nesting group seems to show an increase (Hilterman and Goverse 2004). In 2001, the number of nests for Suriname and French Guiana combined was 60,000, one of the highest numbers observed for this region in 35 years (Hilterman and Goverse 2004). The most recent TEWG report (2007) indicates that using nest numbers from 1967-2005, a positive population growth rate was found over the 39-year period for French Guinea and Suriname, with a 95% probability that the population was growing.

Annual nest numbers have also increased at Northern Caribbean and Brazilian nesting beaches. Long term consistent data is lacking for West African beaches and the large fluctuations in nesting make it difficult to conduct any reliable analysis of trends for this region (NMFS and FWS 2007).

Tag return data emphasize the link between these South American nesters and animals found in US 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). Many other examples also exist. For example, leatherbacks tagged at nesting beaches in Costa Rica have been found in Texas, Florida, South Carolina, Delaware, and New York (STSSN database). Leatherback turtles tagged in Puerto Rico, Trinidad, and the Virgin Islands have also been subsequently found on US beaches of southern, Mid-Atlantic and northern states (STSSN database).

Threats to Leatherback recovery

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

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. According to observer records, an estimated 6,363 leatherback sea turtles were caught by the US Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NMFS SEFSC 2001). Since the US 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 (NMFS SEFSC 2001).

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

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

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

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

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

Poaching is not known to be a problem for nesting populations in the continental US. However, the NMFS SEFSC (2001) noted that poaching of juveniles and adults was still occurring in the US 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 for eggs.

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

Summary of Status for Leatherback Sea Turtles

The global status and trend of leatherback turtles is difficult to summarize. In the Pacific Ocean, the abundance of leatherback turtles on nesting colonies has declined dramatically over the past 10 to 20 years: nesting colonies throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (for example, egg poaching). The East Pacific and Malyasian leatherback populations are considered to be collapsed (NMFS and FWS 2007c). 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. No reliable long term trend data for the Indian Ocean populations are currently available. While leatherbacks are known to occur in the Mediterranean Sea, nesting in this region is not known to occur (NMFS and FWS 2007c).

As noted above, trends at nesting beaches in other areas of the world appear to be increasing. The most recent population size estimate for the North Atlantic is a range of 34,000 – 94,000 adult leatherbacks, which the TEWG reports indicates a stable population (TEWG 2007). Several ideas have been put forth to explain the disparate population trends seen in the Pacific and Atlantic, including differences in hatching success and less overlap between fishing areas and leatherback habitats in the Atlantic than in the Pacific. Other theories include differences in primary productivity of foraging areas in the Atlantic and Pacific (NMFS and FWS 2007c). The species as a whole continues to face numerous threats at nesting and marine habitats. The long term recovery potential of this species may be further threatened by observed low genetic diversity, even in the largest nesting populations like French Guiana and Suriname (NMFS and FWS 2007c).

Kemp's Ridley Sea Turtle

The Kemp's ridley is one of the least abundant of the world's sea turtle species. In contrast to loggerhead, leatherback and green sea turtles which are found in multiple oceans of the world, Kemp's ridleys typically occur in the Gulf of Mexico and the northern half of the Atlantic Ocean (USFWS and NMFS 1992), with an unknown proportion of the population migrating to US Atlantic coastal waters. Approximately 60% of Kemp's ridley nesting occurs along an approximately 40-km stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (FWS 2006 in NMFS and FWS 2007a). There is a limited amount of scattered nesting to the north and south of the primary nesting beach. Reports from 2006 include several hundred nests laid to the south near Tampico and approximately 100 nests laid in Texas (NMFS and FWS 2007a). Estimates of the adult female nesting population reached a low of 300 in 1985 (TEWG 2000). 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 (TEWG 2000). From 1985 to 1999, the number of nests observed at Rancho Nuevo, and nearby beaches increased at a mean rate of 11.3% (95% C.I. slope = 0.096-0.130) per year (TEWG 2000). An estimated 4,047 females nested in 2006 and an estimated 5,500 females nested in Tamaulipas from May 20-22, 2007 (NMFS and FWS 2007a),

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 NMFS 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).

Foraging areas documented along the Altantic coast include Pamilco Sound (NC), Chesapeake Bay, Long Island Sound, Charleston Harbor (SC) and Delaware Bay. Developmental habitats are defined by several characteristics, including coastal areas sheltered from high winds and waves such as embayments and estuaries, and nearshore temperate waters shallower than 50 meters (NMFS and FWS 2007a). The suitability of these habitats depends on resource availability, with optimal environments providing rich sources of crabs and other invertebrates. A wide variety of substrates have been documented to provide good foraging habitats, including seagrass beds, oyster reefs, sandy and mud bottoms and rock outcroppings (NMFS and FWS 2007a). Adults are primarily found in near-shore waters of 37 meters or less that are rich in crabs and have a sandy or muddy bottom (NMFS and FWS 2007a).

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland state waters, arriving in these areas during May and June (Keinath *et al.* 1987; Musick and Limpus 1997). In the Chesapeake Bay, where the seasonal juvenile population of Kemp's ridley sea turtles is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridleys consume a variety of crab species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds and smaller juveniles from New York and New England to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly *et al.* 1995a; Epperly *et al.* 1995b).

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, as reported in the national STSSN database, 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. Annual cold stun events do not always occur at this magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Although many cold-stun turtles can survive if found early enough, cold-stunning events can represent a significant cause of natural mortality.

Like other turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940s through the early 1960s, nests from Ranch Nuevo were heavily exploited (USFWS and NMFS 1992), but beach protection in 1966 helped to curtail this activity (USFWS and NMFS 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 NMFS 1992). Subsequently, NMFS has worked with the industry to reduce turtle takes in shrimp trawls and other trawl fisheries, including the development and use of TEDs.

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

Summary of Status for Kemp's ridley Sea Turtles

The number of nesting females in the Kemp's ridley population declined dramatically from the late 1940s through the mid 1980s, with an estimated 40,000 nesting females in a single arribada in 1947 and fewer than 250 nesting females in the entire 1985 nesting season. The majority of Kemp's ridleys nest along a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963; NMFS and FWS 2007a)). 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. Kemp's ridleys mature at an earlier age (7 - 15 years) than other chelonids, thus 'lag effects' as a result of unknown impacts to the non breeding life stages would likely have been seen in the increasing nest trend beginning in 1985 (USFWS and NMFS 1992). Approximately 4,000 females are currently documented nesting annually (NMFS and FWS 2007a). While this is a considerable increase over the number of nesting females in the mid-1980s it is still well below the size of the population only 60 years ago. The most recent review of the Kemp's ridley population (NMFS and FWS 2007a) reports that the size of the population is believed to be increasing and that it is in the early stages of recovery. However, the species continues to face numerous threats and remains well below historic population levels.

Green Sea Turtle

Green turtles are the largest chelonid (hard-shelled) sea turtle, with an average adult carapace of 91 cm SCL and weight of 150 kg. Based on growth rate studies of wild green turtles, greens have been found to grow slowly with an estimated age of sexual maturity ranging from 18 to 40 years (Balazs 1982; Frazer and Ehrhart 1985; B. Schroeder pers. comm.). Green turtles are distributed circumglobally, and can be found in the Pacific and Atlantic Oceans as well as the Mediterranean Sea and the Indian Ocean. In 1978, the Atlantic population of the green sea turtle was listed as threatened under the ESA, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered. As it is difficult to differentiate between breeding populations away from the nesting beaches, all green sea turtles, in water, are considered endangered.

Pacific Ocean. In the Pacific Ocean, green sea turtles can be found along the west coast of the US, the Hawaiian Islands, Oceania, Guam, the Northern Mariana Islands, and American Samoa. Along the Pacific coast, green turtles have been reported as far north as British Columbia, but a large number of the Pacific coast sightings occur in northern Baja California and southern California (NMFS and USFWS 1996). The main nesting sites for the East Pacific green turtle are located in Michoacan, Mexico, and in the Galapagos Islands, Ecuador, with no known nesting of East Pacific green turtles occurring in the US. Between 1982 and 1989, the estimated nesting population in Michoacan ranged from a high of 5,585 females in 1982 to a low of 940 in 1984 (NMFS and USFWS 1996). From 2002-2006, an average of 400 nesting females were documented annually in the French Frigate Shoals in the Northwestern Hawaiian Islands (NMFS and FWS 2007b). Current population estimates are unavailable.

Atlantic Ocean. In the western Atlantic, green sea turtles range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz 1999). Green turtle occurrences are infrequent north of Cape Hatteras, but they do occur in mid-Atlantic and northeast waters (e.g., documented in Long Island Sound (Morreale 2003) and cold stunned in Cape Cod Bay, Massachusetts (NMFS unpub. data)). For example, in the winters of 2004/2005 and 2005/2006, a total of three green sea turtles were found coldstunned on Cape Cod beaches.

In the continental US, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). An average of 5,039 nests have been laid annually in Florida between 2001 and 2006 with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and FWS 2007b). 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 important in determining population distributions, the remaining portion of the green turtles life is spent on the foraging and breeding grounds. Green turtles spend the majority of their lives in coastal foraging grounds, including open coastline and protected bays and lagoons. 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 turtle's body. Juveniles are most commonly affected. The occurrence of fibropapilloma tumors may result in impaired foraging, breathing, or swimming ability, leading potentially to death.

Threats to green sea turtle recovery
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).

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. Stranding reports indicate that between 200-400 green turtles strand annually along the Eastern US coast from a variety of causes most of which are unknown (STSSN database). Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles.

Summary of Status of Green Sea Turtles
The global status and trend of green sea turtles is difficult to summarize. In the Pacific Ocean, green turtles are frequent along a north-south band from 15°N to 5°S along 90°W, and between the Galapagos Islands and Central American coast (NMFS and USFWS 1996), but current population estimates are unavailable. Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean. 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 US, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979).

The most recent review of the Green sea turtle species (NMFS and FWS 2007b) includes information on population trends for 46 green turtle nesting rookeries located in 11 major oceanic areas. Of the 46 rookeries, 12 have an increasing population, 4 have a decreasing population (all in the Indian Ocean or Southeast Asia), 10 are stable, and the remainder have an unknown trend. This information includes 6 rookeries in the western Atlantic, with 4 of these rookeries showing a positive trend (including Florida) and 2 showing a stable population. Long term continuous data sets (with at least 20 years of data) are available for 9 sites, all of which are either increasing or stable. The report also estimates that 108,761 to 150,521 females nest each year among the 46 sites. 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 in the Atlantic. The 2007 report indicates that nesting populations are doing relatively well in the Pacific, Western Atlantic and Central Atlantic Ocean and relatively poorly in Southeast Asia, Eastern Indian Ocean and perhaps the Mediterranean. Based on long term nesting data, the Florida and Mexico nesting populations appears to be increasing; however, these populations are thought to still be well below historic levels and continue to face numerous threats.

ENVIRONMENTAL BASELINE

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

Federal Actions that have Undergone Formal or Early Section 7 Consultation

NMFS has undertaken several ESA section 7 consultations to address the effects of vessel operations and gear associated with federally-permitted fisheries on threatened and endangered species in the action area. Each of those consultations sought to develop ways of reducing the probability of adverse impacts of the action on listed species. Similarly, recovery actions NMFS has undertaken under both the Marine Mammal Protection Act (MMPA) and the ESA are addressing the problem of take of whales in the fishing and shipping industries.

Vessel Operations

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the US Navy (USN) and the US Coast Guard (USCG), which maintain the largest federal vessel fleets, the EPA, the National Oceanic and Atmospheric Administration (NOAA), and the ACOE. NMFS has conducted formal consultations with the USCG, the USN, and is currently in early phases of consultation with the other federal agencies on their vessel operations (e.g., NOAA research vessels). In addition to operation of ACOE vessels, NMFS has consulted with the ACOE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. At the present time, the level of impact of vessel operations on listed species is unknown, however, as stranded sea turtles and whales often demonstrate evidence of being involved in vessel collisions, vessel activities are definitely impacting these species. Refer to the biological opinions for the USCG (September 15, 1995; July 22, 1996; and June 8, 1998) and the USN (May 15, 1997) for detail on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

Federal Fishery Operations
Several commercial fisheries operating in the action area use gear which is known to interact with listed species. Efforts to reduce the adverse effects of commercial fisheries are addressed through both the MMPA take reduction planning process and the ESA section 7 process. Federally regulated gillnet, longline, trawl, seine, dredge, and pot fisheries have all been documented as interacting with either whales or sea turtles or both. Other gear types may impact whales and sea turtles as well. For all fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated through the section 7 process.

Formal ESA section 7 consultation has been conducted on the following fisheries which occur in the action area: Multispecies, Monkfish, Summer Flounder/Scup/Black Sea Bass, Mackerel/Squid/Butterfish, Atlantic Bluefish, Atlantic herring, Skate, Lobster and Spiny Dogfish fisheries. These consultations are summarized below. These fisheries overlap with the action area to varying degrees.

The *Northeast Multispecies fishery* operates throughout the year with peaks in spring, and from October through February. Multiple gear types are used in the 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 most recent reinitiation of the Northeast Multispecies consultation was completed on June 14, 2001, and concluded that continued implementation of the Multispecies FMP may adversely affect loggerhead, Kemp's ridley and green sea turtles and is not likely to jeopardize the continued existence of the northern right whale. A new RPA was issued to avoid the likelihood that the operation of the gillnet sector of the multispecies fishery would result in jeopardy to right whales. The ITS exempted the lethal or non-lethal take of one loggerhead sea turtle, and one green, leatherback, or Kemp's ridley turtle annually. 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. However, participation in this fishery has declined since extensive groundfish conservation measures have been implemented, particularly since implementation of Amendment 13 to the Multispecies FMP in April 2004. Additional management measures (*i.e.* Framework Adjustment 42) are expected to further reduce and control effort in the multispecies fishery.

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, observers documented that turtles were taken in excess of the ITS as a result of entanglements in monkfish gillnet gear. NMFS reinitiated consultation on the Monkfish FMP on May 4, 2000, in part, 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 Atlantic Large Whale Take Reduction Plan (ALWTRP) measures, and the ability of the RPA to avoid the likelihood of jeopardy to right whales. The Opinion concluded that continued implementation of the Monkfish FMP was likely to jeopardize the existence of the northern right whale. A new RPA was provided that was expected to remove the threat of jeopardy to northern right whales. In addition, a new ITS was provided for the take of sea turtles in the fishery. However, consultation was once again reinitiated on the Monkfish FMP as of February 12, 2003, to consider the effects of Framework Adjustment 2 measures on ESA-listed species. This consultation was completed on April 14, 2003, and concluded that the proposed action is not likely to result in jeopardy to any ESA-listed species under NMFS jurisdiction. However, takes of sea turtles are still expected to occur, which was reflected in the ITS. The ITS anticipated the take of 3 loggerheads and 1 non-loggerhead species (green, leatherback, or Kemp's ridley) in monkfish gillnet gear, and 1 sea turtle (loggerhead, green, leatherback, or Kemp's ridley) in monkfish trawl gear.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl by requiring the use of TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, NC, and seasonally (March 16-January 14) for trawl vessels fishing between Oregon Inlet, NC and Cape Charles, VA. Takes may still occur with this gear type in other areas however. Based on the occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales. The pot gear and staked trap sectors could also entangle whales and sea turtles. The most recent (December 16, 2001) formal consultation on this fishery concluded that the operation of the fishery may adversely affect but is not likely to jeopardize the continued existence of listed species. The ITS anticipated that 19 loggerhead or Kemp's ridley takes (up to 5 lethal) and 2 green turtle takes (lethal or non-lethal) may occur annually. However, as a result of new information not considered in previous consultations, NMFS has reinitiated section 7 consultation on this FMP to consider the effects of the fisheries on ESA-listed whales and sea turtles. Consultation is currently ongoing and to date, a revised Opinion has not yet been issued.

The *Atlantic Bluefish fishery* may pose a risk to protected marine mammals, but is most likely to interact with sea turtles (primarily Kemp's ridleys and loggerheads) given the time and locations where the fishery occurs. Gillnets are the primary gear used to commercially land bluefish. Whales and turtles can become entangled in the buoy lines of the gillnets or in the net panels. Formal consultation this fishery was completed on July 2, 1999, and NMFS concluded that operation of the fishery under the FMP, as amended, is not likely to jeopardize the continued existence of listed species. The ITS exempted the annual take 6 loggerheads (no more than 3 lethal), 6 Kemp's ridleys (lethal or non-lethal) and 1 shortnose sturgeon (lethal or non-lethal).

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. Sea turtles can be incidentally captured in all gear sectors of this fishery. Turtle takes in 2000 included one dead and one live Kemp's ridley. Since the ITS issued with the August

13, 1999, Opinion anticipated the take of only one Kemp's ridley (lethally or non-lethally), the incidental take level for the dogfish FMP was exceeded. In addition, a right whale mortality occurred in 1999 as a result of entanglement in gillnet gear that may (but was not determined to be) have originated from the spiny dogfish fishery. NMFS, therefore, reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardy to right whales, and the effect 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, signed on June 14, 2001, concluded that continued implementation of the Spiny Dogfish FMP is likely to jeopardize the existence of the northern right whale. A new RPA was provided that was expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the spiny dogfish fishery. In addition, the ITS anticipated the annual take of 3 loggerheads (no more than 2 lethal), 1 green (lethal or non-lethal), 1 leatherback (lethal or non-lethal), and 1 Kemp's ridley (lethal or non-lethal).

The *American lobster trap fishery* has been identified as a source of gear causing serious injuries and mortality of endangered whales and leatherback sea turtles. Previous BOs for this fishery have concluded that operation of the lobster trap fishery is likely to jeopardize the continued existence of right whales and may adversely affect leatherback sea turtles. A Reasonable and Prudent Alternative (RPA) to avoid the likelihood that the lobster fishery would jeopardize the continued existence of right whales was implemented. However, these measures were not expected to reduce the number or severity of leatherback sea turtle interactions with the fishery. Subsequently, the death of a right whale was determined to be entanglement related and NMFS concluded that the death provided evidence that the RPA was not effective at removing the likelihood of jeopardy for right whales from the lobster trap fishery. Consultation was reinitiated and is in progress.

American lobster occur within U.S. waters from Maine to Virginia. They are most abundant from Maine to New Jersey with abundance declining from north to south (ASMFC 1997).
An Interstate Fishery Management Plan (ISFMP) developed through the ASMFC provides management measures for the fishery that are implemented by the states. NMFS has issued regulations for the Federal waters portion of the fishery based on recommendations from the ASMFC. Of the seven lobster management areas (LMAs), only LMA 3 occurs entirely within Federal waters. LMAs 1, 2, 4, 5, and the Outer Cape include both state and Federal waters (NMFS 1999; 2002b). Therefore, management of the Federal waters portion of LMAs 1, 2, 4, 5, and the Outer Cape must be consistent with management in the state waters portion of those areas to meet the objectives of the Lobster ISFMP. Management measures include a limited access permit system, gear restrictions, and other prohibitions on possession (*e.g.*, of berried or scrubbed lobsters), landing limits for lobsters caught by non-trap gear, a trap tag requirement, and trap limits. These measures include reduction of effort and capping of effort. The commercial lobster fishery is frequently described as an inshore fishery (typically defined as within state waters; 0-3 nautical miles from shore) and an offshore fishery (typically defined as nearshore Federal waters and the deepwater offshore fishery) (NMFS 1999).

Most lobster trap effort occurs in the Gulf of Maine. Maine and Massachusetts produced 93% of the 2004 total U.S. landings of American lobster, with Maine accounting for 78% of these landings

(NMFS 2002b). Lobster landings in the other New England states as well as New York and New Jersey account for most of the remainder of U.S. American lobster landings. However, declines in lobster abundance and landings have occurred from Rhode Island through New Jersey in recent years. The Mid-Atlantic states from Delaware through North Carolina have been granted *de minimus* status under the Lobster ISFMP. Low landings of lobster in these *de minimus* states suggest that there is not a directed fishery for lobster in these territorial waters.

The *Squid/Mackerel/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 this 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. An Opinion issued on April 28, 1999 anticipates the take of 6 loggerheads (up to 3 lethal), 2 Kemp's ridleys (lethal or non-lethal), 2 green (lethal or non-lethal), 1 leatherback (lethal or non-lethal) and 3 shortnose sturgeon (1 lethal).

The FMP for the *Atlantic Herring fishery* was implemented on December 11, 2000. The BO that considered the effects to ESA-listed species from the implementation of the Herring FMP concluded that sea turtle takes in fishing gear used in the herring fishery were reasonably likely to occur even though none had been observed. An ITS was provided based on the observed capture of sea turtles in other fisheries using comparable gear.

Three management areas, which may have different management measures, were established under the Herring FMP. Management Area 1 includes Gulf of Maine waters and is subdivided into inshore and offshore sub-areas. Management Area 2 is referred to as the South Coastal Area and includes state and Federal waters adjacent to the States of Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. Management Area 3 includes waters over Georges Bank (NEFMC 1999). The ASMFC's Atlantic Herring ISFMP provides measures for the management of the herring fishery in state waters that are complementary to the Federal FMP.

Operation of the herring fishery was reviewed in a report by the NEFMC Herring Plan Development Team (PDT) and Technical Committee (NEFMC 2004b). The primary gear types used in the fishery are midwater pair trawl, single vessel midwater trawl, purse seine, bottom trawl, and weirs (fixed gear). Of these, midwater pair trawl contributed 65% of the landings for 2003 (NEFMC 2004b). Most of the herring sold in 2003 was from Area 1A (59%) (NEFMC 2004b). Landings from Areas 1B, 2, and 3 contributed 4.9%, 16%, and 20% of the 2003 herring landings, respectively (NEFMC 2004b). Thirty-four vessels landed nearly all of the 2003 landings for herring (NEFMC 2004b). At present, the herring fishery is not a limited access fishery. However, limiting access to the fishery is one of the measures under consideration for Amendment 1 to the Atlantic Herring FMP that is currently being developed. Formal section 7 consultation has been reinitiated on the herring fishery to consider the effect of the fishery on the Gulf of Maine Distinct Population Segment of Atlantic salmon.

The *Skate fishery* is primarily a bottom trawl fishery with 94.5% of skate landings attributed to this gear type. Gillnet gear is the next most common gear type, accounting for 3.5% of skate landings. The Northeast skate complex is comprised of seven skate species. The seven species of skate are distributed along the coast of the northeast US from the tide line to depths exceeding 700m (383 fathoms). There have been no recorded takes of ESA-listed species in the skate fishery. However, given that sea turtle interactions with trawl and gillnet gear have been observed in other fisheries, sea turtle takes in gear used in the skate fishery may be possible where the gear and sea turtle distribution overlap. Section 7 consultation on the new Skate FMP was completed July 24, 2003, and concluded that implementation of the Skate FMP may adversely affect ESA-listed sea turtles as a result of interactions with (capture in) gillnet and trawl gear. The ITS anticipated the take of one sea turtle annually of any species.

Other than entanglement in fishing gear, effects of *fishing vessels* on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Listed species or critical habitat may also be affected by fuel oil spills resulting from fishing vessel accidents. No collisions between commercial fishing vessels and listed species or adverse effects resulting from disturbance have been documented. However, the commercial fishing fleet represents a significant portion of marine vessel activity. In addition, commercial fishing vessels may be the only vessels active in some areas, particularly in cooler seasons. Therefore, the potential for collisions exists. Due to differences in vessel speed, collisions during fishing activities are less likely than collisions during transit to and from fishing grounds. Because most fishing vessels are smaller than large commercial tankers and container ships, collisions are less likely to result in mortality. Although entanglement in fishing vessel anchor lines has been documented historically, no information is available on the prevalence of such events. Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species. Larger 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. Given the current lack of information on prevalence or impacts of interactions, there is no basis to conclude that the level of interaction represented by any of the various fishing vessel activities discussed in this section would be detrimental to the recovery of listed species.

Non-Federally Regulated Actions

Private and Commercial Vessel Operations

Private and commercial vessels operate in the action area of this consultation and also have the potential to interact with whales and sea turtles. Ship strikes have been identified as a significant source of mortality to the northern right whale population (Kraus 1990) and are also known to impact all other endangered whales. An unknown number of private recreational boaters frequent coastal waters; some of these are engaged in whale watching or sportfishing activities. These activities have the potential to result in lethal (through entanglement or boat strike) or non-lethal (through harassment) takes of listed species that could prevent or slow a species' recovery. Effects of harassment or disturbance which may be caused by whale watch operations are currently unknown. Recent federal efforts regarding mitigating impacts of the whale watch and shipping industries on endangered whales are discussed below.

In addition to commercial traffic and recreational pursuits, private vessels participate in high speed marine events concentrated in the southeastern US that are a particular threat to sea turtles. The magnitude of these marine events in the action area is not currently known. The Sea Turtle Stranding and Salvage Network (STSSN) also reports regular incidents of likely vessel interactions (e.g., propeller-type injuries) with sea turtles. Interactions with these types of vessels and sea turtles could occur in the action area, and it is possible that these collisions would result in mortality.

Other than injuries and mortalities resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. Although the difficulty in interpreting animal behavior makes studying the effects of vessel activities problematic, 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.

Non-Federally Regulated Fishery Operations
Very little is known about the level of interactions with listed species in fisheries that operate strictly in state waters. However, depending on the fishery in question, many state permit holders also hold federal licenses; therefore, section 7 consultations on federal actions in those fisheries address some state-water activity. Impacts on sea turtles from state fisheries may be greater than those from federal activities in certain areas due to the distribution of these species. Nearshore entanglements of turtles have been documented; however, information is not currently available on whether the vessels involved were permitted by the state or by NMFS. Impacts of state fisheries on endangered whales are addressed as appropriate through the MMPA take reduction planning process. NMFS is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters.

With regard to whale entanglements, vessel identification is occasionally recovered from gear removed from entangled animals. With this information, it is possible to determine whether the gear was deployed by a federal or state permit holder and whether the vessel was fishing in federal or state waters. In 1998, 3 entanglements of humpback whales in state-water fisheries were documented. Nearshore entanglements of turtles have been documented; however, information is not available on whether the vessels involved were permitted by the state or by NMFS.

Other Potential Sources of Impacts in the Action Area
A number of anthropogenic activities have likely directly or indirectly affect listed species in the action area of this consultation. These sources of potential impacts include previous dredging projects, pollution, water quality, and sonic activities. However, the impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these elusive sources.

Within the action area, sea turtles and optimal sea turtle habitat most likely have been impacted by pollution. Marine debris (e.g., discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990).

Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Chemical contaminants may also have an effect on sea turtle reproduction and survival. While the effects of contaminants on turtles is relatively unclear, pollution may be linked to the fibropapilloma virus that kills many turtles each year (NMFS 1997). If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems.

NMFS and the US Navy have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns. It is expected that the policy on managing anthropogenic sound in the oceans will provide guidance for programs such as the use of acoustic deterrent devices in reducing marine mammal-fishery interactions and review of federal activities and permits for research involving acoustic activities.

Conservation and Recovery Actions Reducing Threats to Listed Species

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

Reducing threats of vessel collision on listed whales

In addition to the ESA measures for federal activities mentioned in the previous section, numerous recovery activities are being implemented to decrease the adverse effects of private and commercial vessel operations on the species in the action area and during the time period of this consultation. These include implementation of NOAA's Right Whale Ship Strike Reduction Strategy, extensive education and outreach activities, the Sighting Advisory System (SAS), other activities recommended by the Northeast Implementation Team for the recovery of the North Atlantic right whale (NEIT) and Southeast Implementation Team for the Right Whale Recovery Plan (SEIT), and NMFS regulations.

Northeast Implementation Team (NEIT)

The Northeast Large Whale Recovery Plan Implementation Team (NEIT) was founded in 1994 to help implement the right and humpback whale recovery plans developed under the ESA. The NEIT provided advice and expertise on the issues affecting right and humpback whale recovery, and was comprised of representatives from federal and state regulatory agencies and private organizations, and was advised by a panel of scientists with expertise in right and humpback whale biology. The Ship Strike Committee (SSC) was one of the most active committees of the NEIT, and NMFS came to recognize that vessel collisions with right whales was the recovery issue needing the most attention. As such, the NEIT was restructured in May 2004 to focus exclusively on right whale ship strike reduction research and issues and providing support to the NMFS Right Whale Ship Strike Working Group.

The Ship Strike Committee (SSC) of the former NEIT undertook multiple projects to reduce ship collisions with North Atlantic right whales. These included production of a video entitled: *Right Whales and the Prudent Mariner*, which 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. NMFS and the NEIT also funded a project to develop recommended measures to reduce right whale ship strikes. The recommended measures project included looking at all possible options such as routing, seasonal and dynamic management areas, and vessel speed. It became evident in the process of meeting with the industry that a comprehensive strategy would have to be developed for the entire East coast. Development of NOAA's Ship Strike Reduction Strategy has been ongoing over the last number of years. The strategy is currently focused on protecting the North Atlantic right whale, but the operational measures are expected to reduce the incidence of ship strike on other large whales to some degree. The strategy consists of five basic elements and includes both regulatory and non-regulatory components: 1) operational measures for the shipping industry, including speed restrictions and routing measures, 2) section 7 consultations with Federal agencies that maintain vessel fleets, 3) education and outreach programs, 4) a bilateral conservation agreement with Canada, and 5) continuation of ongoing measures to reduce ship strikes of right whales (e.g., SAS, MSR, ongoing research into the factors that contribute to ship strikes, and research to identify new technologies that can help mariners and whales avoid each other). Progress made under these elements will be discussed further below.

Regulatory Actions to Reduce Vessel Strikes

In one recovery action aimed at reducing vessel-related impacts, including disturbance, NMFS published a proposed rule in August 1996 restricting vessel approach to right whales (61 FR 41116) to a distance of 500 yards. The Recovery Plan for the Northern Right Whale identified anthropogenic disturbance as one of many factors which had some potential to impede right whale recovery (NMFS 1991b). Following public comment, NMFS published an interim final rule in February 1997 codifying the regulations. With certain exceptions, the rule prohibits both boats and aircraft from approaching any right whale closer than 500 yds. Exceptions for closer approach are provided for the following situations, when: (a) compliance would create an imminent and serious threat to a person, vessel, or aircraft; (b) a vessel is restricted in its ability to maneuver around the 500-yard perimeter of a whale; (c) a vessel is investigating or involved in the rescue of an entangled or injured right whale; or (d) the vessel is participating in a permitted activity, such as a research project. If a vessel operator finds that he or she has unknowingly approached closer than 500 yds, the rule requires that a course be steered away from the whale at slow, safe speed. In addition, all aircraft, except those involved in whale watching activities, are excepted from these approach regulations. This rule is expected to reduce the potential for vessel collisions and other adverse vessel-related effects in the environmental baseline.

In April 1998, the USCG submitted, on behalf of the US, a proposal to the International Maritime Organization (IMO) requesting approval of a mandatory ship reporting system (MSR) in two areas off the east coast of the US, one which includes the right whale feeding grounds in the northeast, and one which includes the right whale calving grounds in the southeast. The USCG worked closely with NMFS and other agencies on technical aspects of the proposal. The package was submitted to the IMO's Subcommittee on Safety and Navigation for consideration and submission to the Marine Safety Committee at IMO and approved in December 1998. The USCG and NOAA play important roles in helping to operate the MSR system, which was implemented on July 1, 1999. Ships entering the northeast and southeast MSR boundaries are required to report the vessel identity, date, time, course, speed, destination, and other relevant information. In return, the vessel receives an automated reply with the most recent right whale sightings in the area and information on precautionary measures to take while in the vicinity of right whales.

A key component of NOAA's right whale ship strike reduction strategy is the proposed implementation of speed restrictions for vessels transiting the US Atlantic in areas and seasons where right whales predictably occur in high concentrations. The NEIT-funded "Recommended Measures to Reduce Ship Strikes of North Atlantic Right Whales" found that seasonal speed and routing measures could be an effective means of reducing the risk of ship strike along the US east coast. Based on these recommendations, NMFS published an Advance Notice of Proposed Rulemaking (ANPR) in June 2004 (69 FR 30857), and subsequently published a proposed rule on June 26, 2006 (71 FR 36299). The rulemaking process is ongoing, but NMFS intends to publish final regulations in the near future.

Vessel Routing Measures to Reduce the Co-occurrence of Ships and Whales
Another critical, non-regulatory component of NOAA's right whale ship strike reduction strategy involves the development and implementation of routing measures that reduce the co-occurrence of vessels and right whales, thus reducing the risk of vessel collisions. Recommended routes were developed for the Cape Cod Bay and Southeast critical habitat areas by overlaying right whale sightings data on existing vessel tracks, and plotting alternative routes where vessels could expect to encounter fewer right whales. Full implementation of these routes was completed at the end of November 2006. The routes are now charted on all NOAA electronic and printed charts, published in US Coast Pilots, and mariners have been notified through USCG Notices to Mariners.

Through a joint effort between NOAA and the USCG, the US also submitted a proposal to the IMO to shift the northern leg of the existing Boston Traffic Separation Scheme (TSS) 12 degrees to the north. Overlaying sightings of right whales and all baleen whales on the existing TSS revealed that the existing TSS directly overlaps with areas of high whale densities, while an area slightly to the north showed a considerable decrease in sightings. Separate analyses by the SBNMS and the NEFSC both indicated that the proposed TSS would overlap with 58% fewer right whale sightings and 81% fewer sightings of all large whales, thus considerably reducing the risk of collisions between ships and whales. The proposal was submitted to the IMO in April 2006, and was adopted by the Maritime Safety Committee in December 2006. The change was implemented domestically by the US Coast Guard on July 1, 2007.

Right Whale Sighting Advisory System

The right whale Sighting Advisory System (SAS) was initiated in early 1997 as a partnership among several federal and state agencies and other organizations to conduct aerial and ship board surveys to locate right whales and to alert mariners to right whale sighting locations in a near real time manner. The SAS surveys and opportunistic sightings reports document the presence of right whales and are provided to mariners via fax, email, NAVTEX, Broadcast Notice to Mariners, NOAA Weather Radio, several web sites, and the Traffic Controllers at the Cape Cod Canal. Fishermen and other vessel operators can obtain SAS sighting reports, and make necessary adjustments in operations to decrease the potential for interactions with right whales. The SAS has also served as the only form of active entanglement monitoring in the Cape Cod Bay and Great South Channel critical habitats. 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 USCG has also played a vital role in this effort, providing air and sea support as well as a commitment of resources to NMFS operations. The Commonwealth of Massachusetts has been a key collaborator to the SAS effort and has continued the partnership. Other sources of opportunistic right whale sightings include whale watch vessels, commercial and recreational mariners, fishermen, the U.S. Navy, NMFS research vessels, and NEFSC cetacean abundance aerial survey data.

Education and Outreach Activities

NMFS, primarily through the NEIT and SEIT, is engaged in a number of education and outreach activities aimed specifically at increasing mariner awareness of the threat of ship strike to right whales. The NEIT and SEIT have developed a comprehensive matrix of mariner education and outreach tasks ranked by priority for all segments of the maritime industry, including both commercial and recreational vessels, and are in the process of implementing high priority tasks as funding allows. In anticipation of the 2006/2007 calving season, the SEIT is nearing completion of two new outreach tools—a multimedia CD to educate commercial mariners about right whale ship strike issues, and a public service announcement (PSA) targeted towards private recreational vessel operators to be distributed to media outlets in the southeast.

NMFS also distributes informational packets on right whale ship strike avoidance to vessels entering ports in the northeast. The informational packets contain various outreach materials developed by NMFS, including the video "Right Whales and the Prudent Mariner," a placard on the MSR system, extracts from the US Coast Pilots about whale avoidance measures and seasonal right whale distribution, and a placard on applicable right whale protective regulations and recommended vessel operating measures.

NMFS has also worked with the International Fund for Animal Welfare (IFAW) to develop educational placards for recreational vessels. These placards provide vessel operators with information on right whale identification, behavior, and distribution, as well as information about the threat of ship strike and ways to avoid collisions with whales.

The NEIT has contracted the development of a comprehensive merchant mariner education module for use and distribution to maritime academies along the east coast. The purpose of this program is to inform both new captains and those being re-certified about right whales and operational guidelines for minimizing the risk of collision. Development of the module is now complete and is in the process of being distributed and implemented in various maritime academies.

Miscellaneous Activities
Through deliberations of the NEIT and its Ship Strike Committee, NMFS and the National Ocean Service (NOS) recently revised the whale watch guidelines for the Northeast, including the Studds-Stellwagen Bank National Marine Sanctuary (SBNMS). The whale watch guidelines provide operating measures to reduce repeated harassment of whales from close approaches of whale watch vessels. These measures include vessel speed guidelines at specific approach distances, and are therefore expected to reduce the risk of ship strike as well as harassment.

NMFS has established memoranda of agreements (MOA) with several Federal agencies, including the USCG, the Navy, and the ACOE, to provide funding and support for NOAA's aerial surveys conducted for the SAS and the Early Warning System in the southeast. Through these MOAs, the USCG also broadcasts right whale sighting information over USCG outlets such as Notices to Mariners, NAVTEX, and the MSR system, provides enforcement support for regulations that protect right whales, and assists NMFS with distribution of outreach materials aimed at commercial mariners.

In addition, NMFS continues to research technological solutions that have the potential to minimize the threat of vessel collisions with right whales, including technologies that improve our ability to detect the presence and location of right whales and transmit that information to mariners on a real-time basis.

Although many of the above-mentioned activities are focused specifically on right whales, other cetaceans and some sea turtles will likely benefit from the measures as well.

Reducing the Threat of Entanglement on Whales
Several efforts are ongoing to reduce the risk and impact of entanglement on listed whales, including both regulatory and non-regulatory measures. Most of these activities are captured under the Atlantic Large Whale Take Reduction Plan (ALWTRP). The ALWTRP is a multi-faceted plan that includes both regulatory and non-regulatory actions. Regulatory actions are directed at reducing serious entanglement injuries and mortality of right, humpback and fin whales from fixed gear fisheries (*i.e.*, trap and gillnet fisheries). The measures identified in the ALWTRP will also benefit minke whales (a non ESA-listed species). The non-regulatory component of the ALWTRP is composed of four principal parts: (1) gear research and development, (2) disentanglement, (3) the Sighting Advisory System (SAS), and (4) education/outreach. These components will be discussed in more detail below.

Regulatory Measures to Reduce the Threat of Entanglement on Whales
The regulatory component of the ALWTRP includes a combination of broad fishing gear modifications and time-area restrictions supplemented by progressive gear research to reduce the chance that entanglements will occur, or that whales will be seriously injured or die as a result of an entanglement. The long-term goal, established by the 1994 Amendments to the MMPA, was to reduce entanglement related serious injuries and mortality of right, humpback and fin whales to insignificant levels approaching zero within five years of its implementation. The ALWTRP is a "work-in-progress", and revisions are made to the regulations as new information and technology becomes available. Because gear entanglements of right, humpback and fin 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, scientists and conservation organizations.

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.

Gear Modification and Research
Gear research and development is a critical component of the ALWTRP, with the aim of finding new ways of reducing the number and severity of protected species-gear interactions while still allowing for fishing activities. At the outset, the gear research and development program followed 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. Development of gear modifications are ongoing and are primarily used to minimize risk of large whale entanglement. This regulatory development has now moved into the next phase and reducing the profile of groundlines in the water column is the focus and priority, while reducing risk associated with vertical lines is being discussed and assessed and ongoing research is continuing to develop and alleviate future risk. This aspect of the ALWTRP is important, in that it incorporates the knowledge and encourages the participation of industry in the development and testing of modified and experimental gear.

Large Whale Disentanglement Network
In recent years, NMFS has greatly increased funding for the Whale Disentanglement Network, purchasing equipment caches to be located at strategic spots along the Atlantic coastline, supporting training for fishers and biologists, purchasing telemetry equipment, etc. This has resulted in an expanded capacity for disentanglement along the Atlantic seaboard including offshore areas. The

Center for Coastal Studies (CCS), under NMFS authorization, has responded to numerous calls since 1984 to disentangle whales entrapped in gear, and has developed considerable expertise in whale disentanglement. NMFS has supported this effort financially since 1995. Memorandum of Understandings developed with the USCG ensure their participation and assistance in the disentanglement effort. Hundreds of Coast Guard and Marine Patrol workers have received training to assist in disentanglements. As a result of the success of the disentanglement network, NMFS believes that many whales that may otherwise have succumbed to complications from entangling gear have been freed and survived the ordeal. Humpback and right whales are two species that commonly become entangled due to fishing gear. Over the past five years the disentanglement network has been involved in many successes and has assisted many whales shed gear or freed them by disentangling gear from 35 humpback and 11 right whales (CCS web site).

Sighting Advisory System
Although the Sighting Advisory System (SAS) was developed primarily as a method of locating right whales and alerting mariners to right whale sighting locations in a real time manner, the SAS also addresses entanglement threats. Fishermen can obtain SAS sighting reports and make necessary adjustments in operations to decrease the potential for interactions with right whales. The SAS has also served as the only form of active entanglement monitoring in the Cape Cod Bay and Great South Channel critical habitats. Some of these sighting efforts have resulted in successful disentanglement of right whales.

Education and Outreach
Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species from human activities, including fishing activities. Outreach efforts for fishermen under the ALWTRP are fostering a more cooperative relationship between all parties interested in the conservation of threatened and endangered species. NMFS has also been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. NMFS has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NMFS intends to continue these outreach efforts in an attempt to increase the survival of protected species through education on proper release techniques.

Reducing Threats to Listed Sea Turtles

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

Sea Turtle Stranding and Salvage Network (STSSN)

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

Sea Turtle Disentanglement Network
NMFS Northeast Region established the Northeast Atlantic Coast Sea Turtle Disentanglement Network (STDN) in 2002. This program was established in response to the high number of leatherback sea turtles found entangled in pot gear along the U.S. Northeast Atlantic coast. The STDN is considered a component of the larger STSSN program. The NMFS Northeast Regional Office oversees the STDN program. In Massachusetts, NOAA Fisheries has partnered with the Provincetown Center for Coastal Studies (PCCS) for response to entangled sea turtles in MA. Since the programs inception in 2002, MA responders have received over 50 sea turtle entanglement reports, which resulted in over 20 live turtle disentanglements in MA waters.

Sea Turtle Handling and Resuscitation Techniques
NMFS also developed and published as a final rule in the *Federal Register* (66 FR 67495, December 31, 2001) 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 handle and resuscitate (as necessary) sea turtles as prescribed in the final rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear.

Sea Turtle Entanglements and Rehabilitation
A final rule (70 FR 42508) published on July 25, 2005, allows any agent or employee of NMFS, the FWS, the U.S. Coast Guard, or any other Federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife, when acting in the course of his or her official duties, to take endangered sea turtles encountered in the marine environment if such taking is necessary to aid a sick, injured, or entangled endangered sea turtle, or dispose of a dead endangered sea turtle, or salvage a dead endangered sea turtle that may be useful for scientific or educational purposes. NMFS already affords the same protection to sea turtles listed as threatened under the ESA (50 CFR 223.206(b)).

Summary and Synthesis of the Status of the Species and Environmental Baseline
The purpose of the Environmental Baseline is to analyze the status of the species in the action area. Generally speaking, the status of sea turtle and whale species overall is the same as the status of these species in the action area given their migratory nature. Impacts from actions occurring in the Environmental Baseline for the action area have the potential to impact sea turtles and whales. Despite regulations on fisheries actions, improvements in dredge technologies and improvements in

water quality, sea turtles and whales still face numerous threats in this area, primarily from habitat alteration and interactions with fishing gear and dredging operations.

Without more information on the status of these species, including reliable population estimates, it is difficult to speculate about the long term survival and recovery of these species. However, the best available information has led NMFS to make the determinations about species status as stated below.

Summary of status of whale species
Based on recent estimates, NMFS considers the best approximation for the number of *Northern right whales* to be 300 +/- 10%. Losses of adult whales due to ship strikes and entanglements in fishing gear continue to depress the recovery of this species and the right whale population continues to be declining.

The best available population estimate for *humpback whales* in the North Atlantic Ocean is 10,600 animals. Anthropogenic mortality associated with ship strikes and fishing gear entanglements is significant. Modeling using data obtained from photographic mark-recapture studies estimates the growth rate of the Gulf of Maine feeding population at 6.5% (Barlow and Clapham 1997). With respect to the species as a whole, 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.

The minimum population estimate for the western North Atlantic *fin whale* is 2,362 which is believed to be an underestimate. Information on the abundance and population structure of fin whales worldwide is limited. NMFS recognizes three fin whale stocks in the Pacific for the purposes of managing this species under the MMPA. 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. As this species continues to be subject to natural and anthropogenic mortality, this population is assumed to be at best stable and at worst declining.

Summary of status of sea turtle species
As noted in the status of the species section, *loggerhead sea turtles* in the action area are most likely to be from the northern or South Florida nesting subpopulations or the Yucatan subpopulation. The South Florida nesting subpopulation is the largest known loggerhead nesting assemblage in the Atlantic. The northern nesting subpopulation is the second largest loggerhead nesting assemblage in the Atlantic. Nesting data has led the TEWG to conclude that the northern subpopulation is likely declining and at best is stable. While researchers have documented significant increases in loggerhead nesting on seven beaches at Quintana Roo, Mexico, nesting survey effort overall has been inconsistent among the Yucatán nesting beaches and no trend can be determined for this subpopulation given the currently available data. No reliable estimate of the total number of loggerheads in any of the subpopulations or the species as a whole exists.

The most recent population size estimate for the North Atlantic *leatherback* population is a range of

34,000-94,000 adult leatherbacks (TEWG 2007). The most recent TEWG report indicates that this population is stable. However, the population still faces numerous threats leatherbacks continue to be captured and killed in many kinds of fisheries and it is likely that the population is declining and at best is stable. New information also indicates that this species has low levels of genetic diversity which may affect the species potential for long term survival and recovery (NMFS and FWS 2007c)..

The *Kemp's ridley* is the most endangered sea turtle species with 60% of the population nesting at one site. Approximately 4,000 females are currently documented nesting annually (NMFS and FWS 2007a). While this is a considerable increase over the number of nesting females in the mid-1980s it is still well below the size of the population only 60 years ago. The most recent review of the Kemp's ridley population (NMFS and FWS 2007a) reports that the size of the population is believed to be increasing and that it is in the early stages of recovery. However, the species continues to face numerous threats and remains well below historic population levels.

There is cautious optimism that the *green* sea turtle population is increasing in the Atlantic. The most recent report on this population (NMFS and FWS 2007b) indicates that nesting populations are doing relatively well in the Western and Central Atlantic. Based on long term nesting data, the Florida and Mexico nesting populations appears to be increasing; however, these populations are thought to still be well below historic levels and continue to face numerous threats.

EFFECTS OF THE ACTION

This section of an Opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

Sea turtles are likely to occur in the action area from June – November of any year. The areas under consideration in this Opinion are part of the coastal corridor through which sea turtles migrate. In addition, sea turtles are likely to be foraging in this area during the summer months. Sea turtles are likely to be feeding on or near the bottom of the water column during the warmer months, with loggerhead and Kemp's ridley sea turtles being the most common species in these waters. Although not expected to be as numerous as loggerheads and Kemp's ridleys, green sea turtles may also occur in the action area and this species may be impacted by the proposed project. Leatherback sea turtles may also be present in the action area while migrating or foraging, but are more subject to vessel collisions than dredge entrainment due to their size and behavioral characteristics.

The majority of sea turtle observations in Nantucket Shoals have been of leatherback sea turtles, although loggerhead, Kemp's ridley and green sea turtles have also been recorded in the area. The Massachusetts Audubon Society reports that loggerhead sea turtles in Massachusetts waters are subadults ranging in size from 15" to 36" and weighing between 75- 100 pounds. While in Massachusetts waters, loggerhead turtles feed on a variety of foods including hermit and spider crabs, whelks, blue mussels, and moon snails. Kemp's ridleys are found in significant numbers in Cape Cod Bay during the summer months while feeding on mussels and crabs. Kemp's ridleys are less often encountered north of Cape Cod Bay but are known to occur in Nantucket Shoals. The green sea turtle frequents Massachusetts waters with some degree of regularity but is not considered common as there are few records for it north of Cape Cod. The green turtles found in Massachusetts are three- to four -year-old subadults, 24-30 inches long, and weigh about 50lbs. Green turtles are the most herbivorous of all the sea turtles and feed mainly on submerged aquatic vegetation. Leatherback sea turtles are the most common species of sea turtles in Massachusetts waters with frequent sightings in the summer and fall as this species pursues its preferred jellyfish prey.

One of the main factors influencing sea turtle presence in northern waters is seasonal temperature patterns (Ruben and Morreale 1999). Temperature is correlated with the time of year, with the warmer waters in the late spring, summer, and early fall being the most suitable for cold-blooded sea turtles. Sea turtles are most likely to occur in the action area between June and November when water temperatures are above 11°C. As all dredging will be scheduled between April and November, sea turtles are likely to be present in the action area when dredging will occur. Little effort has been expended to document sea turtle use of Nantucket Shoals and the action area has not been systematically surveyed for sea turtles. However, sea turtles have been documented in the action area by the CETAP aerial and boat surveys as well as by surveys conducted by NMFS Northeast Science Center and fisheries observers. Additionally, satellite tracked sea turtles have been documented in the action area (Seaturtle.org tracking database). As sea turtles have been documented in the areas surrounding the action area and there is nothing about the action area that would preclude sea turtles from using the action area, it is reasonable to expect that some number of sea turtles are likely present in the action area between June and November.

To some extent, water depth also dictates the number of sea turtles occurring in a particular area. Waters in and around the borrow areas range from approximately 30 to 60 ft deep. Satellite tracking studies of sea turtles in the Northeast found that foraging turtles mainly occurred in areas where the water depth was between approximately 16 and 49 ft (Ruben and Morreale 1999). This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles (Morreale and Standora 1990). The borrow areas and the depths preferred by sea turtles do overlap and preferred sea turtle forage items occur in the borrow area (NASA 2007), suggesting that loggerheads and Kemp's ridleys may be foraging in the borrow areas. As there are no SAV beds in any of the borrow areas, green sea turtles are less likely to use the borrow areas for foraging. In addition, migrating loggerhead, Kemp's ridley, green or leatherback sea turtles may be found swimming through the borrow areas. Sea turtles may also transit the action area while moving into or out of nearby foraging areas (i.e., Cape Cod Bay or Stellwagen Bank), or may be resting on or near the bottom.

Right, humpback and fin whales have also been documented in the action area (Rutgers University/OBIS database; ACOE 2007). These endangered whales migrate through the action area at various times of the year and migratory movements of these whales species may overlap with times when dredging or transport of dredged materials is occurring in the action area. The waters surrounding the borrow area are feeding grounds and seasonal nursery grounds for many species of whales.

Right whales are likely to be present from December through June, humpbacks from March 15 – November 30 and fin whales from April - October. Similar to sea turtles, no systematic surveys for whales within the action area have occurred. However, some sightings data from opportunistic surveys conducted by the Right Whale Consortium is available. Data reported in the BA indicated that at least 47 right whales have been observed in the waters surrounding the borrow site between 1995 and 2006, with at least 7 individuals actively feeding and 2 with calves. These sightings were recorded between February and October. Other available data demonstrate that right whales are regularly observed in the waters surrounding the borrow area (Rutgers University/OBIS database). Neither of the right whale critical habitat designations in Massachusetts waters coincides with the action area; however, the borrow area is 20 nautical miles west of the Great South Channel critical habitat. Although right whale sightings are concentrated in the critical habitat areas, right whales have been documented using the waters surrounding the borrow site. As such, it is reasonable to assume that at least some number of individual right whales transit the action area each year.

Humpback whales reach their peak abundance in Massachusetts waters in the spring and remain in these waters through October. The applicant reports the sighting of 108 individuals from 1995-2006 within the action area. This included 6 actively feeding individuals and 3 whales with calves. These sightings were recorded in January, April – July and September. Fin whales are also common visitors to Massachusetts waters. While the preferred feeding habitat for this species is over deeper waters of the continental shelf (300 to 600 feet) they are regularly observed in shallower waters. The abundance of fin whales in Massachusetts waters peaks between April and October of each year. The applicant reports the sighting of 25 individuals from 1995-2006 within the action area. This included 1 actively feeding whale. These sightings were recorded between April and June. Both humpback and fin whales are also routinely recorded at Stellwagen Bank and in Cape Cod Bay and are likely to transit the action area while migrating from foraging and other concentration areas.

The ACOE has indicated that approximately 2.6 million cy of material will be removed from the borrow site between April and November in the year in which all project approvals are received. Only one dredge cycle is currently proposed. Project proponents have indicated that dredging in 2008 is likely. The primary concern for loggerhead, Kemp's ridley and green sea turtles is entrainment in the draghead of the hopper dredge, while the main concern for leatherback sea turtles and endangered whales involves the potential for vessel collisions. As noted above, the areas under consideration in this Opinion are part of the coastal corridor through which sea turtles migrate.

Effects of Dredging Operations

NMFS has determined that dredging of the proposed borrow areas (and associated activities) may affect threatened and endangered species in several different ways: (1) the proposed action can alter foraging habitat; (2) dredges can entrain and kill sea turtles; (3) sediment plumes associated with the dredge can disrupt normal behaviors; and (4) the proposed action can increase the number of individuals injured or killed in collisions with vessels by increasing vessel traffic in the action area.

Alteration of foraging habitat
Since dredging involves removing the bottom material down to a specified depth, the benthic environment will be impacted by dredging operations. No sea grass beds occur in the borrow areas, therefore green sea turtles will not use the borrow areas as foraging areas. Thus, NMFS anticipates that the dredging activities are not likely to disrupt normal feeding behaviors for green sea turtles. Surveys conducted at the borrow areas indicate that potential sea turtle forage items are present at the borrow area, including jellyfish, clams, mussels, sea urchins, whelks, horseshoe crabs, blue crabs and rock crabs. The proposed dredging is likely to entrain and kill at least some of these potential forage items.

Of the listed species found in the action area, loggerhead and Kemp's ridley sea turtles are the most likely to utilize these areas for feeding, foraging mainly on benthic species, namely crabs and mollusks (Morreale and Standora 1992, Bjorndal 1997). As noted above, suitable sea turtle foraging items occur at the borrow area. As preferred sea turtle foraging items occur at the borrow areas and depths are suitable for use by sea turtles, some sea turtle foraging likely occurs at these sites.

Dredging can cause indirect effects on sea turtles by reducing prey species through the alteration of the existing biotic assemblages. Some of the prey species targeted by turtles, including horseshoe crabs, are mobile; therefore, some individuals are likely to avoid the dredge. While some offshore areas may be more desirable to certain turtles due to prey availability, there is no information to indicate that the borrow areas proposed for dredging have more abundant turtle prey or better foraging habitat than other surrounding areas. The assumption can be made that sea turtles are not likely to be more attracted to the borrow areas than to other foraging areas and should be able to find sufficient prey in alternate areas. Recolonization by benthic organisms is expected to occur within approximately 12 months, thus the action area will only be available for foraging habitat for a year at a time before dredging occurs again. It also should be noted that only a small percentage of the available sand at each borrow area is proposed to be removed and suitable forage should continue to be available at the borrow area at all times. NMFS anticipates that while the dredging activities may temporarily disrupt normal feeding behaviors for sea turtles by causing them to move to alternate areas, the action is not likely to remove critical amounts of prey resources from the action area and any disruption to normal foraging is likely to be insignificant. In addition, the dredging activities are not likely to alter the habitat in any way that prevents sea turtles or whales from using the action area as a migratory pathway. Effects to habitat will be the same regardless of whether a cutterhead or hopper dredge is used.

Entrainment
Leatherback turtles, and humpback, fin, and right whales are not vulnerable to entrainment in dredge gear due to their large size. Therefore, this section of the Opinion will only consider the effects of entrainment on loggerhead, Kemp's ridley and green sea turtles. Entrainment is the most imminent danger for sea turtles during hopper dredging operations. The National Research Council's Committee on Sea Turtle Conservation (1990) estimated that dredging mortalities, along with boat strikes, were second only to fishery interactions as a source of probable lethal takes of sea turtles. Experience has shown that injuries sustained by sea turtles entrained in hopper dredge dragheads are

usually fatal. Mortality in hopper dredging operations most often occurs when turtles are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper. Because entrainment is believed to occur primarily while the draghead is operating on the bottom, it is likely that only those species feeding or resting on or near the bottom would be vulnerable to entrainment. Additionally, animals may be entrained if suction is created in the draghead by current flow while the device is being placed or removed, or if the dredge is operating on an uneven or rocky substrate and rises off the bottom. However, it is possible to operate the dredge in a manner that minimizes potential for such incidents as noted in the Monitoring Specifications for Hopper Dredges (Appendix B).

Sea turtles have been killed in hopper dredge operations along the East and Gulf coasts of the US. Documented turtle mortalities during dredging operations in the ACOE South Atlantic Division (SAD; i.e., south of the Virginia/North Carolina border) are more common than in the ACOE North Atlantic Division (NAD; Virginia-Maine) probably due to the greater abundance of turtles in these waters and the greater frequency of hopper dredge operations. For example, in the ACOE SAD, over 400 sea turtles have been entrained in hopper dredges since 1980 and in the Gulf Region over 160 sea turtles have been killed since 1995. Records of sea turtle entrainment in the ACOE NAD began in 1994. Since this time, at least 66 sea turtles deaths (see Table 1) related to hopper dredge activities have been recorded in waters north of the North Carolina/Virginia border (ACOE Sea Turtle Database[4]).

4 The USACE Sea Turtle Data Warehouse is maintained by the ACOE's Environmental Laboratory and contains information on ACOE dredging projects conducted since 1980 with a focus on information on interactions with sea turtles.

Table 1. Sea Turtle Takes in ACOE NAD dredging operations

Project Location	Year of Operation	Cubic Yardage Removed	Observed Takes
York Spit	2007	608,000	1 Kemp's Ridley
Cape Henry	2006	NA	3 Loggerheads
Thimble Shoal Channel	2006	300,000	1 loggerhead
Delaware Bay	2005	50,000	2 Loggerheads
Thimble Shoal Channel	2003	1,828,312	7 Loggerheads 1 Kemp's ridley 1 unknown
Cape Henry	2002	1,407,814	6 Loggerheads 1 Kemp's ridley 1 green
VA Beach Hurricane Protection Project (Cape Henry)	2002	NA	1 Loggerhead
York Spit Channel	2002	911,406	8 Loggerheads 1 Kemp's ridley
Cape Henry	2001	1,641,140	2 loggerheads 1 Kemp's ridley
VA Beach Hurricane Protection Project (Thimble Shoals)	2001	NA	5 loggerheads 1 unknown
Thimble Shoal Channel	2000	831,761	2 loggerheads 1 unknown
York River Entrance Channel	1998	672,536	6 loggerheads
Atlantic Coast of NJ	1997	1,000,000	1 Loggerhead
Thimble Shoal Channel	1996	529,301	1 loggerhead
Delaware Bay	1995	218,151	1 Loggerhead
Cape Henry	1994	552,671	4 loggerheads 1 unknown
York Spit Channel	1994	NA	4 loggerheads
Delaware Bay	1994	NA	1 Loggerhead
Cape May NJ	1993	NA	1 Loggerhead
Off Ocean City MD	1992	1,592,262	3 Loggerheads
			TOTAL = 69 Turtles

Official records of sea turtle mortality in dredging activities in the ACOE NAD begin in the early 1990s. Before this time, endangered species observers were not required on board hopper dredges and dredge baskets were not inspected for sea turtles or sea turtle parts. The majority of sea turtle takes in the NAD have occurred in the Norfolk district. However, since 1992, the take of 9 sea turtles (all loggerheads) has been recorded during hopper dredge operations in the Philadelphia, Baltimore and New York Districts. Hopper dredging is relatively rare in New England waters where sea turtles are known to occur, with most hopper dredge operations being completed by the specialized Government owned dredge Currituck which operates at low suction and has been demonstrated to have a very low likelihood of entraining or impinging sea turtles. To date, no hopper dredge operations (other than the Currituck) have occurred in the New England District in areas or at times when sea turtles are likely to be present.

Of the 9 sea turtle mortalities observed outside of the Norfolk District, 5 have occurred in the Philadelphia District, 3 in the Baltimore District and 1 in the New York District. A loggerhead turtle was taken by a hopper dredge off the coast of Cape May, New Jersey in August 1993. Loggerheads were killed during dredging in Delaware Bay on June 22, 1994, November 3, 1995, and August 2005 (2 individuals). Three turtles killed in an offshore hopper dredge operation were stranded on a beach in Maryland in 1992. These sea turtles were found on the beach and necropsies confirmed that their deaths were caused by a hopper dredge. These takes have been attributed to a hopper dredge operation occurring 2 miles offshore of Ocean City, Maryland. One loggerhead was killed during dredging operations off Sea Girt, New Jersey during an ACOE beach renourishment project on August 23, 1997. This turtle was closed up in the hinge between the draghead and the dragarm as the dragarm lifted off the bottom.

Most of the available information on the effects of hopper dredging on sea turtles in the ACOE NAD has come from operations in Virginia waters, particularly in the entrance channels to the Chesapeake Bay. Since 1994, 60 sea turtles mortalities have been observed on hopper dredges operating in Virginia waters. In Thimble Shoals Channel, maintenance dredging took several turtles during the warmer months of 1996 (1 loggerhead) and 2000 (2 loggerheads, 1 unknown). A total of 6 turtles (5 loggerhead, 1 unknown) were taken in association with dredging in Thimble Shoal Channel during 2001, and one turtle was taken in May 2002 (1 loggerhead). Nine sea turtle takes were reported during dredging conducted in September and October 2003 (7 loggerhead, 1 Kemp's ridley, 1 unknown). Most recently, Thimble Shoals Channel was dredged in the summer of 2006, with 1 loggerhead killed during this operation.

Incidental takes have occurred in the Cape Henry and York Spit Channels as well. In May and June 1994, parts of at least five sea turtles were observed (at least 4 loggerheads and 1 unknown) during dredging at Cape Henry. In September and October 2001, 3 turtle takes were observed (1 Kemp's ridley and 2 loggerheads). Eight turtle takes were observed during dredging at Cape Henry in April, May, June and October 2002 (1 green, 1 Kemp's and 6 loggerhead). Three loggerheads were killed during the dredging of the Cape Henry Channel in the summer of 2006. At York Spit, four loggerheads were taken in dredging operations occurring during one week in June 1994. Nine turtles were taken in dredging operations at York Spit in 2002 (8 loggerheads, 1 Kemp's ridley). York Spit was last dredged in the summer of 2007, with the take of 1 Kemp's ridley reported. In

1998, dredging in the York River Entrance Channel took 5 loggerheads. No turtles had been observed in dredging operations in Rappahannock Shoal Channels or the Sandbridge Shoals borrow area.

It should be noted that the observed takes may not be representative of all the turtles killed during dredge operations. Typically, endangered species observers are required to observe a total of 50% of the dredge activity (i.e., 6 hours on watch, 6 hours off watch). As such, if the observer was off watch or the cage was emptied and not inspected or the dredge company either did not report or was unable to identify the turtle incident, there is the possibility that a turtle could be taken by the dredge and go unnoticed. Additionally, in older Opinions, NMFS frequently only required 25% observer coverage and monitoring of the overflows which has since been determined to not be as effective as monitoring of the intakes. These conditions may have led to sea turtle takes going undetected.

NMFS raised this issue to the ACOE during the 2002 season, after several turtles were taken in the Cape Henry and York Spit Channels, and expressed the need for 100% observer coverage. On September 30, 2002, the ACOE informed the dredge contractor that when the observer was not present, the cage should not be opened unless it is clogged. This modification was to ensure that any sea turtles that were taken and on the intake screen (or in the cage area) would remain there until the observer evaluated the load. The ACOE's letter further stated "Crew members will only go into the cage and remove wood, rocks, and man-made debris; any aquatic biological material is left in the cage for the observer to document and clear out when they return on duty. In addition, the observer is the only one allowed to clean off the overflow screen. This practice provides us with 100% observation coverage and shall continue." Theoretically, all sea turtle parts were observed under this scheme, but the frequency of clogging in the cage is unknown at this time. Obviously, the most effective way to ensure that 100% observer coverage is attained is to have a NMFS-approved endangered species observer monitoring all loads at all times. This level of observer coverage would document all turtle interactions and better quantify the impact of dredging on turtle populations. More recently issued Opinions have required 100% observer coverage which increases the likelihood of takes being detected and reported.

Sea turtles have been found resting in deeper waters, which could increase the likelihood of interactions from dredging activities. In 1981, observers documented the take of 71 loggerheads by a hopper dredge at the Port Canaveral Ship Channel, Florida (Slay and Richardson 1988). This channel is a deep, low productivity environment in the Southeast Atlantic where sea turtles are known to rest on the bottom, making them extremely vulnerable to entrainment. The large number of turtle mortalities at the Port Canaveral Ship Channel in the early 1980s resulted in part from turtles being buried in the soft bottom mud, a behavior known as brumation. Chelonid turtles have been found to make use of deeper, less productive channels as resting areas that afford protection from predators because of the low energy, deep water conditions. While sea turtle brumation has not been documented in mid-Atlantic or New England waters, it is possible that this phenomenon occurs in these waters.

It is likely that not all sea turtles killed by dredges are observed onboard the hopper dredge. Several sea turtles stranded on Virginia shores with crushing type injuries from May 25 to October 15, 2002.

The Virginia Marine Science Museum (VMSM) found 10 loggerheads, 2 Kemp's ridleys, and 1 leatherback exhibiting injuries and structural damage consistent with what they have seen in animals that were known dredge takes. While it cannot be conclusively determined that these strandings were the result of dredge interactions, the link is possible given the location of the strandings (e.g., in the southern Chesapeake Bay near ongoing dredging activity), the time of the documented strandings in relation to dredge operations, the lack of other ongoing activities which may have caused such damage, and the nature of the injuries (e.g., crushed or shattered carapaces and/or flipper bones, black mud in mouth). Additionally, in 1992, three dead sea turtles were found on an Ocean City, Maryland beach while dredging operations were ongoing at a borrow area located 3 miles offshore. Necropsy results indicate that the deaths of all three turtles were dredge related. It is unknown if turtles observed on the beach with these types of injuries were crushed by the dredge and subsequently stranded on shore or whether they were entrained in the dredge, entered the hopper and then were discharged onto the beach with the dredge spoils.

A dredge could crush an animal as it was setting the draghead on the bottom, or if the draghead was lifting on and off the bottom due to uneven terrain, but the actual cause of these crushing injuries cannot be determined at this time. Further analyses need to be conducted to better understand the link between crushed strandings and dredging activities, and if those strandings need to be factored into an incidental take level. More research also needs to be conducted to determine if sea turtles are in fact undergoing brumation in mid-Atlantic or New England waters. Regardless, it is possible that dredges are taking animals that are not observed on the dredge which may result in strandings on nearby beaches.

Due to the nature of interactions between listed species and dredge operations, it is difficult to predict the number of interactions that are likely to occur from a particular dredging operation. Projects that occur in an identical location with the same equipment year after year may result in interactions in some years and none in other years as noted in the examples of sea turtle takes above. Dredging operations may go on for months, with sea turtle takes occurring intermittently throughout the duration of the action. For example, dredging occurred at Cape Henry over 160 days in 2002 with 8 sea turtle takes occurring over 3 separate weeks while dredging at York Spit in 1994 resulted in 4 sea turtle takes in one week.

The number of interactions between dredge equipment and sea turtles seems to be best associated with the volume of material removed, which is closely correlated to the length of time dredging takes, with a greater number of interactions associated with a greater volume of material removed and a longer duration of dredging. The number of interactions is also heavily influenced by the time of year dredging occurs (with more interactions correlated to times of year when more sea turtles are present in the action area) and the type of dredge plant used (sea turtles are apparently capable of avoiding pipeline and mechanical dredges as no takes of sea turtles have been reported with these types of dredges).

Few interactions with listed sea turtles have been recorded during dredging at offshore borrow areas which makes it even more difficult to predict the likely number of interactions between this action and listed sea turtles. This lack of information is largely due to the infrequency of dredging in offshore borrow areas in the ACOE NAD. As sea turtles have been documented in the action area and suitable habitat and forage items are present, it is likely that sea turtles will be present in the action area when dredging takes place. As sea turtles are likely to be less concentrated in the action area than they are while foraging in Virginia waters such as the entrance channels to the Chesapeake Bay, the level of interactions during this project are likely to be fewer than those recorded during dredging in the Chesapeake Bay area (i.e., the Thimble Shoals and Cape Henry projects noted above).

In the ACOE Sea Turtle Database, records for 31 projects occurring during "sea turtle season" (i.e., April 1 – November 30) are available that report the cubic yardage removed during a project (see Table 2). As noted above, the most complete information is available for the Norfolk district. Records for 17 projects occurring in the April – November time frame that report cubic yards removed are available for channels in the Chesapeake Bay (see Table 3). NMFS has made calculations from that data which indicate that, in the Norfolk District, an average of 1 sea turtle is killed for approximately every 300,000 cy removed. This calculation has been based on a number of assumptions including the following: that sea turtles are evenly distributed throughout all channels and borrow areas for which takes have occurred, that all dredges will take an identical number of sea turtles, and that sea turtles are equally likely to be encountered throughout the April to November time frame.

Table 2. Dredging projects in ACOE NAD with recorded cubic yardage

Project Location	Year of Operation	Cubic Yards Removed	Observed Takes
York Spit	2007	608,000	1 Kemp's Ridley
Atlantic Ocean Channel	2006	1,118,749	0
Thimble Shoal Channel	2006	300,000	1 loggerhead
Dewey Beach/Cape Henlopen (DE Bay)	2005	1,134,329	0
Delaware Bay	2005	50,000	2 Loggerheads
Cape May	2004	2,425,268	0
Thimble Shoal Channel	2004	139,200	0
Thimble Shoal Channel	2003	1,828,312	7 Loggerheads 1 Kemp's ridley 1 unknown
York River Entrance Channel	2003	343,092	0
Off Ocean City MD	2002	744,827	0
Cape Henry	2002	1,407,814	6 Loggerheads 1 Kemp's ridley 1 green
York Spit Channel	2002	911,406	8 Loggerheads 1 Kemp's ridley
Chincoteague Inlet	2002	84,479	0
Cape Henry	2001	1,641,140	2 loggerheads 1 Kemp's ridley
Cape Henry	2001	1,641,140	0
Thimble Shoal Channel	2000	831,761	2 loggerheads 1 unknown
Cape Henry	2000	759,986	0
York River Entrance Channel	1998	672,536	6 loggerheads
Off Ocean City MD	1998	1,289,817	0
York Spit Channel	1998	296,140	0
Atlantic Coast of NJ	1997	1,000,000	1 Loggerhead
Thimble Shoal Channel	1996	529,301	1 loggerhead
Delaware Bay	1995	218,151	1 Loggerhead
Cape Henry Channel	1995	485,885	0
Bethany Beach (DE Bay)	1994	184,451	0
Cape Henry	1994	552,671	4 loggerheads 1 unknown
Dewey Beach (DE Bay)	1994	907,740	0
Off Ocean City MD	1994	1,245,125	0
Off Ocean City MD	1992	1,592,262	3 Loggerheads
Off Ocean City MD	1991	1,622,776	0
Off Ocean City MD	1990	2,198,987	0
	TOTAL	***28,765,345 cy***	***53 Turtles***

Table 3. Projects in ACOE NAD with recorded cubic yardage (with Chesapeake Bay projects removed)

Project Location	Year of Operation	Cubic Yards Removed	Observed Takes
Dewey Beach/Cape Henlopen (DE Bay)	2005	1134329	0
Delaware Bay	2005	50000	2 Loggerhead
Cape May	2004	2425268	0
Off Ocean City MD	2002	744827	0
Chincoteague Inlet	2002	84479	0
Offshore New Jersey	1997	1000000	1 loggerhead
Off Ocean City MD	1998	1289817	0
Delaware Bay	1995	218,151	1 Loggerhead
Bethany Beach (DE Bay)	1994	184451	0
Dewey Beach (DE Bay)	1994	907740	0
Off Ocean City MD	1994	1245125	0
Off Ocean City MD	1992	1,592,262	3 Loggerheads
Off Ocean City MD	1991	1622776	0
Off Ocean City MD	1990	2198987	0
	TOTAL	*14,698,212*	*7 loggerheads*

As noted above, sea turtles are likely to be less concentrated in the action area for this consultation than they are in the Chesapeake Bay area. Based on this information, NMFS believes that hopper dredges operating in the offshore borrow areas are less likely to interact with sea turtles than hopper dredges operating in the Chesapeake Bay area. Based on habitat characteristics and geographic area, the level of interactions during this project may be more comparable to the level of interactions recorded for dredging projects in Delaware Bay or offshore New York and New Jersey (i.e., Cape May, Sea Girt, lower Delaware Bay).

Records for 14 projects occurring during "sea turtle season" (i.e., April 1 – November 30) in the Baltimore, Philadelphia and New York District (all offshore) are available that report the cubic yardage removed during a project (see Table 4). NMFS has made calculations from that data which indicate that, for offshore dredging projects outside of the Norfolk District, an average of 1 sea turtle is killed for approximately every 2 million cy removed. An important caveat is that observer coverage at these projects has ranged from 0 to 50%.

Table 4. Projects in ACOE NAD with recorded cubic yardage – Chesapeake Bay Only

Project Location	**Year of Operation**	**Cubic Yards Removed**	**Observed Takes**
York Spit	2007	608,000	1 Kemp's Ridley
Atlantic Ocean Channel	2006	1,118,749	0
Thimble Shoal Channel	2006	300,000	1 loggerhead
Thimble Shoal Channel	2004	139,200	0
Thimble Shoal Channel	2003	1,828,312	7 Loggerheads 1 Kemp's ridley 1 unknown
York River Entrance Channel	2003	343,092	0
Cape Henry	2002	1,407,814	6 Loggerheads 1 Kemp's ridley 1 green
York Spit Channel	2002	911,406	8 Loggerheads 1 Kemp's ridley
Cape Henry	2001	1,641,140	2 loggerheads 1 Kemp's ridley
Cape Henry	2001	1,641,140	0
Thimble Shoal Channel	2000	831,761	2 loggerheads 1 unknown
Cape Henry	2000	759,986	0
York River Entrance Channel	1998	672,536	6 loggerheads
York Spit Channel	1998	296,140	0
Thimble Shoal Channel	1996	529,301	1 loggerhead
Cape Henry Channel	1995	485,885	0
Cape Henry	1994	552,671	4 loggerheads 1 unknown
	TOTAL	***14,067,133 cy***	***46 turtles***

As information available (number of days dredged, cubic yards removed) on projects outside of the Norfolk District is incomplete and observer coverage has been relatively low, it is difficult to estimate the number of sea turtles likely to be taken in these areas. The most reasonable approach is to calculate the number of sea turtles taken during projects where cubic yardage is available, not just for projects where take has occurred (which would overestimate the likelihood of interactions). Using this method, an estimate of 1 sea turtle per 2 million cubic yards is calculated. If the Norfolk district projects are included, this estimate is 1 sea turtle per 550,000 cy. As noted above, it is likely that including the Norfolk District data would overestimate the number of interactions in offshore borrow areas likely due to the concentration of sea turtles in the Chesapeake Bay and differences in habitat between the Norfolk District's Chesapeake Bay entrance channels and the offshore locations dredged in the other districts. Therefore, the best available information indicates that for dredging in offshore borrow areas outside of the Chesapeake Bay, 1 sea turtle is likely to be entrained for every 2 million cubic yards of material removed by a hopper dredge. This calculation has been based on a number of assumptions including the following: that sea turtles are evenly distributed throughout all channels and borrow areas, that all dredges will take an identical number of sea turtles, that all takes of sea turtles in hopper dredge operations have been observed, and that sea turtles are equally likely to be encountered throughout the April to November time frame.

With the exception of one green turtle in a Virginia dredge, all other sea turtles entrained in dredges operating in the ACOE NAD have been loggerheads and Kemp's ridley. Of these 69 sea turtles, 59 have been loggerhead, 5 have been Kemp's ridleys, 1 green and 4 unknown. Overall, of those identified to species, approximately 90% of the sea turtles taken in dredges operating in the ACOE North Atlantic Division have been loggerheads. No Kemp's ridleys or greens have been taken in dredge operations outside of the Chesapeake Bay area. The high percentage of loggerheads is likely due to several factors including their tendency to forage on the bottom where the dredge is operating and the fact that this species is the most numerous of the sea turtle species in Northeast and Mid-Atlantic waters. It is likely that the documentation of only one green sea turtle take in Virginia dredging operations is a reflection of the low numbers of green sea turtles that occur in waters north of North Carolina. The low number of green sea turtles in the action area makes an interaction with a green sea turtle unlikely to occur.

Based on the above information, NMFS believes that it is reasonable to expect that 1 sea turtle is likely to be injured or killed for approximately every 2,000,000 cy of material removed from the proposed borrow area with a hopper dredge. Based on the information outlined above, NMFS anticipates that no more than 2 sea turtles are likely to be entrained during the proposed project when 2.6 million cy of material is removed with a hopper dredge. Due to the nature of the injuries expected by entrainment, all of the turtles are expected to die. As noted above, no injuries or mortalities are likely if a cutterhead dredge is used exclusively.

NMFS expects that nearly all of the sea turtle entrained in the dredge will be loggerheads. While Kemp's ridleys and green sea turtles may also occur at the borrow area, the most likely species to be encountered is a loggerhead and this species also appears to be the most vulnerable to entrainment in a hopper dredge.

As explained in the Status of the Species section, loggerheads in the action area are most likely to come from the northern nesting subpopulation and the south Florida nesting subpopulation with a smaller portion from the Yucatan subpopulation. However, as genetic analysis of sea turtles in northeastern waters is incomplete and sea turtles from all five subpopulations are thought to be distributed along the US Atlantic coast, it is likely that a small percentage of sea turtles in the action area could come from the other cohorts. Based on the best available information on sea turtles in New England waters, NMFS anticipates that a loggerhead entrained at the Sconset Beach borrow site is likely to be either a benthic immature or sexually mature turtle. There is no information to suggest that either sex is disproportionately taken in hopper dredges. Therefore, either a male or female loggerhead may be entrained in the dredge.

Interactions with the Sediment Plume

Dredging operations cause sediment to be suspended in the water column. This results in a sediment plume in the water, typically present from the dredge site and decreasing in concentration as sediment falls out of the water column as distance increases from the dredge site. The nature, degree, and extent of sediment suspension around a dredging operation are controlled by many factors including : the particle size distribution, solids concentration, and composition of the dredged material; the dredge type and size, discharge/cutter configuration, discharge rate, and solids concentration of the slurry; operational procedures used; and the characteristics of the hydraulic regime in the vicinity of the operation, including water composition, temperature and hydrodynamic forces (i.e., waves, currents, etc.) causing vertical and horizontal mixing (ACOE 1983). The sediment plume resulting from a cutterhead dredge and a hopper dredge are different and both types of dredges are discussed below.

Resuspension of fine-grained dredged material during *hopper dredging* operations is caused by the dragheads as they are pulled through the sediment, turbulence generated by the vessel and its prop wash, and overflow of turbid water during hopper filling operations. During the filling operation, dredged material slurry is often pumped into the hoppers after they have been filled with slurry in order to maximize the amount of solid material in the hopper. The lower density, turbid water at the surface of the filled hoppers overflows and is usually discharged through ports located near the waterline of the dredge. In the vicinity of hopper dredges during operations, a near-bottom turbidity plume of resuspended bottom material may extend 2300 to 2400 ft downcurrent from the dredge. In the immediate vicinity of the dredge, a well-defined, upper plume is generated by the overflow process. Approximately 1000 ft behind the dredge the two plumes merge into a single plume. Suspended solid concentrations above ambient may be as high as several tens of parts per thousand (grams per litre) near the discharge port and as high as a few parts per thousand near the draghead. Turbidity levels in the near-surface plume appear to decrease exponentially with increasing distance from the dredge due to settling and dispersion, quickly reaching concentrations less than 1 ppt. By a distance of 4000 feet from the dredge, plume concentrations are expected to return to background levels.

Maximum reported suspended sediment levels generated during *cutterhead dredge* operations range from 11.5 to 282 mg/L (U. Washington, 2001). Based on analysis of cutterhead dredging activities (ACOE 1983), increased sediment levels are likely to be present for no more than 1000-feet downstream of the dredge area. In addition, the reported maximum downstream turbidity ranged from 0.1 to 45.2 NTUs which is well below the toxic concentrations of suspended sediments reported in the literature.

No information is available on the effects of TSS on juvenile and adult sea turtles or whales. Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). TSS is most likely to affect sea turtles or whales if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle prey. As sea turtles and whales are highly mobile they are likely to be able to avoid any sediment plume and any effect on sea turtle or whale movements is likely to be insignificant. Additionally, the TSS levels expected are below those shown to have an adverse effect on fish (Breitburg 1988 in Burton 1993; (Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993) and benthic communities (EPA 1986).

While the increase in suspended sediments may cause sea turtles or whales to alter their normal movements, any change in behavior is likely to be insignificant as it will only involve movement to alter course out of the sediment plume. Based on this information, any increase in suspended sediment is not likely to affect the movement of sea turtles or whales between foraging areas or while migrating or otherwise negatively affect listed species in the action area. Based on this information, it is likely that the effect of the suspension of sediment resulting from dredging operations, regardless of which type of dredge is used, will be insignificant.

Collisions with dredges
There have not been any reports of dredge vessels colliding with listed species but contact injuries resulting from dredge movements could occur at or near the water surface and could therefore involve any of the listed species present in the area. Because the dredge is unlikely to be moving at speeds greater than three knots during dredging operations, blunt trauma injuries resulting from contact with the hull are unlikely during dredging. It is more likely that contact injuries during actual dredging would involve the propeller of the vessel. Contact injuries with the dredge are more likely to occur when the dredge is moving from the dredging area to port, or between dredge locations. As a cutterhead dredge pipes material directly to the borrow area, trips between shore and the borrow area are less frequent than when a hopper dredge is used. While the distance between these areas is relatively short, a hopper dredge in transit would be moving at faster speeds than during dredging operations, particularly when empty while returning to the borrow area. The ACOE is including a special condition in the proposed permit for this project which will restrict project vessels to a maximum speed of 10 knots.

The dredge vessel may collide with marine mammals and sea turtles when they are at the surface. These species have been documented with injuries consistent with vessel interactions and it is reasonable to believe that the dredge vessels considered in this Opinion could inflict such injuries on marine mammals and sea turtles, should they collide. As mentioned, sea turtles are found distributed throughout the action area in the warmer months, generally from June through November.

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 propeller 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 northeast (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 (NMFS SEFSC 2001).

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. In addition, the risk of ship strike will be influenced by the amount of time the animal remains near the surface of the water. For the proposed action, the greatest risk of vessel collision will occur during transit between shore and the offshore borrow area. Sea turtles present in these shallow nearshore waters are most likely to be foraging along the bottom. The presence of an experienced endangered species observer who can advise the vessel operator to slow the vessel or maneuver safely when sea turtles are spotted will further reduce to a discountable level the potential for interaction with vessels.

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. Laist et al. (2001) reports that of 41 ship strike accounts that reported vessel speed, no lethal or severe injuries occurred at speeds below ten knots, and no collisions have been reported for vessels traveling less than six knots. A majority of whale 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). As discussed in the Status of the Species section, all whales are potentially subject to collisions with ships. However, due to their critical population status, slow speed, and behavioral characteristics that cause them to remain at the surface, vessel collisions pose the greatest threat to right whales. In the past two years, at least four female right whales have been killed by ship collisions, two of which were carrying near-term fetuses. Because females are more critical to a population's ability to replace its numbers and grow, the premature loss of even one reproductively mature female could hinder the species' likelihood of recovering.

While there is currently no rule or regulation that implements a requirement for vessel speed, NMFS has prepared a draft Ship Strike Reduction Strategy that outlines a number of measures to reduce the threat of ship strikes to right whales. Information included with this strategy suggests that collisions with vessels greater than or equal to 65 feet in length traveling at speeds of less than 14 knots are less likely to result in serious injury and mortality to whales. As discussed in the Environmental Baseline, to address the occurrence of ship strikes of endangered right whales along the US east coast, NMFS has proposed measures to regulate speed in the approaches to major port entrances, including the approaches to Boston (71 FR 36299, June 26, 2006). However, the rulemaking process is still ongoing, and there are no regulations currently in place to restrict vessel activity in the vicinity of right whales. As noted, the ACOE will include a special condition in any permit issued for this project limiting vessel speed during project operations to ten knots or less and the speed of the dredge is not expected to exceed 3 knots while dredging or while transiting to the pump out site with a full load. Laist et al. (2001) reports that of 41 ship strike accounts that reported vessel speed, no lethal or severe injuries occurred at speeds below ten knots, and no collisions have been reported for vessels traveling less than six knots. In addition, the onboard observer will be able to watch for whales while the vessel is in transit and provide advice on avoiding interactions. Therefore, the risk of vessel strike to right, humpback, and fin whales as a result of the proposed action is discountable, regardless of the type of dredge to be used.

CUMULATIVE EFFECTS

NMFS has estimated that the proposed action, removing 2.6 million cy of sand and gravel with a hopper dredge from the designated borrow area, will result in the mortality of no more than 2 loggerhead sea turtles. While collisions between project vessels and whales and sea turtles are possible, NMFS does not believe that this is likely to occur. As explained in the "Effects of the Action" section, effects of the proposed dredging on sea turtle foraging areas are likely to be insignificant. Furthermore, the dredging is not likely to alter the borrow areas in a way that would make the action area unsuitable for use as a migratory pathway for any species. As noted above, no critical habitat has been designated in the action area; therefore, this action will not affect any designated critical habitat.

Cumulative effects, as defined in the ESA, are those effects of future state or private activities, not involving federal activities that are reasonably certain to occur within the action area of the federal action subject to consultation. 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.

Future commercial fishing activities in state waters may take several protected species. However, it is not clear to what extent these future activities would affect listed species differently than the current state fishery activities described in the Environmental Baseline section. The Atlantic Coastal Cooperative Statistics Program (ACCSP) and the NMFS sea turtle/fishery strategy, when implemented, are expected to provide information on takes of protected species in state fisheries and systematically collected fishing effort data which will be useful in monitoring impacts of the fisheries. NMFS expects these state water fisheries to continue in the future, and as such, the potential for interactions with listed species will also continue.

As noted in the Environmental Baseline section, private vessel activities in the action area may adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. 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 addition to commercial boat traffic, recreational boat traffic is likely to persist at the current level or increase in the Massachusetts and Cape Cod Bays. Interactions, including close encounters and strikes, between whale watch boats and recreational vessels have been recorded in Massachusetts waters as well as in waters outside this region (Jensen and Silber 2003). 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. In addition, over 500 fishing vessels and over 11,000 pleasure craft frequent Massachusetts and Cape Cod Bays (Wiley *et al.* 1995). Various initiatives have also been planned or undertaken to expand or establish high-speed watercraft service in the northwest Atlantic. It appears likely that these types of private activities will continue to affect listed species if actions are not taken to minimize the impacts, although it is not possible to predict to what degree these activities will be detrimental to the species.

Increasing vessel traffic in the action area also raises concerns about the potential effects of noise pollution on marine mammals and sea turtles. The effects of increased noise levels are not yet completely understood, although they can range from minor behavioral disturbance to injury and even death. Acoustic impacts can include auditory trauma, temporary or permanent loss of hearing sensitivity, habitat exclusion, habituation, and disruption of other normal behavior patterns such as feeding, migration, and communication. NMFS is working to develop policy guidelines for monitoring and managing acoustic impacts on marine mammals from anthropogenic sound sources in the marine environment.

Marine debris (e.g., discarded fishing line, lines from boats, plastics) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990). It is anticipated that marine debris will continue to impact listed species in the action area.

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 or destruction, eventually leading to foraging difficulties, which may in turn lead to long term avoidance or complete abandonment of the polluted area by the affected species (Ruben and Morreale 1999).

INTEGRATION AND SYNTHESIS OF EFFECTS

Loggerhead sea turtles. Loggerheads are threatened throughout their entire range. This species exists as five subpopulations in the western Atlantic that show limited evidence of interbreeding. Based on information provided in this Opinion, NMFS anticipates the entrainment of no more than 2 loggerhead sea turtle as a result of dredging at the Sconset Beach borrow area. The loggerhead sea turtles entrained in the dredge are expected to: (1) be from the benthic immature and/or sexually mature age classes, (2) be of either sex, and (3) given the size of those subpopulations, the proximity of the nesting beaches to the action area, and the available genetic data for sea turtles on the northern foraging grounds (see discussion on p. 19), are likely to originate from the south Florida and northern subpopulations or to a lesser extent the Yucatan subpopulation,.

Rather than consider the effects of the action on loggerheads for each combination of factors listed above given that there are so many possible combinations (*e.g.*, lethal take of immature males from the south Florida subpopulation, non-lethal take of mature female from the northern subpopulation, *etc.*), the following analysis will only consider what is expected to be the "worst case scenario": the lethal take of benthic immature or mature females from any of the three subpopulations likely to occur in the action area. Although the take of mature versus immature animals is generally considered to be a worst case scenario approach, NMFS chose not to make this distinction for this analysis given unknowns regarding the cumulative impacts to loggerheads for each of these age classes and the late age to maturity for loggerheads (*i.e.*, even though a population is expected to have a greater number of benthic immature animals than mature animals, if the cumulative effects to loggerhead sea turtles over the past 20-38 years have disproportionately affected benthic immature loggerheads, additional negative impacts to this age class may be the "worst case scenario" as compared to reductions in the number of existing mature females).

While it is difficult to predict the subpopulation from which a loggerhead entrained at the Sconset Beach borrow area originates and this information can not be confirmed until after a genetic analysis of any affected individuals is completed, the best available information indicates that sea turtles from only 3 of the 5 Atlantic subpopulations are likely to occur in the action area (Rankin-Baransky et al. 2001). As explained in the Status of the Species section (see p. 18), using a maximum likelihood stock analysis program, researchers determined the subpopulation of origin for 82 loggerheads stranded from Massachusetts to Virginia. Based on the information presented, NMFS has determined that of the 2 loggerheads that may be entrained during dredging at the Sconset Beach borrow area, no more than 1 of the turtles is likely to be from the Northern subpopulation or the Yucatan subpopulation and the remainder are likely to be from the South Florida subpopulation. NMFS recognizes that these estimates are based on several assumptions, including: that the subpopulation of origin for stranded sea turtles is representative of all sea turtles occurring in the area; that the distribution of loggerheads from the various subpopulations from Virginia to Massachusetts is representative of loggerhead distribution in the action area; and, that the distribution of loggerheads from the various subpopulations is stable from season to season (i.e., is not likely to change over time).

As described in the *Status of the Species* section, the threatened loggerhead sea turtle is the most abundant sea turtle in U.S. waters but is also affected by numerous anthropogenic activities. A number of stock assessments (TEWG 1998; 2000; NMFS SEFSC 2001; Heppell *et al.* 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Nesting beach survey data can be used to index the status and trends of loggerheads (USFWS and NMFS 2003). However, detection of nesting trends requires consistent data collection methods over long periods of time (USFWS and NMFS 2003). The currently available nesting data is still too limited to indicate statistically reliable trends for the western Atlantic loggerhead subpopulations. NMFS SEFSC (2001)[5] took an alternative approach for looking at trends in loggerhead subpopulations based on a model developed by Heppell *et al.* (2003). Using multiple model scenarios that varied based on differences in starting growth rates, sex ratios, and age to maturity, the model looked at the relative change in the northern loggerhead subpopulation trend when mortality of pelagic immature, benthic immature, and mature loggerhead sea turtles was reduced as a result of changes to the U.S. shrimp trawl fishery and the U.S. Atlantic pelagic longline fishery for swordfish. The modeling work suggests that western Atlantic loggerhead subpopulations should increase as a result of implementation of the new TED regulations that substantially reduce mortality of large, benthic immature and sexually mature loggerheads combined with a reduction in mortality of pelagic immature loggerheads resulting from implementation of new measures for the pelagic longline fishery. Even in the absence of a reduction in pelagic immature mortality from changes to the pelagic longline fishery, the model work supports the conclusion that the trend for western Atlantic loggerhead subpopulations will move from declining to stable (with an initial growth rate of 0.97, average age to maturity of 39 years, and a sex ratio of 35% females) or from declining to increasing (with an initial growth rate of 0.97, average age to maturity of 39 years, and female sex ratio of 50%) (NMFS SEFSC 2001) given the reduction in mortality of large benthic immature and mature loggerheads as a result of changes to the TED requirements for the shrimp trawl fishery.

As with any modeling approach, NMFS SEFSC (2001) made certain assumptions in developing the loggerhead model. NMFS NERO PRD considered these assumptions and discussed the modeling approach with the SEFSC. The SEFSC confirmed that the modeling approach did consider the effects to all western Atlantic loggerhead subpopulations although the northern subpopulation was specifically mentioned in many aspects because it was considered to have the weakest status with respect to the other subpopulations. For example, NMFS SEFSC (2001) ran the model scenarios using 0.95, 0.97 and 1.0 as the starting growth rates based on information collected for the northern nesting subpopulation. In addition, NMFS SEFSC (2001) ran the model scenarios using 35%, 50%, and 80% as the proportion of females in the population, where 35% was thought to be representative of the northern subpopulation and 80% was believed to be representative of the south Florida subpopulation. The 50% was included since it was used in historical models (Heppell *et al.*, 2003; NMFS SEFSC 2001). The range of sex ratios bracket the estimated sex ratio (69%) of the Yucatán subpopulation.

NMFS also recognizes that the modeling approach takes into account only those effects to the northern loggerhead subpopulation that have been on-going long enough for their effects to be measurable in the starting growth rates used in the model (*i.e.*, the effects are subsumed in the

5 NMFS SEFSC (2001) actually proceeded Heppell *et al.* but has an earlier publication date due to differences in time to publication

starting growth rates). The model scenarios demonstrate changes in subpopulation status based on the predicted change in survivability of certain age classes as a result of one specific action, only-- the change in TED regulations for the U.S. shrimp fishery. The model then looks at how the subpopulation trends would be further affected by a change in pelagic immature survival of up to 10%, presumably as a result of subsequent changes in the operation of the U.S. pelagic longline fishery for swordfish. The model scenarios do not account for other subsequent changes that negatively affect loggerhead subpopulations (*i.e.*, if a new activity develops that reduces the survivability of one or more loggerhead age classes; if an existing activity changes to the extent that the survivability of one or more loggerhead age classes is reduced).

As discussed above, in a letter dated October 25, 2006, the Director of the Florida Fish and Wildlife Research Institute of the Florida Fish and Wildlife Conservation Commission informed NMFS that an analysis of Florida loggerhead nesting data indicated a decrease of 22.3% in the annual nest density between 1989 and 2005 and a 39.5% decline since 1998. In addition, data from the 2006 nesting season was the second lowest on record since the implementation of the State's index nesting beach surveys in 1989 and further depresses the trend line (letter to NMFS from the Director, Florida FWRI, October 25, 2006). NMFS NERO PRD contacted Sheryan Epperly of the SEFSC as to whether the new nesting trend information for the south Florida subpopulation would change the assumption of the SEFSC 2001 model that the northern subpopulation had the weakest status with respect to the other subpopulations. In response, PRD was informed that the information presented was still considered preliminary at that time. The SEFSC informed PRD that the SEFSC was not expecting to make any changes to the SEFSC 2001 model based on the preliminary information provided by the State of Florida to NMFS in October 2006 (Sheryan Epperly, SEFSC pers. comm. to Lynn Lankshear, PRD). The Loggerhead TEWG is currently reviewing all available information on loggerhead sea turtles to assess the status of the subpopulations and the species in the Atlantic, overall. A final report from the TEWG with their findings is expected by the end of 2007.

NMFS has implemented the new TED regulations as modeled for in NMFS SEFSC (2001) and has taken action to increase the survival of pelagic immature loggerheads by modification of the longline fisheries managed under the HMS FMP with the intent of increasing pelagic immature survival, overall, by 10% (NMFS 2004c). This suggests that the loggerhead subpopulations considered in this Opinion will experience positive population growth or, in the event that the 10% increase in pelagic immature survival is not realized, will at the very least stabilize in subsequent years. These changes are unlikely to be evident in nesting beach censuses for many years to come given the late age at maturity for loggerhead sea turtles and the normal fluctuations in nesting.

Looking at a snap shot of population size at any specific time, it can be argued that any amount of lethal take will reduce the numbers of a population. Therefore, using the approach of this Opinion which errs on the side of the worst case scenario in the face of uncertainty, the lethal removal of no more than 2 loggerhead sea turtles from the south Florida subpopulation and the lethal removal of no more than 1 loggerhead sea turtles from the northern loggerhead subpopulation or the Yucatán subpopulation, would be expected to reduce the number of female loggerhead sea turtles from these subpopulations as compared to the number of loggerheads that would have been present in the absence of the proposed actions (assuming all other variables remained the same). However, this does not necessarily mean that these subpopulations will experience reductions in reproduction, numbers or distribution in response to these effects to the extent that survival and recovery would be appreciably reduced. Action has been taken to reduce anthropogenic impacts to loggerhead sea turtles from various sources, particularly since the early 1990's. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce anthropogenic mortality of pelagic immature, benthic immature and sexually mature age classes in various fisheries and other marine activities. In addition, current modeling data suggests that all western loggerhead subpopulations should experience positive or at least stabilizing subpopulation growth as a result of the change in TED regulations (NMFS SEFSC 2001).

While these model results need to be viewed with all of the caveats in mind as described in NMFS SEFSC (2001), it is unlikely that, in the worst case scenario, the loss of no more than 2 benthic immature or mature female loggerheads from the south Florida subpopulation that numbers approximately 10,000 nesting females, and the loss of no more than 1 benthic immature or mature female loggerheads from the northern subpopulation that numbers approximately 1,000 nesting females or the loss of no more than 1 benthic immature or mature female loggerheads from the Yucatán subpopulation that numbers in the hundreds of nesting females will have a detectable effect on the numbers and population trends of loggerheads in these subpopulations or the number of loggerheads in the population as a whole.

Additionally, this action is not likely to reduce distribution of loggerheads because the action will not impede loggerheads from accessing suitable foraging grounds or disrupt other migratory behaviors. In addition, as the action is not likely to have a detectable effect on the numbers or reproduction of loggerheads, it is not likely to affect the distribution of sea turtles in US waters or throughout the range of the species. For these reasons, NMFS believes that there is not likely to be any reduction in reproduction and distribution and only a small and likely undetectable decrease in the numbers of loggerheads in the US Atlantic. As such, there is not likely to be an appreciable reduction in the likelihood of survival and recovery in the wild of this species.

Kemp's ridley sea turtles. Kemp's ridleys are endangered throughout their entire range. As explained in the "Effects of the Action" section, NMFS has determined that is unlikely that an interaction between a Kemp's ridley sea turtle and the dredge will occur. Additionally, any effects to foraging Kemp's ridley sea turtles are likely to be insignificant. The action is also not likely to significantly alter migratory or resting behavior of Kemp's ridley sea turtles. As the proposed action will not affect the numbers, reproduction or distribution of green sea turtles, it will not affect the likelihood of survival and recovery in the wild of this species.

Green sea turtles. Green sea turtles are endangered throughout their entire range. As explained in the "Effects of the Action" section, NMFS has determined that is unlikely that a green turtle will be encountered during dredging operations. Additionally, as suitable forage for green sea turtles is not known to occur at the borrow site, there are no likely effects on foraging sea turtles. The action is also not likely to significantly alter migratory or resting behavior of green sea turtles. As the proposed action will not affect the numbers, reproduction or distribution of green sea turtles, it will not affect the likelihood of survival and recovery in the wild of this species.

Leatherback sea turtles
As noted in the Effects of the Action section, interactions with leatherback sea turtles are unlikely to occur during dredging. While leatherback sea turtles have been observed swimming near dredge operations in Virginia and New York waters, no entrainments have ever been recorded. While vessel strikes are possible, the low speeds that the vessels will be operating at make this unlikely to occur. As the proposed action will not affect the numbers, reproduction or distribution of green sea turtles, it will not affect the likelihood of survival and recovery in the wild of this species.

Right whales. Right whales are endangered throughout their entire range. As explained in the "Effects of the Action" section, June is the only month when project operations and right whales may overlap in the action area. Right whales may be affected by the vessels transiting the action area during project operations, given the potential for collisions with these large whales. While collisions are considered unlikely, a reduction in the speed at which the vessels will be traveling and the practice of maintaining a bridge watch would help reduce the possibility of these interactions. As the proposed action will not affect the numbers, reproduction or distribution of right whales, it will not affect the likelihood of survival and recovery in the wild of this species.

Humpback and fin whales
Humpback and fin whales may be affected by the vessels transiting the action area during project operations, given the potential for collisions with these large whales. While collisions are considered unlikely, a reduction in the speed at which the vessels will be traveling and the practice of maintaining a bridge watch would help reduce the possibility of these interactions. As the proposed action will not affect the numbers, reproduction or distribution of humpback or fin whales, it will not affect the likelihood of survival and recovery in the wild of these species.

CONCLUSION
After reviewing the best available information on the status of endangered and threatened species under NMFS jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NMFS' biological opinion that the proposed action may adversely affect but is not likely to jeopardize the continued existence of the loggerhead sea turtle and is not likely to adversely affect Kemp's ridley, leatherback or green sea turtles or right, humpback or fin whales. NMFS has also concluded that the action will not affect hawksbill turtles or shortnose sturgeon as these species are unlikely to occur in the action area. Because no critical habitat is designated in the action area, none will be affected by the proposed action.

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, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns

including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken so that they become binding conditions 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 of section 7(o)(2).

Amount or Extent of Take

The proposed dredging project has the potential to directly affect loggerhead sea turtles by entraining these species in the dredge. These interactions are likely to cause injury and/or mortality to the affected sea turtles. Based on the distribution of sea turtles in the action area and information available on historic interactions between sea turtles and dredging and relocation trawling operations, NMFS believes that it is reasonable to expect that no more than 1 loggerhead sea turtle is likely to be injured or killed for approximately every 2,000,000 cy of material removed from the borrow area with a hopper dredge and that no more than 2 loggerhead sea turtles will be entrained during the proposed project (which involves the removal of a total of 2.6 million cy of sand). Due to the nature of the injuries expected by entrainment, any entrained sea turtle is expected to die. No injuries or mortalities are likely to result if a cutterhead dredge is used exclusively.

NMFS also expects that the maintenance dredging may collect an additional unquantifiable number of parts from previously dead sea turtles. While collecting decomposed animals or parts there of in federal operations is considered to be a take, based on the definition of "take" in Section 3 of the ESA and "wildlife" at 50CFR§222.102, NMFS recognizes that decomposed sea turtles may be taken in dredging operations that may not necessarily be related to the dredging activity itself. Theoretically, if dredging operations are conducted properly, no takes of sea turtles should occur as the turtle draghead defector should push the turtles to the side and the suction pumps should be turned off whenever the dredge draghead is away from the substrate. However, due to certain environmental conditions (e.g., rocky bottom, uneven substrate), the dredge draghead may periodically lift off the bottom and entrain previously dead sea turtle parts (as well as live turtles) that may be on the bottom through the high level of suction

Thus, the aforementioned anticipated level of take refers to those turtles which NMFS confirms as freshly dead. While this definition is subject to some interpretation by the observer, a fresh dead animal may exhibit the following characteristics: little to no odor; fresh blood present; fresh (not necrotic, pink/healthy color) tissue, muscle, or skin; no bloating; color consistent with live animal; and live barnacles. A previously (non-fresh) dead animal may exhibit the following characteristics: foul odor; necrotic, dark or decaying tissues; sloughing of scutes; pooling of old blood; atypical coloration; and opaque eyes. NMFS recognizes that decomposed sea turtles may be taken in dredging operations that may not necessarily be related to the dredging activity itself. NMFS expects that the maintenance dredging may take an additional unquantifiable number of previously dead sea turtle parts.

NMFS believes this level of incidental take is reasonable given the seasonal distribution and abundance of these species in the action area and the level of take historically during other dredging operations in the ACOE NAD. In the accompanying Opinion, NMFS determined that this level of anticipated take is not likely to result in jeopardy to the species.

Measures have been undertaken by the ACOE to reduce the takes of sea turtles in dredging activities. Measures that have been successful in minimizing take in other dredging operations have included reevaluating all dredging procedures to assure that the operation of the dragheads and turtle deflectors were in accordance with the project specifications; modifying dredging operations per the recommendation of Mr. Glynn Banks of the ACOE Engineering Research and Development Center; training the dredge crew and all inspectors in proper operation of the dragpipe and turtle deflector systems; and initiating sea turtle relocation trawling. Proper use of draghead deflectors prevent an unquantifiable yet substantial number of sea turtles from being entrained and killed in dredging operations. Tests conducted by the ACOE's Jacksonville District using fake turtles and draghead deflectors showed convincingly that the sea turtle deflecting draghead is useful in reducing entrainments. As the use of draghead deflectors and other modifications to hopper dredge operations have been demonstrated to be effective at minimizing the number of sea turtles taken in dredging operations, NMFS has determined that the use of draghead deflectors and certain operating guidelines (as outlined below) are necessary and appropriate to minimize the take of sea turtles during the dredging of the four borrow areas.

In order to effectively monitor the effects of this action, it is necessary to examine the sea turtles entrained in the dredge. Monitoring provides information on the characteristics of the turtles encountered and may provide data which will help develop more effective measures to avoid future interactions with listed species. For example, measurement data may reveal that draghead deflectors or trawl gear is most effective for a particular size class of turtle. In addition, data from genetic sampling of dead sea turtles can definitively identify the species of turtle as well as the subpopulation from which it came (in the case of loggerheads). Reasonable and prudent measures and implementing terms and conditions requiring this monitoring are outlined below.

Reasonable and Prudent Measures

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

1. The ACOE shall ensure that during times of the year when sea turtles are known to be present in the action area, hopper dredges are outfitted with state-of-the-art sea turtle deflectors on the draghead and operated in a manner that will reduce the risk of interactions with sea turtles which may be present in the action area.
2. A NMFS-approved observer must be present on board the vessel for any dredging occurring in the June 1 – November 30 time frame.

3. The ACOE shall ensure that dredges are equipped and operated in a manner that provides endangered/threatened species observers with a reasonable opportunity for detecting interactions with listed species and that provides for handling, collection, and resuscitation of turtles injured during project activity. Full cooperation with the endangered/threatened species observer program is essential for compliance with the ITS.
4. The ACOE shall ensure that all measures are taken to protect any turtles that survive entrainment in the dredge.
5. NMFS must be contacted before dredging commences and again upon completion of the dredging activity.
6. All interactions with listed species must be properly documented and promptly reported to NMFS.

Terms and Conditions

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

1. To implement RPM #1, hopper dredges must be equipped with the rigid deflector draghead as designed by the ACOE Engineering Research and Development Center, formerly the Waterways Experimental Station (WES), or if that is unavailable, a rigid sea turtle deflector attached to the draghead. Deflectors must be checked and/or adjusted by a designated expert prior to a dredge operation to insure proper installment and operation during dredging. The deflector must be checked after every load throughout the dredge operation to ensure that proper installation is maintained. Since operator skill is important to the effectiveness of the WES-developed draghead, operators must be properly instructed in its use. Dredge inspectors must ensure that all measures to protect sea turtles are being followed during dredge operations.

2. To implement RPM #2, if dredging occurs during the period of June 1 through November 30, the ACOE must adhere to the attached "Monitoring Specifications for Hopper Dredges" with trained NMFS-approved sea turtle observers, in accordance with the attached "Observer Protocol" and "Observer Criteria" (Appendix B). NMFS-approved observers must be on hopper dredges once surface waters reach or exceed 11° C, or during the period of April 1 through November 30 (whichever occurs first), of any year to monitor the hopper spoil, inflow, screening and dragheads for sea turtles and their remains.

3. To implement RPM #2, observer coverage must be sufficient for 100% monitoring of hopper dredging operations. All biological material found in the intake screens must be documented by the observer.

4. To implement RPM #3, the ACOE must ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that

will minimize takes of sea turtles. Training shall include measures discussed in Appendix B.

5. To implement RPM #3, if sea turtles are present during dredging or material transport, vessels transiting the area must post a bridge watch, avoid intentional approaches closer than 100 yards when in transit, and reduce speeds to below 4 knots if bridge watch identifies a listed species in the immediate vicinity of the dredge.

6. To implement RPM #4, the procedures for handling live sea turtles must be followed in the unlikely event that a sea turtle survives entrainment in the dredge (Appendix C).

7. To implement RPM #5, the ACOE must inform NMFS of the commencement of operations 3 days prior to the actual start date and of the completion date within 3 days after the actual end of operations.

8. To implement RPM #6, if a dead sea turtle or sea turtle part is taken in dredging or relocation trawling operations, a genetic sample must be taken following the procedure outlined in Appendix D.

9. To implement RPM #6, if a sea turtle or sea turtle parts are taken in dredging operations, the take must be documented on the form included as Appendix F and submitted to NMFS along with the final report (T&C # 12).

10. To implement RPM #6, if a decomposed turtle or turtle part is taken in dredging operations, an incident report must be completed and the specimen must be photographed (Appendix F). Any turtle parts that are considered 'not fresh' (i.e., they were obviously dead prior to the dredge take and ACOE anticipates that they will not be counted towards the ITS) must be frozen and transported to a nearby stranding or rehabilitation facility for review. The ACOE must submit the incident report for the decomposed turtle part, as well as photographs, to NMFS within 24 hours of the take (see Appendix F) and request concurrence that this take should not be attributed to the Incidental Take Statement. NMFS shall have the final say in determining if the take should count towards the Incidental Take Statement.

11. To implement RPM #6, a final report summarizing the results of the dredging and any takes of listed species must be submitted to NMFS (at the addresses specified in Appendix B) within 30 working days of completion of each cycle of the project.

12. To implement RPM #6, if a sea turtle is taken during dredging operations the ACOE must immediately contact NMFS at (978) 281-9300, ext. 6530, to review the situation. At that time, the ACOE must provide NMFS with information on the amount of material dredged thus far and the amount remaining to be dredged. Also at that time, the ACOE should discuss with NMFS whether any new management measures could be implemented to prevent the total incidental take level from being exceeded.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize and monitor the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, reinitiation of consultation and review of the reasonable and prudent measures are required. ACOE must immediately provide an explanation of the causes of the taking and review with NMFS the need for possible modification of the reasonable and prudent measures.

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 this 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. When endangered species observers are required on hopper dredges (June 1 to November 30), 100% overflow screening is recommended. While monitoring 100% of the inflow screening is required as a term and condition of this project's Incidental Take Statement, observing 100% of the overflow screening would ensure that any takes of sea turtles are detected and reported.

2. If any Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are observed during dredging operations, this should be reported to NMFS (Kimberly Damon-Randall at (978)281-9300 x6535 or by e-mail (Kimberly.Damon-Randall@noaa.gov)). Observers should also attempt to take length and weight data and photograph specimens if possible.

3. The ACOE should work with the STSSN to monitor the beach where sand is to be placed in an attempt to document the presence of any entrained sea turtles or sea turtle parts on the beach. Should any sea turtles or sea turtle parts be discovered on the beach, NMFS should be contacted immediately.

4. To facilitate future management decisions on listed species occurring in the action area, ACOE should maintain a database mapping system to: a) create a history of use of the geographic areas affected; and, b) document endangered/threatened species presence/interactions with project operations.

5. The ACOE should support ongoing and/or future research to determine the abundance and distribution of sea turtles in New England waters.

6. The ACOE should investigate, support, and/or develop additional technological solutions to further reduce the potential for sea turtle takes in hopper dredges. For instance, NMFS recommends that the ACOE coordinate with other Southeast Districts, the Association of Dredge Contractors of America, and dredge operators regarding additional reasonable measures they may take to further reduce the likelihood of sea turtle takes. The diamond-shaped pre-deflector, or other potentially promising pre-deflector designs such as tickler chains, water jets,

sound generators, etc., should be developed and tested and used where conditions permit as a means of alerting sea turtles and sturgeon of approaching equipment. New technology or operational measures that would minimize the amount of time the dredge is spent off the bottom in conditions of uneven terrain should be explored. Pre-deflector use should be noted on observer daily log sheets, and annual reports to NMFS should note what progress has been made on deflector or pre-deflector technology and the benefits of or problems associated with their usage. NMFS believes that development and use of effective pre-deflectors could reduce the need for sea turtle relocation trawling.

7. New approaches to sampling for turtle parts should be investigated. The ACOE should seek continuous improvements in detecting takes and should determine, through research and development, a better method for monitoring and estimating sea turtle takes by hopper dredges. Observation of overflow and inflow screening appears to be only partially effective and may provide only minimum estimates of total sea turtle mortality. NMFS believes that some listed species taken by hopper dredges may go undetected because body parts are forced through the sampling screens by the water pressure (as seen in 2002 Cape Henry dredging) and are buried in the dredged material, or animals are crushed or killed but not entrained by the suction and so the takes may go unnoticed (or may subsequently strand on nearby beaches). The only mortalities that are documented are those where body parts float, are large enough to be caught in the screens, or can be identified to species.

8. NMFS recommends that all sea turtles entrained in hopper dredge dragheads, and sea turtles captured during relocation trawling, be sampled for genetic analysis by a NMFS laboratory. Any genetic samples from live sea turtles must be taken by trained and permitted personnel. Copies of NMFS genetic sampling protocols for live and dead turtles are attached as Appendix D.

9. The ACOE should consider devising and implementing some method of significant economic incentives to hopper dredge operators such as financial reimbursement based on their satisfactory completion of dredging operations, or a certain number of cubic yards of material removed, or hours of dredging performed, *without taking turtles*. This may encourage dredging companies to research and develop "turtle friendly" dredging methods, more effective deflector dragheads, pre-deflectors, top-located water ports on dragarms, etc.

10. When whales are present in the action area, vessels transiting the area should post a bridge watch, avoid intentional approaches closer than 100 yards (or 500 yards in the case of right whales) when in transit, and reduce speeds to below 4 knots.

REINITIATION OF CONSULTATION

This concludes formal consultation on ACOE's proposed issuance of a permit to the Siasconset Beach Preservation Fund for dredging at the identified offshore borrow area with placement of the sand on Sconset Beach for beach renourishment. 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) a new species is listed or critical habitat designated that may be affected by the action; (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) 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. If the amount or extent of incidental take is exceeded, the ACOE must immediately request reinitiation of formal consultation.

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Appendix A

Figure 1

DELORME

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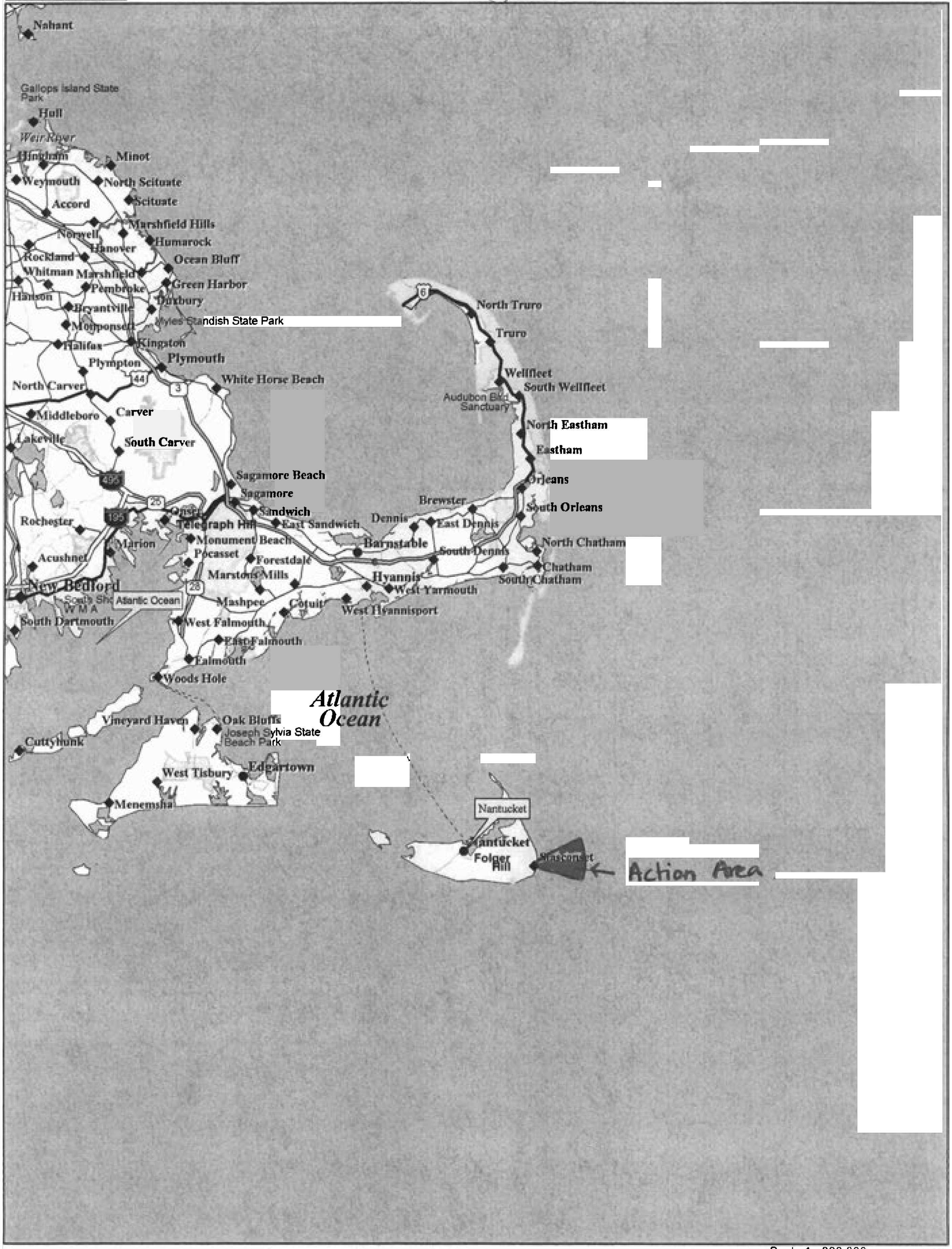

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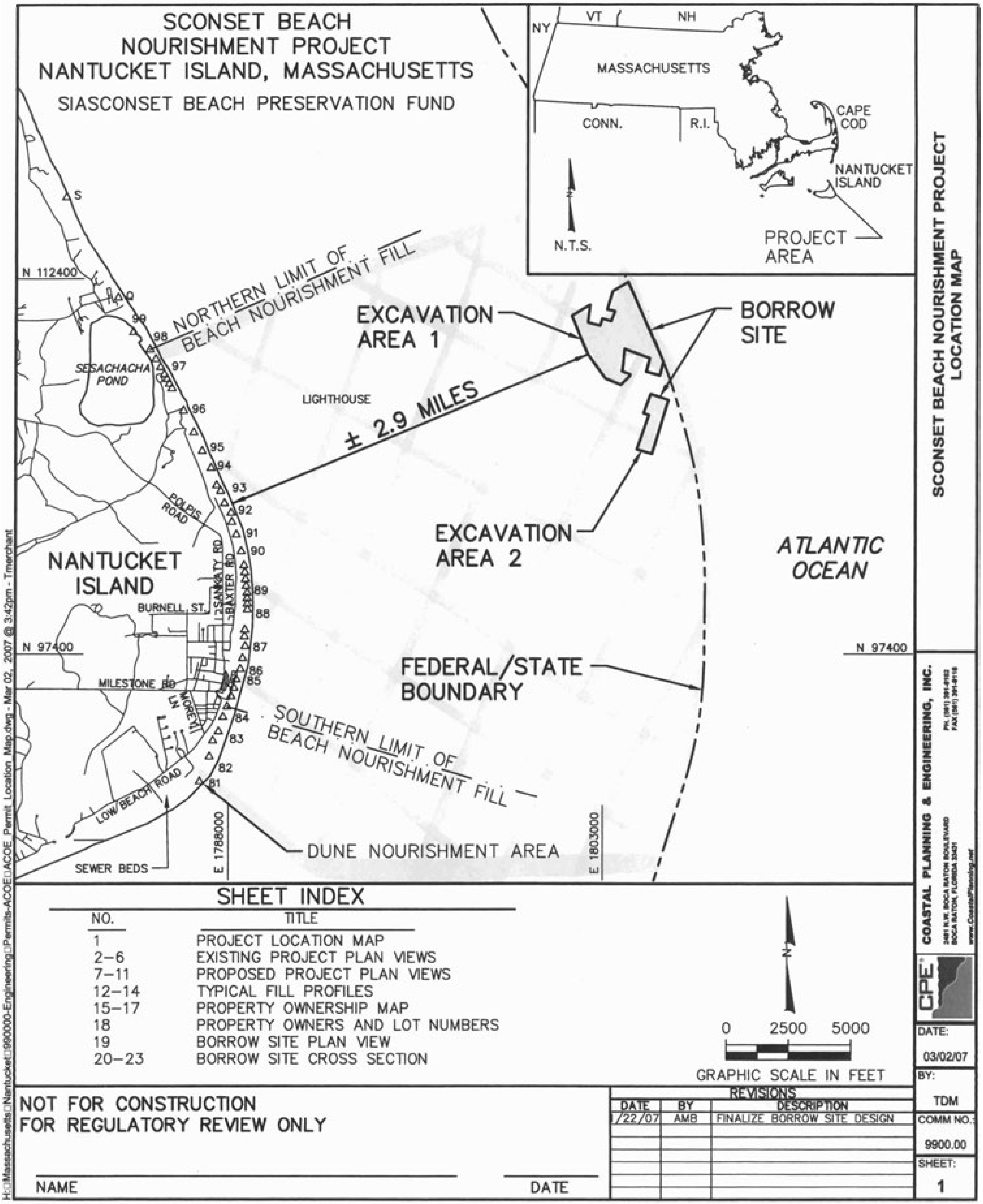
Appendix A
Figure 2

= Action Area



APPENDIX B.

MONITORING SPECIFICATIONS FOR HOPPER DREDGES

I. EQUIPMENT SPECIFICATIONS

A. Baskets or screening

Baskets or screening must be installed over the hopper inflows with openings no smaller than 4 inches by 4 inches to provide 100% coverage of all dredged material and shall remain in place during all dredging operations between June 1 and November 30 of any calendar year. Baskets/screening will allow for better monitoring by observers of the dredged material intake for sea turtles and their remains. The baskets or screening must be safely accessible to the observer and designed for efficient cleaning.

B. Draghead

The draghead of the dredge shall remain on the bottom **at all times** during a pumping operation, except when:

1) the dredge is not in a pumping operation, and the suction pumps are turned completely off;
2) the dredge is being re-oriented to the next dredge line during borrow activities; and
3) the vessel's safety is at risk (i.e., the dragarm is trailing too far under the ship's hull).

At initiation of dredging, the draghead shall be placed on the bottom during priming of the suction pump. If the draghead and/or dragarm become clogged during dredging activity, the pump shall be shut down, the dragarms raised, whereby the draghead and/or dragarm can be flushed out by trailing the dragarm along side the ship. If plugging conditions persist, the draghead shall be placed on deck, whereby sufficient numbers of water ports can be opened on the draghead to prevent future plugging.

Upon completion of a dredge track line, the drag tender shall:

1) throttle back on the RPMs of the suction pump engine to an idling speed (e.g., generally less than 100 RPMs) **prior to** raising the draghead off the bottom, so that no flow of material is coming through the pipe into the dredge hopper. Before the draghead is raised, the vacuum gauge on the pipe should read zero, so that no suction exists both in the dragarm and draghead, and no suction force exists that can impinge a turtle on the draghead grate;
2) hold the draghead firmly on the bottom with no flow conditions for approximately 10 to 15 seconds before raising the draghead; then, raise the draghead quickly off the bottom and up to a mid-water column level, to further reduce the potential for any adverse interaction with nearby turtles;
3) re-orient the dredge quickly to the next dredge line; and

4) re-position the draghead firmly on the bottom prior to bringing the dredge pump to normal pumping speed, and re-starting dredging activity.

C. Floodlights

Floodlights must be installed to allow the NMFS-approved observer to safely observe and monitor the baskets or screens.

D. Intervals between dredging

Sufficient time must be allotted between each dredging cycle for the NMFS-approved observer to inspect and thoroughly clean the baskets and screens for sea turtles and/or turtle parts and document the findings. Between each dredging cycle, the NMFS-approved observer should also examine and clean the dragheads and document the findings.

II. OBSERVER PROTOCOL

A. Basic Requirement

A NMFS-approved observer with demonstrated ability to identify sea turtle species must be placed aboard the dredge(s) being used, starting immediately upon project commencement to monitor for the presence of listed species and/or parts being entrained or present in the vicinity of dredge operations.

B. Duty Cycle

Beginning April 1, NMFS-approved observers are to be onboard for every week of the dredging project until project completion or November 30, whichever comes first. While onboard, observers shall provide the required inspection coverage on a rotating basis so that combined monitoring periods represent 100% of total dredging through the project period.

C. Inspection of Dredge Spoils

During the required inspection coverage, the trained NMFS-approved observer shall inspect the galvanized screens and baskets at the completion of each loading cycle for evidence of sea turtles or shortnose sturgeon. The Endangered Species Observation Form shall be completed for each loading cycle, whether listed species are present or not (Appendix E). If any whole (alive or dead) or turtle parts are taken incidental to the project(s), Julie Crocker (978) 281-9300 ext. 6530 or Pat Scida (978) 281-9208 must be contacted within 24 hours of the take. An incident report for sea turtle/shortnose sturgeon take (Appendix F) shall also be completed by the observer and sent to Julie Crocker via FAX (978) 281-9394 within 24 hours of the take. Incident reports shall be completed for every take regardless of the state of decomposition. NMFS will determine if the take should be attributed to the incidental take level, after the incident report is received. Every incidental take (alive or dead, decomposed or fresh) should be photographed, and photographs shall be sent to NMFS either electronically (julie.crocker@noaa.gov) or through the mail. Weekly reports, including all completed load sheets, photographs, and relevant incident reports, as well as a final report, shall be submitted to NMFS NER, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298.

D. Information to be Collected

For each sighting of any endangered or threatened marine species (including whales as well as sea turtles), record the following information on the Endangered Species Observation Form (Appendix E):

1) Date, time, coordinates of vessel
2) Visibility, weather, sea state
3) Vector of sighting (distance, bearing)
4) Duration of sighting
5) Species and number of animals
6) Observed behaviors (feeding, diving, breaching, etc.)
7) Description of interaction with the operation

E. Disposition of Parts

If any whole turtles or shortnose sturgeon (alive or dead, decomposed or fresh) or turtle or shortnose sturgeon parts are taken incidental to the project(s), Julie Crocker (978) 281-9328 ext. 6530 or Pat Scida (978) 281-9208 must be contacted within 24 hours of the take. All whole dead sea turtles or shortnose sturgeon, or turtle or shortnose sturgeon parts, must be photographed and described in detail on the Incident Report of Sea Turtle Mortality (Appendix F). The photographs and reports should be submitted to Julie Crocker, NMFS, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298. After NMFS is notified of the take, it may instruct the observer to save the animal for future analysis if there is freezer space. Regardless, any dead **Kemp's ridley** sea turtles shall be photographed, placed in plastic bags, labeled with location, load number, date, and time taken, and placed in cold storage. Dead turtles or turtle parts will be further labeled as recent or old kills based on evidence such as fresh blood, odor, and length of time in water since death. Disposition of dead sea turtles/shortnose sturgeon will be determined by NMFS at the time of the take notification. If the species is unidentifiable or if there are entrails that may have come from a turtle, the subject should be photographed, placed in plastic bags, labeled with location, load number, date and time taken, and placed in cold storage. Dead Kemp's ridley or unidentifiable species or parts will be collected by NMFS or NMFS-approved personnel (contact Julie Crocker at (978) 281-9328 ext. 6530).

Live turtles (both injured and uninjured) should be held onboard the dredge until transported as soon as possible to the appropriate stranding network personnel for rehabilitation (Appendix C). No live turtles should be released back into the water without first being checked by a qualified veterinarian or a rehabilitation facility. Virginia and Maryland stranding network members (for rehabilitating turtles) include Mark Swingle and/or Susan Barco at the Virginia Marine Science Museum [(757)437-4949], Jack Musick at the Virginia Institute of Marine Science [(804)684-

7313], and Dr. Brent Whitaker and/or David Schofield of the National Aquarium in Baltimore [(410)576-3853]. Mark Swingle/Susan Barco, Brent Whitaker/David Schofield, and the NMFS Stranding Network Coordinator ((978) 281-9300) should also be contacted immediately for any marine mammal injuries or mortalities.

III. OBSERVER REQUIREMENTS

Submission of resumes of endangered species observer candidates to NMFS for final approval ensures that the observers placed onboard the dredges are qualified to document takes of endangered and threatened species, to confirm that incidental take levels are not exceeded, and to provide expert advice on ways to avoid impacting endangered and threatened species. NMFS does not offer certificates of approval for observers, but approves observers on a case-by-case basis.

A. Qualifications

Observers must be able to:

1) differentiate between leatherback (*Dermochelys coriacea*), loggerhead *Caretta caretta*), Kemp's ridley *(Lepidochelys kempii*), green (*Chelonia mydas*), and hawksbill *(Eretmochelys imbricata*) turtles and their parts, and shortnose (*Acipenser brevirostrum*) and Atlantic (*Acipenser oxyrinchus oxyrinchus*) sturgeon and their parts;
2) handle live sea turtles and sturgeon and resuscitate and release them according accepted procedures;
3) correctly measure the total length and width of live and whole dead sea turtle and sturgeon species;
4) observe and advise on the appropriate screening of the dredge's overflow, skimmer funnels, and dragheads; and
5) identify marine mammal species and behaviors.

B. Training

Ideally, the applicant will have educational background in marine biology, general experience aboard dredges, and hands-on field experience with the species of concern. For observer candidates who do not have sufficient experience or educational background to gain immediate approval as endangered species observers, the below observer training is necessary to be considered admissible by NMFS. We can assist the ACOE by identifying groups or individuals capable of providing acceptable observer training. Therefore, at a minimum, observer training must include:

1) instruction on how to identify sea turtles and sturgeon and their parts;

2) instruction on appropriate screening on hopper dredges for the monitoring of sea turtles and sturgeon (whole or parts);

3) demonstration of the proper handling of live sea turtles and sturgeon incidentally captured during project operations. Observers may be required to resuscitate sea turtles according to accepted procedures prior to release;

4) instruction on standardized measurement methods for sea turtle and sturgeon lengths and widths; and

5) instruction on how to identify marine mammals; and

6) instruction on dredging operations and procedures, including safety precautions onboard a vessel.

APPENDIX C

Sea Turtle Handling and Resuscitation

It is unlikely that sea turtles will survive entrainment in a hopper dredge, as the turtles found in the dragheads are usually dead, dying, or dismantled. However, the procedures for handling live sea turtles follow in case the unlikely event should occur. These guidelines are adapted from 50 CFR § 223.206(d)(1).

Please photograph all turtles (alive or dead) and turtle parts found during dredging activities and complete the Incident Report of Sea Turtle Take (Appendix F).

Dead sea turtles
The procedures for handling dead sea turtles and parts are described in Appendix C-II-E.

Live sea turtles
When a sea turtle is found in the dredge gear, observe it for activity and potential injuries.

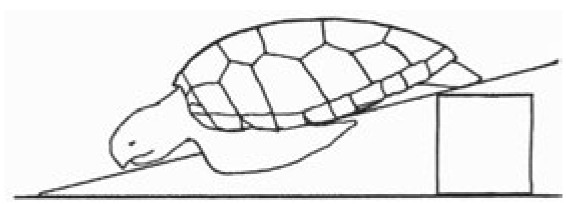
If the turtle is actively moving, it should be retained onboard until evaluated for injuries by a permitted rehabilitation facility. Due to the potential for internal injuries associated with hopper entrainment, it is necessary to transport the live turtle to the nearest rehabilitation facility as soon as possible, following these steps:

1) Contact the nearest rehabilitation facility to inform them of the incident. If the rehabilitation personnel cannot be reached immediately, please contact Julie Crocker at (978) 281-9300 ext. 6530 or Pat Scida at (978) 281-9128.
2) Keep the turtle shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers), and in a confined location free from potential injury.
3) Contact the crew boat to pick up the turtle as soon as possible from the dredge (within 12 to 24 hours maximum). The crew boat should be aware of the potential for such an incident to occur and should develop an appropriate protocol for transporting live sea turtles.
4) Transport the live turtle to the closest permitted rehabilitation facility able to handle such a case.

Do not assume that an inactive turtle is dead. The onset of rigor mortis and/or rotting flesh are often the only definite indications that a turtle is dead. Releasing a comatose turtle into any amount of water will drown it, and a turtle may recover once its lungs have had a chance to drain.

If a turtle appears to be comatose (unconscious), contact the designated stranding/rehabilitation personnel immediately. Once the rehabilitation personnel has been informed of the incident, attempts should be made to revive the turtle at once. Sea turtles have been known to revive up to 24 hours after resuscitation procedures have been followed.

- Place the animal on its bottom shell (plastron) so that the turtle is right side up and elevate the hindquarters at least 6 inches for a period of 4 up to 24 hours. The degree of elevation depends on the size of the turtle; greater elevations are required 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 then alternate to the other side.
- Periodically, gently touch the eye and pinch the tail (reflex test) to see if there is a response.
- Keep the turtle in a safe, contained place, shaded, and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers) and observe it for up to 24 hours.
- If the turtle begins actively moving, retain the turtle until the appropriate rehabilitation personnel can evaluate the animal. The rehabilitation facility should eventually release the animal in a manner that minimizes the chances of re-impingement and potential harm to the animal (i.e., from cold stunning).
- Turtles that fail to move within several hours (up to 24) must be handled in the manner described in Appendix C-II-E, or transported to a suitable facility for necropsy (if the condition of the sea turtle allows and the rehabilitation facility wants to necropsy the animal).



Stranding/rehabiliton contacts

Sea Turtles in Massachusetts

NMFS Stranding Hotline: (978) 281-9351 or NERStranding.staff@noaa.gov

New England Aquarium (617)973-5247

South of Boston

Wellfleet Bay Wildlife Sanctuary 508-349-2615 x-102

Marine Mammals in Massachusetts

NMFS Stranding Hotline: (978) 281-9351 or NERStranding.staff@noaa.gov

North of Boston

▸Whale Center of New England 978-281-6351

South of Boston

Cape Cod Stranding Network 508-743-9548

National Marine Life Center 508-743-9888

APPENDIX D
Protocol for Collecting Tissue from Sea Turtles for Genetic Analysis

Materials for Collecting Genetic Tissue Samples

- surgical gloves
- alcohol swabs
- betadine swabs
- sterile disposable biopsy punches
- sterile disposable scalpels
- permanent marker to externally label the vials
- scotch tape to protect external labels on the vials
- pencil to write on internal waterproof label
- waterproof label, 1/4" x 4"
- screw-cap vial of saturated NaCl with 20% DMSO*, wrapped in parafilm
- piece of parafilm to wrap the cap of the vial after sample is taken
- vial storage box

* The 20% DMSO buffer within the vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you wear gloves each time you collect a sample and handle the buffer vials. DO **NOT** store the buffer where it will experience extreme heat. The buffer must be stored at room temperature or cooler, such as in a refrigerator.

Please collect two small pieces of muscle tissue from all live, comatose, and dead stranded loggerhead, green, leatherback, and hybrid sea turtles (and any hawksbills, although this would be a rare incident). A muscle sample can be obtained no matter what stage of decomposition a carcass is in. Please utilize the equipment in these kits for genetic sampling of **turtles only** and contact the NMFS sea turtle stranding coordinator when you need additional biopsy supplies.

Sampling Protocol for Dead Turtles

1. Put on a pair of surgical gloves. The best place to obtain the muscle sample is on the ventral side where the front flippers insert near the plastron. It is not necessary to cut very deeply to get muscle tissue.

2. Using a new (sterile and disposable) scalpel cut out two pieces of muscle of a size that will fit in the vial.

3. Transfer both samples directly from the scalpel to a single vial of 20% DMSO saturated with salt.

4. Use the pencil to write the stranding ID, date, species ID and SCL on the waterproof label and place it in the vial with the samples.

5. Label the outside of the vial using the permanent marker with stranding ID, date, species ID and SCL .

6. Apply a piece of clear scotch tape over the what you have written on the outside of the vial to protect the label from being erased or smeared.

7. Wrap parafilm around the cap of the vial by stretching as you wrap.

8. Place the vial in the vial storage box.

9. Complete the Sea Turtle Biopsy Sample Collection Log.

10. Attach a copy of the STSSN form to the Collection Log - be sure to indicate on the STSSN form that a genetic sample was taken.

11. Dispose of the used scalpel and gloves. It is very important to use a new scalpel for each animal to avoid cross contamination.

At the end of the calendar year submit all genetic samples to:

Sea Turtle Stranding Coordinator
NMFS Protected Resources Division
One Blackburn Drive
Gloucester, MA 01930
(978)281-9300

APPENDIX E

ENDANGERED SPECIES OBSERVER FORM
Borrow Area Dredging
Sconset Beach Project

Daily Report

Date: ______________________________
Geographic Site:____
Location: Lat/Long ____________________ Vessel Name __________________________

Weather conditions:____
____

Water temperature: Surface ____________ Below midwater (if known) ____________

Condition of screening apparatus: ____
____
____

Incidents involving endangered or threatened species? (Circle) Yes No
(*If yes, fill out Incident Report of Sea Turtle/Shortnose Sturgeon Mortality*)

Comments (type of material, biological specimens, unusual circumstances, etc:)
____
____
____

Observer's Name: ____
Observer's Signature: ____

Species	# of Sightings	# of Animals	Comments

APPENDIX F

Incident Report of Sea Turtle Take

Species _____________ Date _______________ Time (specimen found) ________________

Geographic Site ____
Location: Lat/Long ____
Vessel Name ________________________ Load # ____________________________
Begin load time ______________________ End load time________________________
Begin dump time _____________________ End dump time _______________________

Sampling method ____
Condition of screening ____
Location where specimen recovered____
____

Draghead deflector used? YES NO Rigid deflector draghead? YES NO
Condition of deflector ____
____

Weather conditions____
____

Water temp: Surface ________________ Below midwater (if known) ____________________
Species Information: *(please designate cm/m or inches.)*
Head width ___________________________ Plastron length ____________________________
Straight carapace length ________________ Straight carapace width______________________
Curved carapace length _________________ Curved carapace width ______________________

Condition of specimen/description of animal (please complete attached diagram)

____
____
____

Turtle Decomposed: NO SLIGHTLY MODERATELY SEVERELY

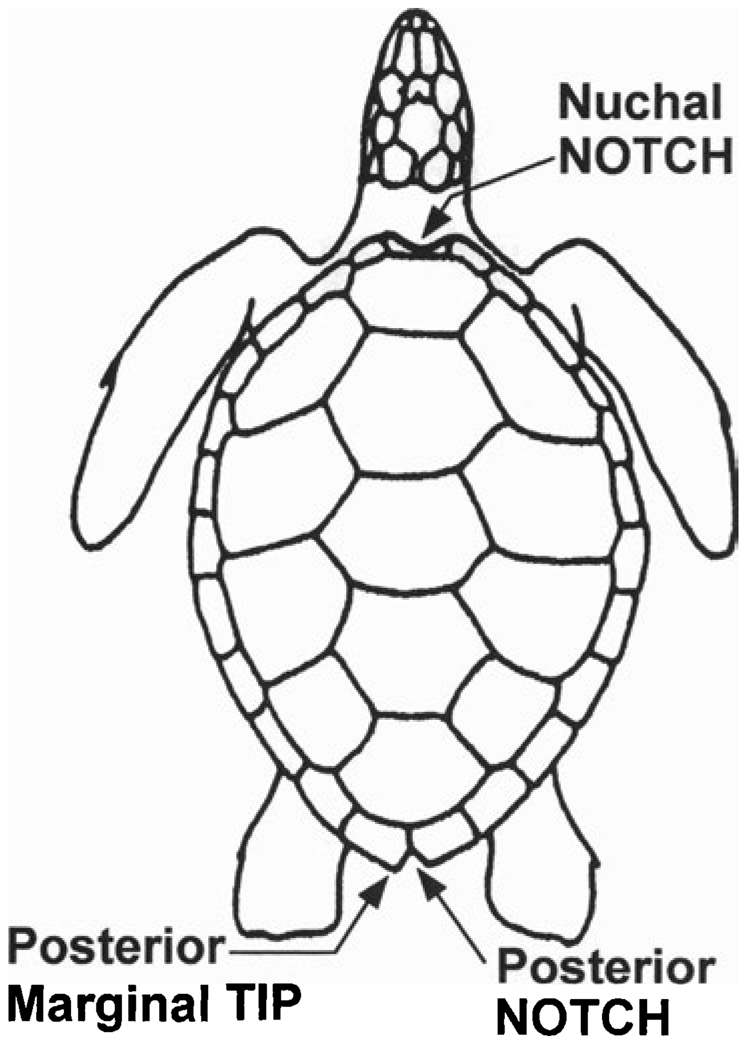
Turtle tagged: YES NO *Please record all tag numbers.* Tag # ______________________
Genetic sample taken: YES NO
Photograph attached: YES NO
(please label *species, date, geographic site* and *vessel name* on back of photograph)

Comments/other (include justification on how species was identified) ____________________
____
____
____

Observer's Name ____
Observer's Signature ____________________________________

Incident Report of Sea Turtle Take

Draw wounds, abnormalities, tag locations on diagram and briefly describe below.



Description of animal: