Endangered Species Act - Section 7 Consultation
Biological Opinion

Agency:	National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Southeast Regional Office (SERO)
Activity:	Reinitiation of Endangered Species Act (ESA) Section 7 Consultation on the Continued Authorization of the Fishery Management Plan (FMP) for Coastal Migratory Pelagic (CMP) Resources in the Atlantic and Gulf of Mexico under the Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA) Consultation No. SER-2015-15985
Consulting Agency:	NOAA, NMFS, SERO, Protected Resources Division (F/SER3) and Sustainable Fisheries Division (F/SER2)
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List of Acronyms and Abbreviations

ACCSP	Atlantic Coastal Cooperative Statistics Program
ACL	Annual Catch Limits
ALWTRT	Atlantic Large Whale Take Reduction Team
ALWTRP	Atlantic Large Whale Take Reduction Plan
ASMFC	Atlantic States Marine Fisheries Commission
BIRNM	Buck Island Reef National Monument
BOEM	Bureau of Ocean Energy Management
CAFO	Concentrated Animal Feeding Operations
CCL	Curved Carapace Length
CFLP	Coastal Fisheries Logbook Program
CMP	Coastal Migratory Pelagics
CPA	Central Planning Area
CPUE	Catch Per Unit Effort
DNA	Deoxyribonucleic Acid
DO	Dissolved Oxygen
DoD	Department of Defense
DPS	Distinct Population Segment
DTRU	Dry Tortugas Recovery Unit
DWH	DEEPWATER HORIZON
EFH	Essential Fish Habitat
EFP	Exempted Fishing Permit
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
F/SER2	NMFS Southeast Regional Office, Sustainable Fisheries Division
F/SER3	NMFS Southeast Regional Office, Protected Resources Division
FIN	Fisheries Information Network
FMP	Fishery Management Plan
FP	Fibropapillomatosis
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
GADNR	Georgia Department of Natural Resources
GCRU	Greater Caribbean Recovery Unit
GMFMC	Gulf of Mexico Fishery Management Council
GMT	SEFSC Gear Monitoring Team
GOM	Gulf of Mexico
IPCC	Intergovernmental Panel on Climate Change
ISED	International Sawfish Encounter Database
ISFMP	Interstate Fishery Management Plan
ITS	Incidental Take Statement
LAPP	Limited Access Privilege Program
LCS	Large Coastal Shark

LOA	Letter of Acknowledgement
LOF	List of Fisheries
MMPA	Marine Mammal Protection Act of 1972
MMS	Minerals Management Service
MRFSS	Marine Recreational Fisheries Statistics Survey
MRIP	Marine Recreational Information Program
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NEAMAP	Northeast Area Monitoring and Assessment Program
NCDMF	North Carolina Division of Marine Fisheries
NEFMC	Northeast Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NERO	Northeast Regional Office
NGMRU	Northern Gulf of Mexico Recovery Unit
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NRC	National Research Council
NRU	Northern Recovery Unit
NWA	Northwest Atlantic
OLE	NMFS Office of Law Enforcement
PBR	Percent Biological Removal
PCB	Polychlorinated Biphenyls
PFRU	Peninsular Florida Recovery Unit
PSE	Proportional Standard Error
RPAs	Reasonable and Prudent Alternatives
RPMs	Reasonable and Prudent Measures
SCDNR	South Carolina Department of Natural Resources
SCL	Straight Carapace Length
SAFMC	South Atlantic Fishery Management Council
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SRP	Scientific Research Permit
STSSN	Sea Turtle Stranding and Salvage Network
TED	Turtle Excluder Device
TEWG	Turtle Expert Working Group
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USN	United States Navy
VTR	Vessel Trip Reporting Program
YOY	Young-Of-The-Year

Introduction

Section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. § 1531 et seq.), requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of any critical habitat of such species. To fulfill this obligation, Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any action they propose that "may affect" listed species or designated critical habitat. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

A federal action agency requests consultation when it determines that a proposed action "may affect" listed species or designated critical habitat. Consultations on most listed marine species and their designated critical habitat are conducted between the action agency and NMFS. The consultation is concluded after NMFS concurs with an action agency that its action is not likely to adversely affect a listed species or critical habitat or issues a Biological Opinion ("Opinion") that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its critical habitat. If either of those circumstances is expected, the Opinion identifies reasonable and prudent alternatives (RPAs) to the action as proposed, if any, that can avoid jeopardizing listed species or resulting in the destruction/adverse modification of critical habitat. The Opinion states the amount or extent of incidental take of the listed species that may occur, specifies reasonable and prudent measures (RPMs) that are required to minimize the impacts of incidental take and monitoring to validate the expected effects of the action, and recommends conservation measures to further conserve the species.

This document represents NMFS's Opinion on the effects of its continued authorization of fishing for species managed by the CMP FMP in the U.S. Atlantic and Gulf of Mexico (GOM) Exclusive Economic Zone (EEZ) on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. NMFS has dual responsibilities as both the action agency under the MSFCMA (16 U.S.C. §1801 et seq.) and the consulting agency under the ESA. For the purposes of this consultation, F/SER2 is considered the action agency and the consulting agency is F/SER3.

This Opinion has been prepared in accordance with Section 7 of the ESA and regulations promulgated to implement that section of the ESA. It is based on information provided in the original CMP FMP and subsequent amendments to the CMP FMP, particularly Draft CMP Amendment 20B (GMFMC et al. 2013), as well as information provided in recovery plans, research, population modeling efforts, and other relevant published and unpublished scientific and commercial data cited in the Literature Cited section of this document.

1 Consultation History

Previous Consultations
An informal Section 7 consultation was conducted on the original FMP (NMFS 1983), which concluded the proposed management measures in the CMP FMP were not likely to adversely affect any listed species under the ESA. The consultation did not, however, analyze the effects of the actual operation of the fisheries.

The effects of CMP fisheries on endangered and threatened species were first considered in an April 28, 1989, Opinion, which analyzed the effects of all commercial fishing activities in the Southeast Region as part of a formal Section 7 consultation on NMFS's Marine Mammal Authorization Program (NMFS 1989a). The Opinion concluded that commercial fishing activities in the southeastern United States were not likely to jeopardize the continued existence of endangered or threatened species. The incidental take of 10 Kemp's ridley, green, hawksbill, or leatherback sea turtles; 100 loggerhead sea turtles; or 100 shortnose sturgeon was allotted to each fishery identified in the incidental take statement (ITS). The CMP hook-and-line and gill net fisheries were 2 of the fisheries identified. The amount of incidental take was later amended by a July 5, 1989, Opinion, which reduced the amount of take to only 10 documented Kemp's ridley, green, hawksbill, or leatherback sea turtles; 100 loggerhead sea turtles; or 100 shortnose sturgeon for all commercial fishing activities conducted in the combined Atlantic Ocean and the GOM fisheries (NMFS 1989b).

On November 6, 1991, a formal Section 7 consultation on Amendment 6 to the FMP was initiated. The resulting August 19, 1992, Opinion on the effects of commercial fishing activities under the CMP FMP and Amendment 6 found that the regulatory actions were not likely to adversely affect listed species (NMFS 1992). Additionally, the Opinion concluded fishing activities conducted under the authority of the CMP FMP might affect, but were not likely to jeopardize, the continued existence of listed sea turtles. An ITS with associated RPMs and terms and conditions was issued; conservation recommendations were also made. The incidental take levels for listed species for all fisheries in the United States established in the July 5, 1989, Opinion were retained. Nevertheless, the August 19, 1992, Opinion also stated that Section 7 consultation was to be reinitiated if a total documented take of 5 Kemp's ridley, green, hawksbill, or leatherback sea turtles, or 25 loggerhead sea turtles, was met or exceeded for the combined CMP gill net and hook-and line-fisheries.

Subsequent amendments to the CMP FMP and emergency actions were all either consulted on informally and found not likely to adversely affect any threatened or endangered species, or were determined by F/SER2 to have no effect and not warrant consultation. None of the actions were found to change the prosecution of CMP fisheries in any manner that would alter the findings of the August 19, 1992, Opinion.

On November 8, 2004, F/SER2 sent a memorandum to F/SER3 requesting initiation of the Section 7 consultation process for Amendment 15 to the CMP FMP. Through this amendment and its associated rule, F/SER2 sought to implement 2 actions: (1) establish an indefinite limited access program for the federal king mackerel fishery; and (2) change the fishing year for Atlantic migratory group king and Spanish mackerel from April 1 through March 31 to March 1 through February 28 or 29 for the Atlantic groups of king and Spanish mackerel. To help restrict harvest in the king mackerel fishery, a moratorium on the issuance of new commercial vessel permits was established in 1998 and was scheduled to expire in October 2005. Amendment 15 effectively extended that moratorium indefinitely by establishing a limited access program for the federal king mackerel fishery. The intent of the program was to maintain the commercial king mackerel fishery at current levels of participation and possible reductions through attrition. The fishing year change was intended to ensure mackerel fisheries in the Atlantic would be open during March when several other fisheries (e.g., snapper-grouper) would be closed. On February 14, 2005, NMFS determined that allowing the CMP fisheries to continue during the reinitiation period would not violate Section 7(a)(2) or 7(d). This allowed review and implementation of Amendment 15 to proceed while the consultation process for the entire fishery continued. The final rule implementing Amendment 15 was published on July 7, 2005 (70 FR 39187).

On April 6, 2005, F/SER2 requested initiation of the Section 7 consultation process on the proposed implementation of Final Generic Amendment 3 for addressing essential fish habitat (EFH) requirements, habitat areas of particular concern, and adverse effects of fishing in FMPs of the Gulf of Mexico Fishery Management Council (GMFMC). The proposed action included establishing EFH for CMP species in the GOM. On August 25, 2005, NMFS determined that the measures proposed in Generic Amendment 3 would not modify fishing activities under the CMP FMP during the consultation period in any way that would invalidate the previous Section 7(a)(2) or 7(d) determination. The Final Rule to implement Generic Amendment 3 was published on December 20, 2005.

Ultimately, NMFS determined reinitiation of formal consultation was warranted to evaluate the effect of fishing activities authorized under the CMP FMP to address new sea turtle information. Additionally, 2 new species had been listed under the ESA; in April 2003, NMFS listed the U.S. distinct population segment (DPS) of smalltooth sawfish as endangered and in May 2006, NMFS listed elkhorn and staghorn corals as threatened under the ESA.

On August 13, 2007, NMFS completed its Opinion on the continued authorization of GOM and South Atlantic CMP fisheries, as managed under the CMP FMP. The Opinion concluded the continued authorization of the fisheries may adversely affect green, leatherback, hawksbill, Kemp's ridley, and loggerhead sea turtles and smalltooth sawfish. However, it determined the continued operation of the CMP fisheries is not likely to jeopardize the continued existence of sea turtles or smalltooth sawfish. The 2007 Opinion also concluded that ESA-listed whales, elkhorn and staghorn coral, and Gulf sturgeon were all not likely to be adversely affected by the CMP fisheries. The Opinion also determined the designated critical habitat for the North Atlantic right whale would not be adversely affected by activities authorized by the CMP FMP. In a separate consultation memorandum dated May 18, 2010, NMFS concluded the continued authorization of the CMP fisheries was not likely to adversely affect elkhorn- and staghorn-designated critical habitat.

Cause for Reinitiation and Present Consultation
As provided in 50 CFR 402.16, reinitiation of formal consultation is required if 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 the taking specified in the ITS is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

Since the completion of the aforementioned consultations, incidental take authorized via the Opinion has not been exceeded. On February 6, 2012, however, 5 DPSs of Atlantic sturgeon were listed under the ESA; therefore, at least 1 of the 4 reinitiation criteria had been met. On November 26, 2012, F/SER2 requested initiation of the Section 7 consultation process on the proposed implementation of a generic amendment to the CMP FMP. The request noted the listing of the 5 DPSs of Atlantic sturgeon under the ESA. On January 11, 2013, NMFS determined the continued authorization of the CMP fisheries during the reinitiation period would not violate Section 7(a)(2) or 7(d). This allowed review and implementation of Amendment 20B to proceed while the consultation process for the CMP fisheries continued.

When consulting on FMP amendments, NMFS must consider not only the effects of specific management measures being proposed, but also the effects of all discretionary fishing activities authorized under the amended FMP. Therefore, the proposed action potentially subject to Section 7 consultation is the continued authorization of fishing under the CMP FMP.

2 Description of the Proposed Action and Action Area

F/SER2 is proposing to continue its authorization of the CMP fisheries via the CMP FMP and implementing regulations at 50 CFR Part 622 under the authority of the MSFCMA. The MSFCMA is the governing authority for all fishery management activities that occur in federal waters within the United States' 200-nautical-mile (nmi) limit, or EEZ. Responsibility for federal fishery management decision making under the CMP FMP is divided between NMFS, and jointly, the GMFMC, South Atlantic Fishery Management Council (SAFMC), and Mid-Atlantic Fishery Management Council (MAFMC). This Opinion analyzes the effects of all fishing activities prosecuted under the CMP FMP, as amended to date.

A detailed description of the CMP fisheries was included in Amendment 18 to the FMP and is incorporated herein by reference. Draft Amendment 20B to the CMP FMP provides additional information on the fisheries and the following sections provide a brief summary, with an emphasis on the characteristics relevant to the analysis of potential effects on endangered and threatened species.

2.1 Description of Managed CMP Species

CMP fisheries managed under the FMP include king mackerel, Spanish mackerel, and cobia; bluefish, cero, little tunny, and dolphin were part of the FMP, but were removed from management via Amendment 18 (GMFMC and SAFMC 2011).

King Mackerel
King mackerel is a pelagic species found throughout the GOM and Caribbean Sea and in the western Atlantic from the Gulf of Maine to Brazil at depths of up to 200 m. Adults are typically found in the southern portion of the species' range in the winter and in the northern portion of the range in the summer. This seasonal migratory pattern is likely a response to both water temperature and food availability. Larger individuals are often solitary and occur around structures, such as wrecks and oil rigs (GMFMC and SAFMC 1981). Smaller individuals form immense schools, which tend to congregate in areas of bottom relief, such as holes or reefs. Sometimes small king mackerel run in schools of similarly sized Spanish mackerel (Brooks and Ortiz 2004).

Spanish Mackerel
Spanish mackerel is a pelagic species, which occurs to depths of 75 meters (m) throughout the GOM and in the western Atlantic from southern New England to the Florida Keys (Collette and Russo 1979). Adults usually are found from the low-tide line to the edge of the continental shelf, and along coastal areas. They inhabit estuarine areas, especially the higher salinity areas, during seasonal migrations, but are considered rare and infrequent in many GOM estuaries. This species, like king mackerel, exhibits seasonal migratory behavior; adults generally move from wintering areas off south Florida and Mexico to more northern latitudes in the spring and summer. Spanish mackerel form immense schools of similar sized individuals (GMFMC and SAFMC 1981).

Cobia
Cobia is distributed worldwide in tropical, subtropical, and warm-temperate waters to depths of 125 m. In the western Atlantic it occurs from Canada south to Argentina, including the Caribbean Sea. It is abundant in warm waters off the coast of the U.S. from the Chesapeake Bay south and throughout the GOM. Cobia prefers to reside near any structure that interrupts the open water such as pilings, buoys, platforms, anchored boats, and flotsam. The species can also found inshore inhabiting bays, inlets, and mangroves.

2.2 Description of the Gear Used in CMP Fisheries

The 3 main gear types used in CMP fisheries are hook-and-line, cast net, and gill net. Diver-held spearguns are also a main gear type specific to cobia.

2.2.1 Hook-and-Line Gear

Hook-and-line gear includes handline, rod-and-reel, and bandit gear. Commercial vessels use all 3 types of gear while recreational fishers only use rod-and-reel. Trolling is by far the most common fishing technique employing hook-and-line gear for these species, and is used by both commercial and recreational fishers. Trolling involves towing 1-8 lines at various depths with artificial spoons, feathered jigs, or hooks commonly baited with mullet or menhaden through the water behind a slow (e.g., 3-6 knots [kt]) moving vessel. Recreational fishers may also employ a technique called jigging, which involves casting a lure or bait into the water and retrieving it with a jerking motion, keeping the lure or bait near the surface of the water. Fishers using this technique catch mostly Spanish mackerel. Chum is used to bring fish to the surface; glass minnows or small sardines are most frequently used.

2.2.2 Cast Nets

A cast net is a circular, hand-held net with weights attached to the perimeter. The basic structure of a cast net includes a handline,[1] swivel,[2] horn,[3] brail lines,[4] netting, and leadline.[5] When thrown or cast properly, the net opens up and lands on the surface of the water in a flat circular shape. The leadline causes the net to sink quickly, trapping fish underneath the net. When the handline is pulled, the brail lines draw up, closing the net to form a pocket, catching the trapped fish. The whole net is then pulled out of the water. The mesh size used varies, but normally ranges from 3.25-inches (in) to 4.5-in stretched. Some fishers carry several different mesh sizes onboard so they can select the 1 they expect to best gill the size of target species they encounter.

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[1] A rope, attached at one end to a swivel and the caster's wrist at the other.
[2] Two metal loops or rings attached together that turn at both ends.
[3] A ring with an indentation around the center where the top of the net is tied.
[4] Lines attached to the swivel at one end and to the leadline at the other. Their function is to pucker the net, thus trapping the catch.
[5] A rope with sinkers attached; this rope is at the outside perimeter of the net to sink it.

2.2.3 Gill Nets

A gill net is a vertical wall of monofilament or twine netting designed to wedge and gill fish as they attempt to swim through. Wedging occurs when an animal is stuck in the mesh at its point of greatest girth. Gilling occurs when a fish penetrates the mesh and the twine slips behind the gill cover preventing the fish from escaping. Gill nets are also known to entangle non-targeted fish and other marine organisms (DeAlteris 1998).

Gill nets are generally characterized as drift (unanchored), set (anchored), or run-around. Drift gill nets (defined in 50 CFR Part 622.2) are prohibited in the CMP fisheries. Set nets, which may either be sinking or floating, are basically stationary anchored nets. In some areas, fishers either choose or are required to reduce the vertical profile of their gill nets by using “tie-downs.” Tie-downs refer to twine used between the floatline and the lead line as a way to create a pocket or bag of netting to trap fish. Fishers may use tie-downs in order to better entangle bottom species (e.g., flounder) in the gill net or to reduce vertical profile of the net to minimize protected species entanglements. Sink gill nets and run-around gill nets are used in the CMP fisheries and are discussed in more detail below.

Drift Gill Nets
Drift gill nets are normally set in a straight line off the vessel’s stern, allowed to drift at the surface for a period of time and then hauled back onto the vessel when the catch is adequate. Observed drift gill net operations for Spanish and king mackerel in 2009 documented average set time of 0.10 hours, haul time of 0.52 hours, and the entire fishing process (time net was first set until time haul back was completed) averaged 2.15 hours (Passerotti et al. 2010).

Sink Gill Nets
A sink gill net is not explicitly defined in 50 CFR Part 600.10 or 622, but refers to a gill net that has the top line submerged beneath the water. Most sink gill nets used are stab nets. A stab net is legally defined in 50 CFR Part 622.2 as a gill net, other than a long gill net or trammel net, whose weight line sinks to the bottom and submerges the float line. The term is commonly used to refer to a type of sink gill net fishing technique that is fished in an active manner (i.e., set near schools of mackerel located with fish finders with short soak times). Although federal regulations do not require fishers to tend their nets, they often do to avoid capturing unwanted bycatch and to ensure strong currents do not foul the gear. Fishers usually fish 5 or 6 nets (each 400 yards [yd] in length) simultaneously, moving from 1 net to another throughout the day. They generally fish the gear within a couple of hours, depending on the catch (GMFMC et al. 2004). Observed Spanish mackerel sink gill net operations in 2012 documented nets with 3.0-3.8 in stretched mesh, an average set time of 0.10 hours, haul time of 0.5 hours, and the entire fishing process (time net was first set until time haul back was completed) averaged 1.9 hours (Mathers et al. 2013).

Run-Around (Strike) Gill Nets
Run-around gill nets, also known as strike nets, are often used in conjunction with spotter aircraft to actively encircle a school of fish (Steve et al. 2001). In general, the nets are set encircling the

school, or a part of the school, and then closed off. The process of setting, retrieving, and unloading a net can take several hours. If the net is set during the day, it is frequently left in the water until dusk when the fish cannot see as well, thus are unlikely to find a way to escape. Following placement of the net, movement of fish into the net to become gilled is stimulated by the use of noise (e.g., revving the engine, striking the water) or light. The net is then retrieved using a mechanical drum elevated above the rear deck of the vessel, starting with the last part set, and laying the net on the deck for storage. The fish are typically not removed from the net until the boat is docked. Any animals not gilled would be able to escape as the net is being pulled in (i.e., not retrieved like a seine). Observed king mackerel strike gill net operations in 2012 documented nets with 3.5-4.8 in stretched mesh, an average set time of 0.05 hours, haul time of 1.66 hours, and the entire fishing process (time net was first set until time haul back was completed) averaged 8.46 hours (Mathers et al. 2013).

2.2.4 Spearguns

Spearguns are devices that use rubber bands or pneumatic pressure to throw a spear shaft at a targeted fish. Sometimes, a diver will employ ammunition cartridges (e.g., .223 or .38 caliber bullet) to a casing at the shaft tip known as a powerhead, which efficiently delivers a lethal charge to their quarry. While spearfishing may result in coral breakage as divers subdue a fish, use of this gear on CMP species is not expected to cause any such impacts due to the pelagic nature of the managed species.

2.3 Description of the Fisheries

Two migratory groups, GOM and Atlantic, are recognized for king mackerel and Spanish mackerel. Commercial landings data come from the Southeast Fisheries Science Center (SEFSC) Accumulated Landings System, the Northeast Fisheries Science Center (NEFSC) Commercial Fisheries Data Base System, and SEFSC Coastal Fisheries Logbook Program (CFLP) database. Recreational data come from the Marine Recreational Fisheries Statistics Survey (MRFSS), the Marine Recreational Information Program (MRIP), the Headboat Survey, and the Texas Parks and Wildlife Department. All landings are in whole weight.

There is currently no observer program in place for the commercial CMP fisheries. However, mackerel gill net sets are sometimes observed indirectly via other observer programs. For example, between November 1994 and July 2005, NMFS’s Northeast Fishery Science Center observed 1,142 mackerel sets off North Carolina, a small percentage of which were conducted in EEZ waters (M. Tork, pers comm.).

Detailed descriptions of the CMP fisheries and the CMP FMP management history were included in Amendment 18 and Amendment 20B to the CMP FMP (GMFMC and SAFMC 2011; GMFMC and SAFMC 2013) and is incorporated herein by reference. Management actions since the last Opinion, including those in Amendment 20B, have been isolated to administrative revisions and regulatory modifications (e.g., shift from calendar year to fishing year, allocation shifts, trip limit reductions within existing annual catch limits [ACL] to extend seasons, ACL shifts/adjustments amongst fishing zones, modifications to framework provisions). The CMP fisheries are further summarized below.

2.3.1 Participation and Effort

The following table summarizes the number of CMP permits for the commercial sector.

Table 1. Number of Commercial Permits Associated with the CMP Fisheries as of October 9, 2014

	Valid[1]
King Mackerel	1,346
King Mackerel Gill Net	20
Spanish Mackerel	1,741

[1]Non-expired; expired permits may be renewed within 1 year of expiration.

Extrapolated recreational effort derived from the MRFSS/MRIP database, which does not include Texas, can be characterized in terms of the number of trips as follows:

> Target effort: The number of individual angler trips, regardless of trip duration, where the angler indicated that the species was targeted as either the first or the second primary target for the trip. The species did not have to be caught.
> Catch effort: The number of individual angler trips, regardless of trip duration and target intent, where the individual species was caught. The fish caught did not have to be kept.
> All trips: The total estimated number of individual angler recreational trips taken, regardless of target intent or catch success.

Estimates of average annual recreational effort, 2009-2013, for the CMP species are provided in Tables 2-3. In each table, where appropriate, the "total" refers to the total number of target or catch trips, as appropriate, while "all trips" refers to the total number of trips across all species regardless of target intent of catch success. Among the 3 species examined, Spanish mackerel is subject to more target and catch effort than the other 2 species for the GOM and Atlantic states (Tables 2-3).

Table 2. Average Annual Recreational Effort by Target Trips and Catch Trips for Each Mode in the Gulf of Mexico, 2009-2013

Species	Shore	Charter	Private	Total	All Trips
Target Trips					
King Mackerel	245,652	34,574	195,470	475,696	7,163,060
Spanish Mackerel	556,200	26,617	212,902	795,718	
Cobia	49,510	1,947	109,741	161,197	
Catch Trips					
King Mackerel	42,674	42,623	127,089	212,385	7,160,169
Spanish Mackerel	606,659	54,315	481,473	1,142,448	
Cobia	7,139	7,497	62,564	77,201	

Source: SERO-LAPP
The "All Trips" column is the sum of all trips from 2009-2013. Target trips are defined as primary or secondary species targeted. Recreational effort is included for all modes however there are no shore mode statistics for Texas since Texas does not survey shore anglers. The number of target trips for cobia do not include target trips from Texas because the Texas recreational survey does qualify cobia as a target species.

Table 3. Average annual recreational effort by target trips and catch trips for each mode in the South Atlantic from 2009-2013

Species	Shore	Charter	Private	Total	All Trips
Target Trips					
King Mackerel	99,101	11,412	305,429	415,943	5,846,162
Spanish Mackerel	226,124	20,099	236,829	483,052	
Cobia	34,666	8,240	227,331	270,238	
Catch Trips					
King Mackerel	9,238	14,771	127,745	151,754	3,086,829
Spanish Mackerel	179,948	21,979	197,117	399,043	
Cobia	7,744	5,321	53,504	66,569	

Source: SERO-LAPP
The "All Trips" column is the sum of all the trips from 2009-2013. Target trips are defined as primary or secondary species targeted.

2.3.2 King Mackerel

Commercial king mackerel fisheries operating off the west coast of Florida utilize both hook-and-line and gill net gear. Those operating off Alabama, Mississippi, Louisiana, and Texas utilize only hook-and-line gear. The majority of king mackerel landings come from the western GOM and off south Florida from November through March. Landings in Virginia-New York are trivial and appear to be a bycatch species; from 2009-2013, the most king mackerel to be landed in these northern states was 170 pounds (lb) in 2011. A winter troll fishery operates along the east and south GOM coast, and a run-around gill net fishery operates off the Florida Keys during January (GMFMC et al. 2004). In the Atlantic, gill nets were the predominant gear used to harvest king mackerel from 1966-1988. However, because of various state and federal restrictions on the use of gill nets, most (98%) Atlantic king mackerel are now captured with hook-and-line gear (GMFMC et al. 2004); the remaining 2% is taken primarily in state waters off North Carolina using sink nets, with most effort expended in November and December. In 2013, the most prevalent gear for all king mackerel landings combined was hook-and-line (86.7%) followed by gill nets (12.9%); all other gears each accounted for less than 0.5% of the total catch (Figure 1). While hook-and-line gear is cited as the prevalent gear, within that category trolling is the predominant method to harvest king mackerel. For instance, in 1977, 98% of king mackerel on the Florida west coast was landed by troll boats (GMFMC and SAFMC 1983).

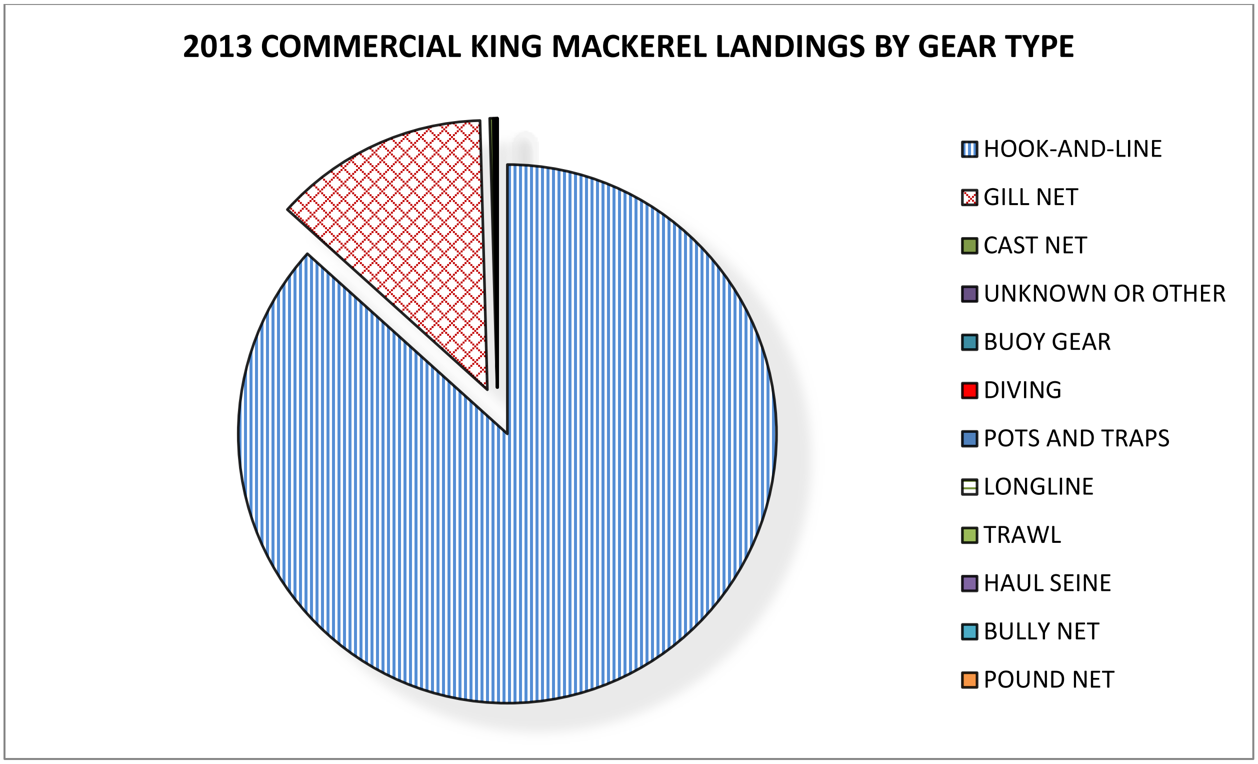

Figure 1. 2013 commercial king mackerel landings by gear type

For the commercial sector, the area occupied by GOM migratory group king mackerel is divided into regional zones. The Western Zone extends from the southern border of Texas to the Alabama/Florida state line. The fishing year for this zone is July 1 through June 30. The Eastern Zone, which includes only waters off Florida, is divided into the East Coast and West Coast Subzones (Figure 2). The East Coast Subzone is from the Flagler/Volusia county line south to the Miami-Dade/Monroe county line and only exists from November 1 through March 31 (Figure 2A), when GOM migratory group king mackerel migrate into that area. During the rest of the year, king mackerel in that area are considered part of the Atlantic migratory group (Figure 2B).

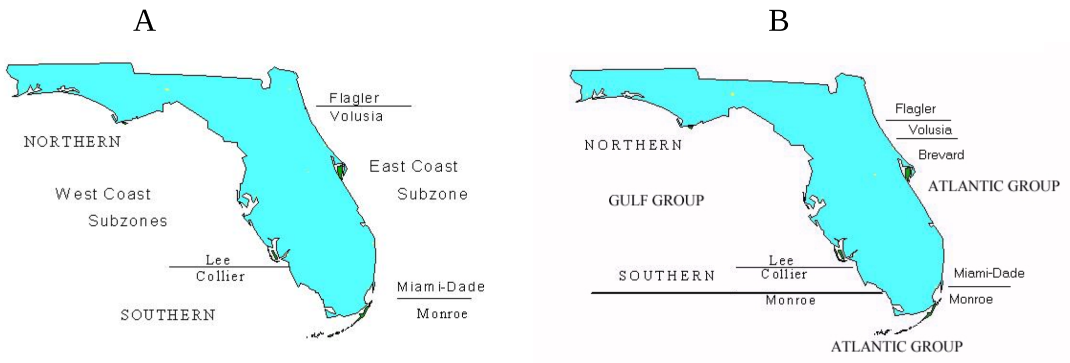

Figure 2. GOM migratory group king mackerel Eastern Zone Subzones for: (A) November 1 - March 31; and (B) April 1 - October 31

The West Coast Subzone, from the Alabama/Florida state line to the Monroe/Miami-Dade county line, is further divided into Northern and Southern Subzones at the Lee/Collier county line. The fishing year for hook-and-line gear in both regions runs July 1-June 30; in the Southern Subzone, the gill net season opens on the day after the Martin Luther King, Jr. holiday. Gill net fishing is allowed during the first weekend thereafter, but not on subsequent weekends.

Management measures for the South Atlantic apply to king mackerel from New York to the east coast of Florida. The Atlantic migratory group of king mackerel has a commercial quota of 3.71 million lb and the fishing year is March 1 through end of February. This migratory group is not divided into zones; however, different areas have different trip limits at different times of the year.

While current management of the fishery has established a fishing year with corresponding quotas for the various zones, for the purposes of this Opinion we are evaluating data on a calendar year and for the entire fishery (i.e., excluding management groups and zones).

Table 4. Annual Commercial Landings of King Mackerel

Year	Landings (lb)
2009	7,826,211
2010	6,640,700
2011	5,771,299
2012	5,085,687
2013	4,049,429

Source: SEFSC landings data

King mackerel have been a popular target for recreational fishers for many years. The recreational sector is allocated 68% of the GOM annual catch limit (ACL) and 62.9% of the Atlantic ACL. From the late 1980s to the late 1990s, GOM recreational landings averaged about 4.9 million lb per year. In the most recent 5 years, average total recreational catch has about 4.7 million lb (Table 5). During that time, total catch in the GOM has fluctuated between 1.7 and 3.6 million lb, while total catch in the Atlantic has steadily declined from 4.1 to 1.1 million lb over the same 5-year period (Table 5).

Table 5. Annual Recreational Catch of King Mackerel

Year	Total Catch (lb)		
	GOM	Atlantic	Combined
2009	3,635,271	4,068,489	7,703,760
2010	1,865,586	2,373,223	4,238,809
2011	1,677,996	1,815,591	3,493,587
2012	2,501,381	1,755,984	4,257,365
2013	2,711,213	1,081,470	3,792,683

Source: MRFSS database; total catch (Type A [landings] + B1 [discard] + B2 [released alive])

On the Atlantic coast, king mackerel is caught primarily in Florida, though landings are reported north through Virginia. Catches in the northern portion of this range, however, are relatively low and sporadic (Table 6). For example, throughout 2009-2013, MRFSS only documented 729 lb of king mackerel caught in Virginia, and in only 2 of those years (2010 and 2013). It should also be noted the proportional standard error (PSE) is fairly large (e.g., 93.3-118.7) for Virginia and Georgia during this time series, which indicates less precise estimates of catch.

Table 6. Annual Atlantic recreational catch (lb of fish) of king mackerel by state

Year	Florida	Georgia	South Carolina	North Carolina	Virginia
2009	2,656,081	54,405	373,264	984,739	0
2010	1,863,100	73,451	99,616	336,327	729
2011	1,582,414	39,724	13,439	180,014	0
2012	1,300,244	187	121,939	333,614	0
2013	799,677	234	46,123	235,436	-

Source: MRFSS database; total catch (Type A [landings] + B1 [discard] + B2 [released alive])

Commercial allocations are managed with minimum size limits, gear, area, and mesh size restrictions, seasonal closures, and trip limit regulations, which vary by geographic area and gear type. The gill net fishery is restricted to Monroe and Collier counties, and the fishing season opens in January on the Tuesday following the Martin Luther King, Jr., federal holiday. The fishery is open during the first weekend thereafter, but closed on subsequent weekends, until the quota is met and the fishery is closed for the year. Recreational allocations are managed with minimum size limit and bag limit regulations, and some area restrictions imposed on Atlantic group participants.

2.3.3 Spanish Mackerel

While historically the majority of commercial harvest of Spanish mackerel has been landed by gill nets from states waters off the west coast of Florida (due to the 1995 Florida net ban), cast nets have become an increasingly important gear. In 2013, the majority of commercial Spanish mackerel landings were from gill nets (47.2%), followed by hook-and-line (39.6%), cast nets (10.1%), and haul seines (2.3%); all other gears each accounted for less than 0.5% of the total catch (Figure 3). Landings in Virginia-New York are relatively trivial, accounting for 0.3% of total Spanish mackerel landings in 2013. According to landings data, the majority of these landings originate from state waters (e.g., pound net landings or landings originating within

Chesapeake Bay). As with king mackerel, historically the majority of hook-and-line harvest originated from trolling boats (GMFMC and SAFMC 1983).

The majority of the landings from the Atlantic occur in the late fall-early winter seasons (December through February). Most cast net fisheries operate from October through March off the east coast of Florida, and from May through October farther north (GMFMC et al. 2004). Though cast nets account for a greater percentage of the total Spanish mackerel landings, Spanish mackerel remains the primary species targeted by gill nets off the Florida east coast. The main season for this activity is September through December.

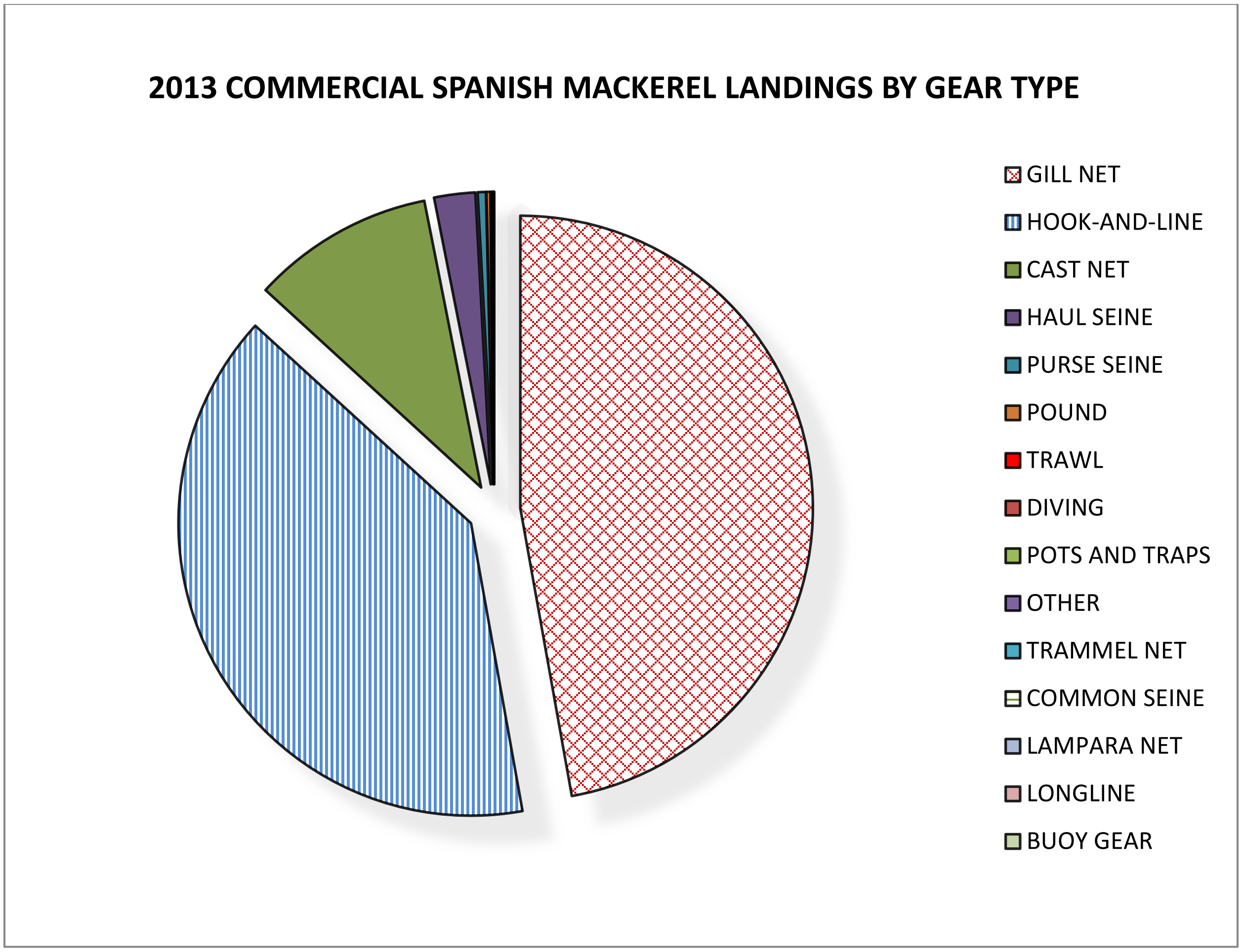

Figure 3. 2013 commercial Spanish mackerel landings by gear type

While current management of the fishery has established a fishing year with corresponding quotas for the various zones, for the purposes of this Opinion we are evaluating data on a calendar year and for the entire fishery (i.e., excluding management zones).

Table 7. Annual Commercial Landings of Spanish Mackerel

Year	Landings (lb)
2009	5,572,524
2010	5,788,426
2011	5,696,028
2012	5,234,266
2013	3,646,845

Source: SEFSC landings data

Recreational catches of Spanish mackerel in the GOM have remained relatively stable at around 2.0 to 3.0 million lb since the early 1990s, despite GMFMC action to increase the bag limit from 3 fish in 1987, to 10 fish in 1992, and to 15 fish in 2000 (NMFS 2003a). The reduced popularity of Spanish mackerel compared with king mackerel and other offshore stocks is believed to keep catches from increasing in response to less restrictive management measures.

Table 8. Annual Recreational Landings of Spanish Mackerel

Fishing Year	Total Catch (lb)		
	GOM	Atlantic	Combined
2009	2,051,665	1,639,171	3,690,836
2010	2,505,560	1,697,818	4,203,378
2011	2,130,004	1,490,762	3,620,766
2012	2,676,706	1,203,016	3,879,722
2013	4,499,857	1,400,264	5,900,121

Source: MRFSS database; total catch (Type A [landings] + B1 [discard] + B2 [released alive])

On the Atlantic coast, Spanish mackerel is caught primarily in Florida and North Carolina, though landings are reported north through New Jersey. Catches in the northern portion of this range, however, are relatively low and sporadic (Table 9). For example, throughout 2009-2013, MRFSS only documented 55 and 302 lb of Spanish mackerel caught in Delaware and New Jersey, respectively, and each in only 1 year. It should also be noted the PSE is fairly large (e.g., 74.8-101.4) for catches in Maryland-New Jersey during this time series, which indicates less precise estimates of catch.

Table 9. Annual Atlantic Recreational Catch (lb of fish) of Spanish Mackerel by State

Year	Florida	Georgia	South Carolina	North Carolina	Virginia	Maryland	Delaware	New Jersey
2009	651,494	6,909	96,827	824,225	22,131	37,284	0	302
2010	983,764	5,383	103,956	565,830	27,503	11,383	0	0
2011	873,222	9,439	73,605	470,541	41,325	22,630	0	0
2012	411,935	4,536	98,316	665,201	17,806	5,223	0	0
2013	646,996	2,158	50,865	625,035	68,205	6,949	55	0

Source: MRFSS database; total catch (Type A [landings] + B1 [discard] + B2 [released alive])

Commercial allocations are managed with minimum size limits, gear and mesh size restrictions, and trip limits. The fishing season extends from April 1 through March 31 of each year, or until the quota has been taken. Gill net fishers pursuing Spanish mackerel in the South Atlantic EEZ off Florida north of the line directly east from the Miami-Dade/Monroe County, Florida boundary (25º20.4' N) may not use a float line longer than 800 yd (732 m), set more than 1 net at a time, or soak their net(s) for more than 1 hour. Recreational allocations are managed with minimum size limit and bag limit regulations.

2.3.4 Cobia

Commercial landings have declined since the highest landings in 1996 (Vondruska 2010). Over the last 5 years (2009-2013), annual landings have averaged approximately 216,000 lb (Table 10). In 2013, the predominant gear type was hook-and-line (78.2%), followed by diving (i.e., spearfishing; 10.4%), longline (7.5%), and gill net (2.5%); all other gears each accounted for less than 0.5% of the total catch (Figure 4). Most cobia landings are in Florida and landings are highest during summer. Landings in Virginia-New York are relatively trivial, accounting for approximately 2-3% of total cobia landings during the period 2009-2013. According to landings data, the majority of these landings originate from state waters (e.g., pound net landings or landings originating within Chesapeake Bay).

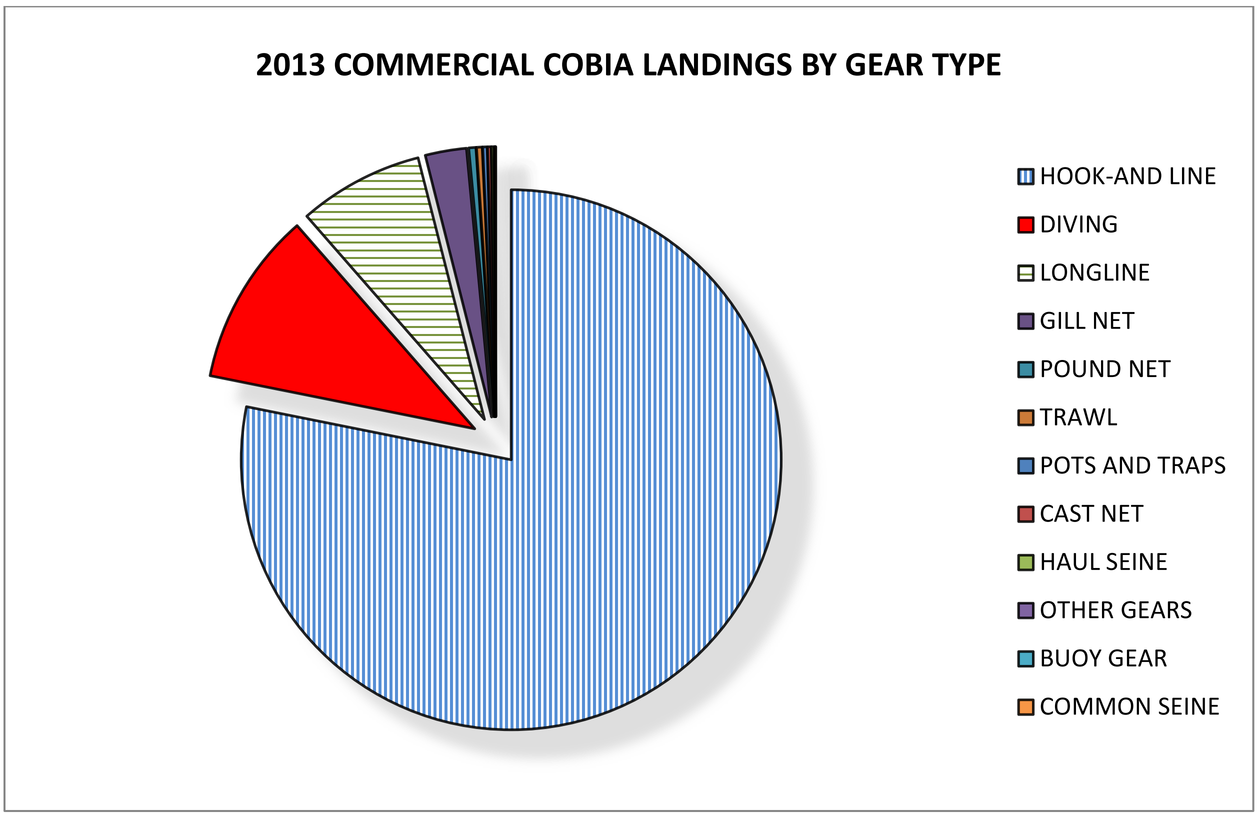

Figure 4. 2013 commercial cobia landings by gear type

Table 10. Annual commercial landings of cobia

Year	Landings (lb)
2009	181,609
2010	257,635
2011	277,162
2012	192,613
2013	169,343

Source: SEFSC landings data

Recreational cobia landings have fluctuated during the past 20 years between 1.5 and 3.5 million lb. Over the last 5 years, landings averaged 1.9 million lb (Table 11). Most landings are in Florida and landings peak during May through June.

Table 11. Annual recreational landings of cobia

Fishing Year	Total Catch (lb)		
	GOM	Atlantic	Combined
2009	491,940	1,037,649	1,529,589
2010	453,543	1,657,078	2,110,620
2011	1,132,455	1,089,311	2,221,766
2012	876,210	806,800	1,683,010
2013	1,149,572	1,037,755	2,187,326

Source: MRFSS database; total catch (Type A [landings] + B1 [discard] + B2 [released alive])

On the Atlantic coast, cobia is caught primarily in Florida, North Carolina, and Virginia though landings are reported north through New Jersey. Catches in the northern portion of this range, however, are relatively low and sporadic (Table 12). For example, throughout 2009-2013, MRFSS only documented 1,069 and 6,796 lb of cobia caught in Maryland and New Jersey, respectively, and each in only 1 year. It should also be noted the PSE is fairly large (e.g., 96.2-99.7) for the northern catches during this time series, which indicates less precise estimates of catch.

Table 12. Annual Atlantic recreational catch (lb of fish) of cobia by state

Year	Florida	Georgia	South Carolina	North Carolina	Virginia	Maryland	New Jersey
2009	361,120	2,009	62,332	166,195	445,993	0	0
2010	745,228	88,840	67,946	498,581	254,414	1,069	0
2011	761,440	74,651	0	145,796	107,424	0	0
2012	370,373	97,766	201,223	104,106	26,537	0	6,796
2013	274,276	25,183	9,873	506,067	222,355	0	0

Source: MRFSS database; total catch (Type A [landings] + B1 [discard] + B2 [released alive])

Commercial and recreational fisheries in the South Atlantic and GOM are managed by a minimum size limit, gear restrictions, and a bag and possession limit.

2.4 Exempted Fishing, Scientific Research, and Exempted Educational Activity Involving CMP Species

Regulations at 50 CFR 600.745 allow NMFS SERO's Regional Administrator to authorize the target or incidental harvest of species managed under an FMP or fishery regulations that would otherwise be prohibited for scientific research activity, limited testing, public display, data collection, exploratory, health and safety, environmental cleanup, hazardous waste removal purposes, or for educational activity. Every year, SERO may issue a small number of exempted fishing permits (EFPs) and/or letters of authorization (LOAs) exempting the collection of a limited number of CMP species from the GOM and/or Atlantic EEZ from regulations implementing the CMP FMP; from 2011-2013, SERO issued 2 EFPs, 3 SRPs, and 5 LOAs involving CMP species. These EFPs, SRPs, and LOAs involve fishing by commercial or research vessels, similar or identical to the fishing methods of the CMP fisheries, the subject of this Opinion.

We consider EFPs, SRPs, and LOAs, involving fishing consistent with the description of CMP fishing in Section 2.2, unlikely to increase fishing effort significantly enough to warrant separate consideration in this Opinion. The types and rates of interactions with listed species from these types of EFP, SRP, and LOA activities are expected to be similar to (and fall within) the level of effort and impacts analyzed in this Opinion. For example, issuing an EFP to an active commercial vessel would not likely result in effects other than those that would result from the vessel's normal commercial activities. Similarly, issuing an EFP, SRP, or LOA to a vessel to conduct a minimal number of CMP trips with hook-and-line or gill net gear would not likely increase fishing effort to a degree that would affect the total annual effort expended in the fisheries.

2.5 Description of the Action Area

The action area for an Opinion is defined as all of the areas directly or indirectly affected by the federal action, and not merely the immediate area involved in the action. The CMP fisheries are authorized to operate within the U.S mid-Atlantic, South Atlantic, and the GOM EEZ. The U.S. mid-Atlantic and South Atlantic EEZ extends from 3-200 nmi off the coasts of New York south through Florida. The actual outer boundaries of the EEZ vary according to areas where jurisdictional boundaries meet with Bermuda, the Bahamas, and Cuba. The GOM EEZ extends from 9 nmi seaward of the states of Florida and Texas, and from 3 nmi seaward of the states of Alabama, Mississippi, and Louisiana, to 200 nmi from the seaward boundary of each coastal state. Therefore, the action area for this consultation is restricted to the EEZ within which the CMP fisheries are authorized to operate (Figure 5).

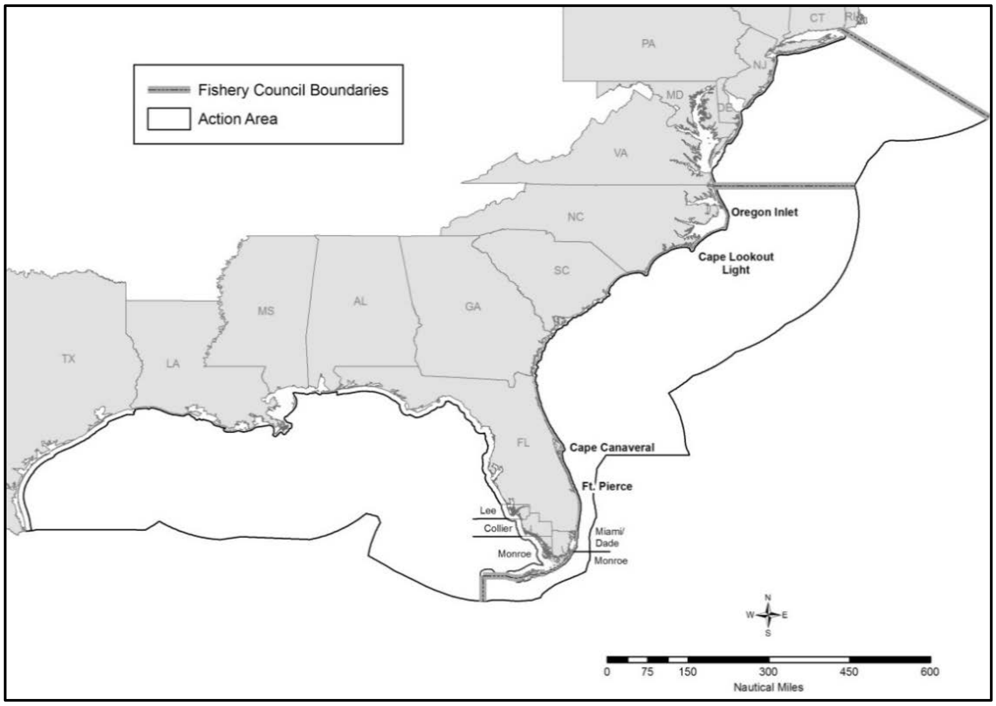

Figure 5. CMP fisheries action area

3 Status of Species and Critical Habitat

Listed species occurring within the action area that may be affected by the proposed action include 6 species of whales, 5 species of sea turtles, 3 species of fish, and 7 invertebrate species. Table 13 lists each species, scientific name and status, as well as the specific geographic area within the action area in which each species occurs. Designated critical habitat in the action area is listed in Table 14.

Table 13. Status of Listed Species in the Action Area (E= endangered, T=threatened)

Species		Scientific Name	Status	Geographic Area
Whales	Sei whale	*Balaenoptera borealis*	E	South Atlantic
	Blue whale	*Balaenoptera musculus*	E	South Atlantic, EEZ only
	Fin whale	*Balaenoptera physalus*	E	South Atlantic
	North Atlantic right whale	*Eubalaena glacialis*	E	South Atlantic
	Sperm whale	*Physeter macrocephalus*	E	South Atlantic and GOM, EEZ only
	Humpback whale	*Megaptera novaeangliae*	E	South Atlantic
Sea Turtles	Loggerhead sea turtle: Northwest Atlantic (NWA) DPS	*Caretta caretta*	T	South Atlantic and GOM
	Green sea turtle: proposed North Atlantic DPS	*Chelonia mydas*	E/T[6]	South Atlantic and GOM
	Leatherback sea turtle	*Dermochelys coriacea*	E	South Atlantic and GOM
	Hawksbill sea turtle	*Eretmochelys imbricata*	E	South Atlantic and GOM
	Kemp's ridley sea turtle	*Lepidochelys kempii*	E	South Atlantic and GOM
Fish	Atlantic sturgeon: all DPSs	*Acipenser oxyrinchus oxyrinchus*	E/T[7]	South Atlantic and Mid-Atlantic
	Gulf sturgeon	*Acipenser oxyrinchus desotoi*	T	GOM
	Smalltooth sawfish	*Pristis pectinata*	E	South Atlantic and GOM
Invertebrates	Elkhorn coral	*Acropora palmata*	T	South Atlantic[8] and GOM
	Staghorn coral	*Acropora cervicornis*	T	South Atlantic[8]
	Lobed star coral	*Orbicella* (formerly *Montastraea*) *annularis*	T	South Atlantic[8] and GOM
	Mountainous star coral	*Orbicella* (formerly *Montastraea*) *faveolata*	T	South Atlantic[8] and GOM
	Boulder star coral	*Orbicella* (formerly *Montastraea*) *franksi*	T	South Atlantic[8] and GOM
	Pillar coral	*Dendrogyra cylindrus*	T	South Atlantic[8]
	Rough cactus coral	*Mycetophyllia ferox*	T	South Atlantic[8] and GOM

[6] Currently, green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. On March 23, 2015, NMFS published a proposed rule (80 FR 15271) listing 11 DPSs for green sea turtles; the proposed North Atlantic DPS for green sea turtles is listed as threatened, and is the only DPS whose individuals can be expected to be encountered in the action area.
[7] The South Atlantic, Carolina, Chesapeake Bay, and New York Bight DPSs are listed as endangered, while the Gulf of Maine DPS is listed as threatened.
[8] Florida.

Table 14. Designated or proposed critical habitat in the action area

Species	Geographic Area
North Atlantic right whale	South Atlantic
Elkhorn and staghorn corals	South Atlantic
Loggerhead sea turtle, NWA DPS	South Atlantic

3.1 Analysis of Species and Critical Habitats Not Likely to be Adversely Affected

We have determined that the proposed action is not likely to adversely affect any listed whales (i.e., blue, sei, sperm, fin, humpack, or North Atlantic right whales), Gulf sturgeon, or elkhorn and staghorn corals. We have also determined that the proposed action is not likely to adversely affect designated critical habitats for elkhorn and staghorn corals or loggerhead sea turtles, and will have no effect on designated critical habitat for North Atlantic right whale. These species and critical habitats are excluded from further analysis and consideration in this Opinion. The following discussion summarizes our rationale for these determinations.

Blue, Sei, and Sperm Whales
Blue, sei, and sperm whales are not likely to be adversely affected by the proposed action. Although these species may be present within the action area, they are not expected to overlap with fishing activities authorized under the CMP FMP. Blue, sei, and sperm whales are all typically found seaward of the continental shelf, well beyond the depths at which CMP species are targeted. We have analyzed the proposed action and determined the only potential route of effect is direct effects resulting from these whale species interacting with fishing gear. Based on the 2015 List of Fisheries (LOF) (79 FR 77919, December 29, 2014), there are no documented encounters between these species and hook-and-line gear or gill net gear. Based on the rarity of these species in the action area where CMP gear is used and absence of documented interactions between these species and the CMP fisheries, we believe any adverse effects resulting from the proposed action will be discountable.

North Atlantic Right, Fin, and Humpback Whales
North Atlantic right, fin, and humpback whales are considered coastal whale species. In the GOM portion of the action area, they are extremely rare. Individuals observed in the GOM have likely been inexperienced juveniles straying from the normal range of these stocks or occasional transients (Mullin et al. 1994; Würsig et al. 2000). In the South Atlantic portion of the action area, these species are more common, and may be present in the vicinity of CMP fishing activities. These species are sighted most frequently in the South Atlantic along the southeastern United States from November through April during their annual migration.

Hook-and-line fishing, the primary CMP fishing method, is not likely to adversely affect North Atlantic right, fin, and humpback whales. There are no reported interactions between CMP hook-and-line gear and these species. The 2015 LOF classifies the CMP hook-and-line fisheries as Category III. A Category III fishery is 1 in which the annual mortality and serious injury of a marine mammal stock resulting from the fishery is less than or equal to 1% of the potential biological removal level (PBR). The PBR level is defined as the maximum number of animals, not including natural mortalities, which may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (79 FR 77919, December 29, 2014). Based on this information, effects on these whale species from CMP hook-and-line fishing are considered discountable.

The gill net gear components of the CMP fisheries pose entanglement risks to North Atlantic right, fin, and humpback whales. Under the LOF the South Atlantic component of the CMP gill net fishery is classified as part of the Southeast Atlantic gill net fishery. Similarly, the GOM component of the CMP gill net fishery is categorized as part of the GOM gill net fishery. Both the Southeast Atlantic gill net fishery and the GOM gill net fishery are listed as Category II fisheries in the 2015 LOF (79 FR 77919, December 29, 2014). Category II fisheries have been determined to have occasional incidental mortality and serious injury of marine mammals, causing annual mortality and serious injury greater than 1% and less than 50% of the PBR level for a given marine mammal stock. NMFS classified these fisheries as Category II based on analogy (i.e., similar risk to marine mammals) with other gill net fisheries.

Reducing large whale entanglement risks is the primary responsibility of the Atlantic Large Whale Take Reduction Team (ALWTRT). The ALWTRT was created in 1996 to address entanglement issues of large whales in fishing gear, including gill net gear. The ALWTRT was convened under the provisions of the Marine Mammal Protection Act, and through its efforts an Atlantic Large Whale Take Reduction Plan (ALWTRP) was finalized in July 1997.

Under the ALWTRP, certain restrictions apply to the South Atlantic gill net fisheries; detailed regulations can be found at 50 CFR 229.32. No person may fish with or possess gill net gear in the Southeast U.S. Restricted Area North during the restricted period (November 15 through April 15) (50 CFR 229.32(f)(2)(ii)). The Southeast U.S. Restricted Area North includes waters north of 29°00’ N to 32°00’ N (i.e., just south of Little River Inlet, South Carolina) and from the shoreline eastward to 80°00’ W, and off the majority of South Carolina within 35 nmi of the shoreline. The only exemption for this area is for vessels transiting with gill net gear aboard that have their nets covered with canvas or similar material; have their nets lashed or otherwise securely fastened to the deck, rail, or drum; have their buoys, high flyers, and anchors disconnected from all gill nets; and are in possession of no fish. Additionally, from December 1 through March 31, no person may fish with gill net gear in the Southeast U.S. Restricted Area South (50 CFR 229.32(f)(2)(ii)(B)). The Southeast U.S. Restricted Area South includes waters north of 27°51’ N. to 29°00’ N and from the shoreline eastward to 80°00’ W. Spanish mackerel is exempt from these restrictions from December 1-31 and from March 1-31, however, if the restrictions found in 50 CFR 229.32(f)(2)(iv)(A-K) are met.

The ALWTRP requires specific gear marking for southeastern gill nets, including those used in CMP fisheries. The requirements are as follows: (1) gill net surface buoys are marked to identify the vessel or fishery; (2) letters and numbers must be at least 1 in in height and block letters or Arabic numbers in a color that contrasts with the color of the buoy; and (3) non-shark gill net gear must be marked with 1, 4-in, yellow mark midway along the buoy line.

The ALWTRP also includes management measures for the Mid-Atlantic gill net fisheries. Per the ALWTRP, Mid/South Atlantic Gill Net Waters consists of all U.S. waters bounded on the north at 36°33.03' N from 72°30' W east to the eastern edge of the EEZ, and bounded on the south by 32°00' N east to the eastern edge of the EEZ (50 CFR 229.32(d)(7)). Regulations are as follows: from September 1 through May 31, no person may possess anchored gill net gear unless that gear complies with the gear marking requirements specified in 50 CFR 229.32(d)(1) of the ALWTRP. Gear marking requirements for anchored gill nets (includes those weighted to the bottom of the sea) include: (1) no buoy line floating at the surface; (2) no wet storage of gear – anchored gear must be hauled out of the water at least once every 30 days; (3) gill net surface buoys must be marked to identify the vessel or fishery using at least 1 in height, block letters or Arabic numbers, in a color that contrasts with the color of the buoy; and (4) buoys must be marked with 1, 4-in blue mark midway along the buoy line. Additionally, all buoys, flotation devices, and/or weights must have a weak link having a maximum breaking strength of 1,100 lb, and all net panels are required to have a weak link with a maximum breaking strength of 1,100 lb in the center of the floatline of each 50-fathom net panel in a net string or every 25 fathoms for longer panels. Gill nets that do not return to port with the vessel must be anchored with the holding power of at least a 22-lb Danforth-style anchor at each end of the net string and must include weak link placement in 1 of 2 configuration options. Fishers are also encouraged to maintain their buoy lines to be as knot-free as possible. No drift gill net gear may be fished at night unless gear is tended (i.e., attached to the vessel), and all drift gill net gear must be removed from the water and stowed on board before returning to port (50 CFR 229.32 (e)(6)(ii)).

On January 22, 2006, a dead North Atlantic right whale calf was reported off Jacksonville, Florida. Based on the best available data, NMFS determined the whale's death had resulted from entanglement in allowable gill net gear while inside the Southeast U.S. Restricted Area during the restricted period. In accordance with ALWTRP's implementing regulations at 50 CFR 229.32(g)(1), an emergency rule was issued on February 16, 2006, prohibiting all gill net fishing within the Southeast U.S. Restricted Area (71 FR 8223). The prohibitions on gill net fishing expired on March 31, 2006. Under the ALWTRP, closure of this area during North Atlantic right whale season (November 15 through March 31) must continue in perpetuity, unless other appropriate measures can be implemented to protect North Atlantic right whales.

In April of 2006, the Mid-Atlantic/Southeast Subgroup of the ALWTRT (SE Subgroup) was convened to discuss the North Atlantic right whale calf's death, the resultant emergency closure of the Southeast U.S. Restricted Area, and future management options that might avoid the total closure of this area in the future. The SE Subgroup suggested several potential management options that might allow the area to be reopened to gill net fishing in the future.

Particularly relevant to this analysis are the SE Subgroup discussions of the characteristics and deployment methods of gill net fishing for Spanish mackerel operating under the CMP FMP to determine whether this fishing operation warranted an exemption under 229.32(g)(2) from the recommended prohibition on gill nets in the Southeast U.S. Restricted Area south of 29°00' N during the restricted period. The SE Subgroup concluded that the combination of existing gear requirements for Spanish mackerel gill nets at 622.41(c)(3)(ii)(i.e., headrope length limits, soak time limits, gear tending requirements); new gear requirements prohibiting the setting of gear at night or in low visibility and requiring nets not to be set and to be removed from the water if endangered whales (North Atlantic right, humpback, or fin) are within 3 nmi; known and predicted North Atlantic right whale distribution patterns in the Southeast U.S. Restricted Area south of 29°00' N during December and March; and existing Florida regulations prohibiting gill nets in state waters are operationally effective and will protect North Atlantic right whales from the risk of serious injury or mortality in the Southeast U.S. Restricted Area south of 29°00' N from December 1-31 and from March 1-31. Therefore, an exemption was warranted, pursuant to 50 CFR 229.32(g)(2)(I), to allow the use of gill nets to fish for Spanish mackerel during this time and in this area.

Following these discussions, NMFS published a proposed rule on November 15, 2006 (71 FR 66485), amending the ALWTRP. Those proposed changes included expanding the Southeast U.S. Restricted Area to include waters within 35 nmi of the South Carolina coast; dividing the Southeast U.S. Restricted Area at 29°00' N into 2 areas– Southeast U.S. Restricted Areas North and South; and restricting gill netting within the Southeast U.S Restricted Area during the North Atlantic right whale calving season. Specifically, the rule proposed to prohibit gill net fishing and possession in the Southeast U.S. Restricted Area North each year from November 15 through April 15, with an exemption for transiting through this area if gear is stowed in accordance with the rule. Additionally, gill net fishing would be prohibited annually in the Southeast U.S. Restricted Area South from December 1 through March 31, with limited exemptions for gill net fishing for sharks and Spanish mackerel.

Because the proposed protections would not be in place until well after North Atlantic right whales arrived in the Southeast U.S. Restricted Area for the 2006-2007 calving season, NMFS simultaneously published an emergency rule to protect North Atlantic right whales from entanglement in the core North Atlantic right whale calving area during right whale calving season (71 FR 66469, November 15, 2006). This emergency rule prohibited gill net fishing or gill net possession in Atlantic Ocean waters from the shore out to 80°00' W between 29°00' N and 32°00' N and within 35 nmi of the South Carolina coast. This emergency rule expired on April 15, 2007.

A rule published on June 25, 2007 (72 FR 34632), finalized the proposed amendments to the ALWTRP. The only difference between the proposed and Final Rules was an adjustment of the northern boundary of the Southeast U.S. Restricted Area to exclude Little River Inlet, South Carolina on the border between North Carolina and South Carolina (see Figure 6).

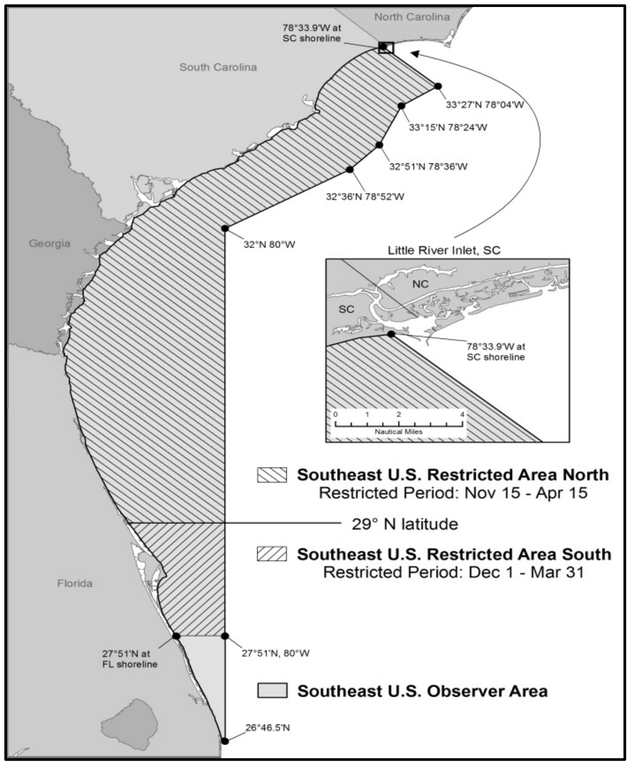

Figure 6. Southeast U.S. Restricted Area and restricted periods, as amended by the June 25, 2007 ALWTRP final rule (72 FR 34632)

Although gill nets can pose a serious entanglement threat to whales, the primary gill net used in the CMP fisheries is the run-around gill net. Run-around gill nets are thought to pose less of a risk to marine mammals because of their rapid deployment and retrieval. With no documented takes of large whales in the CMP gill net fisheries in the past, existing CMP gill net practices, and continued management under the ALWTRP, we believe negative effects on North Atlantic right, fin, and humpback whales are extremely unlikely and, therefore, are discountable.

North Atlantic Right Whale Critical Habitat
Currently-designated North Atlantic right whale critical habitat (50 FR 28793) can be found in the Atlantic portion of the action area from the mouth of the Altamaha River, Georgia, to Jacksonville, Florida, out 15 nmi and from Jacksonville, Florida, to Sebastian Inlet, Florida, out 5 nmi. The area was designated because of its importance as a calving area. Although sightings of North Atlantic right whales off Georgia and Florida primarily include adult females and calves, juveniles and adult males have also been observed. North Atlantic right whales are most abundant in this area from Mid-November through March (Slay et al. 1996). Fishing activities conducted under the CMP FMP (gill net, trolled, and jigged rod and reel) are described in detail in Section 2. To summarize, these activities involve the placing of gill nets in the water column, trolling with a rod and reel, and jigging baits/lures with a rod and reel, which results in the temporary displacement of the water and matter within the water column. Therefore, these activities have no potential route of effect on the physical and biological features (water depth, water temperature, and the distribution of right whale cow/calf pairs in relation to the distance

from the shoreline to the 40-m isobaths), which were the basis for determining this habitat to be critical. Thus, the proposed action will not affect currently-designated critical habitat for the North Atlantic right whale.

On February 20, 2015, NMFS published a proposed rule (80 FR 9314) to replace existing critical habitat with 2 new areas: the Gulf of Maine and Georges Bank region (Unit 1) and an area off the Southeast U.S. coast (Unit 2.) Proposed critical habitat Unit 2 (i.e., calving habitat) would include 8,611 nmi^2 from roughly Cape Canaveral, Florida, through Cape Fear, North Carolina, with the following essential features: sea surface conditions with Force 4 or less on the Beaufort Scale, sea surface temperatures of 7°C to 17°C, and water depths of 6 to 28 m. For the same reasons cited above for currently-designated critical habitat, due to an absence of a potential route of effect, fishing activities conducted under the CMP FMP will not affect proposed critical habitat for the North Atlantic right whale.

Gulf Sturgeon

The CMP fisheries will have no effect on the Gulf sturgeon. The Gulf sturgeon is an anadromous, benthic species. It inhabits coastal rivers from Louisiana to Florida during the warmer months and over-winters in estuaries, bays, and the GOM. Available data indicate Gulf sturgeon in the marine environment show a preference for sandy shoreline habitats with water depths less than 3.5 m and salinity less than 6.3 parts per thousand (Fox and Hightower 1998). CMP species are targeted at or near the surface of deeper federal waters, where Gulf sturgeon would not be present.

Corals

The CMP fisheries are not likely to adversely affect any listed coral species (elkhorn, staghorn, lobed star, mountainous star, boulder star, pillar, or rough cactus corals). Elkhorn and staghorn corals are found in the action area but typically only in waters 15 m or less in the Florida Keys and in the Atlantic, north to West Palm Beach, Florida (*Acropora* Biological Review Team 2005). The other coral species can be found in deeper waters (e.g., to 40 m) off southern Florida and the Flower Garden Banks National Marine Sanctuary off Texas. Potential routes of effect on coral from fishing activities stem from physical contact by fishing vessels and gear, leading to coral breakage. Fishing for CMP species in the GOM and South Atlantic region is primarily conducted by hook and line, with a limited run-around gill net fishery that operates in southwest Florida. The pelagic nature of CMP species means the gears used to target those species are typically deployed in the water column or at the surface, where corals are not present. Fishers also typically troll or drift when targeting these species, thus potential damage from anchoring by these fishers is also unlikely. The run-around gill net fishery is prosecuted using floating nets that do not often contact the bottom, and to avoid entanglement, fishing is not conducted in areas where corals exist. Based on this information, we believe effects from the proposed action are discountable.

Elkhorn and Staghorn Coral Critical Habitat

The proposed action is not likely to adversely affect elkhorn and staghorn coral critical habitat. The potential route of effect from the proposed action on elkhorn and staghorn coral critical habitat is direct, physical damage from CMP fishing activities in federal waters. Areas of critical habitat occurring in the action area are limited to a small portion of the South Atlantic. The feature essential to the conservation of elkhorn and staghorn corals is substrate of suitable quality and availability (i.e., "natural consolidated hard substrate or dead coral skeleton that is free from fleshy or turf macroalgae cover and sediment cover"), in water depths from the mean high water line to 30 m. Because CMP fishing activities are pursued in pelagic waters, impacts to hard substrate of suitable quality and availability are highly unlikely. Thus, adverse effects from the CMP fisheries on elkhorn and staghorn coral critical habitat are discountable.

Loggerhead Sea Turtle (NWA DPS) Critical Habitat

<u>Nearshore Reproductive Habitat (Units LOGG-N-3 through N-36) and Winter Concentration Habitat (Units LOGG-N-1 and N-2)</u>

The CMP fisheries will have no effect on nearshore reproductive habitat and winter concentration habitat. Nearshore reproductive habitats are those waters adjacent to nesting beaches and extend from the waterline out 0.86 nmi. The federally-authorized CMP fisheries operate well offshore of the 0.86 nmi boundary, so there will be no possibility of impacting the PCEs of this critical habitat. Winter concentration habitat only occurs off the coast of North Carolina between Cape Hatteras and Cape Lookout. While CMP fisheries occur in this region, none are capable of affecting the PCEs of water temperature, the proximity of shelf waters in relation to the Gulf Stream, and water depth.

<u>Concentrated Breeding Habitat (Units LOGG-N-17 and N-19)</u>

NMFS designated 2 concentrated breeding habitat units along the east coast of Florida as essential for the conservation of the species. The PCEs that support this habitat are: (1) high densities of reproductive male and female loggerheads; (2) proximity to primary Florida migratory corridor; and (3) proximity to Florida nesting grounds.

CMP fisheries have the potential to capture protected loggerhead sea turtles as analyzed in previous Opinions, though we do not believe this will noticeably affect the density of reproductive males and females in the area. The CMP fisheries do not capture a large number of loggerheads, particularly at any one time, and most of these captured animals are released alive within the same area they are caught. Therefore, any effects from the operation of these fisheries on the first PCE are considered insignificant. Further, we believe these fisheries have no means by which to affect the other PCEs of concentrated breeding habitat. CMP gears and activities do not have the capacity to affect the distance of the concentrated breeding habitat in relation to the Florida migratory corridor or the Florida nesting grounds.

<u>Constricted Migratory Corridor Habitat (Units LOGG-N-1 and LOGG-N-17 through N-19)</u>

NMFS designated 4 constricted migratory habitat units along the east coast of Florida. Two of these habitat units directly overlap with the two concentrated breeding habitat units described above. The PCEs that support this critical habitat are: (1) constricted continental shelf area relative to nearby continental shelf waters that concentrate migratory pathways; and (2) passage conditions to allow for migration to and from nesting, breeding, and/or foraging areas.

The CMP fisheries deploy gears in Atlantic waters that could possibly affect migratory pathways and passage conditions. However, because any gears deployed in these areas are spatially limited and temporary, we do not expect them to meaningfully alter the amount of continental shelf area or passage conditions that allow migration to and from nesting, breeding, or feeding habitats. Therefore any effects to these PCEs from the CMP fisheries will be insignificant.

Sargassum Habitat (LOGG-S-01 and LOGG-S-02)
Two units of *Sargassum* critical habitat were designated to conserve loggerhead sea turtles by protecting essential forage, cover, and transport habitat for post-hatchlings and early juveniles. The PCEs that support this habitat are: (1) convergence zones, surface-water downwelling areas, the margins of major boundary currents, and other locations where there are concentrated components of the *Sargassum* community; (2) *Sargassum* in concentrations that support adequate prey abundance and cover; (3) available prey and other material associated with *Sargassum* habitat; and (4) sufficient water depth and proximity to available currents to ensure offshore transport, foraging, and cover requirements for post-hatchlings.

The CMP fisheries do not have the capability to affect the location of convergence zones, surface-water downwelling (the movement of denser water downward in the water column) areas, or other locations where there are concentrated components of the *Sargassum* community in water temperatures suitable for optimal growth of *Sargassum* and inhabitance of loggerheads. Likewise, the CMP fisheries would not affect the availability of prey for hatchling loggerhead sea turtles or other material associated with *Sargassum* habitat as fisheries are not targeting or incidentally harvesting smaller prey species or *Sargassum*. Nor do the fisheries have the capability to affect the water depth or proximity to currents necessary for offshore transport, foraging, and cover. While some vessels associated with these fisheries may transit through *Sargassum* habitat, those vessel tracks are not anticipated to scatter *Sargassum* mats to the point of affecting the functionality of the PCEs. Further, the wakes and surface water disruption associated with these vessels are not of sufficient magnitude to result in significant effects to the distribution of *Sargassum* mats. Temporary and incidental removal of *Sargassum* via fishing gear could occur, though any incidental harvest is not anticipated to be at such a level that functionality of the PCEs will be affected. Therefore, any adverse effects to the PCEs of *Sargassum* habitat will be insignificant.

In summary, activities associated with any CMP fishery will not adversely affect any of the NWA loggerhead DPS critical habitat units. CMP fisheries will either have no effect on the critical habitat due to location or methods, or will have discountable or insignificant effects that will not adversely affect the habitat's ability to perform its function.

3.2 Analysis of Species Likely to be Adversely Affected

Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, Atlantic sturgeon, and the smalltooth sawfish are all likely to be adversely affected by the proposed action. Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles area all highly migratory, travel widely throughout the GOM and South Atlantic, and are known to occur in areas subject to shrimp trawling. The distribution of Atlantic sturgeon and smalltooth sawfish within the action area is more limited, but all of these species do overlap in certain regions of the action area and these species have the potential to be been incidentally captured in CMP fisheries. The remaining sections of this Opinion will focus solely on these species.

The following subsections are synopses of the best available information on the status of the species that are likely to be adversely affected by 1 or more components of the proposed action, including information on the distribution, population structure, life history, abundance, and population trends of each species and threats to each species. The biology and ecology of these species as well as their status and trends inform the effects analysis for this Opinion. Additional background information on the status of sea turtle species can be found in a number of published documents, including: recovery plans for the Atlantic green sea turtle (NMFS and USFWS 1991), hawksbill sea turtle (NMFS and USFWS 1993), Kemp's ridley sea turtle (NMFS and USFWS 1992b), leatherback sea turtle (NMFS and USFWS 1992a), and loggerhead sea turtle (NMFS and USFWS 2008a); Pacific sea turtle recovery plans (NMFS and USFWS 1998a; NMFS and USFWS 1998b; NMFS and USFWS 1998c; NMFS and USFWS 1998b); and sea turtle status reviews, stock assessments, and biological reports (Conant et al. 2009; NMFS SEFSC 2001; NMFS SEFSC 2009a; NMFS and USFWS 1995b; NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e; TEWG 1998; TEWG 2000a; TEWG 2007; TEWG 2009). Sources of background information on the smalltooth sawfish include the smalltooth sawfish status review (NMFS 2000), the proposed and Final Listing Rules, and pertinent other publications (e.g., Simpfendorfer et al. 2010). Sources of background information on Atlantic sturgeon include the status review (ASSRT and NMFS 2007) and proposed and Final Listing Rules (77 FR 5880 and 77 FR 5914).

3.2.1 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and man-made threats that shape their status and affect their ability to recover. Many of the threats are either the same or similar in nature for all listed sea turtle species, those identified in this section are discussed in a general sense for all sea turtles. Threat information specific to a particular species are then discussed in the corresponding status sections where appropriate.

Fisheries
Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and threat to future recovery, for all of the sea turtle species (NMFS and USFWS 1991; NMFS and USFWS 1992; NMFS and USFWS 1993; NMFS and USFWS 2008a; NMFS et al. 2011). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters. These fishing methods include trawls, gill nets, purse seines, hook-and-line gear (including bottom longlines and vertical lines [e.g., bandit gear, handlines, and rod-reel], pound nets, and trap fisheries. Refer to the Environmental Baseline

section of this Opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). The Southeast U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of sea turtles each year.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom longlines and gill net fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Non-Fishery In-Water Activities

There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997b). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, in-water construction activities, and scientific research activities.

Coastal Development and Erosion Control

Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may decrease the amount of nesting area available to females and change the natural behaviors of both adults and hatchlings, directly or indirectly, through loss of beach habitat or changing thermal profiles and increasing erosion, respectively. (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, coastal development is usually accompanied by artificial lighting which can alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991). In-water erosion control structures such as breakwaters, groins, and jetties can impact nesting females and hatchling as they approach and leave the surf zone or head out to sea by creating physical blockage, concentrating predators, creating longshore currents, and disrupting of wave patterns.

Environmental Contamination

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., dichlorodiphenyltrichloroethane, polychlorinated biphenyls [PCB], and perfluorinated chemicals), and others that may cause adverse health effects to sea turtles (Garrett 2004; Hartwell 2004; Iwata et al. 1993). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area.

The April 20, 2010, explosion of the DEEPWATER HORIZON (DWH) oil rig affected sea turtles in the GOM. There is an on-going assessment of the long-term effects of the spill on GOM marine life, including sea turtle populations. Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. Approximately 536 live adult and juvenile sea turtles were recovered from the Gulf and brought into rehabilitation centers; of these, 456 were visibly oiled (these and the following numbers were obtained from http://www.nmfs.noaa.gov/pr/health/oilspill/). To date, 469 of the live recovered sea turtles have been successfully returned to the wild, 25 died during rehabilitation, and 42 are still in care but will hopefully be returned to the wild eventually.

During the clean-up period, 613 dead sea turtles were recovered in coastal waters or on beaches in Mississippi, Alabama, Louisiana, and the Florida Panhandle. As of February 2011, 478 of these dead turtles had been examined. Many of the examined sea turtles showed indications that they had died as a result of interactions with trawl gear, most likely used in the shrimp fishery, and not as a result of exposure to or the ingestion of oil.

During the spring and summer of 2010, nearly 300 sea turtle nests were relocated from the northern Gulf to the east coast of Florida with the goal of preventing hatchlings from entering the oiled waters of the northern Gulf. From these relocated nests, 14,676 sea turtles, including 14,235 loggerheads, 125 Kemp's ridleys, and 316 greens, were ultimately released from Florida beaches.

A thorough assessment of the long-term effects of the spill on sea turtles has not yet been completed. However, the spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. The population level effects of the spill and associated response activity are likely to remain unknown for some period into the future.

Marine debris is a continuing problem for sea turtles. Sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons, and ghost fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles).

Climate Change

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and USFWS 2007c). In sea turtles, sex is determined by the ambient sand temperature (during the middle third of incubation) with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c).

The effects from increased temperatures may be intensified on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of the erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007c). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen [DO] levels, nutrient distribution) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish) which could ultimately affect the primary foraging areas of sea turtles.

Other Threats
Predation by various land predators is a threat to developing nests and emerging hatchlings. The major natural predators of sea turtle nests are mammals, including raccoons, dogs, pigs, skunks, and badgers. Emergent hatchlings are preyed upon by these mammals as well as ghost crabs, laughing gulls, and the exotic South American fire ant (*Solenopsis invicta*). In addition to natural predation, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges (NMFS and USFWS 2008b).

Diseases, toxic blooms from algae and other microorganisms, and cold stunning events are additional sources of mortality that can range from local and limited to wide-scale and impacting hundreds or thousands of animals.

Actions Taken to Reduce Threats
Actions have been taken to reduce man-made impacts to sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes from various fisheries and other marine activities. Some actions have resulted in significant steps towards reducing the recurring sources of mortality of sea turtles in the environmental baseline and improving the status of all sea turtle populations in the Atlantic and GOM. For example, the turtle excluder device (TED) regulation published on February 21, 2003 (68 FR 8456), represents a significant improvement in the baseline effects of trawl fisheries on sea turtles, though shrimp trawling is still considered to be one of the largest source of anthropogenic mortality for most of our sea turtle species (NMFS SEFSC 2009).

3.2.2 Loggerhead Sea Turtle (NWA DPS)

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a Final Rule designating 9 DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, and effective October 24, 2011). This rule established several DPSs: (1) NWA (threatened); (2) Northeast Atlantic Ocean (endangered); (3) South Atlantic Ocean (threatened); (4) Mediterranean Sea (endangered); (5) North Pacific Ocean (endangered); (6) South Pacific Ocean (endangered); (7) North Indian Ocean (endangered); (8) Southeast Indo-Pacific Ocean (endangered); and (9) Southwest Indian Ocean (threatened). The NWA DPS is the only one that occurs within the action area and therefore is the only one considered in this Opinion.

Species Description and Distribution
Loggerheads are large sea turtles. Adults in the southeast United States average about 3 ft (92 cm) long, measured as a straight carapace length (SCL), and weigh approximately 255 lb (116 kg) (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along

seam lines. They typically have 11 or 12 pairs of marginal scutes, 5 pairs of costals, 5 vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 1988).

The loggerhead sea turtle inhabits continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans (Dodd 1988). Habitat uses within these areas vary by life stage. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Subadult and adult loggerheads are primarily found in coastal waters and eat benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990). For the NWA DPS most nesting occurs along the coast of the United States, from southern Virginia to Alabama. Additional nesting beaches for this DPS are found along the northern and western GOM, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

Non-nesting, adult female loggerheads are reported throughout the U.S. Atlantic, GOM, and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches. Aerial surveys suggest that loggerheads as a whole are distributed in U.S. waters as follows: 54% off the southeast U.S. coast, 29% off the northeast U.S. coast, 12% in the eastern GOM, and 5% in the western GOM (TEWG 1998).

Within the NWA DPS, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf Coast of Florida. Previous Section 7 analyses have recognized at least 5 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 of the state 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 M 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 recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia); (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida); (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida); (4) the Northern

GOM Recovery Unit (Franklin County, Florida, through Texas); and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA DPS.

Life History Information
The Northwest Atlantic Loggerhead Recovery Team defined the following 8 life stages for the loggerhead life cycle, which include the ecosystems those stages generally use: (1) egg (terrestrial zone); (2) hatchling stage (terrestrial zone); (3) hatchling swim frenzy and transitional stage (neritic zone[9]); (4) juvenile stage (oceanic zone); (5) juvenile stage (neritic zone); (6) adult stage (oceanic zone); (7) adult stage (neritic zone); and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985; NMFS 2001a). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008). Loggerhead hatchlings are 1.5-2 in long and weigh about 0.7 ounces (20 grams).

As post-hatchlings, loggerheads hatched on U.S. beaches enter the "oceanic juvenile" life stage, migrating offshore and becoming associated with *Sargassum* habitats, driftlines, and other convergence zones (Carr 1986; Conant et al. 2009; Witherington 2002). Oceanic juveniles grow at rates of 1-2 in (2.9-5.4 cm) per year (Bjorndal et al. 2003; Snover 2002) over a period as long as 7-12 years (Bolten et al. 1998) before moving to more coastal habitats. Studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the oceanic habitat in the North Atlantic longer than hypothesized, or they move back and forth between oceanic and coastal habitats interchangeably (Witzell 2002). Stranding records indicate that when immature loggerheads reach 15-24 in (40-60 cm) SCL, they begin to reside in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and GOM (Witzell 2002).

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, The Bahamas, Cuba, and the GOM. Estuarine waters of the United States, including areas such as Long Island Sound, Chesapeake Bay, Pamlico and Core Sounds, Mosquito and Indian River Lagoons, Biscayne Bay, Florida Bay, and numerous embayments fringing the GOM, comprise

[9] Neritic refers to the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 m.

important inshore habitat. Along the Atlantic and GOM shoreline, essentially all shelf waters are inhabited by loggerheads (Conant et al. 2009).

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads do not use the relatively enclosed shallow-water estuarine habitats with limited ocean access as frequently as juveniles. Areas such as Pamlico Sound, North Carolina, and the Indian River Lagoon, Florida, are regularly used by juveniles but not by adult loggerheads. Adult loggerheads do tend to use estuarine areas with more open ocean access, such as the Chesapeake Bay in the U.S. mid-Atlantic. Shallow-water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads (Conant et al. 2009).

Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, the Bahamas, Cuba, and the GOM. Seasonal use of mid-Atlantic shelf waters, especially offshore New Jersey, Delaware, and Virginia during summer months, and offshore shelf waters, such as Onslow Bay (off the North Carolina coast), during winter months has also been documented (Hawkes et al. 2007; Georgia Department of Natural Resources, unpublished data; South Carolina Department of Natural Resources, unpublished data). Satellite telemetry has identified the shelf waters along the west Florida coast, The Bahamas, Cuba, and the Yucatán Peninsula as important resident areas for adult female loggerheads that nest in Florida (Foley et al. 2008; Girard et al. 2009; Hart et al. 2012). The southern edge of the Grand Bahama Bank is important habitat for loggerheads nesting on the Cay Sal Bank in The Bahamas, but nesting females are also resident in the bights of Eleuthera, Long Island, and Ragged Islands. They also reside in Florida Bay in the United States, and the north coast of Cuba (A. Bolten and K. Bjorndal, University of Florida, unpublished data). Moncada et al. (2010) report the recapture in Cuban waters of 5 adult female loggerheads originally flipper-tagged in Quintana Roo, Mexico, indicating that Cuban shelf waters likely also provide foraging habitat for adult females that nest in Mexico.

Status and Population Dynamics
A number of stock assessments and similar reviews (Conant et al. 2009; Heppell et al. 2003; NMFS SEFSC 2001; NMFS SEFSC 2009; NMFS and USFWS 2008; TEWG 1998; TEWG 2000; TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. Nesting beach surveys, though, can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of female loggerhead sea turtles, as long as such studies are sufficiently long and survey effort and methods are standardized (e.g., NMFS and USFWS 2008). NMFS and USFWS (2008) concluded that the lack of change in 2 important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population.

Peninsular Florida Recovery Unit

The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989-2007 showed an average of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008). The statewide estimated total for 2013 was 77,975 nests (FWRI nesting database).

In addition to the total nest count estimates, the Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute (FWRI) uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. This provides a better tool for understanding the nesting trends (Figure 7). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2013) (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Over that time period, 3 distinct trends were identified. From 1989-1998 there was a 30% increase that was then followed by a sharp decline over the subsequent decade. Large increases in loggerhead nesting occurred since then. FWRI examined the trend from the 1998 nesting high through 2013 and found the decade-long post-1998 decline had reversed and there was no longer a demonstrable trend. Looking at the data from 1989 through 2014 (an increase of over 32%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

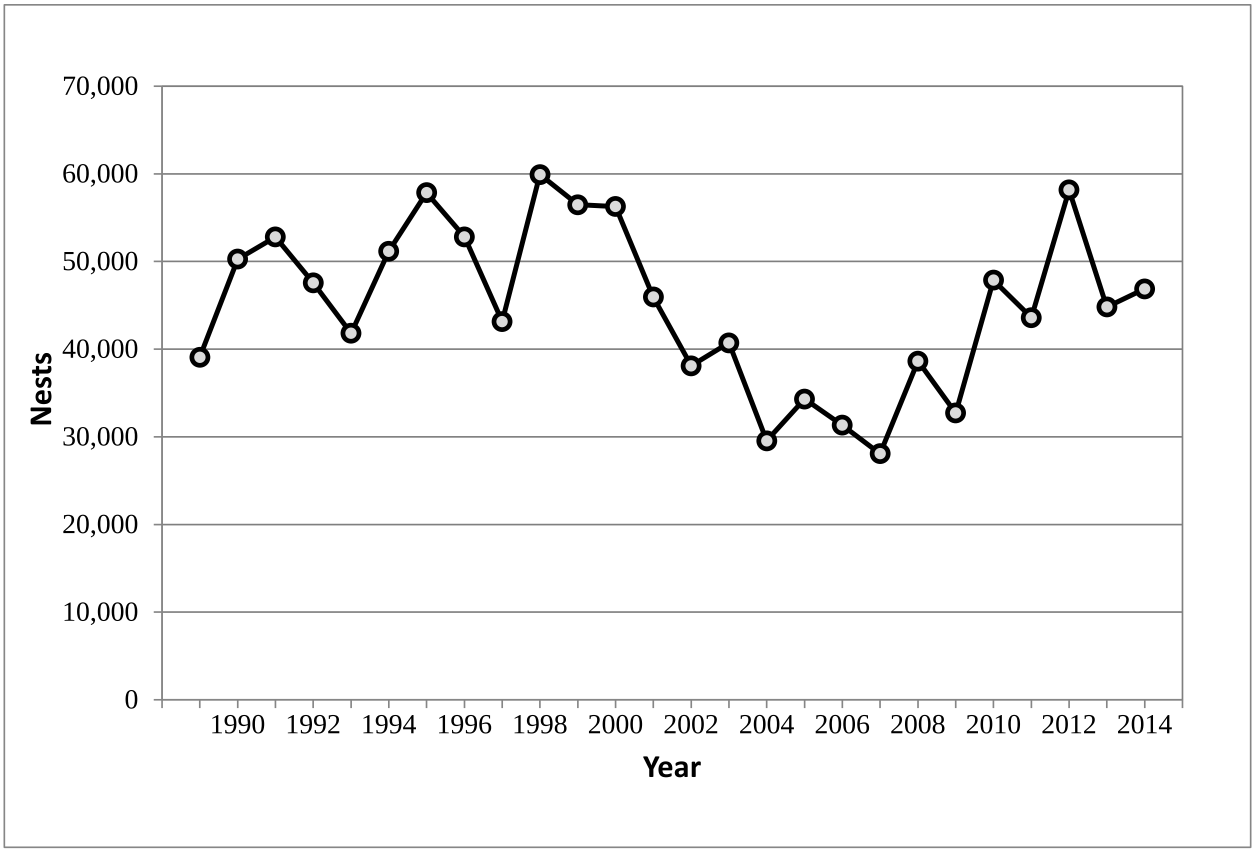

Figure 7. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (Georgia Department of Natural Resources [GADNR] unpublished data, North Carolina Wildlife Resources Commission [NCWRC] unpublished data, South Carolina Department of Natural Resources [SCDNR] unpublished data), and represent approximately 1,272 nesting females per year, assuming 4.1 nests per female (Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3% annually from 1989-2008. Nest totals from aerial surveys conducted by SCDNR showed a 1.9% annual decline in nesting in South Carolina from 1980-2008. Overall, there is strong statistical data to suggest the NRU had experienced a long-term decline over that period of time.

Data since that analysis (Table 15) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the declining trend of the past.

Table 15. Total number of NRU loggerhead nests (GADNR, SCDNR, and NCWRC nesting datasets)

Nests Recorded	2008	2009	2010	2011	2012	2013	2014
Georgia	1,649	998	1,760	1,992	2,241	2,289	1,196
South Carolina	4,500	2,182	3,141	4,015	4,615	5,193	2,083
North Carolina	841	302	856	950	1,074	1,260	542
Total	6,990	3,472	5,757	6,957	7,930	8,742	3,821

South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009-2012, with 2012 showing the highest index nesting total since the start of the program (Figure 8).

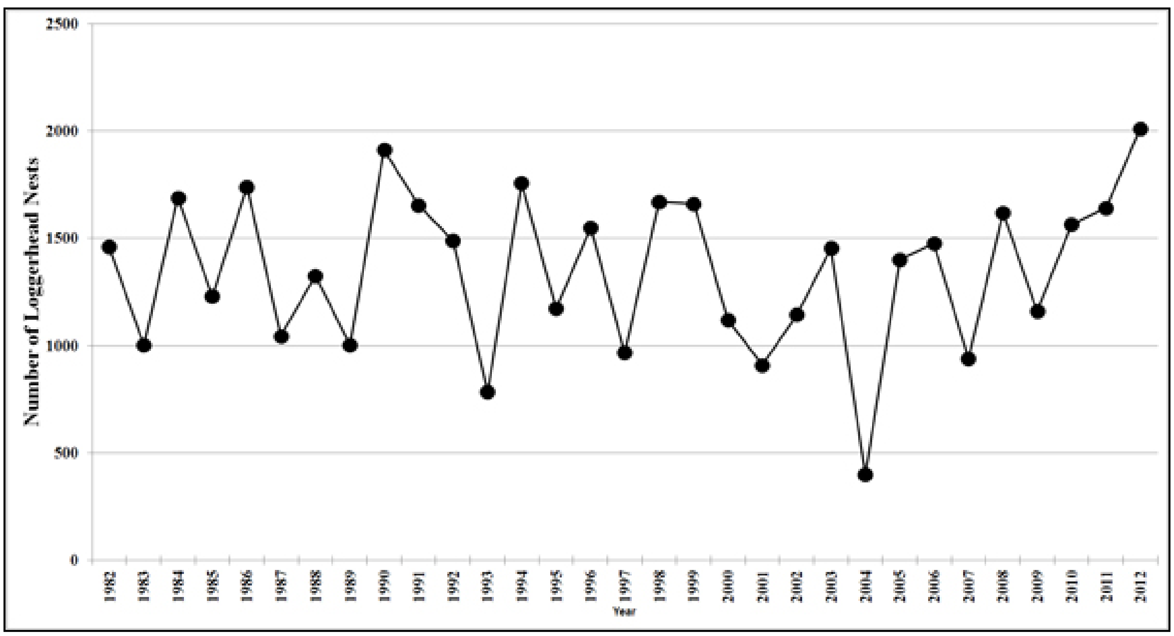

Figure 8. South Carolina index nesting beach counts for loggerhead sea turtles (from the SCDNR website, http://www.dnr.sc.gov/seaturtle/nest.htm)

Other NW Atlantic DPS Recovery Units

The remaining 3 recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages, but they are still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004, although the 2002 year was missed. Nest counts ranged from 168-270, with a mean of 246, but there was no detectable trend during this period (NMFS and USFWS 2008). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997-2008) of index nesting beaches in the area shows a statistically significant declining trend of 4.7% annually. Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches, and no trend can be determined for this subpopulation (NMFS and USFWS 2008). Zurita et al. (2003) found a statistically significant increase in the number of nests on 7 of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. Nonetheless, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

In-water Trends

Nesting data are the best current indicator of sea turtle population trends; but, in-water data also provide some insight. In-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in catch per unit effort (CPUE) (Arendt et al. 2009; Ehrhart et al. 2007; Epperly et al. 2007). Researchers believe that this increase in CPUE is likely linked to an increase in juvenile abundance, although it is unclear whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence. Bjorndal et al. (2005), cited in NMFS and USFWS (2008), caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern United States may be due to increased abundance of the largest oceanic/neritic juveniles (historically referred to as small benthic juveniles), which could indicate a relatively large number of individuals around the same age may mature in the near future (TEWG 2009). In-water studies throughout the eastern United States, however, indicate a substantial decrease in the abundance of the smallest oceanic/neritic juvenile loggerheads, a pattern corroborated by stranding data (TEWG 2009).

Population Estimate

The SEFSC developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS SEFSC 2009). The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Resulting trajectories of model runs for each individual recovery unit, and the western North Atlantic population as a whole, were found to be very similar. The model run estimates, from the adult female population size for the western North Atlantic (from the 2004-2008 time frame), suggest the adult female population size approximately 20,000-40,000 individuals, with a low likelihood of being up to 70,000 (NMFS SEFSC 2009). A less robust estimate for total benthic females in the western North Atlantic was also obtained, yielding approximately 30,000-300,000 individuals, up to less than 1 million (NMFS SEFSC 2009). A preliminary regional abundance survey of loggerheads within the northwestern Atlantic continental shelf for positively identified loggerhead in all strata estimated about 588,000 loggerheads (interquartile range of 382,000-817,000). When correcting for unidentified turtles in proportion to the ratio of identified turtles, the estimate increased to about 801,000 loggerheads (interquartile range of 521,000-1,111,000) (NEFSC 2011).

Threats (Specific to Loggerhead Sea Turtles)
The threats faced by loggerhead sea turtles are well-summarized in the general discussion of threats in Section 3.2.1. Yet the impact of fishery interactions is a point of further emphasis for this species. The joint NMFS and USFWS Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009).

Regarding the impacts of pollution, loggerheads may be particularly affected by organochlorine contaminants; they have the highest organochlorine concentrations (Storelli et al. 2008) and metal loads (D'Ilio et al. 2011) in sampled tissues among the sea turtle species. It is thought that dietary preferences were likely to be the main differentiating factor among sea turtle species. Storelli et al. (2008) analyzed tissues from stranded loggerhead sea turtles and found that mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals, and porpoises (Law et al. 1991).

Specific information regarding potential climate change impacts on loggerheads is also available. Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80% female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100% female offspring. Such highly skewed sex ratios could undermine the reproductive capacity of the species. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most nests, leading to egg mortality (Hawkes et al. 2007). Warmer sea surface temperatures have also been correlated with an earlier onset of loggerhead nesting in the spring (Hawkes et al. 2007; Weishampel et al. 2004), short inter-nesting intervals (Hays et al. 2002), and shorter nesting seasons (Pike et al. 2006).

3.2.3 Green Sea Turtle

The green sea turtle was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered. On March 23, 2015, NMFS published a proposed rule (80 FR 15271) listing 11 DPSs of green sea turtle. This includes 8 DPSs listed as threatened (Central North Pacific, East Indian-West Pacific, East Pacific, North Atlantic, North Indian, South Atlantic, Southwest Indian, and Southwest Pacific) and 3 as endangered (Central South Pacific, Central West Pacific, and Mediterranean).

Species Description and Distribution
The green sea turtle is the largest of the hardshell marine turtles, growing to a weight of 350 lb (159 kg) and a straight carapace length of greater than 3.3 ft (1 m). Green sea turtles have a

smooth carapace with 4 pairs of lateral (or costal) scutes and a single pair of elongated prefrontal scales between the eyes. They typically have a black dorsal surface and a white ventral surface, although the carapace of green sea turtles in the Atlantic Ocean has been known to change in color from solid black to a variety of shades of grey, green, or brown and black in starburst or irregular patterns (Lagueux 2001).

With the exception of post-hatchlings, green sea turtles live in nearshore tropical and subtropical waters where they generally feed on marine algae and seagrasses. They have specific foraging grounds and may make large migrations between these forage sites and natal beaches for nesting (Hays et al. 2001). Green sea turtles nest on sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands in more than 80 countries worldwide (Hirth and USFWS 1997). The 2 largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Pacific coast of Australia along the Great Barrier Reef.

Differences in mitochondrial deoxyribonucleic acid (DNA) properties of green sea turtles from different nesting regions indicate there are genetic subpopulations (Bowen et al. 1992; Fitzsimmons et al. 2006). Despite the genetic differences, sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. Such mixing occurs at extremely low levels in Hawaiian foraging areas, perhaps making this central Pacific population the most isolated of all green sea turtle populations occurring worldwide (Dutton et al. 2008).

In U.S. Atlantic and GOM waters, green sea turtles are distributed throughout inshore and nearshore waters from Texas to Massachusetts. Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984; Hildebrand 1982; Shaver 1994), the GOM off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957; Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon system in Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward Counties (Guseman and Ehrhart 1992; Wershoven and Wershoven 1992). The summer developmental habitat for green sea turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997). Additional important foraging areas in the western Atlantic include the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean coast of Panama, scattered areas along Colombia and Brazil (Hirth 1971), and the northwestern coast of the Yucatán Peninsula.

The complete nesting range of green sea turtles within the southeastern United States includes sandy beaches between Texas and North Carolina, as well as the U.S. Virgin Islands and Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991). Still, the vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994; Meylan et al. 1995). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard south through Broward counties. For more information on green sea turtle nesting in other ocean basins, refer to the 1991 publication, *Recovery Plan for the Atlantic*

Green Turtle (NMFS and USFWS 1991) or the 2007 publication, *Green Sea Turtle 5-Year Status Review* (NMFS and USFWS 2007a).

*Life History Informati*on

Green sea turtles reproduce sexually, and mating occurs in the waters off nesting beaches. Mature females return to their natal beaches (i.e., the same beaches where they were born) to lay eggs (Balazs 1982; Frazer and Ehrhart 1985) every 2-4 years while males are known to reproduce every year (Balazs 1983). In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989). During the nesting season, females nest at approximately 2-week intervals, laying an average of 3-4 clutches (Johnson and Ehrhart 1996). Clutch size often varies among subpopulations, but mean clutch size is approximately 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989). Eggs incubate for approximately 2 months before hatching. Hatchling green sea turtles are approximately 2 in (5 cm) in length and weigh approximately 0.9 ounces (25 grams). Survivorship at any particular nesting site is greatly influenced by the level of anthropogenic stressors, with the more pristine and less disturbed nesting sites (e.g., along the Great Barrier Reef in Australia) showing higher survivorship values than nesting sites known to be highly disturbed (e.g., Nicaragua [Campbell and Lagueux 2005; Chaloupka and Limpus 2005]).

After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years. During this life stage, green sea turtles feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. This early oceanic phase remains one of the most poorly understood aspects of green sea turtle life history (NMFS and USFWS 2007b). Green sea turtles exhibit particularly slow growth rates of about 0.4-2 in (1-5 cm) per year (Green 1993; McDonald-Dutton and Dutton 1998), which may be attributed to their largely herbivorous, low-net energy diet (Bjorndal 1982). At approximately 8-10 in (20-25 cm) carapace length, juveniles leave the pelagic environment and enter nearshore developmental habitats such as protected lagoons and open coastal areas rich in sea grass and marine algae. Growth studies using skeletochronology indicate that green sea turtles in the western Atlantic shift from the oceanic phase to nearshore developmental habitats after approximately 5-6 years (Bresette et al. 2006; Zug and Glor 1998). Within the developmental habitats, juveniles begin the switch to a more herbivorous diet, and by adulthood feed almost exclusively on seagrasses and algae (Rebel 1974), although some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). Green sea turtles mature slowly, requiring 20-50 years to reach sexual maturity (Chaloupka and Musick 1997; Hirth and USFWS 1997).

While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds, and it is clear they are capable of “homing in” on these sites if displaced (McMichael et al. 2003). Reproductive migrations of Florida green sea turtles have been identified through flipper tagging and/or satellite telemetry. Based on these studies, the majority of adult female Florida green sea turtles are believed to reside in nearshore foraging areas throughout the Florida

Keys and in the waters southwest of Cape Sable, with some post-nesting turtles also residing in Bahamian waters as well (NMFS and USFWS 2007b).

Status and Population Dynamics

Population estimates for marine turtles do not exist because of the difficulty in sampling turtles over their geographic ranges and within their marine environments. Nonetheless, researchers have used nesting data to study trends in reproducing sea turtles over time. A summary of nesting trends is provided in the most recent 5-year status review for the species (NMFS and USFWS 2007b) organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). It shows trends at 23 of the 46 nesting sites: 10 appeared to be increasing, 9 appeared to be stable, and 4 appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic, and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, the Eastern Indian Ocean, and possibly the Mediterranean Sea regions appeared to show more negative trends (i.e., more nesting sites decreasing than increasing). These regional determinations should be viewed with caution, because trend data was only available for about half of the total nesting concentration sites examined in the review and site specific data availability appeared to vary across all regions.

The Western Atlantic region (i.e., the focus of this Opinion) was one of the best performing in terms of abundance in the entire review, as there were no sites that appeared to decrease. The 5-year status review for the species reviewed the trend in nest count data for each identified 8 geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean (NMFS and USFWS 2007a): (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Achipelago, Guinea-Bissau. Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for 8 sites in the western, eastern, and central Atlantic, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting, with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic; however, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a). More information about site-specific trends for the other major ocean regions can be found in the most recent 5-year status review for the species (see NMFS and USFWS 2007a).

By far, the largest known nesting assemblage in the western Atlantic region occurs at Tortuguero, Costa Rica. According to monitoring data on nest counts, as well as documented emergences (both nesting and non-nesting events), there appears to be an increasing trend in this nesting assemblage since monitoring began in the early 1970s. For instance, from 1971-1975 there were approximately 41,250 average annual emergences documented and this number increased to an average of 72,200 emergences from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 nesting females per year (NMFS and USFWS 2007a). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population's growing at 4.9% annually.

In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida where an estimated 200-1,100 females nest each year (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf Coast of Florida (Meylan et al. 1995). More recently, green sea turtle nesting has occurred in North Carolina on Bald Head Island, just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. In 2010, a total of 18 nests were found in North Carolina, 6 nests in South Carolina, and 6 nests in Georgia (nesting databases maintained on http://www.seaturtle.org).

In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989, the pattern of green sea turtle nesting has generally shown biennial peaks in abundance with a positive trend during the 10 years of regular monitoring (Figure 9). According to data collected from Florida's index nesting beach survey from 1989-2012, green sea turtle nest counts across Florida have increased approximately ten-fold from a low of 267 in the early 1990s to a high of 25,553 in 2013. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in both 2010 and 2011, a decrease in 2012, and another increase in 2013 (Figure 9). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9%.

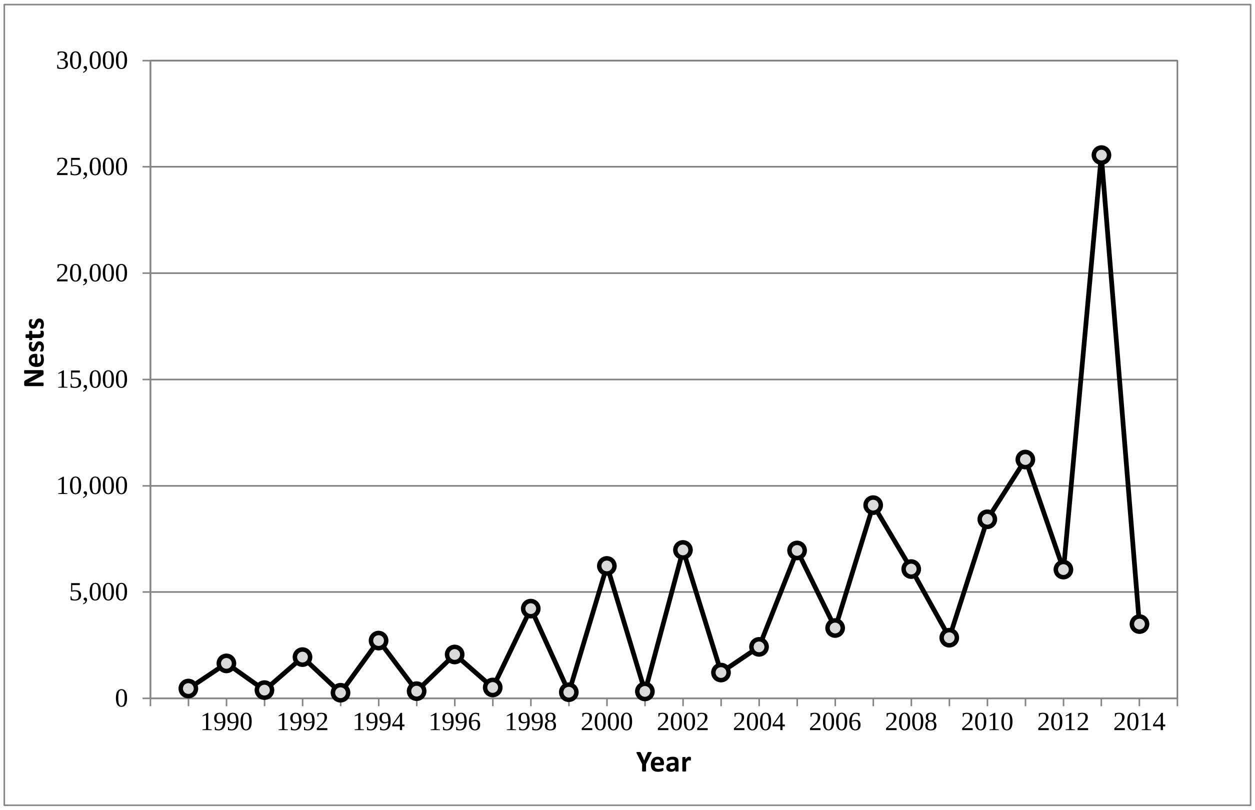

Figure 9. Green sea turtle nesting at Florida index beaches since 1989

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of the species for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. Green sea turtles also face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (e.g., plastics, petroleum products, petrochemicals), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.1.

In addition to general threats, green sea turtles are susceptible to natural mortality from Fibropapillomatosis (FP) disease. FP results in the growth of tumors on soft external tissues (flippers, neck, tail, etc.), the carapace, the eyes, the mouth, and internal organs (gastrointestinal tract, heart, lungs, etc.) of turtles (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). These tumors range in size from 0.04 in (0.1 cm) to greater than 11.81 in (30 cm) in diameter and may affect swimming, vision, feeding, and organ function (Aguirre et al. 2002; Herbst 1994;

Jacobson et al. 1989). Presently, scientists are unsure of the exact mechanism causing this disease, though it is believed to be related to both an infectious agent, such as a virus (Herbst et al. 1995), and environmental conditions (e.g., habitat degradation, pollution, low wave energy, and shallow water [Foley et al. 2005]). Presently, FP is cosmopolitan, but it has been found to affect large numbers of animals in specific areas, including Hawaii and Florida (Herbst 1994; Jacobson 1990; Jacobson et al. 1991).

Cold-stunning is another natural threat to green sea turtles. Although it is not considered a major source of mortality in most cases, as temperatures fall below 46.4-50°F (8-10°C) turtles may lose their ability to swim and dive, often floating to the surface. The rate of cooling that precipitates cold-stunning appears to be the primary threat, rather than the water temperature itself (Milton and Lutz 2003). Sea turtles that overwinter in inshore waters are most susceptible to cold-stunning because temperature changes are most rapid in shallow water (Witherington and Ehrhart 1989). During January 2010, an unusually large cold-stunning event in the southeastern United States resulted in around 4,600 sea turtles, mostly greens, found cold-stunned, with hundreds found dead or dying. A large cold-stunning event occurred in the western GOM in February 2011, resulting in approximately 1,650 green sea turtles found cold-stunned in Texas. Of these, approximately 620 were found dead or died after stranding, while approximately 1,030 turtles were rehabilitated and released. Additionally, during this same time frame, approximately 340 green sea turtles were found cold-stunned in Mexico, though approximately 300 of those were subsequently rehabilitated and released.

3.2.4 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its entire range on June 2, 1970, (35 FR 8491) under the Endangered Species Conservation Act of 1969.

Species Description and Distribution
The leatherback is the largest sea turtle in the world, with a curved carapace length (CCL) often exceeding 5 ft (150 cm) and front flippers that can span almost 9 ft (270 cm) (NMFS and USFWS 1998). Mature males and females can reach lengths of over 6 ft (2 m) and weigh close to 2,000 lb (900 kg). The leatherback does not have a bony shell. Instead, its shell is approximately 1.5 in (4 cm) thick and consists of a leathery, oil-saturated connective tissue overlaying loosely interlocking dermal bones. The ridged shell and large flippers help the leatherback during its long-distance trips in search of food.

Unlike other sea turtles, leatherbacks have several unique traits that enable them to live in cold water. For example, leatherbacks have a countercurrent circulatory system (Greer et al. 1973),[10]

[10] Countercurrent circulation is a highly efficient means of minimizing heat loss through the skin's surface because heat is recycled. For example, a countercurrent circulation system often has an artery containing warm blood from the heart surrounded by a bundle of veins containing cool blood from the body's surface. As the warm blood flows away from the heart, it passes much of its heat to the colder blood returning to the heart via the veins. This conserves heat by recirculating it back to the body's core.

a thick layer of insulating fat (Davenport et al. 1990; Goff and Lien 1988), gigantothermy (Paladino et al. 1990),[11] and they can increase their body temperature through increased metabolic activity (Bostrom and Jones 2007; Southwood et al. 2005). These adaptations allow leatherbacks to be comfortable in a wide range of temperatures, which helps them to travel further than any other sea turtle species (NMFS and USFWS 1995). For example, a leatherback may swim more than 6,000 miles (10,000 km) in a single year (Benson et al. 2007a; Benson et al. 2011; Eckert 2006b; Eckert et al. 2006). They search for food between latitudes 71°N and 47°S, in all oceans, and travel extensively to and from their tropical nesting beaches. In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (NMFS SEFSC 2001).

While leatherbacks will look for food in coastal waters, they appear to prefer the open ocean at all life stages (Heppell et al. 2003). Leatherbacks have pointed tooth-like cusps and sharp-edged jaws that are adapted for a diet of soft-bodied prey such as jellyfish and salps. A leatherback's mouth and throat also have backward-pointing spines that help retain jelly-like prey. Leatherbacks' favorite prey (e.g., medusae, siphonophores, and salps) occur commonly in temperate and northern or sub-arctic latitudes and likely has a strong influence on leatherback distribution in these areas (Plotkin 1995). Leatherbacks are known to be deep divers, with recorded depths in excess of a half-mile (Eckert et al. 1989), but they may also come into shallow waters to locate prey items.

Genetic analyses using microsatellite markers along with mitochondrial DNA and tagging data indicate there are 7 groups or breeding populations in the Atlantic Ocean: Florida, Northern Caribbean, Western Caribbean, Southern Caribbean/Guianas, West Africa, South Africa, and Brazil (TEWG 2007). General differences in migration patterns and foraging grounds may occur between the seven nesting assemblages, although data to support this is limited in most cases.

Life History Information

The leatherback life cycle is broken into several stages: (1) egg/hatchling; (2) post-hatchling; (3) juvenile; (4) subadult; and (5) adult. Leatherbacks are a long-lived species that delay age of maturity, have low and variable survival in the egg and juvenile stages, and have relatively high and constant annual survival in the subadult and adult life stages (Chaloupka 2002; Crouse 1999; Heppell et al. 1999; Heppell et al. 2003; Spotila et al. 1996b; Spotila et al. 2000). While a robust estimate of the leatherback sea turtle's life span does not exist, the current best estimate for the maximum age is 43 (Avens et al. 2009). It is still unclear when leatherbacks first become sexually mature. Using skeletochronological data, Avens et al. (2009) estimated that leatherbacks in the western North Atlantic may not reach maturity until 29 years of age, which is longer than earlier estimates of 2-3 years by Pritchard and Trebbau (1984), of 3-6 years by Rhodin (1985), of 13-14 years for females by Zug and Parham (1996), and 12-14 years for leatherbacks nesting in the U.S. Virgin Islands by Dutton et al. (2005). A more recent study that examined leatherback growth rates estimated an age at maturity of 16.1 years (Jones et al. 2011).

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[11] "Gigantothermy" refers to a condition when an animal has relatively high volume compared to its surface area, and as a result, it loses less heat.

The average size of reproductively active females in the Atlantic is generally 5-5.5 ft (150-162 cm) CCL (Benson et al. 2007a; Hirth et al. 1993; Starbird and Suarez 1994). Still, females as small as 3.5-4 ft (105-125 cm) CCL have been observed nesting at various sites (Stewart et al. 2007).

Female leatherbacks typically nest on sandy, tropical beaches at intervals of 2-4 years (Garcia M. and Sarti 2000; McDonald and Dutton 1996; Spotila et al. 2000). Unlike other sea turtle species, female leatherbacks do not always nest at the same beach year after year; some females may even nest at different beaches during the same year (Dutton et al. 2005; Eckert et al. 1989; Keinath and Musick 1993; Steyermark et al. 1996). Individual female leatherbacks have been observed with fertility spans as long as 25 years (Hughes 1996). Females usually lay up to 10 nests during the 3-6 month nesting season (March through July in the United States), typically 8-12 days apart, with 100 eggs or more per nest (Eckert et al. 2012; Eckert et al. 1989; Maharaj 2004; Matos ; Stewart and Johnson 2006; Tucker 1988). Yet, up to approximately 30% of the eggs may be infertile (Eckert et al. 1989; Maharaj 2004; Matos ; MTN 1984; Stewart and Johnson 2006; Tucker 1988). The number of leatherback hatchlings that make it out of the nest on to the beach (i.e., emergent success) is approximately 50% worldwide (Eckert et al. 2012), which is lower than the greater than 80% reported for other sea turtle species (Miller 1997). In the United States, the emergent success is higher at 54-72% (Eckert and Eckert 1990; Stewart and Johnson 2006; Tucker 1988). Thus, the number of hatchlings in a given year may be less than the total number of eggs produced in a season. Eggs hatch after 60-65 days, and the hatchlings have white striping along the ridges of their backs and on the edges of the flippers. Leatherback hatchlings weigh approximately 1.5-2 ounces (40-50 g), and are approximately 2-3 in (51-76 mm) in length, with fore flippers as long as their bodies. Hatchlings grow rapidly with reported growth rates for leatherbacks from 2.5-27.6 in (6-70 cm) in length, estimated at 12.6 in (32 cm) per year (Jones et al. 2011).

In the Atlantic, the sex ratio appears to be skewed toward females. The Turtle Expert Working Group (TEWG) reports that nearshore and onshore strandings data from the U.S. Atlantic and GOM coasts indicate that 60% of strandings were females (TEWG 2007). Those data also show that the proportion of females among adults (57%) and juveniles (61%) was also skewed toward females in these areas (TEWG 2007). James et al. (2007) collected size and sex data from large subadult and adult leatherbacks off Nova Scotia and also concluded a bias toward females at a rate of 1.86:1.

The survival and mortality rates for leatherbacks are difficult to estimate and vary by location. For example, the annual mortality rate for leatherbacks that nested at Playa Grande, Costa Rica, was estimated to be 34.6% in 1993-1994 and 34.0% in 1994-1995 (Spotila et al. 2000). In contrast, leatherbacks nesting in French Guiana and St. Croix had estimated annual survival rates of 91% (Rivalan et al. 2005) and 89% (Dutton et al. 2005), respectively. For the St. Croix population, the average annual juvenile survival rate was estimated to be approximately 63% and the total survival rate from hatchling to first year of reproduction for a female was estimated to be between 0.4% and 2% (assuming age at first reproduction is between 9-13 years (Eguchi et al. 2006). Spotila et al. (1996a) estimated first-year survival rates for leatherbacks at 6.25%.

Migratory routes of leatherbacks are not entirely known; however, recent information from satellite tags have documented long travels between nesting beaches and foraging areas in the Atlantic and Pacific Ocean basins (Benson et al. 2007a; Benson et al. 2011; Eckert 2006a; Eckert et al. 2006; Ferraroli et al. 2004; Hays et al. 2004; James et al. 2005). Leatherbacks nesting in Central America and Mexico travel thousands of miles through tropical and temperate waters of the South Pacific (Eckert and Sarti 1997; Shillinger et al. 2008). Data from satellite tagged leatherbacks suggest that they may be traveling in search of seasonal aggregations of jellyfish (Benson et al. 2007b; Bowlby et al. 1994; Graham 2009; Shenker 1984; Starbird et al. 1993; Suchman and Brodeur 2005).

Status and Population Dynamics

The status of the Atlantic leatherback population has been less clear than the Pacific population, which has shown dramatic declines at many nesting sites (Santidrián-Tomillo et al. 2007; Sarti Martínez et al. 2007; Spotila et al. 2000). This uncertainty has been a result of inconsistent beach and aerial surveys, cycles of erosion, and reformation of nesting beaches in the Guianas (representing the largest nesting area). Leatherbacks also show a lesser degree of nest-site fidelity than occurs with the hardshell sea turtle species. Coordinated efforts of data collection and analyses by the leatherback Turtle Expert Working Group have helped to clarify the understanding of the Atlantic population status (TEWG 2007).

The Southern Caribbean/Guianas stock is the largest known Atlantic leatherback nesting aggregation (TEWG 2007). This area includes the Guianas (Guyana, Suriname, and French Guiana), Trinidad, Dominica, and Venezuela, with most of the nesting occurring in the Guianas and Trinidad. The Southern Caribbean/Guianas stock of leatherbacks was designated after genetics studies indicated that animals from the Guianas (and possibly Trinidad) should be viewed as a single population. Using nesting females as a proxy for population, the TEWG (2007) determined that the Southern Caribbean/Guianas stock had demonstrated a long-term, positive population growth rate. TEWG observed positive growth within major nesting areas for the stock, including Trinidad, Guyana, and the combined beaches of Suriname and French Guiana (TEWG 2007). More specifically, Wallace et al. (2013) report an estimated three-generation abundance change of +3%, +20, 800%, +1,778%, and +6% in Trinidad, Guyana, Suriname, and French Guiana, respectively.

Researchers believe the cyclical pattern of beach erosion and then reformation has affected leatherback nesting patterns in the Guianas. For example, between 1979 and 1986, the number of leatherback nests in French Guiana had increased by about 15% annually (NMFS SEFSC 2001). This increase was then followed by a nesting decline of about 15% annually. This decline corresponded with the erosion of beaches in French Guiana and increased nesting in Suriname. This pattern suggests that the declines observed since 1987 might actually be a part of a nesting cycle that coincides with cyclic beach erosion in Guiana (Schultz 1975). Researchers think that the cycle of erosion and reformation of beaches may have changed where leatherbacks nest throughout this region. The idea of shifting nesting beach locations was supported by increased nesting in Suriname,[12] while the number of nests was declining at beaches in Guiana (Hilterman et al. 2003). Though this information suggested the long-term trend for the overall Suriname and French Guiana population was increasing.

The Western Caribbean stock includes nesting beaches from Honduras to Colombia. Across the Western Caribbean, nesting is most prevalent in Costa Rica, Panama, and the Gulf of Uraba in Colombia (Duque et al. 2000). The Caribbean coastline of Costa Rica and extending through Chiriquí Beach, Panama, represents the fourth largest known leatherback rookery in the world (Troëng et al. 2004). Examination of data from index nesting beaches in Tortuguero, Gandoca, and Pacuaré in Costa Rica indicate that the nesting population likely was not growing over the 1995-2005 time series (TEWG 2007). Other modeling of the nesting data for Tortuguero indicates a possible 67.8% decline between 1995 and 2006 (Troëng et al. 2007). Wallace et al. (2013) report an estimated three-generation abundance change of -72%, -24%, and +6% for Tortuguero, Gandoca, and Pacuare, respectively.

Nesting data for the Northern Caribbean stock is available from Puerto Rico, St. Croix (U.S. Virgin Islands), and the British Virgin Islands (Tortola). In Puerto Rico, the primary nesting beaches are at Fajardo and on the island of Culebra. Nesting between 1978 and 2005 has ranged between 469-882 nests, and the population has been growing since 1978, with an overall annual growth rate of 1.1% (TEWG 2007). Wallace et al. (2013) report an estimated three-generation abundance change of -4% and +5,583% at Culebra and Fajardo, respectively. At the primary nesting beach on St. Croix, the Sandy Point National Wildlife Refuge, nesting has varied from a few hundred nests to a high of 1,008 in 2001, and the average annual growth rate has been approximately 1.1% from 1986-2004 (TEWG 2007). From 2006-2010, Wallace et al. (2013) report an annual growth rate of +7.5% in St. Croix and a three-generation abundance change of +1,058%. Nesting in Tortola is limited, but has been increasing from 0-6 nests per year in the late 1980s to 35-65 per year in the 2000s, with an annual growth rate of approximately 1.2% between 1994 and 2004 (TEWG 2007).

The Florida nesting stock nests primarily along the east coast of Florida. This stock is of growing importance, with total nests between 800-900 per year in the 2000s following nesting totals fewer than 100 nests per year in the 1980s (FWC, unpublished data). Using data from the index nesting beach surveys, the TEWG (TEWG 2007) estimated a significant annual nesting growth rate of 1.17% between 1989 and 2005. FWC Index Nesting Beach Survey Data indicates biennial peaks in nesting abundance beginning in 2007 (Table 16 and Figure 10). A similar pattern was also observed statewide (Table 5). This up-and-down pattern is thought to be a result of the cyclical nature of leatherback nesting, similar to the biennial cycle of green turtle nesting. Overall, the trend shows growth on Florida's east coast beaches. Wallace et al. (2013) report an annual growth rate of 9.7% and a three-generation abundance change of +1,863%.

[12] Leatherback nesting in Suriname increased by more than 10,000 nests per year since 1999 with a peak of 30,000 nests in 2001.

Table 16. Number of Leatherback Sea Turtle Nests in Florida

Nests Recorded	2009	2010	2011	2012	2013
Index Nesting Beaches	615	552	625	515	322
Statewide	1,747	1,334	1,653	1,712	896

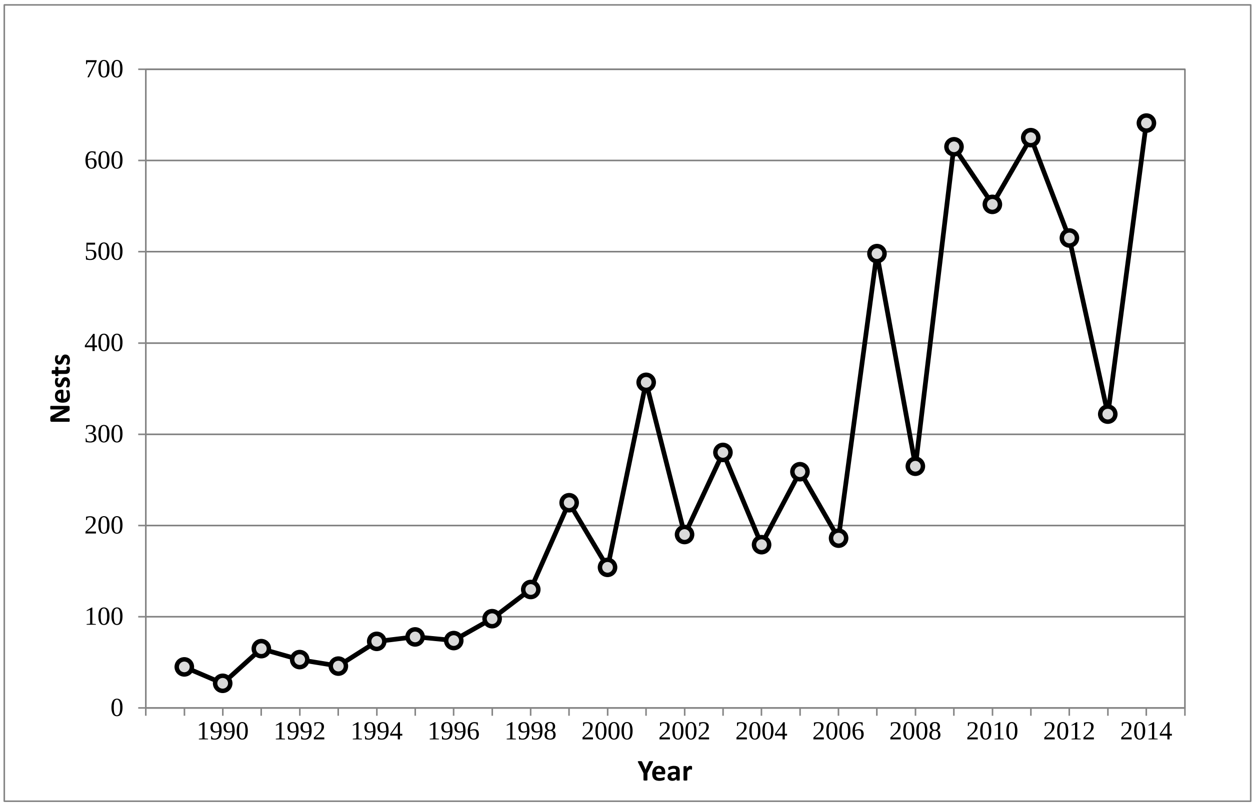

Figure 10. Leatherback sea turtle nesting at Florida index beaches since 1989

The West African nesting stock of leatherbacks is large and important, but it is a mostly unstudied aggregation. Nesting occurs in various countries along Africa's Atlantic coast, but much of the nesting is undocumented and the data are inconsistent. Gabon has a very large amount of leatherback nesting, with at least 30,000 nests laid along its coast in a single season (Fretey et al. 2007). Fretey et al. (2007) provide detailed information about other known nesting beaches and survey efforts along the Atlantic African coast. Because of the lack of consistent effort and minimal available data, trend analyses were not possible for this stock (TEWG 2007).

Two other small but growing stocks nest on the beaches of Brazil and South Africa. Based on the data available, TEWG (2007) determined that between 1988 and 2003, there was a positive annual average growth rate between 1.07 and 1.08% for the Brazilian stock. TEWG (2007) estimated an annual average growth rate between 1.04 and 1.06% for the South African stock.

Because the available nesting information is inconsistent, it is difficult to estimate the total population size for Atlantic leatherbacks. Spotila et al. (1996b) characterized the entire Western Atlantic population as stable at best and estimated a population of 18,800 nesting females.

Spotila et al. (1996b) further estimated that the adult female leatherback population for the entire Atlantic basin, including all nesting beaches in the Americas, the Caribbean, and West Africa, was about 27,600 (considering both nesting and interesting females), with an estimated range of 20,082-35,133. This is consistent with the estimate of 34,000-95,000 total adults (20,000-56,000 adult females; 10,000-21,000 nesting females) determined by the TEWG (2007). The TEWG (2007) also determined that at of the time of their publication, leatherback sea turtle populations in the Atlantic were all stable or increasing with the exception of the Western Caribbean and West Africa populations. The latest review by NMFS and USFWS (2013) suggests the leatherback nesting population is stable in most nesting regions of the Atlantic Ocean.

Threats

Leatherbacks face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.1; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically impact leatherback sea turtles.

Of all sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear, especially gill net and pot/trap lines. This may be because of their body type (large size, long pectoral flippers, and lack of a hard shell), their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, their method of locomotion, and/or perhaps their attraction to the lightsticks used to attract target species in longline fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine and many other stranded individuals exhibited evidence of prior entanglement (Dwyer et al. 2002). Zug and Parham (1996) point out that a combination of the loss of long-lived adults in fishery-related mortalities and a lack of recruitment from intense egg harvesting in some areas has caused a sharp decline in leatherback sea turtle populations and represents a significant threat to survival and recovery of the species worldwide.

Leatherback sea turtles may also be more susceptible to marine debris ingestion than other sea turtle species due to their predominantly pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding and migratory purposes (Lutcavage et al. 1997; Shoop and Kenney 1992). The stomach contents of leatherback sea turtles revealed that a substantial percentage (33.8% or 138 of 408 cases examined) contained some form of plastic debris (Mrosovsky et al. 2009). Blocking of the gut by plastic to an extent that could have caused death was evident in 8.7% of all leatherbacks that ingested plastic (Mrosovsky et al. 2009). Mrosovsky et al. (2009) also note that in a number of cases, the ingestion of plastic may not cause death outright, but could cause the animal to absorb fewer nutrients from food, eat less in general, etc.—factors which could cause other adverse effects. The presence of plastic in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items and forms of debris such a plastic bags (Mrosovsky et al. 2009). Balazs (1985) speculated that the plastic object might resemble a food item by its shape, color, size, or even movement as it drifts about, and therefore induce a feeding response in leatherbacks.

As discussed in Section 3.2.1, global climate change can be expected to have various impacts on all sea turtles, including leatherbacks. Global climate change is likely to also influence the distribution and abundance of jellyfish, the primary prey item of leatherbacks (NMFS and USFWS 2007). Several studies have shown leatherback distribution is influenced by jellyfish abundance (Houghton et al. 2006; Witt et al. 2007; Witt et al. 2006); however, more studies need to be done to monitor how changes to prey items affect distribution and foraging success of leatherbacks so population-level effects can be determined.

3.2.5 Hawksbill Sea Turtle

The hawksbill sea turtle was listed as endangered throughout its entire range on June 2, 1970 (35 FR 8491) under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Critical habitat was designated on June 2, 1998, in coastal waters surrounding Mona and Monito Islands in Puerto Rico (63 FR 46693).

Species Description and Distribution
Hawksbill sea turtles are small to medium-sized (99 to 150 lb on average [45 to 68 kg]) although females nesting in the Caribbean are known to weigh up to 176 lb (80 kg) (Pritchard et al. 1983). The carapace is usually serrated and has a "tortoise-shell" coloring, ranging from dark to golden brown, with streaks of orange, red, and/or black. The plastron of a hawksbill turtle is typically yellow. The head is elongated and tapers to a point, with a beak-like mouth that gives the species its name. The shape of the mouth allows the hawksbill turtle to reach into holes and crevices of coral reefs to find sponges, their primary adult food source, and other invertebrates. The shells of hatchlings are 1.7 in (42 mm) long, are mostly brown, and somewhat heart-shaped (Eckert 1995; Hillis and Mackay 1989; Van Dam and Sarti 1989).

Hawksbill sea turtles have a circumtropical distribution and usually occur between latitudes 30°N and 30°S in the Atlantic, Pacific, and Indian Oceans. In the western Atlantic, hawksbills are widely distributed throughout the Caribbean Sea, off the coasts of Florida and Texas in the continental United States, in the Greater and Lesser Antilles, and along the mainland of Central America south to Brazil (Amos 1989; Groombridge and Luxmoore 1989; Lund 1985; Meylan and Donnelly 1999; NMFS and USFWS 1998; Plotkin and Amos 1988; Plotkin and Amos 1990). They are highly migratory and use a wide range of habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Adult hawksbill sea turtles are capable of migrating long distances between nesting beaches and foraging areas. For instance, a female hawksbill sea turtle tagged at Buck Island Reef National Monument (BIRNM) was later identified 1,160 miles (1,866 km) away in the Miskito Cays in Nicaragua (Spotila 2004).

Hawksbill sea turtles nest on sandy beaches throughout the tropics and subtropics. Nesting occurs in at least 70 countries, although much of it now only occurs at low densities compared to that of other sea turtle species (NMFS and USFWS 2007b). Meylan and Donnelly (1999) believe that the widely dispersed nesting areas and low nest densities is likely a result of overexploitation of previously large colonies that have since been depleted over time. The most significant nesting within the United States occurs in Puerto Rico and the U.S. Virgin Islands, specifically on Mona Island and BIRNM, respectively. Although nesting within the continental United States is typically rare, it can occur along the southeast coast of Florida and the Florida Keys. The largest hawksbill nesting population in the western Atlantic occurs in the Yucatán Peninsula of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade et al. 1999; Spotila 2004). In the U.S. Pacific, hawksbills nest on main island beaches in Hawaii, primarily along the east coast of the island. Hawksbill nesting has also been documented in American Samoa and Guam. More information on nesting in other ocean basins may be found in the 5-year status review for the species (NMFS and USFWS 2007).

Mitochondrial DNA studies show that reproductive populations are effectively isolated over ecological time scales (Bass et al. 1996). Substantial efforts have been made to determine the nesting population origins of hawksbill sea turtles assembled in foraging grounds, and genetic research has shown that hawksbills of multiple nesting origins commonly mix in foraging areas (Bowen and Witzell 1996). Since hawksbill sea turtles nest primarily on the beaches where they were born, if a nesting population is decimated, it might not be replenished by sea turtles from other nesting rookeries (Bass et al. 1996).

Life History Information

Hawksbill sea turtles exhibit slow growth rates although they are known to vary within and among populations from a low of 0.4-1.2 in (1-3 cm) per year, measured in the Indo-Pacific (Chaloupka and Limpus 1997; Mortimer et al. 2003; Mortimer et al. 2002; Whiting 2000), to a high of 2 in (5 cm) or more per year, measured at some sites in the Caribbean (Díez and Dam 2002; León and Díez 1999). Differences in growth rates are likely due to differences in diet and/or density of sea turtles at foraging sites and overall time spent foraging (Bjorndal and Bolten 2000; Chaloupka et al. 2004). Consistent with slow growth, age to maturity for the species is also long, taking between 20 and 40 years, depending on the region (Chaloupka and Musick 1997; Limpus and Miller 2000). Hawksbills in the western Atlantic are known to mature faster (i.e., 20 or more years) than sea turtles found in the Indo-Pacific (i.e., 30-40 years) (Boulan 1983; Boulon 1994; Díez and Dam 2002; Limpus and Miller 2000). Males are typically mature when their length reaches 27 in (69 cm), while females are typically mature at 30 in (75 cm) (Eckert et al. 1992; Limpus 1992).

Female hawksbills return to the beaches where they were born (natal beaches) every 2-3 years to nest (van Dam et al. 1991; Witzell 1983) and generally lay 3-5 nests per season (Richardson et al. 1999). Compared with other sea turtles, the number of eggs per nest (clutch) for hawksbills can be quite high. The largest clutches recorded for any sea turtle belong to hawksbills (approximately 250 eggs per nest) (Hirth and Abdel Latif 1980), though nests in the U.S. Caribbean and Florida more typically contain approximately 140 eggs (USFWS hawksbill fact sheet, http://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/hawksbill-sea-turtle.htm). Eggs incubate for approximately 60 days before hatching (USFWS hawksbill fact sheet). Hatchling hawksbill sea turtles typically measure 1-2 in (2.5-5 cm) in length and weigh approximately 0.5 oz (15 g).

Hawksbills may undertake developmental migrations (migrations as immatures) and reproductive migrations that involve travel over many tens to thousands of miles (Meylan 1999a). Post-hatchlings (oceanic stage juveniles) are believed to live in the open ocean, taking shelter in floating algal mats and drift lines of flotsam and jetsam in the Atlantic and Pacific oceans (Musick and Limpus 1997) before returning to more coastal foraging grounds. In the Caribbean, hawksbills are known to almost exclusively feed on sponges (Meylan 1988; van Dam and Díez 1997), although at times they have been seen foraging on other food items, notably corallimorphs and zooanthids (León and Díez 2000; Mayor et al. 1998; van Dam and Díez 1997).

Reproductive females undertake periodic (usually non-annual) migrations to their natal beaches to nest and exhibit a high degree of fidelity to their nest sites. Movements of reproductive males are less certain, but are presumed to involve migrations to nesting beaches or to courtship stations along the migratory corridor. Hawksbills show a high fidelity to their foraging areas as well (van Dam and Díez 1998). Foraging sites are typically areas associated with coral reefs, although hawksbills are also found around rocky outcrops and high energy shoals which are optimum sites for sponge growth. They can also inhabit seagrass pastures in mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent (Bjorndal 1997; van Dam and Díez 1998).

Status and Population Dynamics
There are currently no reliable estimates of population abundance and trends for non-nesting hawksbills at the time of this consultation; therefore, nesting beach data is currently the primary information source for evaluating trends in global abundance. Most hawksbill populations around the globe are either declining, depleted, and/or remnants of larger aggregations (NMFS and USFWS 2007). The largest nesting population of hawksbills occurs in Australia where approximately 2,000 hawksbills nest off the northwest coast and about 6,000-8,000 nest off the Great Barrier Reef each year (Spotila 2004). Additionally, about 2,000 hawksbills nest each year in Indonesia and 1,000 nest in the Republic of Seychelles (Spotila 2004). In the United States, hawksbills typically laid about 500-1,000 nests on Mona Island, Puerto Rico in the past (Diez and van Dam 2007), but the numbers appear to be increasing, as the Puerto Rico Department of Natural and Environmental Resources counted nearly 1,600 nests in 2010 (Puerto Rico Department of Natural and Environmental Resources nesting data). Another 56-150 nests are typically laid on Buck Island off St. Croix (Meylan 1999b; Mortimer and Donnelly 2008). Nesting also occurs to a lesser extent on beaches on Culebra Island and Vieques Island in Puerto Rico, the mainland of Puerto Rico, and additional beaches on St. Croix, St. John, and St. Thomas, U.S. Virgin Islands.

Mortimer and Donnelly (2008) reviewed nesting data for 83 nesting concentrations organized among 10 different ocean regions (i.e., Insular Caribbean, Western Caribbean Mainland, Southwestern Atlantic Ocean, Eastern Atlantic Ocean, Southwestern Indian Ocean, Northwestern

Indian Ocean, Central Indian Ocean, Eastern Indian Ocean, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). They determined historic trends (i.e., 20-100 years ago) for 58 of the 83 sites, and also determined recent abundance trends (i.e., within the past 20 years) for 42 of the 83 sites. Among the 58 sites where historic trends could be determined, all showed a declining trend during the long-term period. Among the 42 sites where recent (past 20 years) trend data were available, 10 appeared to be increasing, 3 appeared to be stable, and 29 appeared to be decreasing. With respect to regional trends, nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland) are generally doing better than those in the Indo-Pacific regions. For instance, 9 of the 10 sites that showed recent increases are located in the Caribbean. Buck Island and St. Croix's East End beaches support 2 remnant populations of between 17-30 nesting females per season (Hillis and Mackay 1989; Mackay 2006). While the proportion of hawksbills nesting on Buck Island represents a small proportion of the total hawksbill nesting occurring in the greater Caribbean region, Mortimer and Donnelly (2008) report an increasing trend in nesting at that site based on data collected from 2001-2006. The conservation measures implemented when BIRNM was expanded in 2001 most likely explains this increase.

Nesting concentrations in the Pacific Ocean appear to be performing the worst of all regions despite the fact that the region currently supports more nesting hawksbills than either the Atlantic or Indian Oceans (Mortimer and Donnelly 2008). Even so, while still critically low in numbers, sightings of hawksbills in the eastern Pacific appear to have been increasing since 2007, though some of that increase may be attributable to better observations (Gaos et al. 2010). More information about site-specific trends can be found in the most recent 5-year status review for the species (NMFS and USFWS 2007).

Threats

Hawksbills are currently subjected to the same suite of threats on both nesting beaches and in the marine environment that affect other sea turtles (e.g., interaction with federal and state fisheries, coastal construction, oil spills, climate change affecting sex ratios) as discussed in Section 3.2.1. There are also specific threats that are of special emphasis, or are unique, for hawksbill sea turtles discussed in further detail below.

The historical decline of the species is primarily attributed to centuries of exploitation for the beautifully patterned shell, which made it a highly attractive species to target (Parsons 1972). The fact that reproductive females exhibit a high fidelity for nest sites and the tendency of hawksbills to nest at regular intervals within a season made them an easy target for capture on nesting beaches. The shells from hundreds of thousands of sea turtles in the western Caribbean region were imported into the United Kingdom and France during the nineteenth and early twentieth centuries (Parsons 1972). Additionally, hundreds of thousands of sea turtles contributed to the region's trade with Japan prior to 1993 when a zero quota was imposed (Milliken and Tokunaga 1987), as cited in (Brautigram and Eckert 2006).

The continuing demand for the hawksbills' shells as well as other products derived from the species (e.g., leather, oil, perfume, and cosmetics) represents an ongoing threat to its recovery.

The British Virgin Islands, Cayman Islands, Cuba, Haiti, and the Turks and Caicos Islands (United Kingdom) all permit some form of legal take of hawksbill sea turtles. In the northern Caribbean, hawksbills continue to be harvested for their shells, which are often carved into hair clips, combs, jewelry, and other trinkets (Márquez M 1990; Stapleton and Stapleton 2006). Additionally, hawksbills are harvested for their eggs and meat, while whole, stuffed sea turtles are sold as curios in the tourist trade. Hawksbill sea turtle products are openly available in the Dominican Republic and Jamaica, despite a prohibition on harvesting hawksbills and their eggs (Fleming 2001). Up to 500 hawksbills per year from 2 harvest sites within Cuba were legally captured each year until 2008 when the Cuban government placed a voluntary moratorium on the sea-turtle fishery (Carillo et al. 1999; Mortimer and Donnelly 2008). While current nesting trends are unknown, the number of nesting females is suspected to be declining in some areas (Carillo et al. 1999; Moncada et al. 1999). International trade in the shell of this species is prohibited between countries that have signed the Convention on International Trade in Endangered Species of Wild Flora and Fauna, but illegal trade still occurs and remains an ongoing threat to hawksbill survival and recovery throughout its range.

Due to their preference to feed on sponges associated with coral reefs, hawksbill sea turtles are particularly sensitive to losses of coral reef communities. Coral reefs are vulnerable to destruction and degradation caused by human activities (e.g., nutrient pollution, sedimentation, contaminant spills, vessel groundings and anchoring, recreational uses) and are also highly sensitive to the effects of climate change (e.g., higher incidences of disease and coral bleaching) (Crabbe 2008; Wilkinson 2004). Because continued loss of coral reef communities (especially in the greater Caribbean region) is expected to impact hawksbill foraging, it represents a major threat to the recovery of the species.

3.2.6 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970, under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Groombridge 1982; TEWG 2000; Zwinenberg 1977).

Species Description and Distribution

The Kemp's ridley sea turtle is the smallest of all sea turtles. Adults generally weigh less than 100 lb (45 kg) and have a carapace length of around 2.1 ft (65 cm). Adult Kemp's ridley shells are almost as wide as they are long. Coloration changes significantly during development from the grey-black dorsum and plastron of hatchlings, a grey-black dorsum with a yellowish-white plastron as post-pelagic juveniles, and then to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are 2 pairs of prefrontal scales on the head, 5 vertebral scutes, usually 5 pairs of costal scutes, and generally 12 pairs of marginal scutes on the carapace. In each bridge adjoining the plastron to the carapace, there are 4 scutes, each of which is perforated by a pore.

Kemp's ridley habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 ft (37 m) deep, although they can also be found in deeper offshore waters. These areas support the primary prey species of the Kemp's ridley sea turtle, which consist of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The primary range of Kemp's ridley sea turtles is within the GOM basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia. Historic records indicate a nesting range from Mustang Island, Texas, in the north to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia.

Life History Information

Kemp's ridley sea turtles share a general life history pattern similar to other sea turtles. Females lay their eggs on coastal beaches where the eggs incubate in sandy nests. After 45-58 days of embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size. Hatchlings generally range from 1.65-1.89 in (42-48 mm) straight carapace length (SCL), 1.26-1.73 in (32-44 mm) in width, and 0.3-0.4 lb (15-20 g) in weight. Their return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from 1-4 years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic coast) as water temperature drops.

The average rates of growth may vary by location, but generally fall within 2.2-2.9 ± 2.4 in per year (5.5-7.5 ± 6.2 cm/year) (Schmid and Barichivich 2006; Schmid and Woodhead 2000). Age to sexual maturity ranges greatly from 5-16 years, though NMFS et al. (2011) determined the best estimate of age to maturity for Kemp's ridley sea turtles was 12 years. It is unlikely that most adults grow very much after maturity. While some sea turtles nest annually, the weighted mean remigration rate for Kemp's ridley sea turtles is approximately 2 years. Nesting generally occurs from April to July and females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M 1994).

Population Dynamics

Of the 7 species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century (Figure 11), which indicates the species is recovering. It is worth noting that when the Bi-

National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo nesting database 2013). In 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively. A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012 (National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm).

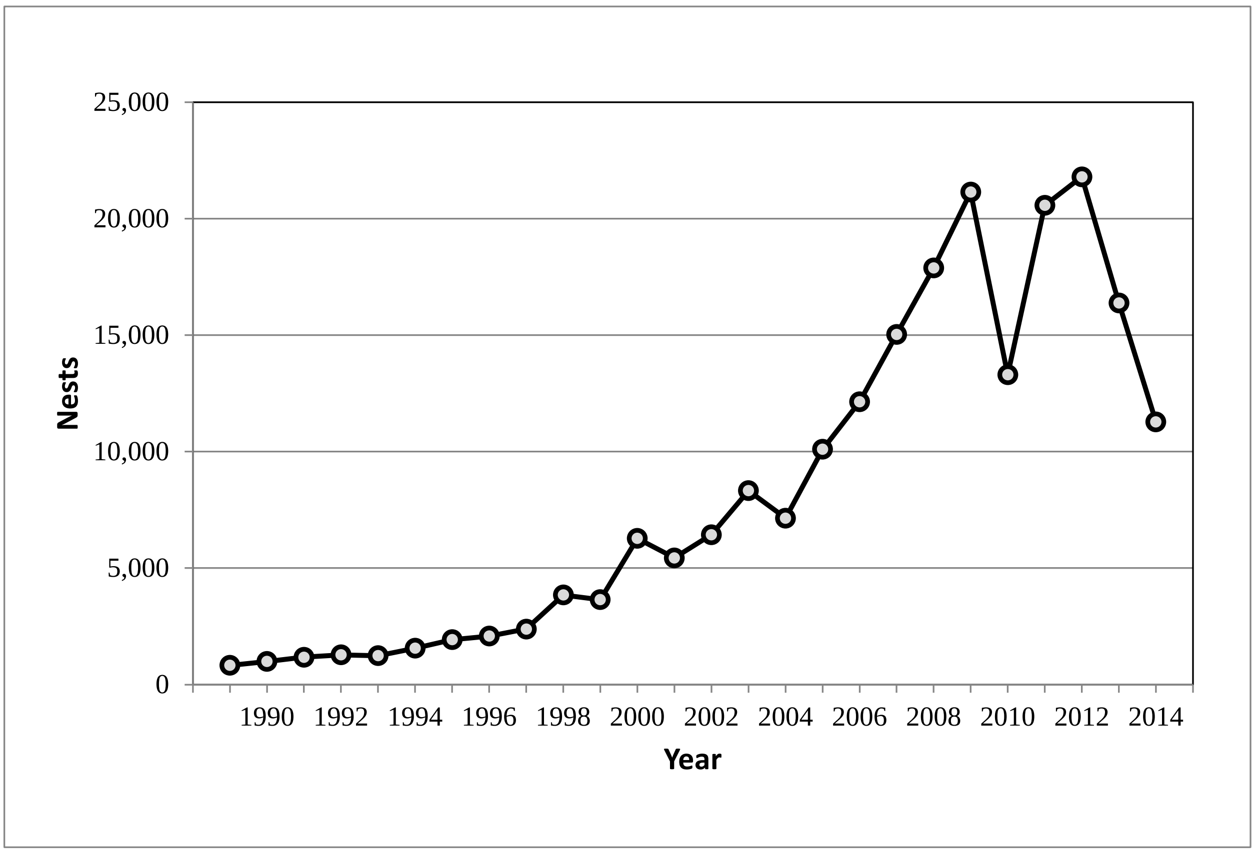

Figure 11. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2014)

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population is steadily increasing over the long term. The recent increases in Kemp's ridley sea turtle nesting seen in the last 2 decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of TEDs, reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000). While these results are encouraging, the species limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty. Additionally, the significant nesting declines observed in 2010 and 2013-2014 potentially indicate a serious population-level impact, and there is cause for concern regarding the ongoing recovery trajectory.

Threats

Kemp's ridley sea turtles face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.1; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically impact Kemp's ridley sea turtles.

As Kemp's ridley sea turtles continue to recover and nesting arribadas[13] are increasingly established, bacterial and fungal pathogens in nests are also likely to increase. Bacterial and fungal pathogen impacts have been well documented in the large arribadas of the olive ridley at Nancite in Costa Rica (Mo 1988). In some years, and on some sections of the beach, the hatching success can be as low as 5% (Mo 1988). As the Kemp's ridley nest density at Rancho Nuevo and adjacent beaches continues to increase, appropriate monitoring of emergence success will be necessary to determine if there are any density-dependent effects.

Over the past 3 years, NMFS has documented (via the Sea Turtle Stranding and Salvage Network [STSSN] data, http://www.sefsc.noaa.gov/species/turtles/strandings.htm) elevated sea turtle strandings in the northern GOM, particularly throughout the Mississippi Sound area. In the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the DWH oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of

[13] Arribada is the Spanish word for "arrival" and is the term used for massive synchronized nesting within the genus *Lepidochelys*.

428 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 301 (70%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. It should be noted that stranding coverage has increased considerably due to the DWH oil spill event.

Nonetheless, considering that strandings typically represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, pers. comm. to M. Barnette, NMFS, March 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that in both 2010 and 2011 approximately 85% of all Louisiana, Mississippi, and Alabama stranded sea turtles were Kemp's ridleys is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fishery during the summer of 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fishery, all but one of which were identified as Kemp's ridleys (1 sea turtle was an unidentified hardshell turtle). Encountered sea turtles were all very small, juvenile specimens ranging from 7.6-19.0 in (19.4-48.3 cm) CCL, and all sea turtles were released alive. The small average size of encountered Kemp's ridleys introduces a potential conservation issue, as over 50% of these reported sea turtles could potentially pass through the maximum 4-in bar spacing of TEDs currently required in the shrimp fishery. Due to this issue, a proposed 2012 rule to require TEDs in the skimmer trawl fishery (77 FR 27411) was not implemented. Based on anecdotal information, these interactions were a relatively new issue for the inshore skimmer trawl fishery. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the northern GOM may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

3.2.7 Smalltooth Sawfish (U.S. DPS)

The U.S. DPS of smalltooth sawfish was listed as endangered under the ESA effective May 1, 2003 (68 FR 15674; April 1, 2003).

Species Description and Distribution

The smalltooth sawfish is a tropical marine and estuarine elasmobranch. It has an extended snout with a long, narrow, flattened, rostral blade (rostrum) with a series of transverse teeth along either edge. In general, smalltooth sawfish inhabit shallow coastal waters of warm seas throughout the world and feed on a variety of small fish (e.g., mullet, jacks, and ladyfish)

(Simpfendorfer 2001), and crustaceans (e.g., shrimp and crabs) (Bigelow and Schroeder 1953; Norman and Fraser 1937).

Although this species is reported to have a circumtropical distribution, we identified smalltooth sawfish from the Southeast United States as a DPS, due to the physical isolation of this population from others, the differences in international management of the species, and the significance of the U.S. population in relation to the global range of the species (see 68 FR15674). Within the United States, smalltooth sawfish have been captured in estuarine and coastal waters from New York southward through Texas, although peninsular Florida has historically been the region of the United States with the largest number of recorded captures (NMFS 2000). Recent records indicate there is a resident reproducing population of smalltooth sawfish in south and southwest Florida from Charlotte Harbor through the Dry Tortugas, which is also the last U.S. stronghold for the species (Poulakis and Seitz 2004; Seitz and Poulakis 2002; Simpfendorfer and Wiley 2005). Water temperatures (no lower than 16-18°C) and the availability of appropriate coastal habitat (shallow, euryhaline waters and red mangroves) are the major environmental constraints limiting the northern movements of smalltooth sawfish in the western North Atlantic. Most specimens captured along the Atlantic coast north of Florida are large adults (over 10 ft) that likely represent seasonal migrants, wanderers, or colonizers from a historic Florida core population(s) to the south, rather than being members of a continuous, even-density population (Bigelow and Schroeder 1953).

Life History Information

Smalltooth sawfish fertilization is internal and females give birth to live young. The brood size, gestation period, and frequency of reproduction are unknown for smalltooth sawfish. Therefore, data from the closely related (in terms of size and body morphology) largetooth sawfish represent our best estimates of these parameters. The largetooth sawfish likely reproduces every other year, has a gestation period of approximately 5 months, and produces a mean of 7.3 offspring per brood, with a range of 1-13 offspring (Thorson 1976). Smalltooth sawfish are approximately 31 in (80 cm) at birth and may grow to a length of 18 ft (548 cm) or greater during their lifetime (Bigelow and Schroeder 1953; Simpfendorfer 2002). Simpfendorfer et al. (2008) report rapid juvenile growth for smalltooth sawfish for the first 2 years after birth, with stretched total length increasing by an average of 25-33 in (65-85 cm) in the first year and an average of 19-27 in (48-68 cm) in the second year. By contrast, very little information exists on size classes other than juveniles, which make up the majority of sawfish encounters; therefore, much uncertainty remains in estimating life history parameters for smalltooth sawfish, especially as it relates to age at maturity and post-juvenile growth rates. Based on age and growth studies of the largetooth sawfish (Thorson 1982) and research by Simpfendorfer (2000), the smalltooth sawfish is likely a slow-growing (with the exception of early juveniles), late-maturing (10-20 years) species with a long lifespan (30-60 years). Juvenile growth rates presented by Simpfendorfer et al. (2008) suggest smalltooth sawfish are growing faster than previously thought and therefore may reach sexual maturity at an earlier age.

There are distinct differences in habitat use based on life history stage. Juvenile smalltooth sawfish, those up to 3 years of age or approximately 8 ft in length (Simpfendorfer et al. 2008)), inhabit the shallow waters of estuaries and can be found in sheltered bays, dredged canals, along banks and sandbars, and in rivers (NMFS 2000). Juvenile smalltooth sawfish occur in euryhaline waters (i.e., waters with a wide range of salinities) and are often closely associated with muddy or sandy substrates, and shorelines containing red mangroves (Simpfendorfer 2001; Simpfendorfer 2003). Tracking data from the Caloosahatchee River in Florida indicate very shallow depths and salinity are important abiotic factors influencing juvenile smalltooth sawfish movement patterns, habitat use, and distribution (Simpfendorfer et al. 2011). Another recent acoustic tagging study in a developed region of Charlotte Harbor, Florida, identified the importance of mangroves in close proximity to shallow water habitat for juvenile smalltooth sawfish, stating that juveniles generally occur in shallow water within 328 ft (100 m) of mangrove shorelines, generally red mangroves (Simpfendorfer et al. 2010). Juvenile smalltooth sawfish spend the majority of their time in waters less than 13 ft (4 m) in depth (Simpfendorfer et al. 2010) and are seldom found in depths greater than 32 ft (10 m) (Poulakis and Seitz 2004). Simpfendorfer et al. (2010) also indicated developmental differences in habitat use: the smallest juveniles (young-of-the-year [YOY] juveniles measuring < 100 cm in length) generally used water depths less than 0.5 m (1.64 ft), had small home ranges (4,264-4,557 m^2), and exhibited high levels of site fidelity. Although small juveniles exhibit high levels of site fidelity for specific nursery habitats for periods of time lasting up to 3 months (Wiley and Simpfendorfer 2007), they do undergo small movements coinciding with changing tidal stages. These movements often involve moving from shallow sandbars at low tide to within red mangrove prop roots at higher tides (Simpfendorfer et al. 2010), behavior likely to reduce the risk of predation (Simpfendorfer 2006). As juveniles increase in size, they begin to expand their home ranges (Simpfendorfer et al. 2010; Simpfendorfer et al. 2011), eventually moving to more offshore habitats where they likely feed on larger prey and eventually reach sexual maturity.

Researchers have identified several areas within the Charlotte Harbor Estuary that are disproportionately more important to juvenile smalltooth sawfish, based on intra- or inter-annual (within or between year) capture rates during random sampling events within the estuary (Poulakis 2012; Poulakis et al. 2011). These areas were termed "hotspots" and also correspond with areas where public encounters are most frequently reported. Use of these "hotspots" can vary within and among years based on the amount and timing of freshwater inflow. Smalltooth sawfish use hotspots further upriver during high salinity conditions (drought) and areas closer to the mouth of the Caloosahatchee River during times of high freshwater inflow (Poulakis et al. 2011). At this time, researchers are unsure what specific biotic or abiotic factors influence this habitat use, but they believe a variety of conditions in addition to salinity, such as temperature, DO, water depth, shoreline vegetation, and food availability, may influence habitat selection (Poulakis et al. 2011).

While adult smalltooth sawfish may also use the estuarine habitats used by juveniles, they are commonly observed in deeper waters along the coasts. Poulakis and Seitz (2004) noted that nearly half of the encounters with adult-sized smalltooth sawfish in Florida Bay and the Florida Keys occurred in depths from 200-400 ft (70-122 m) of water. Similarly, Simpfendorfer and Wiley (2005) reported encounters in deeper waters off the Florida Keys, and observations from both commercial longline fishing vessels and fishery-independent sampling in the Florida Straits report large smalltooth sawfish in depths up to 130 ft (~ 40 m) (ISED 2014). Even so, NMFS believes adult smalltooth sawfish use shallow estuarine habitats during parturition (when adult females return to shallow estuaries to pup) because very young juveniles still containing rostral sheaths are captured in these areas. Since very young juveniles have high site fidelities, we hypothesize that they are birthed nearby or in their nursery habitats.

Status and Population Dynamics

Few long-term abundance data exist for the smalltooth sawfish, making it very difficult to estimate the current population size. Simpfendorfer (2001) estimated that the U.S. population may number less than 5% of historic levels, based on anecdotal data and the fact that the species' range has contracted by nearly 90%, with south and southwest Florida the only areas known to support a reproducing population. Since actual abundance data are limited, researchers have begun to compile capture and sightings data (collectively referred to as encounter data) in the International Sawfish Encounter Database (ISED) that was developed in 2000. Although this data cannot be used to assess the population because of the opportunistic nature in which they are collected (i.e., encounter data are a series of random occurrences rather than an evenly distributed search over a defined period of time), researchers can use this database to assess the spatial and temporal distribution of smalltooth sawfish. We expect that as the population grows, the geographic range of encounters will also increase. Since the conception of the ISED, over 3,000 smalltooth sawfish encounters have been reported and compiled in the encounter database (ISED 2014).

Despite the lack of scientific data on abundance, recent encounters with YOY, older juveniles, and sexually mature smalltooth sawfish indicate that the U.S. population is currently reproducing (Seitz and Poulakis 2002; Simpfendorfer 2003). The abundance of juveniles encountered, including very small individuals, suggests that the population remains viable (Simpfendorfer and Wiley 2004), and data analyzed from Everglades National Park as part of an established fisheries-dependent monitoring program (angler interviews) indicate a slightly increasing trend in abundance within the park over the past decade (Carlson and Osborne 2012; Carlson et al. 2007). Using a demographic approach and life history data for smalltooth sawfish and similar species from the literature, Simpfendorfer (2000) estimated intrinsic rates of natural population increase for the species at 0.08-0.13 per year and population doubling times from 5.4-8.5 years. These low intrinsic rates[14] of population increase, suggest that the species is particularly vulnerable to excessive mortality and rapid population declines, after which recovery may take decades.

Threats

Past literature indicates smalltooth sawfish were once abundant along both coasts of Florida and quite common along the shores of Texas and the northern Gulf coast (NMFS 2010) and citations therein). Based on recent comparisons with these historical reports, the U.S. DPS of smalltooth sawfish has declined over the past century (Simpfendorfer 2001; Simpfendorfer 2002). The

[14] The rate at which a population increases in size if there are no density-dependent forces regulating the population.

decline in smalltooth sawfish abundance has been attributed to several factors including bycatch mortality in fisheries, habitat loss, and life history limitations of the species (NMFS 2010).

Bycatch Mortality

Bycatch mortality is cited as the primary cause for the decline in smalltooth sawfish in the United States (NMFS 2010). While there has never been a large-scale directed fishery, smalltooth sawfish easily become entangled in fishing gears (gill nets, otter trawls, trammel nets, and seines) directed at other commercial species, often resulting in serious injury or death (NMFS 2009). This has historically been reported in Florida (Snelson and Williams 1981), Louisiana (Simpfendorfer 2002), and Texas (Baughman 1943). For instance, 1 fisherman interviewed by Evermann and Bean (1897) reported taking an estimated 300 smalltooth sawfish in just one netting season in the Indian River Lagoon, Florida. In another example, smalltooth sawfish landings data gathered by Louisiana shrimp trawlers from 1945-1978, which contained both landings data and crude information on effort (number of vessels, vessel tonnage, number of gear units), indicated declines in smalltooth sawfish landings from a high of 34,900 lb in 1949 to less than 1,500 lb in most years after 1967. The Florida net ban passed in 1995 has led to a reduction in the number of smalltooth sawfish incidentally captured, "…by prohibiting the use of gill and other entangling nets in all Florida waters, and prohibiting the use of other nets larger than 500 square feet in mesh area in nearshore and inshore Florida waters"[15] (FLA. CONST. art. X, § 16). However, the threat of bycatch currently remains in commercial fisheries (e.g., South Atlantic shrimp fishery, GOM shrimp fishery, federal shark fisheries of the South Atlantic, and the GOM reef fish fishery), though anecdotal information collected by NMFS port agents suggest smalltooth sawfish captures are now rare.

In addition to incidental bycatch in commercial fisheries, smalltooth sawfish have historically been and continue to be captured by recreational fishers. Encounter data (ISED 2014) and past research (Caldwell 1990) document that rostrums are sometimes removed from smalltooth sawfish caught by recreational fishers, thereby reducing their chances of survival. While the current threat of mortality associated with recreational fisheries is expected to be low given that possession of the species in Florida has been prohibited since 1992, bycatch in recreational fisheries remains a potential threat to the species.

Habitat Loss

Modification and loss of smalltooth sawfish habitat, especially nursery habitat, is another contributing factor in the decline of the species. Activities such as agricultural and urban development, commercial activities, dredge-and-fill operations, boating, erosion, and diversions of freshwater runoff contribute to these losses (SAFMC 1998). Large areas of coastal habitat were modified or lost between the mid-1970s and mid-1980s within the United States (Dahl and Johnson 1991). Since then, rates of loss have decreased, but habitat loss continues. From 1998-2004, approximately 64,560 acres (ac) of coastal wetlands were lost along the Atlantic and Gulf Coasts of the United States, of which approximately 2,450 ac were intertidal wetlands consisting

[15] "Nearshore and inshore Florida waters" means all Florida waters inside a line 3 mi seaward of the coastline along the Gulf of Mexico and inside a line 1 mi seaward of the coastline along the Atlantic Ocean.

of mangroves or other estuarine shrubs (Stedman and Dahl 2008). Further, Orlando et al. (1994) analyzed 18 major southeastern estuaries and recorded over 703 mi of navigation channels and 9,844 mi of shoreline with modifications. In Florida, coastal development often involves the removal of mangroves and the armoring of shorelines through seawall construction. Changes to the natural freshwater flows into estuarine and marine waters through construction of canals and other water control devices have had other impacts: altered the temperature, salinity, and nutrient regimes; reduced both wetlands and submerged aquatic vegetation; and degraded vast areas of coastal habitat utilized by smalltooth sawfish (Gilmore 1995; Reddering 1988; Whitfield and Bruton 1989). While these modifications of habitat are not the primary reason for the decline of smalltooth sawfish abundance, it is likely a contributing factor and almost certainly hampers the recovery of the species. Juvenile sawfish and their nursery habitats are particularly likely to be affected by these kinds of habitat losses or alternations, due to their affinity for shallow, estuarine systems. Although many forms of habitat modification are currently regulated, some permitted direct and/or indirect damage to habitat from increased urbanization still occurs and is expected to continue to threaten survival and recovery of the species in the future.

Life History Limitations

The smalltooth sawfish is also limited by its life history characteristics as a slow-growing, relatively late-maturing, and long-lived species. Animals using this life history strategy are usually successful in maintaining small, persistent population sizes in constant environments, but are particularly vulnerable to increases in mortality or rapid environmental change (NMFS 2000). The combined characteristics of this life history strategy result in a very low intrinsic rate of population increase (Musick 1999) that make it slow to recover from any significant population decline (Simpfendorfer 2000). More recent data suggest smalltooth sawfish may mature earlier than previously thought, meaning rates of population increase could be higher and recovery times shorter than those currently reported (Simpfendorfer et al. 2008).

Current Threats

The 3 major factors that led to the current status of the U.S. DPS of smalltooth sawfish—bycatch mortality, habitat loss, and life history limitations—continue to be the greatest threats today. All the same, other threats such as the illegal commercial trade of smalltooth sawfish or their body parts, predation, and marine pollution and debris may also affect the population and recovery of smalltooth sawfish on smaller scales (NMFS 2010). We anticipate that all of these threats will continue to affect the rate of recovery for the U.S. DPS of smalltooth sawfish.

In addition to the anthropogenic effects mentioned previously, changes to the global climate are likely to be a threat to smalltooth sawfish and the habitats they use. The Intergovernmental Panel on Climate Change (IPCC) has stated that global climate change is unequivocal (IPCC 2007) and its impacts to coastal resources may be significant. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, changes in the amount and timing of precipitation, and changes in air and water temperatures (EPA 2012; NOAA 2012). The impacts to smalltooth sawfish cannot, for the most part, currently be predicted with any degree of certainty, but we can project some effects to the coastal habitats where they reside. We know that the coastal habitats that contain red mangroves and shallow, euryhaline waters will be directly impacted by climate change through sea level rise, which is expected to exceed 1 m globally by 2100 according to Meehl et al. (2007), Pfeffer et al. (2008), and Vermeer and Rahmstorf (2009). Sea level rise will impact mangrove resources, as sediment surface elevations for mangroves will not keep pace with conservative projected rates of elevation in sea level (Gilman et al. 2008). Sea level increases will also affect the amount of shallow water available for juvenile smalltooth sawfish nursery habitat, especially in areas where there is shoreline armoring (e.g., seawalls). Further, the changes in precipitation coupled with sea level rise may also alter salinities of coastal habitats, reducing the amount of available smalltooth sawfish nursery habitat.

3.2.8 Atlantic Sturgeon

Five separate DPSs of Atlantic sturgeon were listed under the ESA by NMFS effective April 6, 2012 (77 FR 5880 and 5914, February 6, 2012). The New York Bight (NYB), Chesapeake Bay (CB), Carolina, and South Atlantic (SA) DPSs were listed as endangered. The Gulf of Maine (GM) DPS was listed as threatened.

Species Descriptions and Distributions
Atlantic sturgeon are long-lived, late-maturing, estuarine-dependent, anadromous fish distributed along the eastern coast of North America (Waldman and Wirgin 1998). Historically, sightings have been reported from Hamilton Inlet, Labrador, south to the St. Johns River, Florida (Murawski et al. 1977; Smith and Clugston 1997). Atlantic sturgeon may live up to 60 years, reach lengths up to 14 ft, and weigh over 800 lb (ASSRT 2007; Collette and Klein-MacPhee 2002). They are distinguished by armor-like plates (called scutes) and a long protruding snout that has 4 barbels (slender, whisker-like feelers extending from the head used for touch and taste). Atlantic sturgeon spend the majority of their lives in nearshore marine waters, returning to their natal rivers to spawn (Wirgin et al. 2002). Young sturgeon may spend the first few years of life in their natal river estuary before moving out to sea (Wirgin et al. 2002). Sturgeon are omnivorous benthic (bottom) feeders and filter quantities of mud along with their food. Adult sturgeon diets include mollusks, gastropods, amphipods, isopods, and fish. Juvenile sturgeon feed on aquatic insects and other invertebrates (Smith 1985).

Historically, Atlantic sturgeon were present in approximately 38 rivers in the United States from the St. Croix River, Maine to the St. Johns River, Florida, of which 35 rivers have been confirmed to have had a historical spawning population. Atlantic sturgeon are currently present in approximately 32 of these rivers, and spawning occurs in at least 20 of them. The marine range of Atlantic sturgeon extends from the Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida. Because adult Atlantic sturgeon from all DPSs mix extensively in marine waters, we expect fish from all DPSs to be found in the action area.

Life History Information
Atlantic sturgeon populations show clinal variation, with a general trend of faster growth and earlier age at maturity in more southern systems. Atlantic sturgeon mature between the ages of 5-19 years in South Carolina (Smith et al. 1982), between 11-21 years in the Hudson River

(Young et al. 1988), and between 22-34 years in the St. Lawrence River (Scott and Crossman 1973). Most Atlantic sturgeon adults likely do not spawn every year. Multiple studies have shown that spawning intervals range from 1-5 years for males (Caron et al. 2002; Collins et al. 2000b; Smith 1985) and 2-5 years for females (Stevenson and Secor 1999; Van Eenennaam et al. 1996; Vladykov and Greely 1963). Fecundity of Atlantic sturgeon has been correlated with age and body size, with egg production ranging from 0.4-8 million eggs per year (Dadswell 2006; Smith et al. 1982; Van Eenennaam and Doroshov 1998). The average age at which 50% of maximum lifetime egg production is achieved is estimated to be 29 years; approximately 3-10 times longer than for other bony fish species examined (Boreman 1997).

Spawning adult Atlantic sturgeon generally migrate upriver in spring/early summer, which occurs in February-March in southern systems, April-May in mid-Atlantic systems, and May-July in Canadian systems (Bain 1997; Caron et al. 2002; Murawski et al. 1977; Smith 1985; Smith and Clugston 1997). In some southern rivers, a fall spawning migration may also occur (Moser et al. 1998; Rogers and Weber 1995; Weber and Jennings 1996). Atlantic sturgeon spawning occurs in fast-flowing water between the salt front and fall line of large rivers (Bain et al. 2000; Borodin 1925; Crance 1987; Leland 1968; Scott and Crossman 1973) over hard substrate, such as cobble, gravel, or boulders, which the highly adhesive sturgeon eggs adhere to (Gilbert 1989; Smith and Clugston 1997). Hatching occurs approximately 94-140 hours after egg deposition and larvae assume a demersal existence (Smith et al. 1980). The yolk sac larval stage is completed in about 8-12 days, during which time the larvae move downstream to rearing grounds (Kynard and Horgan 2002). During the first half of their migration downstream, movement is limited to night. During the day, larvae use benthic structure (e.g., gravel matrix) as refuge (Kynard and Horgan 2002). During the latter half of migration, when larvae are more fully developed, movement to rearing grounds occurs both day and night. Juvenile sturgeon continue to move further downstream into brackish waters, and eventually become residents in estuarine waters for months or years.

Juvenile and adult Atlantic sturgeon occupy upper estuarine habitat where they frequently congregate around the saltwater/freshwater interface. Estuarine habitats are important for juveniles, serving as nursery areas by providing abundant foraging opportunities, as well as thermal and salinity refuges, for facilitating rapid growth. Some juveniles will take up residency in non-natal rivers that lack active spawning sites (Bain 1997). Residency time of young Atlantic sturgeon in estuarine areas varies between 1-6 years (Schueller and Peterson 2010; Smith 1985), after which Atlantic sturgeon start outmigration to the marine environment. Out-migration of adults from the estuaries to the sea is cued by water temperature and velocity. Adult Atlantic sturgeon will reside in the marine habitat during the non-spawning season and forage extensively. Coastal migrations by adult Atlantic sturgeon are extensive and are known to occur over sand and gravel substrate (Greene et al. 2009). Atlantic sturgeon remain in the marine habitat until the waters begin to warm, at which time ripening adults migrate back to their natal rivers to spawn.

Upstream migration to the spawning grounds is cued primarily by water temperature and velocity. Therefore, fish in the southern portion of the range migrate earlier than those to the north do (Kieffer and Kynard 1993; Smith 1985). In Georgia and South Carolina, migration begins in February or March (Collins et al. 2000a). Males commence upstream migration to the spawning sites when waters reach around 6°C (Dovel and Berggren 1983; Smith 1985; Smith et al. 1982), with females following a few weeks later when water temperatures are closer to 12°C or 13°C (Collins et al. 2000a; Dovel and Berggren 1983; Smith 1985). In some rivers, predominantly in the south, a fall spawning migration may also occur (Moser et al. 1998; Rogers and Weber 1995), with running ripe males found August through October and post-spawning females captured in late September and October (Collins et al. 2000b).

Status and Population Dynamics
At the time Atlantic sturgeon were listed, the best available abundance information for each of the 5 DPSs was the estimated number of adult Atlantic sturgeon spawning in each of the rivers on an annual basis. The estimated number of annually spawning adults in each of the river populations is insufficient to quantify the total population numbers for each DPS of Atlantic sturgeon due to the lack of other necessary accompanying life history data. A recent Atlantic sturgeon population estimate was derived from the Northeast Area Monitoring and Assessment Program (NEAMAP). NEAMAP trawl surveys were conducted from Cape Cod, Massachusetts, to Cape Hatteras, North Carolina, in nearshore waters to depths of 60 ft from fall 2007 through spring 2012. The results of these surveys, assuming 50% gear efficiency (i.e., assumption that the gear will capture some, but not all, of the sturgeon in the water column along the tow path, and the survey area is only a portion of Atlantic sturgeon habitat), are presented in Table 17. It is important to note that the NEAMAP surveys were conducted primarily in the Northeast and may underestimate the actual population abundances of the Carolina and SA DPSs, which are likely more concentrated in the Southeast since they originated from and spawn there. However, the total ocean population abundance estimates listed in Table 17 currently represent the best available population abundance estimates for the 5 U.S. Atlantic sturgeon DPSs.

Table 17. Summary of Calculated Population Estimates based upon the NEAMAP Survey Swept Area, assuming 50% efficiency (NMFS 2013)

DPS	Estimated Ocean Population Abundance	Estimated Ocean Population of Adults	Estimated Ocean Population of Subadults (of size vulnerable to capture in fisheries)
SA	14,911	3,728	11,183
Carolina	1,356	339	1,017
CB	8,811	2,203	6,608
NYB	34,566	8,642	25,925
GM	7,455	1,864	5,591
Canada	678	170	509

SA DPS
The SA DPS includes all Atlantic sturgeon that spawn or are spawned in the watersheds (including all rivers and tributaries) of the Ashepoo, Combahee, and Edisto River (ACE) Basins southward along the South Carolina, Georgia, and Florida coastal areas to the St. Johns River,

Florida. Rivers known to have current spawning populations within the range of the South Atlantic DPS include the Combahee, Edisto, Savannah, Ogeechee, Altamaha, and Satilla Rivers. We determined spawning was occurring if YOY were observed, or mature adults were present, in freshwater portions of a system. However, in some rivers, spawning by Atlantic sturgeon may not be contributing to population growth because of lack of suitable habitat and the presence of other stressors on juvenile survival and development.

Historically, both the Broad-Coosawatchie and St. Marys Rivers were documented to have spawning populations; there is also evidence that spawning may have occurred in the St. Johns River or one of its tributaries. However, the spawning population in the St. Marys River, as well as any historical spawning population in the St. Johns, is believed to be extirpated, and the status of the spawning population in the Broad-Coosawatchie is unknown. Both the St. Marys and St. Johns rivers are used as nursery habitat by young Atlantic sturgeon originating from other spawning populations. The use of the Broad-Coosawatchie by sturgeon from other spawning populations is unknown at this time. The presence of historical and current spawning populations in the Ashepoo River has not been documented; however, this river may currently be used for nursery habitat by young Atlantic sturgeon originating from other spawning populations. This represents our current knowledge of the river systems utilized by the SA DPS for specific life functions, such as spawning, nursery habitat, and foraging. Still, fish from the SA DPS likely use other river systems than those listed here for their specific life functions.

Prior to the collapse of the fishery in the late 1800s, the sturgeon fishery was the third largest fishery in Georgia. Secor (2002) estimated from U.S. Fish Commission landing reports that approximately 11,000 spawning females were likely present in Georgia and 8,000 adult females were present in South Carolina prior to 1890. The Altamaha River population of the SA DPS, with an estimated 343 adults spawning annually, is believed to be the largest remaining population in the Southeast, yet is estimated to be only 6% of its historical population size. The abundances of the remaining river populations within the SA DPS, each estimated to have fewer than 300 annually spawning adults, are estimated to be less than 1% of what they were historically (ASSRT 2007). The NEAMAP model estimates a minimum ocean population of 14,911 SA DPS Atlantic sturgeon, of which 3,728 are adults.

Carolina DPS

The Carolina DPS includes all Atlantic sturgeon that are spawned in the watersheds (including all rivers and tributaries) from the Albemarle Sound southward along the southern Virginia, North Carolina, and South Carolina coastal areas to Charleston Harbor. Rivers known to have current spawning populations within the range of the Carolina DPS include the Roanoke, Tar-Pamlico, Cape Fear, Waccamaw, and Yadkin-Pee Dee River. We determined spawning was occurring if YOY were observed, or mature adults were present, in freshwater portions of a system. In some rivers, though, spawning by Atlantic sturgeon may not be contributing to population growth because of lack of suitable habitat and the presence of other stressors on juvenile survival and development. There may also be spawning populations in the Neuse, Santee, and Cooper Rivers, though it is uncertain.

Historically, both the Sampit and Ashley Rivers in South Carolina were documented to have spawning populations at one time, although the spawning population in the Sampit River is believed to be extirpated and the current status of the spawning population in the Ashley River is unknown. Both rivers may be used as nursery habitat by young Atlantic sturgeon originating from other spawning populations. This represents our current knowledge of the river systems utilized by the Carolina DPS for specific life functions, such as spawning, nursery habitat, and foraging. Still, fish from the Carolina DPS likely use other river systems than those listed here for their specific life functions.

Historical landings data indicate that between 7,000 and 10,500 adult female Atlantic sturgeon were present in North Carolina prior to 1890 (Armstrong and Hightower 2002; Secor 2002). Secor (2002) estimates that 8,000 adult females were present in South Carolina during that same time frame. The Atlantic sturgeon spawning population in at least 1 river system (the Sampit River) within the Carolina DPS has been extirpated, and the statuses of 4 additional spawning populations are uncertain. There are believed to be only 5 of 7-10 historical spawning populations remaining in the Carolina DPS. In some rivers, spawning by Atlantic sturgeon may not be contributing to population growth because of lack of suitable habitat and the presence of other stressors on juvenile survival and development. The abundances of the remaining river populations within the DPS, each estimated to have fewer than 300 spawning adults, are estimated to be less than 3% of what they were historically (ASSRT 2007). The NEAMAP model estimates a minimum ocean population of 1,356 Carolina DPS Atlantic sturgeon, of which 339 are adults.

<u>CB DPS</u>

The CB DPS includes all anadromous Atlantic sturgeons that are spawned in the watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, Virginia. Within this range, Atlantic sturgeon historically spawned in the Susquehanna, Potomac, James, York, Rappahannock, and Nottoway Rivers (ASSRT 2007). Spawning still occurs in the James River, and the presence of juvenile and adult sturgeon in the York River suggests that spawning may occur there as well (ASSRT 2007; Greene et al. 2009; Musick et al. 1994). However, conclusive evidence of current spawning is available for the James River, only. Atlantic sturgeon that are spawned elsewhere are known to use waters of the Chesapeake Bay for other life functions, such as foraging and as juvenile nursery habitat, before entering the marine system as subadults (ASSRT 2007; Grunwald et al. 2008; Vladykov and Greely 1963; Wirgin et al. 2007).

Historically, the CB DPS likely supported more than 10,000 spawning adults (ASSRT 2007; KRRMP 1993; Secor 2002). Current estimates of the CB DPS from the NEAMAP model (Table 17) indicate the current number of spawning adults is likely an order of magnitude lower than historical levels (ASSRT 2007; Kahnle et al. 2007). The NEAMAP model estimates a minimum ocean population of 8,811 CB DPS Atlantic sturgeon, of which 2,319 are adults.

NYB DPS

The NYB DPS includes all anadromous Atlantic sturgeon that spawn in the watersheds that drain into coastal waters from Chatham, Massachusetts, to the Delaware-Maryland border on Fenwick Island. Within this range, Atlantic sturgeon historically spawned in the Connecticut, Delaware, Hudson, and Taunton Rivers (ASSRT 2007; Murawski et al. 1977; Secor 2002). Spawning still occurs in the Delaware and Hudson Rivers, but there is no recent evidence (within the last 15 years) of spawning in the Connecticut and Taunton Rivers (ASSRT 2007). Atlantic sturgeon that are spawned elsewhere continue to use habitats within the Connecticut and Taunton Rivers for other life functions (ASSRT 2007; Savoy 2007; Wirgin and King 2011).

Prior to the onset of expanded fisheries exploitation of sturgeon in the 1800s, a conservative historical estimate for the Hudson River Atlantic sturgeon population was 10,000 adult females (Secor 2002). Current population abundance is likely at least one order of magnitude smaller than historical levels (ASSRT 2007; Kahnle et al. 2007; Secor 2002). Based on data collected from 1985-1995, there are 870 spawning adults per year in the Hudson River (Kahnle et al. 2007). Kahnle (2007; 1998) also showed that the level of fishing mortality from the Hudson River Atlantic sturgeon fishery during the period of 1985-1995 exceeded the estimated sustainable level of fishing mortality for the riverine population, and may have led to reduced recruitment. All available data on abundance of juvenile Atlantic sturgeon in the Hudson River Estuary indicate a substantial drop in production of young since the mid-1970s (Kahnle et al. 1998). A decline appeared to occur in the mid- to late 1970s followed by a secondary drop in the late 1980s (ASMFC 2010; Kahnle et al. 1998; Sweka et al. 2007). CPUE data suggest that recruitment has remained depressed relative to catches of juvenile Atlantic sturgeon in the estuary during the mid- to late 1980s (ASMFC 2010; Sweka et al. 2007). From 1985-2007, there were significant fluctuations in CPUE. The number of juveniles appears to have declined between the late 1980s and early 1990s. While the CPUE is generally higher in the 2000s as compared to the 1990s, significant annual fluctuations make it difficult to discern any trend. The CPUEs from 2000-2007 are generally higher than those from 1990-1999; however, they remain lower than the CPUEs observed in the late 1980s. There is currently not enough information regarding any life stage to establish a trend for the Hudson River population (ASMFC 2010; Sweka et al. 2007).

There is no abundance estimate for the Delaware River population of Atlantic sturgeon. Harvest records from the 1800s indicate that this was historically a large population, with an estimated 180,000 adult females prior to 1890 (Secor 2002; Secor and Waldman 1999). Fisher (2009) sampled the Delaware River in 2009 to target YOY Atlantic sturgeon. The effort captured 34 YOY. Brundage and O'Herron (2003) also collected 32 YOY Atlantic sturgeon from the Delaware River in a separate study. Fisher (2011) reports that genetics information collected from 33 of the 2009 year class YOY indicates that at least 3 females successfully contributed to the 2009 year class. The capture of YOY in 2009 shows that successful spawning is still occurring in the Delaware River, but the relatively low numbers suggest the existing riverine population is limited in size. Similar to the Hudson River, there is currently not enough information to determine a trend for the Delaware River population. The ASSRT (2007) suggested that there may be less than 300 spawning adults per year for the Delaware River portion of the NYB DPS. The NEAMAP model estimates a minimum ocean population of 34,566 Atlantic sturgeon, of which 8,642 are adults.

GM DPS

The GM DPS includes all anadromous Atlantic sturgeons that are spawned in the watersheds from the Maine/Canadian border and, extending southward, all watersheds draining into the Gulf of Maine as far south as Chatham, Massachusetts. Within this range, Atlantic sturgeon historically spawned in the Androscoggin, Kennebec, Merrimack, Penobscot, and Sheepscot Rivers (ASSRT 2007). Spawning still occurs in the Kennebec and Androscoggin Rivers, and may still occur in the Penobscot River. Atlantic sturgeon continue to be present in the Kennebec River; in addition, they are captured in directed research projects in the Penobscot River. They are also observed in the Saco, Presumpscot, and Charles rivers where they were unknown to occur before or had not been observed to occur for many years. These observations suggest that the abundance of the GM DPS of Atlantic sturgeon is large enough that recolonization to rivers historically suitable for spawning may be occurring.

Historically, the GM DPS likely supported more than 10,000 spawning adults (ASSRT 2007; KRRMP 1993; Secor 2002), suggesting the recent estimate of spawning adults within the DPS is 1-2 orders of magnitude smaller than historical levels (i.e., hundreds to low thousands) (ASSRT 2007; Kahnle et al. 2007) . The CPUE of subadult Atlantic sturgeon in a multifilament gillnet survey conducted on the Kennebec River was considerably greater for the period of 1998-2000 (CPUE = 7.43) compared to the CPUE for the period 1977-1981 (CPUE = 0.30). The CPUE of adult Atlantic sturgeon showed a slight increase over the same time period (1977-1981 CPUE = 0.12 versus 1998-2000 CPUE = 0.21) (Squiers 2004). There is also new evidence of Atlantic sturgeon presence in rivers (e.g., the Saco River) where they have not been observed for many years. However, there is not enough information to establish a trend for this DPS. The NEAMAP model estimates a minimum ocean population of 7,455 Atlantic sturgeon, of which 1,864 are adults.

Viability of Atlantic Sturgeon DPSs

The concept of a viable population able to adapt to changing environmental conditions is critical to Atlantic sturgeon, and the low population numbers of every river population in the 5 DPSs on the East Coast put them in danger of extinction throughout their range. None of the riverine spawning populations are large or stable enough to provide with any level of certainty for continued existence of any of the DPSs. Although the largest impact that caused the precipitous decline of the species has been prohibited (directed fishing), the Atlantic sturgeon population sizes within each DPS have remained relatively constant at greatly reduced levels for 100 years. The largest Atlantic sturgeon population in the United States, the Hudson River population within the NYB DPS, is estimated to have only 870 spawning adults each year. The Altamaha River population within the SA DPS is the largest Atlantic sturgeon population in the Southeast and only has an estimated 343 adults spawning annually. All other Atlantic sturgeon river populations in the U.S. are estimated to have less than 300 spawning adults annually.
Small numbers of individuals resulting from drastic reductions in populations, such as occurred with Atlantic sturgeon due to the commercial fishery, can remove the buffer against natural

demographic and environmental variability provided by large populations (Berry 1971; Shaffer 1981; Soulé 1980). Recovery of depleted populations is an inherently slow process for a late-maturing species such as Atlantic sturgeon, and they continue to face a variety of other threats that contribute to their risk of extinction. Their late age at maturity provides more opportunities for individual Atlantic sturgeon to be removed from the population before reproducing. While a long life span allows multiple opportunities to contribute to future generations, it also increases the time frame over which exposure to the multitude of threats facing Atlantic sturgeon can occur.

The viability of the Atlantic sturgeon DPSs depends on having multiple self-sustaining riverine spawning populations and maintaining suitable habitat to support the various life functions (spawning, feeding, growth) of Atlantic sturgeon populations. Because a DPS is a group of populations, the stability, viability, and persistence of individual populations affects the persistence and viability of the larger DPS. The loss of any population within a DPS will result in: (1) a long-term gap in the range of the DPS that is unlikely to be recolonized; (2) loss of reproducing individuals; (3) loss of genetic biodiversity; (4) potential loss of unique haplotypes; (5) potential loss of adaptive traits; (6) reduction in total number; and (7) potential for loss of population source of recruits. The loss of a population will negatively impact the persistence and viability of the DPS as a whole, as fewer than 2 individuals per generation spawn outside their natal rivers (King et al. 2001; Waldman et al. 2002; Wirgin et al. 2000). The persistence of individual populations, and in turn the DPS, depends on successful spawning and rearing within the freshwater habitat, the immigration into marine habitats to grow, and then the return of adults to natal rivers to spawn.

Threats

Atlantic sturgeon were once numerous along the East Coast until fisheries for their meat and caviar reduced the populations by over 90% in the late 1800s. Fishing for Atlantic sturgeon became illegal in state waters in 1998 and in remaining U.S. waters in 1999. Dams, dredging, poor water quality, and accidental catch (bycatch) by fishers continue to threaten Atlantic sturgeon. Though Atlantic sturgeon populations appear to be increasing in some rivers, other river populations along the East Coast continue to struggle and some have been eliminated entirely. The 5 DPSs of Atlantic sturgeon were listed as threatened or endangered under the ESA primarily as a result of a combination of habitat restriction and modification, overutilization (i.e., being taken as bycatch) in commercial fisheries, and the inadequacy of regulatory mechanisms in ameliorating these impacts and threats.

<u>Dams</u>

Dams for hydropower generation, flood control, and navigation adversely affect Atlantic sturgeon by impeding access to spawning, developmental, and foraging habitat, modifying free-flowing rivers to reservoirs, physically damaging fish on upstream and downstream migrations, and altering water quality in the remaining downstream portions of spawning and nursery habitat (ASSRT 2007). Attempts to minimize the impacts of dams using measures such as fish passage have not proven beneficial to Atlantic sturgeon, as they do not regularly use existing fish passage devices, which are generally designed to pass pelagic fish (i.e., those living in the water column) rather than bottom-dwelling species, like sturgeon. Within the range occupied by the Carolina DPS, dams have restricted Atlantic sturgeon spawning and juvenile developmental habitat by blocking over 60% of the historical sturgeon habitat upstream of the dams in the Cape Fear and Santee-Cooper River systems. Water quality (velocity, temperature, and DO) downstream of these dams, as well as on the Roanoke River, has been reduced, which modifies and restricts the extent of spawning and nursery habitat for the Carolina DPS.

Within the range of the NYB DPS, the Holyoke Dam on the Connecticut River blocks further upstream passage; however, the extent that Atlantic sturgeon historically would have used habitat upstream of Holyoke is unknown. Connectivity may be disrupted by the presence of dams on several smaller rivers in the NYB region. Connectivity is disrupted by the presence of dams on several rivers in the range of the GM DPS. Within the GM DPS, access to historical spawning habitat is most severely impacted in the Merrimack River (ASSRT 2007). Construction of the Essex Dam blocked the migration of Atlantic sturgeon to 58% of its historically available habitat (ASSRT 2007). The extent that Atlantic sturgeon are affected by operations of dams in the GM region is currently unknown, although Atlantic sturgeon larvae have been found downstream of the Brunswick Dam in the Androscoggin River. This suggests that Atlantic sturgeon spawning may be occurring in the vicinity of at least 1 hydroelectric project and may be affected by its operations.

Dredging

Riverine, nearshore, and offshore areas are often dredged to support commercial shipping and recreational boating, construction of infrastructure, and marine mining. Environmental impacts of dredging include the direct removal/burial of prey species, turbidity/siltation effects, contaminant resuspension, noise/disturbance, alterations to hydrodynamic regime and physical habitat, and actual loss of riparian habitat (Chytalo 1996; Winger et al. 2000). According to Smith and Clugston (1997), dredging and filling impact important habitat features of Atlantic sturgeon as they disturb benthic fauna, eliminate deep holes, and alter rock substrates.

In the SA DPS, maintenance dredging is currently modifying Atlantic sturgeon nursery habitat in the Savannah River. Modeling indicates that the proposed deepening of the navigation channel will result in reduced DO and upriver movement of the salt wedge, restricting spawning habitat. Dredging is also modifying nursery and foraging habitat in the St. Johns River. For the Carolina DPS, dredging in spawning and nursery grounds modifies the quality of the habitat and is further restricting the extent of available habitat in the Cape Fear and Cooper Rivers, where Atlantic sturgeon habitat has already been modified and restricted by the presence of dams. Dredging for navigational purposes is suspected of having reduced available spawning habitat for the CB DPS in the James River (ASSRT 2007; Bushnoe et al. 2005; Holton and Walsh 1995). Both the Hudson and Delaware rivers have navigation channels that are maintained by dredging. Dredging is also used to maintain channels in the nearshore marine environment. Many rivers in the range of the GM DPS also have navigation channels that are maintained by dredging. Dredging outside of federal channels and in-water construction occurs throughout the range of the NYB and GM DPSs.

Water Quality

Atlantic sturgeon rely on a variety of water quality parameters to successfully carry out their life functions. Low DO and the presence of contaminants modify the quality of Atlantic sturgeon habitat and in some cases, restrict the extent of suitable habitat for life functions. Secor (1995) noted a correlation between low abundances of sturgeon during this century and decreasing water quality caused by increased nutrient loading and increased spatial and temporal frequency of hypoxic (low oxygen) conditions. Of particular concern is the high occurrence of low DO coupled with high temperatures in the river systems throughout the range of the Carolina and SA DPSs in the Southeast. Sturgeon are more highly sensitive to low DO than other fish species (Niklitschek and Secor 2009a; Niklitschek and Secor 2009b) and low DO in combination with high temperature is particularly problematic for Atlantic sturgeon. Studies have shown that juvenile Atlantic sturgeon experience lethal and sublethal (metabolic, growth, feeding) effects as DO drops and temperatures rise (Niklitschek and Secor 2005; Niklitschek and Secor 2009a; Niklitschek and Secor 2009b; Secor and Gunderson 1998).

Reductions in water quality from terrestrial activities have modified habitat utilized by the SA DPS. Low DO is modifying sturgeon habitat in the Savannah due to dredging, and non-point source inputs are causing low DO in the Ogeechee River and in the St. Marys River, which completely eliminates juvenile nursery habitat in summer. Low DO has also been observed in the St. Johns River in the summer. In the Pamlico and Neuse systems occupied by the Carolina DPS, nutrient-loading and seasonal anoxia are occurring, associated in part with concentrated animal feeding operations (CAFOs). Heavy industrial development and CAFOs have degraded water quality in the Cape Fear River. Water quality in the Waccamaw and Yadkin-Pee Dee Rivers has been affected by industrialization and riverine sediment samples contain high levels of various toxins, including dioxins. Decreased water quality also threatens Atlantic sturgeon of the CB DPS, especially since the CB system is vulnerable to the effects of nutrient enrichment due to a relatively low tidal exchange and flushing rate, large surface-to-volume ratio, and strong stratification during the spring and summer months (ASMFC 1998; ASSRT 2007; Pyzik et al. 2004). These conditions contribute to reductions in DO levels throughout the bay. The availability of nursery habitat, in particular, may be limited given the recurrent hypoxia (low DO) conditions within the Bay (Niklitschek and Secor 2005; Niklitschek and Secor 2010). Both the Hudson and Delaware Rivers, as well as other rivers in the NYB region, were heavily polluted in the past from industrial and sewer discharges. In the past, many rivers in Maine, including the Androscoggin River, were heavily polluted from industrial discharges from pulp and paper mills. While water quality has improved and most discharges are limited through regulations, many pollutants persist in the benthic environment of the NYB and GM DPSs. It is particularly problematic if pollutants are present on spawning and nursery grounds, as developing eggs and larvae are particularly susceptible to exposure to contaminants.

Water Quantity

Water allocation issues are a growing threat in the Southeast and exacerbate existing water quality problems. Taking water from one basin and transferring it to another fundamentally and irreversibly alters natural water flows in both the originating and receiving basins, which can affect DO levels, temperature, and the ability of the basin of origin to assimilate pollutants

(GWC 2006). Water quality within the river systems in the range of the SA and Carolina DPSs is negatively affected by large water withdrawals. Known water withdrawals of over 240 million gallons per day are permitted from the Savannah River for power generation and municipal uses. However, permits for users withdrawing less than 100,000 gallons per day are not required, so actual water withdrawals from the Savannah and other rivers within the range of the SA DPS are likely much higher. In the range of the Carolina DPS, 20 interbasin water transfers in existence prior to 1993, averaging 66.5 million gallons per day (mgd), were authorized at their maximum levels without being subjected to an evaluation for certification by the North Carolina Department of Environment and Natural Resources or other resource agencies. Since the 1993 legislation requiring certificates for transfers, almost 170 mgd of interbasin water withdrawals have been authorized, with an additional 60 mgd, pending certification. The removal of large amounts of water from these systems will alter flows, temperature, and DO. Water shortages and "water wars" are already occurring in the rivers occupied by the SA and Carolina DPSs and will likely be compounded in the future by population growth and potentially by climate change.

Climate Change

The IPCC projects with high confidence that higher water temperatures and changes in extremes, including floods and droughts, will affect water quality and exacerbate many forms of water pollution—from sediments, nutrients, dissolved organic carbon, pathogens, pesticides, and salt, as well as thermal pollution—with possible negative impacts on ecosystems (IPCC 2008). In addition, sea level rise is projected to extend areas of salinization of groundwater and estuaries, resulting in a decrease of freshwater availability for humans and ecosystems in coastal areas. Some of the most heavily populated areas are low-lying, and the threat of salt water entering into its aquifers with projected sea level rise is a concern (USGRG 2004). Existing water allocation issues would be exacerbated, leading to an increase in reliance on interbasin water transfers to meet municipal water needs, further stressing water quality.

Dams, dredging, and poor water quality have already modified and restricted the extent of suitable habitat for Atlantic sturgeon spawning and nursery habitat. Changes in water availability (depth and velocities) and water quality (temperature, salinity, DO, contaminants, etc.) in rivers and coastal waters inhabited by Atlantic sturgeon resulting from climate change will further modify and restrict the extent of suitable habitat for Atlantic sturgeon. Effects could be especially harmful since these populations have already been reduced to low numbers, potentially limiting their capacity for adaptation to changing environmental conditions (Belovsky 1987; Salwasser et al. 1984; Soulé 1987; Thomas 1990).

The effects of changes in water quality (temperature, salinity, DO, contaminants, etc.) in rivers and coastal waters inhabited by Atlantic sturgeon are expected to be more severe for those populations that occur at the southern extreme of the Atlantic sturgeon's range, and in areas that are already subject to poor water quality as a result of eutrophication. The SA and Carolina DPSs are within a region the IPCC predicts will experience overall climatic drying (IPCC 2008). Atlantic sturgeon from these DPSs are already susceptible to reduced water quality resulting from various factors: inputs of nutrients; contaminants from industrial activities and non-point sources; and interbasin transfers of water. In a simulation of the effects of water temperature on available Atlantic sturgeon habitat in CB, Niklitschek and Secor (2005) found that a 1°C increase of water temperature in the bay would reduce available sturgeon habitat by 65%.

Vessel Strikes

Vessel strikes are a threat to the CB and NYB DPSs. Eleven Atlantic sturgeon were reported to have been struck by vessels on the James River from 2005 through 2007. Several of these were mature individuals. From 2004-2008, 29 mortalities believed to be the result of vessel strikes were documented in the Delaware River; at least 13 of these fish were large adults. The time of year when these events occurred (predominantly May through July, with 2 in August), indicate the animals were likely adults migrating through the river to the spawning grounds. Because we do not know the percent of total vessel strikes that these observed mortalities represent, we are not able to quantify the number of individuals likely killed as a result of vessel strikes in the CB and NYB DPSs.

Bycatch Mortality

Overutilization of Atlantic sturgeon from directed fishing caused initial severe declines in Atlantic sturgeon populations, from which they have never rebounded. Further, continued overutilization of Atlantic sturgeon as bycatch in commercial fisheries is an ongoing impact to Atlantic sturgeon in all 5 DPSs. Atlantic sturgeon are more sensitive to bycatch mortality because they are a long-lived species, have an older age at maturity, have lower maximum reproductive rates, and a large percentage of egg production occurs later in life. Based on these life history traits, Boreman (1997) calculated that Atlantic sturgeon can only withstand the annual loss of up to 5% of their population to bycatch mortality without suffering population declines. Mortality rates of Atlantic sturgeon taken as bycatch in various types of fishing gear range between 0-51% with the greatest mortality occurring in sturgeon caught by sink gillnets. Currently, there are estimates of the number of Atlantic sturgeon captured and killed in sink gillnet and otter trawl fisheries authorized by FMPs in the Northeast Region (Miller and Shepherd 2011). Those estimates indicate from 2006-2010, on average there were 1,548 and 1,569 encounters per year in observed gillnet and trawl fisheries, respectively, with an average of 3,118 encounters combined annually. Mortality rates in gillnet gear were approximately 20%, while mortality rates in otter trawl gear are generally lower, at approximately 5%. Atlantic sturgeon are particularly vulnerable to being caught in sink gillnets; therefore, fisheries using this type of gear account for a high percentage of Atlantic sturgeon bycatch. Atlantic sturgeon are incidentally captured in state and federal fisheries, reducing survivorship of subadult and adult Atlantic sturgeon (ASMFC 2007; Stein et al. 2004). Little data exists on bycatch in the Southeast and high levels of bycatch underreporting are suspected. However, fisheries known to incidentally catch Atlantic sturgeon occur throughout the marine range of the species and in some riverine waters as well. Because Atlantic sturgeon mix extensively in marine waters and may access multiple river systems, they are subject to being caught in multiple fisheries throughout their range. In addition, stress or injury to Atlantic sturgeon taken as bycatch but released alive may result in increased susceptibility to other threats, such as poor water quality (e.g., exposure to toxins and low DO). This may result in reduced ability to perform major life functions, such as foraging and spawning, or even post-capture mortality.

4 Environmental Baseline

By regulation, environmental baselines for 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).

This section contains a description of the effects of past and ongoing human factors leading to the current status of the species, their habitat, and ecosystem, within the action area. The environmental baseline is a snapshot of the factors affecting the species and includes state, tribal, local, and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated future federal actions affecting the same species that have completed consultation are also part of the environmental baseline, as are implemented and ongoing federal and other actions within the action area that may benefit listed species. The purpose of describing the environmental baseline in this manner is to provide context for the effects of the proposed action on the listed species.

4.1 Status of Species in the Action Area

Sea Turtles
The 5 species of sea turtles that occur in the action area are all highly migratory. Therefore, the status of the 5 species (or DPS where applicable) of sea turtles in the action area, as well as the threats to these species, are best reflected in their range-wide statuses and supported by the species accounts in Section 3.

Smalltooth Sawfish
Smalltooth sawfish greater than 200 cm total length may be found in the southern portion (primarily off Florida) of the action area throughout the year intermittently, spending the rest of their time in shallower waters. The status of smalltooth sawfish in the action area, as well as the threats to this species, is supported by the species account in Section 3.

Atlantic Sturgeon
The 5 DPSs of Atlantic sturgeon on the East Coast of the U.S. mix extensively in marine waters (Erickson et al. 2011; Stein et al. 2004b). During various seasons and portions of their life cycles, individual fish will make migrations into rivers, nearshore waters, and other areas of the North Atlantic Ocean. Adult and subadult (age 2 fish or older) spend a considerable portion of their lives in coastal and marine waters (ASSRT and NMFS 2007; Collins and Smith 1997; Laney et al. 2007; Munro et al. 2007; Stein et al. 2004b) where they are subject to bycatch mortality by commercial fisheries (Armstrong and Hightower 2002; Collins et al. 1996; Spear 2007; Stein et al. 2004a; Trencia et al. 2002), poor water quality in certain estuaries (Collins et al. 2000b; Dadswell 2006) and other potential threats, such as dams, dredging, and alteration of spawning and foraging habitat (ASSRT and NMFS 2007; Munro et al. 2007). The status of the 5

DPSs of Atlantic sturgeon in the action area, as well as the threats to these species, are best reflected in their range-wide statuses and supported by the species accounts in Section 3.

4.2 Factors Affecting Species in the Action Area

As stated in Section 2.5, the action area includes the GOM and Atlantic EEZ and adjacent marine and tidal state waters of the GOM and Atlantic area (i.e., from the Texas-Mexico border to the New York-Rhode Island border). The following analysis examines the impacts of past and on-going actions that may affect these species' environment specifically within this defined action area. The environmental baseline for this Opinion includes the effects of several activities affecting the survival and recovery of ESA-listed species (i.e., threatened and endangered sea turtles, smalltooth sawfish, and Atlantic sturgeon) in the action area. The activities that shape the environmental baseline in the action area of this consultation are primarily federal fisheries. Other environmental impacts include effects of vessel operations, additional military activities, dredging, oil and gas exploration, permits allowing take under the ESA, private vessel traffic, and marine pollution.

4.2.1 Federal Actions

NMFS has undertaken a number of Section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered sea turtle species, as well as smalltooth sawfish and Atlantic sturgeon, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to minimize the adverse effects of the action on these species. The summary below of federal actions and the effects these actions have had on these species includes only those federal actions in the action areas which have already concluded or are currently undergoing formal Section 7 consultation.

4.2.1.1 Fisheries

Threatened and endangered sea turtles, smalltooth sawfish, and Atlantic sturgeon are adversely affected by fishing gears used throughout the continental shelf of the action area. Gill net, pelagic and bottom longline, other types of hook-and-line gear, trawl, and pot fisheries have all been documented as interacting with these species.

For all fisheries for which there is an FMP, impacts have been evaluated under Section 7. Formal Section 7 consultations have been conducted on the following fisheries, occurring at least in part within the action area, found likely to adversely affect threatened and endangered sea turtles, smalltooth sawfish, and/or Atlantic sturgeon: dolphin-wahoo; GOM reef fish; GOM and South Atlantic spiny lobster; South Atlantic snapper-grouper; Southeast shrimp; Highly Migratory Species (HMS) pelagic longline; HMS shark; spiny dogfish; Atlantic herring; American lobster; tilefish; Atlantic sea scallop; Northeast multispecies; monkfish; spiny dogfish; Atlantic bluefish; Northeast skate; mackerel, squid, and butterfish; and the summer flounder, scup, and black sea bass fisheries. Anticipated take levels associated with these fisheries are presented in Appendix 1; the take levels reflect the impact on listed species of each activity anticipated from the date of the ITS forward in time.

Dolphin-Wahoo Fishery
The South Atlantic FMP for the dolphin-wahoo fishery was approved in December 2003. The stated purpose of the Dolphin and Wahoo FMP is to adopt precautionary management strategies to maintain the current harvest level and historical allocations of dolphin (90% recreational) and ensure no new fisheries develop. At that time, HMS pelagic logline vessels were also fishing for dolphin using small hooks attached to their surface buoys. NMFS conducted a formal Section 7 consultation to consider the effects on sea turtles of authorizing fishing under the FMP (NMFS 2003b). The August 27, 2003, Opinion concluded that green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles may be adversely affected by the longline component of the fishery, but it was not expected to jeopardize their continued existence. An ITS for sea turtles was provided with the Opinion. Pelagic longline vessels can no longer target dolphin-wahoo with smaller hooks because of hook size requirements in the pelagic longline fishery, thus little longline effort targeting dolphin is currently believed to be present in the action area.

GOM Reef Fish Fishery
The GOM reef fish fishery uses 2 basic types of gear: spear or powerhead, and hook-and-line gear. Hook-and-line gear used in the fishery includes both commercial bottom longline and commercial and recreational vertical line (e.g., handline, bandit gear, rod-and-reel). Trap gear was phased-out completely by February 2007, but prior to that likely resulted in a few smalltooth sawfish entanglements.

Prior to 2008, the reef fish fishery was believed to have relatively moderate level of sea turtle bycatch attributed to the hook-and-line component of the fishery (i.e., approximately 107 captures and 41 mortalities annually, all species combined, for the entire fishery) (NMFS 2005c). In 2008, SEFSC observer programs and subsequent analyses indicated that the overall amount and extent of incidental take for sea turtles specified in the incidental take statement of the 2005 Opinion on the reef fish fishery had been severely exceeded by the bottom longline component of the fishery (approximately 974 captures and at least 325 mortalities estimated for the period of July 2006-2007).

In response, NMFS published an emergency rule prohibiting the use of bottom longline gear in the reef fish fishery shoreward of a line approximating the 50-fathom depth contour in the eastern GOM, essentially closing the bottom longline sector of the reef fish fishery in the eastern GOM for 6 months pending the implementation of a long-term management strategy. The GMFMC developed a long-term management strategy via Amendment 31 to the Reef Fish FMP. This amendment included a prohibition on the use of bottom longline gear in the GOM reef fish fishery, shoreward of a line approximating the 35-fathom contour east of Cape San Blas, Florida, from June through August; a reduction in the number of bottom longline vessels operating in the fishery via an endorsement program; and a restriction on the total number of hooks that may be possessed onboard each GOM reef fish bottom longline vessel to 1,000—only 750 of which may be rigged for fishing.

On October 13, 2009, F/SER3 completed an Opinion that analyzed the expected effects of the continued operation of the GOM reef fish fishery under the changes proposed in Amendment 31 (NMFS SEFSC 2009c). The Opinion concluded that sea turtle takes would be substantially reduced compared to the fishery as it was previously prosecuted, and that operation of the fishery would not jeopardize the continued existence of any sea turtle species. Amendment 31 was implemented on May 26, 2010. In August 2011, consultation was reinitiated to address the DWH oil spill event and potential changes to the environmental baseline. Reinitiation of consultation was not related to any material change in the fishery itself, violations of any terms and conditions of the 2009 Opinion, or exceedance of the incidental take statement. The resulting September 11, 2011, Opinion concluded the continued operation of the GOM reef fish fishery is not likely to jeopardize the continued existence of any listed sea turtles.

The hook-and-line components of the fishery have likely always had the most adverse effects on smalltooth sawfish. However, all consultations to date have concluded the fishery is not likely to jeopardize the continued existence of the smalltooth sawfish. An ITS was provided authorizing nonlethal takes in the commercial and recreational hook-and-line components of the fishery.

Spiny Lobster Fishery

NMFS completed a Section 7 consultation on the GOM and South Atlantic Spiny Lobster FMP on August 27, 2009 (NMFS 2009c). The commercial component of the fishery consists of diving, bully net and trapping sectors; recreational fishers are authorized to use bully net and hand-harvest gears. Of the gears used, only traps are expected to result in adverse effects on sea turtles or smalltooth sawfish. The consultation determined the continued authorization of the fishery would not jeopardize any listed species. An ITS was issued for takes in the commercial trap sector of the fishery. Fishing activity is limited to waters off south Florida and, although the FMP does authorize the use of traps in federal waters, historic and current effort is very limited. Thus, potential adverse effects on sea turtles are believed to also be very limited (e.g., no more than a couple sea turtle entanglements annually).

South Atlantic Snapper-Grouper Fishery

The South Atlantic snapper-grouper fishery uses spear and powerheads, black sea bass pots, and hook-and-line gear. Hook-and-line gear used in the fishery includes commercial bottom longline gear and commercial and recreational vertical line gear (i.e., handline, bandit gear, and rod-and-reel). The most recent consultation was completed in 2006 (NMFS 2006b) and found only hook-and-line gear likely to adversely affect, green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, as well as smalltooth sawfish. The consultation concluded the proposed action was not likely to jeopardize the continued existence of any of these species, and an ITS was provided.

Southeast Shrimp Trawl Fisheries

Southeast shrimp fisheries target primarily brown, white, and pink shrimp in inland waters and estuaries through the state-regulated territorial seas and in federal waters of the EEZ. As sea turtles rest, forage, or swim on or near the bottom, they are captured by shrimp trawls pulled along the bottom. In 1990, the National Research Council (NRC) concluded that the Southeast shrimp trawl fisheries affected more sea turtles than all other activities combined and was the most significant anthropogenic source of sea turtle mortality in the U.S. waters, in part due to the high reproductive value of turtles taken in this fishery (NRC 1990).

NMFS has prepared Opinions on the GOM shrimp trawling numerous times over the years (most recently 2012 and 2014). The consultation history is closely tied to the lengthy regulatory history governing the use of TEDs and a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial shrimp trawl fisheries. The level of annual mortality described in NRC (1990) is believed to have continued until 1992-1994, when U.S. law required all shrimp trawlers in the Atlantic and GOM to use TEDs, allowing at least some sea turtles to escape nets before drowning (NMFS 2002c).[16] TEDs approved for use have had to demonstrate 97% effectiveness in excluding sea turtles from trawls in controlled testing. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), flotation, and more widespread use.

Despite the apparent success of TEDs for some species of sea turtles (e.g., Kemp's ridleys), it was later discovered that TEDs were not adequately protecting all species and size classes of sea turtles. Analyses by Epperly and Teas (2002) indicated that the minimum requirements for the escape opening dimension in TEDs in use at that time were too small for some sea turtles and that as many as 47% of the loggerheads stranding annually along the Atlantic and GOM were too large to fit the existing openings. On December 2, 2002, NMFS completed an Opinion on shrimp trawling in the southeastern United States (NMFS 2002c) under proposed revisions to the TED regulations requiring larger escape openings (68 FR 8456, February 21, 2003). This Opinion determined that the shrimp trawl fishery under the revised TED regulations would not jeopardize the continued existence of any sea turtle species. The determination was based in part, on the Opinion's analysis that shows the revised TED regulations are expected to reduce shrimp trawl related mortality by 94% for loggerheads and 97% for leatherbacks. In February 2003, NMFS implemented the revisions to the TED regulations.

On May 9, 2012, NMFS completed an Opinion which analyzed the continued implementation of the sea turtle conservation regulations and the continued authorization of the Southeast U.S. shrimp fisheries in federal waters under the MSFCMA (NMFS 2012c). The Opinion also considered a proposed amendment to the sea turtle conservation regulations that would withdraw the alternative tow time restriction at 50 CFR 223.206(d)(2)(ii)(A)(3) for skimmer trawls, pusher-head trawls, and wing nets (butterfly trawls) and instead require all of these vessels to use TEDs. Information considered in the Opinion included the North Carolina Division of Marine Fisheries (NCDMF) reporting that no Atlantic sturgeon were observed in 958 observed tows conducted by commercial shrimp trawlers working in North Carolina waters (L. Daniel, NCDMF, pers. comm., via public comment on the proposed rule to list Atlantic sturgeon, 2010). In October 2008, 6 Atlantic sturgeon were reported captured by a shrimp trawler off South

[16] TEDs were mandatory on all shrimping vessels. However, certain shrimpers (e.g., fishers using skimmer trawls or targeting bait shrimp) could operate without TEDs if they agreed to follow specific tow time restrictions.

Carolina; 1 fish was dead and the other 5 were released alive (E. Scott Denton, NMFS, to J. Lee, NMFS, pers. comm. 2010). An additional Atlantic sturgeon was reported captured by a shrimp trawler off South Carolina in December 2011. The fish passed through the TED and was released alive. The Opinion concluded that the proposed action would not jeopardize the continued existence of any sea turtle species, as well as smalltooth sawfish or Atlantic sturgeon. Sea turtle interactions and captures were estimated to be significantly higher than estimated in the 2002 Opinion due to increases in Kemp's ridley and green sea turtle population abundance, incorporation of the TED compliance data and the effects those violations have on expected sea turtle captures rates, and incorporation of interactions in shrimp trawl gear types previously not estimated (i.e., skimmer trawls and try nets). An ITS was provided that used trawl effort and capture rates as proxies for sea turtle take levels, as well as standard take levels for Atlantic and Gulf sturgeon, and smalltooth sawfish. The Opinion required NMFS to minimize the impacts of incidental takes through monitoring of shrimp effort and regulatory compliance levels, conducting TED training and outreach, and continuing to research the effects of shrimp trawling on listed species. Subsequent to the completion of this Opinion, NMFS withdrew the proposed amendment to require TEDs in skimmer trawls, pusher-head trawls, and wing nets. Consequently, NMFS reinitiated consultation on November 26, 2012. Consultation was completed in April 2014 and determined the continued implementation of the sea turtle conservation regulations and the continued authorization of the Southeast U.S. shrimp fisheries in federal waters under the MSFCMA was not likely jeopardize the continued existence of any sea turtle species. The ITS maintained the use of anticipated trawl effort and fleet TED compliance as surrogates for numerical sea turtle takes.

Atlantic HMS Pelagic Longline Fisheries

Atlantic pelagic longline fisheries targeting swordfish and tuna are also known to incidentally capture and kill large numbers of loggerhead and leatherback sea turtles. U.S. pelagic longline fishers began targeting HMS in the Atlantic Ocean in the early 1960s. The fishery is comprised of 5 relatively distinct segments, including: the GOM yellowfin tuna fishery (the only segment in our action area); southern Atlantic (Florida East Coast to Cape Hatteras) swordfish fishery; mid-Atlantic and New England swordfish and bigeye tuna fishery; U.S. Atlantic Distant Water swordfish fishery; and the Caribbean tuna and swordfish fishery. Pelagic longlines targeting yellowfin tunas in the GOM are set in the morning (pre-dawn) in deep water and hauled in the evening. Although this fishery does occur in the action area, fishing occurs further offshore than where shrimp trawling occurs. The fishery mainly interacts with leatherback sea turtles and pelagic juvenile loggerhead sea turtles, thus, younger, smaller loggerhead sea turtles than the other fisheries described in this environmental baseline.

Over the past 2 decades, NMFS has conducted numerous consultations on this fishery, some of which required RPAs to avoid jeopardy of loggerhead and/or leatherback sea turtles. The estimated historical total number of loggerhead and leatherback sea turtles caught between 1992-2002 (all geographic areas) is 10,034 loggerhead and 9,302 leatherback sea turtles, of which 81 and 121 were estimated to be dead when brought to the vessel (NMFS 2004c). This does not account for post-release mortalities, which historically were likely substantial.

NMFS reinitiated consultation in 2003 on the pelagic longline component of this fishery as a result of exceeded incidental take levels for loggerheads and leatherbacks (NMFS 2004c). The resulting 2004 Opinion stated the long-term continued operation of this sector of the fishery was likely to jeopardize the continued existence of leatherback sea turtles, but RPAs were implemented allowing for the continued authorization of pelagic longline fishing that would not jeopardize leatherback sea turtles.

On July 6, 2004, NMFS published a final rule to implement management measures to reduce bycatch and bycatch mortality of Atlantic sea turtles in the Atlantic pelagic longline fishery (69 FR 40734). The management measures include mandatory circle hook and bait requirements, and mandatory possession and use of sea turtle release equipment to reduce bycatch mortality. The rulemaking, based on the results of the 3-year Northeast Distant Closed Area research experiment and other available sea turtle bycatch reduction studies, is expected to have significantly benefitted endangered and threatened sea turtles by reducing mortality attributed to this fishery.

Atlantic HMS Directed Shark Fisheries

Atlantic HMS commercial directed shark fisheries also adversely affect sea turtles via capture and/or entanglement in the action area. The commercial component uses bottom longline and gill net gear. Bottom longline is the primary gear used to target large coastal sharks (LCS) in the GOM. The largest concentration of bottom longline fishing vessels is found along the central GOM coast of Florida, with the John's Pass-Madeira Beach area considered the center of directed shark fishing activities. Gill nets are the dominant gear for catching small coastal sharks; most shark gill netting occurs off southeast Florida, outside of the action area.

Growing demand for shark and shark products encouraged expansion of the commercial shark fishery through the 1970s and 1980s. As catches accelerated through the 1980s, shark stocks started to show signs of decline. Peak commercial landings of large coastal and pelagic sharks were reported in 1989.

Atlantic LCS, small coastal sharks, and pelagic sharks have been managed by NMFS since the 1993 under an FMP for Atlantic Sharks. At that time, NMFS identified LCS as overfished and implemented commercial quotas for LCS (2,436 metric ton [mt] dressed weight [dw]) and established recreational harvest limits for all sharks. In 1994, under the rebuilding plan implemented in the 1993 Shark FMP, the LCS quota was increased to 2,570 mt dw; in 1997, NMFS reduced the LCS commercial quota by 50% to 1,285 mt dw and the recreational retention limit to 2 LCS, small coastal sharks, and pelagic sharks combined per trip with an additional allowance of 2 Atlantic sharpnose sharks per person per trip (62 FR 16648, April 2, 1997). Since 1997, the directed LCS fishing season was generally open for the first 3 months of the year and then a few weeks in July/August.

Observation of directed HMS shark fisheries has been ongoing since 1994, but a mandatory program was not implemented until 2002. Neritic juvenile and adult loggerhead sea turtles are the primary species that have been taken, but leatherback sea turtles have also been observed caught, and a few observations have been unidentified species of turtles. Between 1994 and 2002, the program covered 1.6% of all hooks, and over that time period caught 31 loggerhead sea turtles, 4 leatherback sea turtles, and 8 unidentified with estimated annual average take levels of 30, 222, and 56, respectively.

In May 2008, NMFS completed a Section 7 consultation on the continued authorization of directed Atlantic HMS shark fisheries under the Consolidated HMS FMP, including Amendment 2 (NMFS 2008b). To protect declining shark stocks, Amendment 2 sought to greatly reduce the fishing effort in the commercial component of the fishery. These effort reductions are believed to have greatly reduced the interactions between the commercial component of the fishery and sea turtles. Amendment 2 to the Consolidated HMS FMP (73 FR 35778, June 24, 2008, corrected at 73 FR 40658, July 15, 2008) established, among other things, a shark research fishery to maintain time series data for stock assessments and to meet NMFS's 2009 research objectives. The shark research fishery permits authorize participation in the shark research fishery and the collection of sandbar and non-sandbar LCS from federal waters in the Atlantic Ocean, GOM, and Caribbean Sea for the purposes of scientific data collection subject to 100% observer coverage. The commercial vessels selected to participate in the shark research fishery are the only vessels authorized to land/harvest sandbars subject to the sandbar quota available for each year. The base quota was 87.9 mt dw per year through December 31, 2012, and has been 116.6 mt dw/year since January 1, 2013. The selected vessels have access to the non-sandbar LCS, small coastal shark, and pelagic shark quotas. Commercial vessels not participating in the shark research fishery are subject to 4-6% observer coverage and may only land non-sandbar LCS, SCS, and pelagic sharks subject to the retention limits and quotas per 50 CFR 635.24 and 635.27, respectively.

During 2007-2011, 10 sea turtle (all loggerheads) takes were observed on bottom longline gear in the sandbar shark research fishery and 5 were taken outside the research fishery. The 5 non-research fishery takes were extrapolated to the entire fishery, providing an estimate of 45.6 sea turtle takes (all loggerheads) for non-sandbar shark research fishery from 2007-2010 (Carlson and Richards 2011). No sea turtle takes were observed in the non-research fishery in 2011 (NMFs unpublished data).

The most recent ESA Section 7 consultation was completed on December 12, 2012, on the continued operation of shark fisheries and Amendments 3 and 4 to the Consolidated HMS FMP (NMFS 201d). Amendment 3 to the Consolidated HMS FMP (74 FR 36892; July 24, 2009) implemented measures to bring smoothhound sharks under federal management and end overfishing of blacknose and shortfin mako sharks. The amendment also implemented measures to rebuild blacknose sharks consistent with the 2007 small coastal shark (SCS) stock assessment, the MSFCMA, and other domestic law. Amendment 4 to the Consolidated HMS FMP amended HMS fishery management regulations related to Atlantic sharks in the U.S. Caribbean to address substantial differences between some segments of the U.S. Caribbean HMS fisheries and the HMS fisheries that occur off the mainland of the United States. The 2012 shark Opinion analyzed the potential adverse effects from the smoothhound fishery on sea turtles for the first time. Few smoothhound trips have been observed and no sea turtle captures have been documented in the smoothhound fishery. The Opinion concluded the proposed action was not likely to jeopardize the continued existence of sea turtles. An ITS was provided authorizing 18 takes (9 of which could be lethal) of each species for hawksbill and leatherback sea turtles every 3 years. The Opinion also authorized the take of 36 (21 of which could be lethal) Kemp's ridley, 57 green (33 of which could be lethal), and 126 (78 of which could be lethal) loggerhead sea turtles.

The commercial shark bottom longline and drift gill net fisheries are both known to adversely affect smalltooth sawfish. NMFS (2008b) concluded the proposed action was not likely to jeopardize the continued existence of the smalltooth sawfish. An ITS was provided authorizing nonlethal takes.

In 2008, NMFS completed a Section 7 consultation on the continued authorization of directed Atlantic HMS shark fisheries under the Consolidated HMS FMP, including Amendment 2 (NMFS 2008b). Atlantic HMS commercial directed shark fisheries use bottom longline and gill net gear. Gill nets are the dominant gear for catching small coastal sharks; most shark gill netting occurs off southeast Florida. No bycatch estimate for this fishery is available, but it is likely to be very low since gill nets are primarily only used at the southern edge of the marine range of Atlantic sturgeon, where presence of the species is thought to be rare.

Spiny Dogfish Fishery

The primary gear types for the spiny dogfish fishery are sink gill nets, otter trawls, bottom longline, and driftnet gear (NEFSC 2003). The predominance of any 1 gear type has varied over time (NEFSC 2003). In 2005, 62.1% of landings were taken by sink gill net gear, followed by 18.4% in otter trawl gear, 2.3% in line gear, and 17.1% in gear defined as "other" (excludes drift gill net gear) (NEFSC 2006). More recently, data from fish dealer reports in fiscal year (FY) 2008 indicate that spiny dogfish landings came mostly from sink gill nets (68.2%), and hook gear (15.2%), bottom otter trawls (4.9%), as well as unspecified (7.7%) or other gear (3.9%) (MAFMC 2010). Sea turtles and Atlantic sturgeon can be incidentally captured in spiny dogfish gear, which can lead to injury and death as a result of forced submergence in the gear.

Section 7 consultation on the continued operation of the fishery under the Spiny Dogfish FMP was reinitiated by NMFS on April 2, 2008. Section 7 consultation on the Spiny Dogfish FMP was completed October 29, 2010, and concluded that operation of the spiny dogfish fishery may adversely affect ESA-listed sea turtles as a result of interactions with (capture in) gill net and trawl gear. The ITS issued with the 2010 Opinion exempted the annual incidental take of 1 loggerhead over a 5-year average in trawl gear, which may be lethal or nonlethal and the annual take of up to 1 loggerhead over a 5-year average in gill net gear, which may be lethal or nonlethal. The ITS also exempted 4 leatherbacks, 4 Kemp's ridleys, and 5 green sea turtles in spiny dogfish gear (NMFS 2010h). Warden (2011) reports the average annual bycatch of loggerhead sea turtles in spiny dogfish bottom otter trawl gear between 2005-2008 was estimated to be zero loggerhead sea turtles per year. Information of loggerhead bycatch in gill net gear for the same period is not currently available.

Stein et al. (2004b) reported that 3,910 lb of Atlantic sturgeon were taken as bycatch in observed trips landing 4,126,878 lb of spiny dogfish; a bycatch rate of 0.000947 lb of Atlantic sturgeon/lb of landed spiny dogfish. They also reported 2,107 lb of Atlantic sturgeon taken as bycatch in observed trips landing 1,320,843 lb of unidentified dogfish; a bycatch rate of 0.001595 lb of Atlantic sturgeon/lb of unidentified dogfish. More recent observer data from 2001-2006 documents 32 recorded interactions between the dogfish fishery and Atlantic sturgeon, with 5 interactions resulting in death, resulting in a 16% bycatch mortality rate (ASMFC 2007).

On December 16, 2013, the NMFS Northeast Regional Office (NERO) completed an Opinion on the fishery (in conjunction with 6 other Northeast fisheries), concluding the continued operation of the fishery over the next 10 years may adversely affect, but is not likely to jeopardize loggerhead, leatherback, Kemp's ridley, and green sea turtles, and any of the 5 DPSs of Atlantic sturgeon. The combined (i.e., from all 7 fisheries) ITS authorized the take of 483 loggerhead sea turtles, with up to 239 being lethal; 12 leatherback sea turtles, with up to 9 being lethal; 7 Kemp's ridley sea turtles, with up to 5 being lethal; 7 green sea turtles, with up to 5 being lethal; and 2,560 Atlantic sturgeon, with up to 197 being lethal (all DPSs combined).

American Lobster Fishery

The American lobster trap fishery has been identified as causing injuries to and mortality of loggerhead and leatherback sea turtles as a result of entanglement in buoy lines of the pot/trap gear (NMFS 2002d). Loggerhead or leatherback sea turtles caught/wrapped in the buoy lines of lobster pot/trap gear can die as a result of forced submergence or incur injuries leading to death as a result of severe constriction of a flipper from the entanglement. Given the seasonal distribution of loggerhead sea turtles in mid-Atlantic and New England waters and the operation of the lobster fishery, loggerhead sea turtles are expected to overlap with the placement of lobster pot/trap gear in the fishery during the months of May through October in waters off of New Jersey through Massachusetts. Compared to loggerheads, leatherback sea turtles have a similar seasonal distribution in mid-Atlantic and New England waters, but with a more extensive distribution in the Gulf of Maine (Shoop and Kenney 1992; James et al. 2005). Therefore, leatherback sea turtles are expected to overlap with the placement of lobster pot/trap gear in the fishery during the months of May through October in waters off of New Jersey through Maine.

Given the distribution of lobster fishing effort, leatherback sea turtles are the most likely sea turtle to be affected since this species occurs regularly in Gulf of Maine waters. The most recent Opinion for this fishery, completed on August 13, 2012, concluded that operation of the federally-regulated portion of the lobster trap fishery may adversely affect loggerhead and leatherback sea turtles as a result of entanglement in the groundlines and/or buoy lines associated with this type of gear. An ITS was issued with the 2012 Opinion, exempting the annual incidental take (lethal or nonlethal) of 1 loggerhead sea turtles and the annual incidental take (lethal or nonlethal) of 5 leatherback sea turtles (NMFS 2012e).

Atlantic Bluefish Fishery

The fishery been operating in the U.S. Atlantic for at least the last half century, although its popularity did not heighten until the late 1970s and early 1980s (MAFMC and ASMFC 1998).

The majority of commercial fishing activity in the North Atlantic and mid-Atlantic occurs in the late spring to early fall, when bluefish (and sea turtles) are most abundant in these areas (NEFSC 2005a). This fishery is known to interact with loggerhead sea turtles, given the time and locations where the fishery occurs. Gill nets and bottom otter trawls are the predominant gear types used in the commercial bluefish fishery (MAFMC 2009). In 2006, gill net gear accounted for 32.4% of the total commercial trips targeting bluefish, and landed 72% of the commercial catch for that year (MAFMC 2007a). Bottom otter trawls accounted for 44% of the total commercial trips targeting bluefish and landed 20.4% of the catch (MAFMC 2007a).

The most recent formal consultation on the bluefish fishery was completed on October 29, 2010. An ITS was provided with the 2010 Opinion along with non-discretionary RPMs to minimize the impacts of incidental take. For trawl gear, NMFS anticipated up to 3 loggerheads takes annually with up to 2 lethal takes, based on a 5-year average. For gill net gear, NMFS anticipated up to 79 annual takes with up to 32 of those takes being lethal, based on a 5-year average. The ITS also exempted 4 leatherbacks, 4 Kemp's ridleys, and 5 green sea turtles in bluefish gear (NMFS 2010e).

The incidental take estimates in the 2010 Opinion were based on observed interactions from Sea Sampling data for gear types targeting or capable of catching bluefish (NMFS 1999a). The anticipated incidental take of loggerhead sea turtles was estimated from annual bycatch reports published by Murray (2006, 2008). At the time of the 2010 Opinion, the bluefish fishery was believed to interact with these species given the time and locations where the fishery occurred. Although no incidental takes of ESA-listed sea turtles had been reported in bottom otter trawl gear for trips that were "targeting" bluefish,[17] incidental takes of loggerhead and Kemp's ridley sea turtles were observed in bottom otter trawl gear where bluefish were caught but constituted less than 50% of the catch (NMFS 1999a).

Warden (2011) has produced a new estimate of loggerhead sea turtle bycatch in bluefish bottom otter trawl gear, based on Northeast Fisheries Observer Program (NEFOP) data from 1996-2008 and Vessel Trip Reporting Progam (VTR) days fished. The new estimate indicated the average annual bycatch of loggerhead sea turtles in bluefish bottom otter trawl gear between 2005-2008 was 4 per year (Warden 2011). Although NMFS was not aware until 2003 that sea turtle interactions with fishing gear targeting bluefish were likely to occur, there is no information to suggest that sea turtle interactions with bluefish fishing gear are a new event or are occurring at a greater rate than what has likely occurred in the past. To the contrary, the methods used to detect any sea turtle interactions with bluefish fishing gear were insufficient prior to increased observer coverage in recent years. Additionally, there have been no known changes to the seasonal distribution of loggerhead sea turtles in the U.S. Atlantic (CETAP 1982; Lutcavage and Musick 1985; Keinath et al. 1987; Thompson 1988; Shoop and Kenney 1992; Burke et al. 1993, 1994) with the exception of recent studies (Morreale et al. 2005; Mansfield 2006), which suggest a decrease rather than an increase in the use of some mid-Atlantic loggerhead foraging areas for unknown reasons. Regardless, the number of incidental takes anticipated in 2010 Opinion for

[17] Bluefish trips were defined as trips were greater than 50% of the catch was bluefish.

bluefish bottom otter trawl gear has been exceeded; this represents new information on the effects of the bluefish fishery on ESA-listed sea turtles. Formal consultation on the bluefish fishery was reinitiated on February 6, 2012, to reevaluate the effects of the fishery on ESA-listed whales and sea turtles, and the newly listed Atlantic sturgeon. On December 16, 2013, NERO completed an Opinion on the fishery (in conjunction with 6 other Northeast fisheries), concluding the continued operation of the fishery over the next 10 years may adversely affect, but is not likely to jeopardize loggerhead, leatherback, Kemp's ridley, and green sea turtles, and any of the 5 DPSs of Atlantic sturgeon. The combined (i.e., from all 7 fisheries) ITS authorized the take of 483 loggerhead sea turtles, with up to 239 being lethal; 12 leatherback sea turtles, with up to 9 being lethal; 7 Kemp's ridley sea turtles, with up to 5 being lethal; 7 green sea turtles, with up to 5 being lethal; and 2,560 Atlantic sturgeon, with up to 197 being lethal (all DPSs combined).

Atlantic Herring Fishery
Section 7 consultation was completed on the Atlantic herring fishery on September 17, 1999 (NMFS 1999b). This fishery is managed under the Northeast Atlantic Herring FMP, which was implemented on December 11, 2000. NMFS concluded that authorization of the federal herring fishery under the Atlantic Herring FMP may adversely affect green, Kemp's ridley, leatherback, and loggerhead sea turtles, but was not likely to jeopardize their continued existence. Purse seines, mid-water trawls (single), and pair trawls are the 3 primary gears involved in the Atlantic herring fishery (NEFMC 2006). Since 2000, pair trawl gear has accounted for the majority of herring landed each year (NEFMC 2006). Although there is no direct evidence of takes of ESA-listed species in this fishery from NMFS's sea sampling program, observer coverage of this fishery has been minimal. An ITS for sea turtles was provided with the Opinion, based on the observed capture of sea turtles in other fisheries using comparable gear. Consultation on the Atlantic herring fishery was reinitiated on March 23, 2005, and concluded informally.

Atlantic Sea Scallop Fishery
The Atlantic sea scallop fishery has a long history of operation in mid-Atlantic, as well as New England waters (NEFMC 1982, 2003). The fishery operates in areas and at times that it has traditionally operated and uses traditionally fished gear (NEFMC 1982, 2003). Landings from Georges Bank and the mid-Atlantic dominate the fishery (NEFSC 2007a). On Georges Bank and in the mid-Atlantic, sea scallops are harvested primarily at depths of 30-100 m, while the bulk of landings from the Gulf of Maine are from relatively shallow nearshore waters (< 40 m) (NEFMC 2007). Effort (in terms of days fished) in the mid-Atlantic is about half of what it was prior to implementation of Amendment 4 to the Scallop FMP in the 1990s (NEFMC 2007).

In 2008, NMFS completed a Section 7 consultation on the Atlantic sea scallop fishery (NMFS 2008c); the ITS was amended on February 4, 2009. NMFS determined that the continued operation of the fishery (including the seasonal use of chain mat modified scallop dredge gear in mid-Atlantic waters) may adversely affect but was not likely to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, and green sea turtles. The ITS anticipated incidental take of up to 929 loggerheads biennially (up to 595 may be lethal) in scallop dredge gear and 154 loggerheads annually (up to 20 may be lethal) in scallop trawl gear. The number of loggerhead sea turtles expected to be killed or suffer serious injuries because of interactions with scallop dredge gear is based on data collected in the 2003 fishing year, prior to the use of chain mats. Therefore, while the estimated 595 loggerhead incidental takes, biennially, resulting in immediate death or serious injury is based on the best currently available information, it is also likely a worst case scenario. RPMs to minimize the impact of these incidental takes are also included in the Opinion, including an RPM to limit scallop dredge fishing effort in the mid-Atlantic area (NMFS 2008c), to be in effect by FY 2010. Measures to minimize the impact of turtle takes were implemented for FY 2010 through Framework 21 to the Scallop FMP and will be re-evaluated in future Frameworks.

Formal Section 7 consultation on the continued operation of the scallop fishery was last completed on July 12, 2012 (NMFS 2012f). NMFS concluded that the continued operation of the scallop fishery under the Scallop FMP may adversely affect, but is not likely to jeopardize, the NWA DPS of loggerhead sea turtles, leatherback sea turtles, Kemp's ridley sea turtles, green sea turtles, or the 5 DPSs of Atlantic sturgeon (GOM, NYB, CB, Carolina, and SA).

Monkfish Fishery

The federal monkfish fishery occurs from Maine to the North Carolina-South Carolina border and is jointly managed by the New England Fishery Management Council and MAFMC, under the Monkfish FMP (NEFMC 1998). The current commercial fishery operates primarily in the deeper waters of the Gulf of Maine, Georges Bank, and southern New England, and in the mid-Atlantic. Monkfish have been found in depths ranging from the tide line to 900 m with concentrations between 70-100 m and at 190 m. The directed monkfish fishery uses several gear types that may entangle protected species, including gill net and trawl gear.

Gill net gear used in the monkfish fishery is known to capture ESA-listed sea turtles. Two unusually large stranding events occurred in April and May 2000 during which 280 sea turtles (275 loggerheads and 5 Kemp's ridleys) washed ashore on ocean-facing beaches in North Carolina. Although there was not enough information to specifically determine the cause of the sea turtle deaths, there was information to suggest that the turtles died as a result of entanglement with large-mesh gill net gear. The monkfish gill net fishery, which uses a large-mesh gill net, was known to be operating in waters off of North Carolina at the time the stranded turtles would have died. As a result, in March 2002, NMFS published new restrictions for the use of gill nets with larger than 8-in (20.3 cm) stretched mesh, in federal waters (3-200 nmi) off of North Carolina and Virginia. These restrictions were published in an Interim Final Rule under the authority of the ESA (67 FR 13098; March 21, 2002) and were implemented to reduce the impact of the monkfish and other large-mesh gill net fisheries on endangered and threatened species of sea turtles in areas where sea turtles are known to concentrate. Following review of public comments submitted on the Interim Final Rule, NMFS published a Final Rule on December 3, 2002, that established the restrictions on an annual basis.

A Section 7 consultation conducted in 2001 concluded that the operation of the fishery may adversely affect sea turtles, but it was not likely to jeopardize their continued existence. In 2003, proposed changes to the Monkfish FMP led to reinitiation of consultation to determine the effects of those actions on ESA-listed species. The resulting Opinion concluded the continued operation of the fishery under the proposed changes was likely to adversely affect green, Kemp's ridley, loggerhead and leatherback sea turtles, but was not likely to jeopardize their continued existence (NMFS 2003c). Although the estimated capture of sea turtles in monkfish gill net gear is relatively low, there is concern that much higher levels of interaction could occur.

In 2006, NEFSC released a reference document that reported on the annual estimated taking of loggerhead sea turtles in bottom-otter trawl gear fished in mid-Atlantic waters during the period of 1996-2004 (Murray 2006). As a follow-up, and in response to a request from NERO, the bycatch rate identified in Murray 2006 was used to estimate the take of loggerhead sea turtles in all fisheries (by FMP group) using bottom otter trawl gear fished in mid-Atlantic waters during the period of 2000-2004 (Murray 2008). This new report on the capture of loggerhead sea turtles in the monkfish fishery led to reinitiation of consultation. The resulting Opinion, issued on October 29, 2010, concluded the continued operation of the monkfish fishery under the proposed changes was likely to adversely affect green, Kemp's ridley, loggerhead and leatherback sea turtles, but was not likely to jeopardize their continued existence. The ITS issued with the 2010 Opinion exempted the annual incidental take of up to 2 loggerheads over a 5-year average in trawl gear, of which up to 1 per year may be lethal. The ITS also exempted 4 leatherbacks, 4 Kemp's ridleys, and 5 green sea turtles in monkfish gear (NMFS 2010f). Warden (2011) estimated the loggerhead sea turtle bycatch in monkfish bottom otter trawl gear between 2005-2008 has not exceeded the ITS for the species (Warden 2011). Information on loggerhead bycatch in monkfish gill net gears for the same period is not currently available.

On December 16, 2013, NERO completed an Opinion on the fishery (in conjunction with 6 other Northeast FMPs), concluding the continued operation of the fishery over the next 10 years may adversely affect, but is not likely to jeopardize loggerhead, leatherback, Kemp's ridley, and green sea turtles, and any of the 5 DPSs of Atlantic sturgeon. The combined (i.e., from all 7 fisheries) ITS authorized the take of 483 loggerhead sea turtles, with up to 239 being lethal; 12 leatherback sea turtles, with up to 9 being lethal; 7 Kemp's ridley sea turtles, with up to 5 being lethal; 7 green sea turtles, with up to 5 being lethal; and 2,560 Atlantic sturgeon, with up to 197 being lethal (all DPSs combined).

Northeast Multispecies Fishery

The Northeast multispecies fishery operates throughout the year, with peaks in the spring and from October through February. Multiple gear types are used in the fishery including sink gill net, trawl, and pot/trap gear, which are known to be a source of injury and mortality loggerhead and leatherback sea turtles as a result of entanglement and capture in the gear (NMFS 2001b). The Northeast multispecies sink gill net fishery has historically occurred from the periphery of the Gulf of Maine to Rhode Island in water as deep as 360 ft. In recent years, more of the effort in the fishery has occurred in offshore waters and into the mid-Atlantic. Participation in this fishery has declined since extensive groundfish conservation measures have been implemented; particularly since implementation of Amendment 13 to the Multispecies FMP. Additional management measures (i.e., Framework Adjustment 42) are expected to have further reduced effort in the fishery. The exact relationship between multispecies fishing effort and the number of endangered species interactions with gear used in the fishery is unknown. However, in general, less fishing effort results in less time that gear is in the water and therefore less opportunity for sea turtles or cetaceans to be captured or entangled in multispecies fishing gear.

A June 14, 2001, Opinion evaluated the impacts of the multiple gear types used in the Northeast multispecies fishery on ESA-listed species (NMFS 2001b). Data indicated that sink gill net gear has taken loggerhead and leatherback sea turtles. In August 2007, NMFS received an estimate of loggerhead sea turtle takes in bottom otter trawl gear used in the Northeast multispecies fishery (Memo from K. Murray, NEFSC to L. Lankshear, NERO, PRD). Using VTR data from 2000-2004 and the average annual bycatch of sea turtles as described in Murray (2006), the average annual bycatch of loggerhead sea turtles in bottom otter trawl gear used in the Northeast multispecies fishery was estimated to be 43 loggerhead sea turtles a year (Memo from K. Murray, NEFSC to L. Lankshear, NERO, PRD). This information reveals effects of the multispecies fishery on sea turtles that were not previously considered in the June 2001 Opinion and consultation was reinitiated (NMFS 2010d).

The resulting Opinion, issued on October 29, 2010, concluded the continued operation of the Northeast multispecies fishery under the proposed changes was likely to adversely affect green, Kemp's ridley, loggerhead and leatherback sea turtles, but was not likely to jeopardize their continued existence. The ITS issued with the 2010 Opinion exempted the annual incidental take of up to 43 loggerheads over a 5-year average in trawl gear, of which up to 19 per year may be lethal. The annual take of up to 3 loggerheads over a 5-year average in gill net gear, of which up to 2 per year may be lethal. The ITS also exempted 4 leatherbacks, 4 Kemp's ridleys, and 5 green sea turtles in monkfish gear (NMFS 2010d). In 2011, Warden (2011) provided new information of the take loggerheads in Northeast multispecies bottom trawl gear. Warden (2011) used NEFOP data from 1996-2008 and VTR data on days fished to estimate the average annual bycatch of loggerhead sea turtles in bottom otter trawl gear used in the Northeast multispecies fishery. Warden (2011) estimated that from 2005-2008, 5 loggerhead sea turtles per year were taken by Northeast multispecies fishery otter trawl gear.

On December 16, 2013, NERO completed an Opinion on this fishery (in conjunction with 6 other Northeast FMPs); the conclusions and ITS are the same as discussed above for the monkfish fishery.

Skate Fishery
The skate fishery has typically been composed of both a directed fishery and an indirect fishery. Otter trawls are the primary gear used to land skates in the United States, with some landings also coming from sink gill net, longline, and other gear (NEFSC 2007). For Section 7 purposes, NMFS considers the effects to ESA-listed species of the directed skate fishery. Fishing effort that contributes to landings of skate for the indirect fishery is considered during Section 7 consultation on the directed fishery in which skate bycatch occurs. Section 7 consultation on the skate FMP was completed July 24, 2003 (NMFS 2003d), and concluded that authorization of the skate fishery may adversely affect ESA-listed sea turtles as a result of interactions with gill net and trawl gear.

The anticipated incidental take of loggerhead, leatherback, Kemp's ridley, and green sea turtles in skate fishing gear authorized by the 2003 Opinion was based on observed captures of sea turtles in analogous trawl and gill net fisheries (NMFS 2003d). From 2006-2009, the NEFSC released a number of reference documents and reports (i.e., Murray 2006, 2008, and 2009a) that allowed for an estimate of sea turtles takes that were specific to skate gill net and trawl gears. The NERO considered these bycatch estimates to be new information on the effects of the skate fishery on ESA-listed sea turtles and reinitiated consultation to reconsider the effects of the skate fishery on ESA-listed species.

Reinitiation of consultation was completed on October 29, 2010, and concluded that operation of the skate fishery may adversely affect ESA-listed sea turtles as a result of interactions with (capture in) gill net and trawl gear. The ITS issued with the 2010 Opinion exempted the annual incidental take of up to 24 loggerheads over a 5-year average in trawl gear, of which up to 11 per year may be lethal. The annual take of up to 15 loggerheads over a 5-year average in gill net gear, of which up to 6 per year may be lethal was also authorized via the ITS. The ITS also exempted 4 leatherbacks, 4 Kemp's ridleys, and 5 green sea turtles in skate gear (NMFS 2010g).

Subsequent to the completion of the 2010 Opinion, new information estimating loggerhead bycatch in bottom trawl gear was published (i.e., Warden 2011). Using NEFOP data from 1996-2008 applied to VTR days fished, the average annual bycatch of loggerhead sea turtles bottom otter trawl gear used in the skate fishery between 2005-2008 was estimated to be 7 loggerhead sea turtles per year (Warden 2011).

On December 16, 2013, NERO completed an Opinion on this fishery (in conjunction with 6 other Northeast FMPs); the conclusions and ITS are the same as discussed above for the monkfish fishery.

Mackerel, Squid, and Butterfish Fisheries

Atlantic mackerel, squid, and butterfish fisheries are managed under a single FMP, which was first implemented on April 1, 1983. Bottom otter trawl gear is the primary gear type used to land *Loligo* and *Illex* squid. Based on NMFS dealer reports, the majority of *Loligo* and *Illex* squid are fished in the mid-Atlantic including waters within the action area of this consultation where loggerheads also occur. While squid landings occur year round, the majority of *Loligo* squid landings occur in the fall through winter months while the majority of *Illex* landings occur from June through October (MAFMC 2007b); time periods that overlap in whole or in part with the distribution of loggerhead sea turtles in mid-Atlantic waters. Gill nets account for a small amount of landings in the mackerel fishery.

Loggerhead sea turtles are captured in bottom-otter trawl gear used in the *Loligo* and *Illex* squid fisheries, and gill net gear used by the mackerel fishery and may be injured or killed as a result of forced submergence in the gear. The most recent Opinion on these federal fisheries was completed on October 29, 2010. The Opinion concluded that the continued operation of the fishery under the FMP was likely to adversely affect sea turtles, but not jeopardize their continued existence. An ITS was provided with the 2010 Opinion along with RPMs to minimize the impacts of incidental take. NMFS anticipates the annual take of up to 62 loggerheads over a 5-year average, of which up to 27 per year may be lethal. The ITS also exempted 2 leatherbacks, 2 Kemp's ridleys, and 2 green sea turtles in squid, mackerel, and butterfish gear (NMFS 2010i).

On December 16, 2013, NERO completed an Opinion on these fisheries (in conjunction with 6 other Northeast FMPs); the conclusions and ITS are the same as discussed above for the monkfish fishery.

Summer Flounder, Scup, and Black Sea Bass Fisheries
In the mid-Atlantic, summer flounder, scup, and black sea bass are managed under 1 FMP because these species occupy similar habitat and are often caught at the same time. Bottom otter and beam trawl gear are used most frequently in the commercial fisheries for all 3 species (MAFMC 2007c). Gill nets, handlines, dredges, and pots/traps are also occasionally used (MAFMC 2007c).

Significant measures have been developed to reduce the incidental take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which includes fisheries for other species like scup and black sea bass). TEDs are required throughout the year for trawl nets fished from the North Carolina-South Carolina border to Oregon Inlet, North Carolina, and seasonally (March 16-January 14) for trawl vessels fishing between Oregon Inlet, North Carolina, and Cape Charles, Virginia. Effort in the summer flounder, scup, and black sea bass fisheries has also declined since the 1980s and since each fishery became managed under the FMP. Therefore, effects to sea turtles are expected, in general, to have declined as a result of the decline in fishing effort. Nevertheless, the fisheries primarily operate in mid-Atlantic waters in areas and times when sea turtles occur. Thus, there is a continued risk of sea turtle captures causing injury and death in summer flounder, scup, and black sea bass fishing gear. In August 2007, NMFS received an estimate of loggerhead sea turtle takes in bottom otter trawl gear used in the summer flounder, scup, black sea bass fisheries (Memo from K. Murray, NEFSC to L. Lankshear, NER, PRD). Using VTR data from 2000-2004 and the average annual bycatch of sea turtles as described in Murray (2006), the average annual bycatch of loggerhead sea turtles in bottom otter trawl gear used in the summer flounder, scup, and black sea bass fisheries was estimated to be 200 loggerhead sea turtles a year (Memo from K. Murray, NEFSC to L. Lankshear, NER, PRD). This information revealed effects of the summer flounder, scup, black sea bass fisheries on sea turtles that were not previously considered (NMFS 2010j). Section 7 consultation on the continued operation of the fishery under the Summer Flounder, Scup and Black Sea Bass FMP was reinitiated by NMFS on April 2, 2008, and completed October 29, 2010. The consultation concluded that operation of the summer flounder, scup and black sea bass fishery may adversely affect ESA-listed sea turtles as a result of interactions with (capture in) trawl gear. An ITS was provided for the anticipated capture of sea turtles in gear used in the summer flounder, scup, and black sea bass fisheries. It currently exempts the annual incidental take of up to 205 loggerheads over a 5-year average in trawl, pot/trap and gill net gear, of which up to 85 may be lethal. The ITS also exempted 6 leatherbacks, 4 Kemp's ridleys, and 5 green sea turtles in summer flounder, scup, and black sea bass gear (NMFS 2010j).

On December 16, 2013, NERO completed an Opinion on these fisheries (in conjunction with 6 other Northeast FMPs); the conclusions and ITS are the same as discussed above for the monkfish fishery.

Mid-Atlantic Tilefish Fishery
The effects of the Northeast and Mid-Atlantic tilefish fishery on ESA-listed species were considered during formal consultation on the implementation of a new tilefish FMP, concluded on March 13, 2001, with the issuance of a non-jeopardy Opinion. The Opinion included an ITS for leatherback and loggerhead sea turtles (NMFS 2001c). The management unit for the Tilefish FMP is all golden tilefish under U.S. jurisdiction in the Atlantic Ocean north of the Virginia/North Carolina border. Tilefish have some unique habitat characteristics and are found in a warm water band (8-18°C) approximately 250-1,200 ft deep on the outer continental shelf and upper slope of the U.S. Atlantic coast. Because of their restricted habitat and low biomass, the tilefish fishery in recent years has occurred in a relatively small area in the Mid-Atlantic Bight, south of New England and west of New Jersey. Bottom longline gear equipped with circle hooks is the primary gear type used in the tilefish fishery.

4.2.1.2 Federal Vessel Activity and Military Operations

Watercraft are the greatest contributors to overall noise in the sea and have the potential to interact with sea turtles though direct impacts or propellers. Sound levels and tones produced are generally related to vessel size and speed. Larger vessels generally emit more sound than smaller vessels, and vessels underway with a full load, or those pushing or towing a load, are noisier than unladen vessels. Vessels operating at high speeds have the potential to strike sea turtles. Potential sources of adverse effects from federal vessel operations in the action area include operations of the U.S. Department of Defense (DoD), U.S. Coast Guard (USCG), NOAA, and U.S. Army Corps of Engineers (USACE).

Military
Formal consultations on overall U.S. Navy (USN) activities in the Atlantic have been completed, including the USN Activities in East Coast Training Ranges (June 1, 2011); USN Atlantic Fleet Sonar Training Activities (AFAST) (January 20, 2011); USN AFAST LOA 2012-2014: USN active sonar training along the Atlantic Coast and GOM (December 19, 2011); activities in GOMEX Range Complex from November 2010 to November 2015 (March 17 2011); and the USN East Coast Training Ranges (Virginia Capes, Cherry Point, and Jacksonville) (June 2010). These Opinions concluded that although there is a potential from some USN activities to affect sea turtles, those effects were not expected to impact any species on a population level. Therefore, the activities were determined to be not likely to jeopardize the continued existence of any ESA-listed sea turtle species.

Military testing and training may also affect listed species of sea turtles. The air space over the GOM is used extensively by the DoD for conducting various air-to-air and air-to-surface operations. Nine military warning areas and 5 water test areas are located within the GOM. The western GOM has 4 warning areas that are used for military operations. The areas total approximately 21 million ac. In addition, 6 blocks in the western GOM are used by the USN for mine warfare testing and training. The central GOM has 5 designated military warning areas that are used for military operations. These areas total approximately 11.3 million ac. Portions of the Eglin Water Test Areas comprise an additional 0.5 million ac in the Central Planning Area (CPA). The total 11.8 million ac is about 25% of the area of the CPA. NMFS has completed 4 consultations on Eglin Air Force Base testing and training activities in the GOM. These consultations concluded that the incidental take of sea turtles is likely to occur. These Opinions have issued incidental take for these actions: Eglin GOM Test and Training Range (NMFS 2004b), the Precision Strike Weapons Tests (NMFS 2005b), the Santa Rosa Island Mission Utilization Plan (NMFS 2005f) and Naval Explosive Ordnance Disposal School (NMFS 2004a). These consultations determined the training operations would adversely affect sea turtles but would not jeopardize their continued existence.

Offshore Energy
NMFS has also conducted Section 7 consultations related to energy projects in the GOM (Mineral Management Service, Federal Energy Regulatory Commission, and the Maritime Administration) to implement conservation measures for vessel operations. Through the Section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. However, at the present time they present the potential for some level of interaction.

Dredging
Marine dredging vessels are common within U.S. coastal waters. Although the underwater noises from dredge vessels are typically continuous in duration (for periods of days or weeks at a time) and strongest at low frequencies, they are not believed to have any long-term effect on sea turtles. However, the construction and maintenance of federal navigation channels and dredging in sand mining sites ("borrow areas") have been identified as sources of sea turtle mortality. Hopper dredges in the dredging mode are capable of moving relatively quickly compared to sea turtle swimming speed and can thus overtake, entrain, and kill sea turtles as the suction draghead(s) of the advancing dredge overtakes the resting or swimming turtle. Entrained sea turtles rarely survive. NMFS completed regional Opinions on the impacts of USACE's hopper-dredging operation in 1997 for dredging along the South Atlantic (NMFS 1997b) and in 2003 for operations in the GOM (NMFS 2007e). In the GOM Regional Opinion, NMFS determined that: (1) GOM hopper dredging would adversely affect green, hawksbill, Kemp's ridley, and loggerhead sea turtles, but would not jeopardize their continued existence; and (2) dredging in the GOM would not adversely affect leatherback sea turtles, smalltooth sawfish, or ESA-listed large whales. An ITS for those species adversely affected was issued. In the South Atlantic Regional Opinion (NMFS 1997b), NMFS determined that: (1) hopper dredging in the South Atlantic would adversely affect shortnose sturgeon and 4 sea turtle species (i.e., green, hawksbill, Kemp's ridley, and loggerheads), but would not jeopardize their continued existence; and (2) South Atlantic dredging would not adversely affect leatherback sea turtles or ESA-listed large whales. An ITS for those species adversely affected was issued. Atlantic sturgeon were not listed at the time and were not included in the consultation. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow

areas, move relatively rapidly and can entrain and kill Atlantic sturgeon, presumably as the drag arm of the moving dredge overtakes the slower moving fish. Between 1990 and 2005, 10 Atlantic sturgeon were reported captured by hopper dredges (ASSRT and NMFS 2007). NMFS is currently reinitiating consultation on dredging and beach renourishment activities of the USACE, South Atlantic Region, which will address potential effects to Atlantic sturgeon.

The above-listed Regional Opinions consider maintenance dredging and sand mining operations. Numerous other “free-standing” Opinions have been produced that analyzed hopper dredging projects that did not fall (partially or entirely) under the scope of actions contemplated by these regional Opinions. For example, in the GOM, in 1998 the Houston-Galveston Navigation Channel dredging project was a major port improvement dredging project that was consulted on separately from the then-existing 1995 GOM Regional Opinion on “maintenance” hopper dredging (the predecessor of the 2003 Gulf of Mexico Regional Opinion). Numerous other Opinions have been issued in the GOM since 2003, covering navigation channel improvements and beach restoration projects, including: dredging of Ship Shoal in the GOM Central Planning Area for coastal restoration projects (NMFS 2005a), Gulfport Harbor Navigation Project (NMFS 2007c), East Pass dredging, Destin, Florida (NMFS 2009a), Mississippi Coastal Improvements Program (federal restoration project) dredging and disposal of sand along Ship Island barrier island (NMFS 2010a), and dredging of City of Mexico beach canal inlet (NMFS 2012a). Similarly, in the South Atlantic, Opinions have been issued for dredging and beach nourishment projects outside the scope of the South Atlantic Regional Opinion: Savannah Harbor Federal Navigation Project (channel widening and deepening for Post-Panamax vessels) (NMFS 2011a), use of Canaveral Shoals borrow area for a beach renourishment and protection project at Patrick Air Force Base, Cocoa Beach, Florida (NMFS 2010b), channel dredging for homeporting of carrier group surface ships at U.S. Naval Station Mayport (NMFS 2009b), and Boca Raton Inlet Dredging Project (NMFS 2008a), among others. Each of the above free-standing Opinions had its own ITS and determined that hopper dredging during the proposed action would not adversely affect any species of sea turtles or other listed species, or destroy or adversely modify critical habitat of any listed species.

Recreational Boat Traffic

Data show that vessel traffic is a cause of sea turtle mortality (Lutcavage et al. 1997; STSSN database). Stranding data for the U.S. GOM and Atlantic coasts show that vessel-related injuries are noted in stranded sea turtles. Data indicate that live- and dead-stranded sea turtles showing signs of vessel-related injuries continue in a high percentage of stranded sea turtles in coastal regions of the southeastern United States. Although the USACE-permitted docks and boats may determine the location of recreational vessels, for most projects, the docks themselves are not believed to result in increases of the number recreational vessels on the water.

Operations of vessels by other federal agencies within the action area (e.g., NOAA, Environmental Protection Agency [EPA], USACE) may adversely affect sea turtles. However, the in-water activities of those agencies are limited in scope, as they operate a limited number of vessels or are engaged in research/operational activities that are unlikely to contribute a large amount of risk.

4.2.1.3 Oil and Gas Exploration and Extraction

Federal and state oil and gas exploration, production, and development are expected to result in some sublethal effects to protected species, including impacts associated with the explosive removal of offshore structures, seismic exploration, marine debris, oil spills, and vessel operation. Many Section 7 consultations have been completed on Minerals Management Service (MMS) oil and gas lease activities. Until 2002, these Opinions concluded only 1 sea turtle take may occur annually due to vessel strikes. Opinions issued on July 11, 2002 (NMFS 2002c), November 29, 2002 (NMFS 2002a), August 30, 2003 (NMFS 2003a), and June 29, 2007 (NMFS 2007b), have concluded that sea turtle takes may also result from vessel strikes, marine debris, and oil spills.

Explosive removal of offshore structures and seismic exploration may adversely affect sea turtles. In July 2004, MMS completed a programmatic environmental assessment on geological and geophysical exploration on the GOM Outer Continental Shelf (OCS). In an August 28, 2006 Opinion, NMFS issued incidental take for MMS-permitted explosive structure removals (NMFS 2006a). On April 18, 2011, NMFS received a revised complete application from the MMS (now the Bureau of Ocean Energy Management [BOEM]) requesting an authorization for the take of marine mammals incidental to seismic surveys on the OCS in the GOM (see 76 FR 34,656, June 14, 2011). NMFS intends to conduct a programmatic consultation with BOEM prior to issuing the requested MMPA authorization that will consider the effects to listed sea turtles for BOEM-authorized seismic activities throughout the northern GOM.

NMFS's June 29, 2007, Opinion issued to MMS concluded that the 5-year leasing program for oil and gas development in the coastal and the Western Planning Areas of the GOM and its associated actions were not likely to jeopardize the continued existence of threatened or endangered species or destroy or adversely modify designated critical habitat. NMFS estimated the number of listed species that could potentially experience adverse effects as the result of exposure to an oil spill over the lifetime of the action. However, as discussed below, on April 20, 2010, the DWH drilling rig exploded and sank, resulting in a massive oil spill. Given the effects of the spill, on July 30, 2010, BOEM requested reinitiation of interagency consultation under Section 7 of the ESA on the June 29, 2007, Opinion on the Five-Year Outer Continental Shelf Oil and Gas Leasing Program (2007-2012) in the Central and Western Planning Areas of the GOM.

NMFS has begun synthesizing data from the spill, and it is clear that MMS underestimated the size, frequency, and impacts associated with a catastrophic spill under the 2007-2012 lease sale program. The size and duration of the DWH oil spill were greater than anticipated, and the effects on listed species have exceeded NMFS's projections. However, NMFS has not yet issued an Opinion concluding the reinitiated consultation.

Impact of DWH Oil Spill on Status of Sea Turtles

On April, 20, 2010, while drilling approximately 43 nmi east-southeast of the Mississippi River Delta off Louisiana and 87 nmi south of Dauphin Island, Alabama, the DWH semi-submersible drilling rig experienced a catastrophic explosion due to a blowout. The fire burned out of control until the rig sank on April 22, 2010, which allowed the compromised well to release oil directly into the GOM. The well was temporarily capped on July 15, 2010, which significantly reduced the amount of leaking oil, but the well was not ultimately sealed and declared "effectively dead" until September 19, 2010. Estimates on the amount of released oil varied widely and over time, but final official estimates indicated 53,000-62,000 barrels were released per day as a result of the event; the total amount of oil released into the GOM was estimated at 4.9 million barrels (780,000 m^3) (McNutt et al. 2011).

In the wake of the explosion and spill, approximately 2.1 million gallons of chemical dispersant were applied to surface waters (1.4 million gallons) and directly at the wellhead (0.77 million gallons) between May 15 and July 12, 2010.[18] COREXIT is a product line of solvents primarily used as a dispersant for breaking up oil slicks, and it (i.e., COREXIT 9527 and COREXIT 9500) was the most-used dispersant in the DWH oil spill event. COREXIT 9527 was replaced by COREXIT 9500 after the former was deemed too toxic; Unified Command records indicate that the last date of use of the COREXIT 9527 was May 22, 2010. According to the manufacturer, "When the COREXIT dispersants are deployed on the spilled oil, the oil is broken up into tiny bio-degradable droplets that immediately sink below the surface where they continue to disperse and bio-degrade. This quickly removes the spilled oil from surface drift and reducing direct exposure to birds, fish, and sea animals in the spill environment."

COREXIT 9527, considered by the EPA to be an acute health hazard, is stated by its manufacturer to be potentially harmful to red blood cells, the kidneys and the liver, and may irritate eyes and skin. The chemical 2-butoxyethanol, found in COREXIT 9527, was identified as having caused lasting health problems in workers involved in the cleanup of the EXXON VALDEZ oil spill. In contrast, COREXIT 9500, a combination of propylene glycol, is deemed to have low human and environmental risk according to the Materials Safety Data Sheet for the chemical. Its ingredients are not considered carcinogens, although no long-term exposure studies have been conducted on the solution. Furthermore, there is no information currently available on the effects of the dispersant on sea turtles, either by direct exposure or other avenues, such as bioaccumulation through foraging on prey species.

At this time, the total effects of the oil spill on species found throughout the GOM, including ESA-listed sea turtles, are not known. Potential DWH-related impacts to all sea turtle species include direct oiling or contact with dispersants from surface and subsurface oil and dispersants, inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, loss of foraging resources which could lead to compromised growth and/or reproductive potential, harm to foraging, resting and/or nesting habitats, and disruption of nesting turtles and nests. There is currently an ongoing investigation and analyses are being conducted under the Oil Pollution Act (33 U.S.C. 2701 et seq.) to assess natural resource damages and to develop and implement a plan

[18] http://www.whitehouse.gov/blog/issues/Deepwater-BP-oil-spill (accessed November 3, 2010); from Kujawinski et al. 2011.

for the restoration, rehabilitation, replacement or acquisition of the equivalent of the injured natural resources. The final outcome of that investigation may not be known for many months to years from the time of this Opinion. Consequently, other than some emergency restoration efforts, most restoration efforts that occur pursuant to the Oil Pollution Act have yet to be determined and implemented, and so the ultimate restoration impacts on the species are unknowable at this time.

During the response phase to the DWH oil spill (April 26-October 20, 2010) a total of 1,146 sea turtles were recovered, either as strandings (dead or debilitated generally onshore or nearshore) or were collected offshore during sea turtle search and rescue operations (Table 18). Subsequent to the response phase, a few sea turtles with visible evidence of oiling have been recovered as strandings. The available data on sea turtle strandings and response collections during the time of the spill are expected to represent a fraction (currently unknown) of the actual losses to the species, as most individuals likely were not recovered. The number of strandings does not provide insights into potential sublethal impacts that could reduce long-term survival or fecundity of individuals affected. However, it does provide some insight into the potential relative scope of the impact among the sea turtle species in the area. Kemp's ridley sea turtles may have been the most affected sea turtle species, as they accounted for almost 71% of all recovered turtles (alive and dead), and 79% of all dead turtles recovered. Green turtles accounted for 17.5% of all recoveries (alive and dead), and 4.8% of the dead turtles recovered. Loggerheads comprised 7.7% of total recoveries (alive and dead) and 11% of the dead turtle recovered. The remaining turtles were hawksbills and decomposed hardshell turtles that were not identified to species. No leatherbacks were among the sea turtles recovered in the spill response area. (Note: leatherbacks were documented in the spill area, but they were not recovered alive or dead).

Table 18. Sea Turtles Recovered in the DWH Spill Response Area (April 26 through October 20, 2010)

Turtle Species	Alive	Dead	Total
Green	172	29	201
Hawksbill	16	0	16
Kemp's ridley	328	481	809
Loggerhead	21	67	88
Unknown	0	32	32
Total	**537**	**609**	**1,146**

(http://www.nmfs.noaa.gov/pr/health/oilspill/turtles.htm)

Although extraordinarily high numbers of threatened and endangered sea turtles were documented stranded (primarily within Mississippi Sound), during the DWH oil spill the vast majority of sea turtles recovered by the STSSN have shown no visible signs of oil. The oil spill increased awareness and human presence in the northern GOM, which likely resulted in some of the increased reporting of stranded turtles to the STSSN. However, we do not believe this factor fully explains the increases observed in 2010. We believe some of the increases in strandings may have been attributed to bycatch mortality in the shrimp fishery. As a result, on August 16, 2010, NMFS reinitiated Section 7 consultation on Southeast state and federal shrimp fisheries based on a high level of strandings, elevated nearshore sea turtle abundance as measured by trawl CPUE, and lack of compliance with TED requirements. These factors indicated sea turtles may be affected by shrimp trawling to an extent not previously considered in the 2002 Shrimp Opinion.

Another period of high stranding levels occurred in 2011, similar to that in 2010. Investigations, including necropsies, were undertaken by NMFS to attempt to determine the cause of those strandings. Based on the findings, the 2 primary considerations for the cause of death of the turtles that were necropsied are forced submergence or acute toxicosis. With regard to acute toxicosis, sea turtle tissue samples were tested for biotoxins of concern in the northern GOM. Environmental information did not indicate a harmful algal bloom of threat to marine animal health was present in the area. With regard to forced submergence, the only known plausible cause of forced submergence that could explain this event is incidental capture in fishing gear. NMFS has assembled information regarding fisheries operating in the area during and just prior to these strandings. While there is some indication that lack of compliance with existing TED regulations and the operations of other trawl fisheries that do not require TEDs may have occurred in the area at the time of the strandings, direct evidence that those events caused the unusual level of strandings is not available. More information on the stranding event, including number of strandings, locations, and species affected, can be found at: http://www.nmfs.noaa.gov/pr/species/turtles/gulfofmexico.htm.

In addition to effects on sub-adult and adult sea turtles, the May through September 2010 sea turtle nesting season in the northern GOM may also have been adversely affected by the DWH oil spill. Setting booms to protect beaches, cleanup activities, lights, people, and equipment all may have had unintended effects, such as preventing females from reaching nesting beaches and thereby reducing nesting in the northern GOM.

The oil spill may also have adversely affected emergence success. In the northern GOM area, approximately 700 nests are laid annually in the Florida Panhandle and up to 80 nests are laid annually in Alabama. Most nests are made by loggerhead sea turtles; however, a few Kemp's ridley and green turtle nests were also documented in 2010. Hatchlings begin emerging from nests in early to mid-July, the number of hatchlings estimated to be produced from northern GOM sea turtle nests in 2010 was 50,000. To try to avoid the loss of most, if not all, of 2010s northern GOM hatchling cohort, all sea turtle nests laid along the northern GOM coast were visibly marked to ensure that nests were not harmed during oil spill cleanup operations that are undertaken on beaches. In addition, a sea turtle late-term nest collection and hatchling release plan was implemented to provide the best possible protection for sea turtle hatchlings emerging from nests in Alabama and the Florida Panhandle. Starting in June, northern GOM nests were relocated to the Atlantic to provide the highest probability of reducing the anticipated risks to hatchlings as a result of the DWH oil spill. A total of 274 nests, all loggerheads except for 4 green turtle and 5 Kemp's ridley nests, were translocated just prior to emergence from northern GOM beaches to the east coast of Florida so that the hatchlings could be released in areas not affected by the oil spill (Table 19). In mid-August, it was determined that the risks to hatchlings emerging from beaches and entering waters off the northern GOM coasts had diminished significantly and all nest translocations were ceased by August 19, 2010.

Table 19. Number of Turtle Nests Translocated from the GOM Coast and Hatchlings Released in the Atlantic Ocean

Turtle Species	Translocated Nests	Hatchlings Released
Green	4	455
Kemp's ridley	5	125
Loggerhead	265*	14,216

*Does not include 1 nest that included a single hatchling and no eggs
The sea turtle nest translocation effort ceased on August 19, 2010.
(http://www.nmfs.noaa.gov/pr/health/oilspill/turtles.htm)

The survivorship and future nesting success of individuals from 1 nesting beach being transported to and released at another nesting beach is unknown. The loggerheads nesting and emerging from nests in the Florida Panhandle and Alabama are part of the NGMRU and differ genetically from loggerheads produced along the Atlantic Coast of Florida, but they are part of NWA DPS. Evidence suggests that some portion of loggerheads produced on Northern GOM beaches are transported naturally into the Atlantic by currents and spend portions of their life cycle away from the GOM. This is based on the presence of some loggerheads with a northern GOM genetic signature in the Atlantic. These turtles are assumed to make their way back to the GOM as sub-adults and adults. It is unknown what the impact of the nesting relocation efforts will be on the NGMRU in particular, or the Northwest Atlantic DPS generally.

Loggerhead nesting in the northern GOM represents a small proportion of overall Florida loggerhead nesting and an even smaller proportion of the Northwest Atlantic Ocean DPS. The 5-year average (2006-2010) for the statewide number of loggerhead nests in the state of Florida is 56,483 nests annually (FWC nesting database) versus an average of well under 1,000 nests per year for the northern GOM (approximately 700 in 2010). As previously stated, we do not know what the impact of relocating 265 nests will be on the 2010 nesting cohort compared to the total of approximately 700 nests laid on Northern GOM beaches. While there may be a risk of possible increased gene flow across loggerhead recovery units, all are within the Northwest Atlantic Ocean DPS and would likely not be on a scale of conservation concern. However, recovery units are subunits of the listed species that are geographically or otherwise identifiable and essential to the recovery of the species. Recovery units are individually necessary to conserve genetic robustness, demographic robustness, important life history stages, or some other feature necessary for long-term sustainability of the species. Recovery units are not necessarily self-sustaining viable units on their own, but instead need to be collectively recovered to ensure recovery of the entire listed entity. Recovery criteria must be met for all recovery units identified in the Recovery Plan before the Northwest Atlantic DPS can be considered for delisting.

As noted earlier, the vast majority of sea turtles collected in relation to the DWH oil spill were Kemp's ridleys; 328 were recovered alive and 481 were recovered dead. We expect that additional mortalities occurred that were undetected and are, therefore, currently unknown. It is likely that the Kemp's ridley sea turtle was also the species most impacted by the DWH event on a population level. Relative to the other species, Kemp's ridley populations are much smaller, yet recoveries during the DWH oil spill response were much higher. The location and timing of the DWH event were also important factors. Although significant assemblages of juvenile Kemp's ridleys occur along the U.S. Atlantic coast, Kemp's ridley sea turtles use the GOM as their primary habitat for most life stages, including all of the mating and nesting. As a result, all mating and nesting adults in the population necessarily spend significant time in the GOM, as do all hatchlings as they leave the beach and enter the pelagic environment. However, not all of those individuals will have encountered oil and/or dispersants, depending on the timing and location of their movements relative to the location of the subsurface and surface oil. In addition to mortalities, the effects of the spill may have included disruptions to foraging and resource availability, migrations, and other unknown effects as the spill began in late April just before peak mating/nesting season (May-July). The distance from the MC252 well to the primary mating and nesting areas in Tamaulipas, Mexico, though, greatly reduces the chance of these disruptions to adults breeding in 2010. Yet, turtle returns from nesting beaches to foraging areas in the northern GOM occurred while the well was still spilling oil. At this time, we cannot determine the specific reasons accounting for year-to-year fluctuations in numbers of Kemp's ridley nests (the number of nests increased in 2011 as compared to 2010); however, there may yet be long-term population impacts resulting from the oil spill. How quickly the species returns to the previous fast pace of recovery may depend in part on how much of an impact the DWH event has had on Kemp's ridley food resources (Crowder and Heppell 2011).

Eighty-eight loggerhead sea turtles have been documented within the designated spill area as part of the response efforts; 67 were dead and 21 were alive. It is unclear how many of those without direct evidence of oil were actually impacted by the spill and spill-related activities versus other sources of mortality. There were likely additional mortalities that were undetected and, therefore, currently unknown. Although we believe that the DWH event had adverse effects on loggerheads, the population level effect was not likely as severe as it was for Kemp's ridleys. In comparison to Kemp's ridleys, we believe the relative proportion of the population exposed to the effects of the event was much smaller, the number of turtles recovered (alive and dead) are fewer in absolute numbers, and the overall population size is believed to be many times larger. Additionally, unlike Kemp's ridleys, the majority of nesting for the Northwest Atlantic Ocean loggerhead DPS occurs on the Atlantic coast. However, it is likely that impacts to the NGMRU of the loggerhead NWA DPS would be proportionally much greater than the impacts occurring to other recovery units because of impacts to nesting (as described above) and a larger proportion of the NGMRU recovery unit, especially mating and nesting adults, being exposed to the spill. However, the impacts to that recovery unit, and the possible effect of such a disproportionate impact on that small recovery unit to the NWA DPS and the species, remain unknown.

Green sea turtles comprised the second-most common species recovered as part of the DWH response. Of the 201 green turtles recovered 29 were found dead or later died while undergoing rehabilitation. The mortality number is lower than that for loggerheads despite loggerheads having far fewer total strandings, but this is because the majority of green turtles came from the offshore rescue (pelagic stage), of which almost all (of all species) survived after rescue, whereas a greater proportion of the loggerhead recoveries were nearshore neritic stage individuals found dead. While green turtles regularly use the northern GOM, they have a widespread distribution throughout the entire GOM, Caribbean, and Atlantic. As described in the Status of the Species section, nesting is relatively rare on the northern GOM coast. Therefore, similar to loggerhead sea turtles, while it is expected that adverse impacts occurred, the relative proportion of the population that is expected to have been exposed to and directly impacted by the DWH event, and thus the population-level impact, is likely much smaller than for Kemp's ridleys.

Available information indicates hawksbill and leatherback sea turtles were least affected, at least directly, by the oil spill. Potential DWH-related impacts to leatherback sea turtles include direct oiling or contact with dispersants from surface and subsurface oil and dispersants, inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

4.2.1.4 ESA Permits

Sea turtles are the focus of research activities authorized by Section 10 permits under the ESA. Regulations developed under the ESA allow for the issuance of permits allowing take of certain ESA-listed species for the purposes of scientific research under Section 10(a)(1)(a) of the ESA. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured sea turtles. The number of authorized takes varies widely depending on the research and species involved, but may involve the taking of hundreds of sea turtles annually. Most takes authorized under these permits are expected to be (and are) nonlethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations. In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS must also be reviewed for compliance with Section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species or adverse modification of its critical habitat.

As of October 2014, NMFS had issued 3 research permits for directed research on the smalltooth sawfish. The permits allow researchers to capture, handle, collect tissue samples, and tag up smalltooth sawfish in Florida waters (both South Atlantic and GOM). All take authorized under these 3 permits is nonlethal. Additionally, NMFS has authorized incidental take (nonlethal) of smalltooth sawfish scientific research for sea turtles.

As of October 2014, 17 Section 10(a)(1)(A) scientific research permits are currently issued to study Atlantic sturgeon in the rivers of the United States. Each permit approves sampling methodology and authorizes take. The specific stressors to fish subject to NMFS-issued ESA permit conditions are capture in nets; handling and restraint during examinations; tagging using passive integrated transponder, internal, and external tags; tissue sampling; anesthetizing; laparoscopy; blood sampling; and gonad biopsy.

4.2.2 State or Private Actions

4.2.2.1 State Fisheries

Various fishing methods used in state commercial and recreational fisheries, including gill nets, fly nets, trawling, pot fisheries, pound nets, and vertical line are all known to incidentally take sea turtles, smalltooth sawfish, and Atlantic sturgeon. Captures of sea turtles (NMFS SEFSC 2001; ASMFC 2007) and Atlantic sturgeon (ASMFC 2006; ASSRT 2007; NEFSC 2011) in nearshore fisheries have been previously documented. Bycatch of smalltooth sawfish in state recreational and commercial fisheries have also been reported. Smalltooth sawfish and Atlantic sturgeon are vulnerable to capture in state fisheries occurring in rivers, however, these riverine areas are outside the action area. Where available, specific information on sea turtle, smalltooth sawfish, and Atlantic sturgeon interactions in state fisheries is provided below.

Atlantic Croaker Fishery
An Atlantic croaker fishery using trawl and gill net gear occurs within the action area and turtle takes have been observed in the fishery. The average annual bycatch of loggerhead sea turtles in bottom otter trawl gear used in the Atlantic croaker fishery was estimated to be 70 loggerhead sea turtles (Warden 2011). Additional information on sea turtle interactions with gill net gear, including gill net gear used in the Atlantic croaker fishery, has also been recently published by Murray (2009a, 2009b). The average annual bycatch of loggerhead sea turtles in gill net gear used in the Atlantic croaker fishery, based on VTR data from 2002 to 2006, was estimated to be 11 per year with a 95% confidence interval of 3-20 (Murray 2009b). ESA-listed cetaceans have also been known to interact with gill net gear, thus interaction may occur where the gear overlaps with cetacean distributions.

Atlantic sturgeon takes have been observed in the Atlantic croaker fishery, but a quantitative assessment of the number of Atlantic sturgeon captured in the croaker fishery is not available. A review of the NEFOP database indicates that, from 2006-2010, 60 Atlantic sturgeon (out of a total of 726 observed interactions) were captured during observed trips where the trip target was identified as croaker. This represents a minimum number of Atlantic sturgeon captured in the croaker fishery during this time period, as it only considers trips that included a NEFOP observer onboard. It should also be noted that very few croaker trips carry NEFOP observers.

Weakfish Fishery
The weakfish fishery occurs in both state and federal waters but the majority of commercially and recreationally caught weakfish are caught in state waters (ASMFC 2002). The dominant commercial gears include gill nets, pound nets, haul seines, and trawls, with the majority of landings occurring in the fall and winter months (ASMFC 2002). Weakfish landings were dominated by the trawl fishery through the mid-1980s, after which gill net landings began to account for most weakfish landed (ASMFC 2002). North Carolina has accounted for the majority of the annual landings since 1972 while Virginia ranks second, followed by New Jersey (ASMFC 2002). Sea turtle bycatch in the weakfish fishery has occurred (Warden 2011; Murray 2009a, 2009b). The average annual bycatch of loggerhead sea turtles in bottom otter trawl gear

used in the weakfish fishery was estimated to be 1 loggerhead sea turtle (Warden 2011). Additional information on sea turtle interactions with gill net gear, including gill net gear used in the weakfish fishery, has also been recently published by Murray (2009a, 2009b). The average annual bycatch of loggerhead sea turtles in gill net gear used in the weakfish fishery, based on VTR data from 2002-2006, was estimated to be 1 per year with a 95% confidence interval of 0-1 (Murray 2009b). ESA-listed cetaceans have also been known to interact with gill net gear, thus interaction may occur where the gear overlaps with cetacean distributions.

A quantitative assessment of the number of Atlantic sturgeon captured in the weakfish fishery is not available. A review of the NEFOP database indicates that from 2006-2010, 36 Atlantic sturgeon (out of a total of 726 observed interactions) were captured during observed trips where the trip target was identified as weakfish. This represents a minimum number of Atlantic sturgeon captured in the weakfish fishery during this time period, as it only considers observed trips, and most inshore fisheries are not observed. An earlier review of bycatch rates and landings for the weakfish fishery reported that the weakfish-striped bass fishery had an Atlantic sturgeon bycatch rate of 16% from 1989-2000; the weakfish-Atlantic croaker fishery had an Atlantic sturgeon bycatch rate of 0.02%,[19] and the weakfish fishery had an Atlantic sturgeon bycatch rate of 1.0% (ASSRT 2007).

Whelk Fishery
A whelk fishery using pot/trap gear is known to occur in several parts of the action area, including waters off Maine, Connecticut, Massachusetts, Delaware, Maryland, and Virginia. Landings data for Delaware suggests that the greatest effort in the whelk fishery for its waters occurs in the months of July and October, times when sea turtles are present. Whelk pots, which, unlike lobster traps, are not fully enclosed and differ in use of a bridle, have been suggested as a potential source of entrapment for loggerhead sea turtles that may be enticed to enter the trap to get the bait or whelks caught in the trap (Mansfield et al. 2001). Leatherback, green, and loggerhead sea turtles as well as right, humpback, and fin whales are known to become entangled in lines associated with trap/pot gear used in several fisheries including lobster, whelk, and crab species (NMFS SEFSC 2001; Dwyer et al. 2002; NMFS 2007a). Atlantic sturgeon are not known to interact with whelk pots.

State Crab Fisheries
Various crab fisheries, such as horseshoe crab and blue crab, also occur in federal and state waters. Leatherback, green, and loggerhead sea turtles as well as right, humpback, and fin whales are known to become entangled in lines associated with trap/pot gear used in several fisheries including lobster, whelk, and crab species (NMFS SEFSC 2001; Dwyer et al. 2002; NMFS 2007a).

The crab fisheries may have detrimental impacts on sea turtles beyond entanglement in the fishing gear itself. Loggerheads are known to prey on crab species, including horseshoe and blue crabs. In a study of the diet of loggerhead sea turtles in Virginia waters from 1983-2002, Seney

[19] Bycatch rates were calculated as pounds of sturgeon per pound landed (Stein et al. 2004a).

and Musick (2007) found a shift in the diet of loggerheads in the area from horseshoe and blue crabs to fish, particularly menhaden and Atlantic croaker. The authors suggested that a decline in the crab species has caused the dietary shift, and loggerheads are likely foraging on fish captured in fishing nets or on discarded fishery bycatch (Seney and Musick 2007). The physiological impacts of this shift are uncertain, although it was suggested as a possible explanation for the declines in loggerhead abundance noted by Mansfield (2006). Other studies have detected seasonal declines in loggerhead abundance coincident with seasonal declines of horseshoe and blue crabs in the same area (Maier et al. 2005). While there is no evidence of a decline in horseshoe crab abundance in the southeast during the period 1995-2003, declines were evident in some parts of the mid-Atlantic (ASMFC 2004; Eyler et al. 2007). Given the variety of loggerheads prey items (Dodd 1988; Burke et al. 1993; Bjorndal 1997; Morreale and Standora 1998) and the differences in regional abundance of horseshoe crabs and other prey items (ASMFC 2004; Eyler et al. 2007), a direct correlation between loggerhead sea turtle abundance and horseshoe crab and blue crab availability cannot be made at this time. Nevertheless, the decline in loggerhead abundance in Virginia waters (Mansfield 2006), and possibly Long Island waters (Morreale et al. 2005), coincident with noted declines in the abundance of horseshoe crab and other crab species raises concerns that crab fisheries may be impacting the forage base for loggerheads in some areas of their range.

Atlantic sturgeon and sea turtles are known to be caught in state water horseshoe crab fisheries (Stein et al. 2004a; Warden 2011), which currently operate in all action area states except New Jersey. Along the East Coast, hand, trawl, and dredge fisheries account for more than 85% of the commercial horseshoe crab landings in the bait fishery. Other methods used are gill nets, pound nets, and traps (ASMFC 2011). State waters from Delaware to Virginia are closed to horseshoe crab harvest and landing from January 1-June 7 (ASMFC 2011). The majority of horseshoe crab landings in 2010 came from Massachusetts, Virginia, and Delaware. Stein et al. (2004a) examined bycatch of Atlantic sturgeon using the NEFOP database (1989-2000) and found that their bycatch rate in horseshoe crab fisheries was low, at 0.05%. Warden (2011) examined bycatch of sea turtles in horseshoe crab fisheries using NEFOP data (2005-2008) and reported an annual average of up to 9 loggerhead turtles estimated to be incidentally captured. An Atlantic sturgeon "reward program" – where commercial fishers were provided monetary rewards for reporting captures of Atlantic sturgeon in the Maryland waters of Chesapeake Bay – operated from 1996-2012 (Mangold et al. 2007).[20] The data from this program during the ten-year period of 1996-2006 show that of the 1,395 wild Atlantic sturgeon, only 1 was found caught in a crab pot (Mangold et al. 2007).

The Florida stone crab fishery used to be managed via a federal FMP. NMFS completed a Section 7 consultation on the GOM Stone Crab FMP on September 28, 2009 (NMFS 2009c). The commercial component of the fishery is traps; recreational fishers use traps or wade/dive for stone crabs. Of the gears used, only commercial traps are expected to result in adverse effects on ESA-listed species. The number of commercial traps actually in the water is very difficult to estimate, and the number of traps used recreationally is unquantifiable with any degree of

[20] The program was terminated in February 2012, with the listing of Atlantic sturgeon under the ESA.

accuracy. The consultation determined the continued authorization of the fishery would not adversely affect ESA-listed marine mammals, Gulf sturgeon, or adversely affect critical habitat. It did conclude the action was likely to adversely affect sea turtles and smalltooth sawfish, but would not jeopardize their continued existence; an ITS was issued for takes in the commercial trap sector of the fishery. On October 28, 2011, NMFS repealed the federal FMP for this fishery, and the fishery is now managed exclusively by the State of Florida.

American Lobster Trap and Fish Trap Fisheries
An American lobster trap fishery occurs in state waters of New England and the mid-Atlantic and is managed under the Atlantic States Marine Fisheries Commission's (ASMFC) Interstate Fishery Management Plan (ISFMP). As with the federal waters component of the fishery, the state waters fishery is known to have the potential to entangle leatherback and loggerhead sea turtles as well as right, humpback, and fin whales in lines associated with trap/pot gear used in this fishery (NMFS SEFSC 2001; Dwyer et al. 2002; NMFS 2007a).

The American lobster fishery has been verified as the gear/fishery involved in 43 leatherback entanglements in the Northeast Region between 2002 and 2010 (STDN 2012). All of the 43 entanglements involved vertical line of the gear. These probable/confirmed entanglements have occurred in Maine, Massachusetts, Rhode Island, and 1 in Connecticut. These entanglements have occurred from May through October. Gear has been verified through the buoy/gear identification numbers, which can be traced in the various state agency and federal permit systems. Of the 43 confirmed or probable sets of gear, 1 has been verified as Massachusetts recreational lobster pot gear (entangled a leatherback in August 2006), and 2 sets of gear have been identified to a fisherman with both Massachusetts state and federal permits for lobster pot gear. Four of the entanglements involved gear from fishers with state permits, and possibly federal permits, but this could not be confirmed. In 7 of the entanglements, it was unknown if the gear came from a state, federal, or recreational fishery. All other lobster gear has been confirmed to be state commercial (Maine, Massachusetts, Connecticut, or Rhode Island) coastal lobster pot gear.

Bycatch of loggerheads in fish traps have also been reported from several Atlantic coast states (Shoop and Ruckdeschel 1989; W. Teas, pers. comm.). No information on interactions between Atlantic sturgeon and fish traps, long haul seines, or channel nets is currently available; however, depending on where this gear is set and the mesh size, the potential exists for Atlantic sturgeon to be entangled or captured in this gear.

Northern Shrimp Fishery
A Northern shrimp fishery occurs in state waters of Maine, New Hampshire, and Massachusetts, and is managed under the ASMFC's ISFMP. In 2010, the ISFMP implemented a 126-day season, from December 1-April 15, but the shrimp fishery has exceeded its TAC and closed early every year, ending on February 17 in 2012. The majority of northern shrimp are caught with otter trawls, which must be equipped with Nordmore grates (ASMFC NSTC 2011). Otter trawls in this fishery are known to interact with Atlantic sturgeon, but exact numbers are not available (NMFS 2011b). A significant majority (84%) of Atlantic sturgeon bycatch in otter trawls occurs

at depths < 20 m, with 90% occurring at depths of < 30 m (ASMFC 2007). During the spring and fall inshore trawl surveys, northern shrimp are most commonly found in tows with depths of > 64 m (ASFMC NSTC 2011), which is well below the depths at which most Atlantic sturgeon bycatch is occurring. Atlantic sturgeon are known to interact with shrimp trawls, but mortality is low: NEFOP data from 2002-2004 showed 0.2% Atlantic sturgeon mortality in shrimp otter trawls. The Northern shrimp fishery is not known to interact with ESA-listed cetaceans or sea turtles.

American Shad Fishery
A directed shad gill net fishery currently occurs in 3 Georgia rivers: Altamaha, Savannah, and Ogeechee. A recent conservation plan created by Georgia Department of Natural Resources includes measures to close river areas that had been open to shad fishing and decrease the number of days per week that other areas are open to fishing. With those recent management measures in mind, NMFS anticipates up to 190 incidental captures and 5 lethal takes of Atlantic sturgeon annually through 2022.

An American shad gill net fishery occurs in state waters of New England and the mid-Atlantic and is managed under the ASMFC's ISFMP. The directed commercial and recreational shad fisheries were closed in all Atlantic coastal states in 2005, with exceptions for sustainable systems as determined through state-specific management programs. Presently, only Connecticut has a directed commercial shad fishery that may occur in the action area, while Maine, New Hampshire, Massachusetts, New York, Rhode Island, Connecticut, New Jersey, Delaware, North Carolina, and Georgia have limited recreational fisheries that may occur in the action area. New York's commercial shad fishery has been known to incidentally capture Atlantic sturgeon, but the fishery is now closed.

About 40-500 Atlantic sturgeon were reportedly caught in the spring shad gill net fishery in the past, primarily from the Delaware Bay, with only 2% caught in the river. Effort has more recently switched to striped bass, however. The fishery uses 5-in mesh gill nets left overnight to soak, but based on the available information, there is little bycatch mortality of any species in this fishery. Unreported mortality may be occurring in the recreational shad fishery, but the extent is unknown (NMFS 2011b).

Recreational hook and line shad fisheries are known to capture Atlantic sturgeon, particularly in southern Maine, where it is considered to be an "acute" problem (NMFS 2011b). Data from the Atlantic Coast Sturgeon Tagging Database (2000-2004) shows that the shad fishery accounted for 8% of Atlantic sturgeon recaptures. The shad fishery also had 1 of the highest Atlantic sturgeon bycatch rates of 30 directed fisheries according to NEFOP data from 1989-2000 (ASSRT 2007). However, greater rates of bycatch do not necessarily translate into high mortality rates. Other factors, such as gear, season, and soak times, may be important variables in understanding Atlantic sturgeon mortality.
Several state water recreational shad fisheries (North Carolina, Delaware, New Jersey, Connecticut, Rhode Island, and Massachusetts) allow the use of gill nets or pound nets, which

have been known to interact with ESA-listed cetaceans and sea turtles, thus interaction may occur where the gear overlaps with sea turtle and cetacean distributions.

All recreational shad fisheries in state waters allow the use of hook and line gear. Loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked sea turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties (NMFS SEFSC 2001).

Striped Bass Fishery

The striped bass fishery occurs only in state waters, as federal waters have been closed to the harvest and possession of striped bass since 1990, except that possession is allowed in a defined area around Block Island, Rhode Island (ASMFC 2011). The ASMFC has managed striped bass since 1981, and regulates the fishery from Maine to North Carolina through an ISFMP. All states are required to have recreational and commercial size limits, recreational creel limits, and commercial quotas. The commercial striped bass fishery is closed in Maine, New Hampshire, and Connecticut, but open in Massachusetts (hook and line only), Rhode Island, New Jersey (hook and line only), Delaware, Maryland, Virginia, and North Carolina. Recreational striped bass fishing occurs all along the U.S. East Coast.

Several states have reported incidental catch of Atlantic sturgeon in the striped bass fishery (NMFS 2011b). In southern Maine, the recreational striped bass fishery is known to catch Atlantic sturgeon and in New Hampshire, live bait recreational fisheries are also known to catch Atlantic sturgeon, although numbers are not available. The hook and line striped bass fishery along the south shore of Long Island has recently had reports of sturgeon caught or snagged in recreational gear particularly around Fire Island and Far Rockaway. Atlantic sturgeon bycatch is occurring in the Delaware Bay and River, but little bycatch mortality has been reported.

Unreported mortality is likely occurring. In Chesapeake Bay, researchers instituted a reward program for commercial fishers and received reports of 85 Atlantic sturgeon captured as bycatch in commercial anchored gill nets, primarily in the striped bass fishery, in 2005 and 423 in 2006. Most of the fish came from the James River, followed by the York River, the ocean, and the Rappahannock (Musick and Hager 2007). In North Carolina, the Winter Beach seine fishery for striped bass takes sturgeon (adults and subadults) but has not reported mortalities. Data from the Atlantic Coast Sturgeon Tagging Database (2000-2004) shows that the striped bass fishery accounted for 43% of Atlantic sturgeon recaptures (ASSRT 2007). The striped bass-weakfish fishery also had 1 of the highest bycatch rates of 30 directed fisheries according to NEFOP data from 1989-2000 (ASSRT 2007). However, greater rates of bycatch do not necessarily translate into high mortality rates. Other factors, such as gear, season, and soak times, may be important variables in understanding Atlantic sturgeon mortality. A recent study on the use of floating gill nets in the striped bass fishery suggests that floating gill nets may reduce bycatch of Atlantic sturgeon while minimally affecting the striped bass catch in Virginia’s striped bass fishery (Trice 2011).

State water commercial striped bass fisheries in Delaware, Maryland, Virginia, and North Carolina allow the use of gill nets or trawls, both of which have been known to interact with

ESA-listed sea turtles, thus interaction may occur where the gear overlaps with sea turtle distributions. ESA-listed cetaceans have also been known to interact with gill net gear, thus interaction may occur where the gear overlaps with cetacean distributions.

All recreational striped bass fisheries in state waters allow the use of hook and line gear. Loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked sea turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties (NMFS SEFSC 2001).

Other State Gill Net Fisheries

A detailed summary of the gill net fisheries currently operating along the mid- and southeast U.S. Atlantic coastline, and GOM, which are known to incidentally capture loggerheads, can be found in the TEWG reports (1998; 2000a). Georgia and South Carolina prohibit gill nets for all but the shad fishery. No adverse effects to sea turtles or any other protected species group were observed during the 1 season the NMFS SEFSC observed this fishery in South Carolina (McFee et al. 1996). Florida has banned all but very small nets in state waters, as has Texas. Louisiana, Mississippi, and Alabama have also placed restrictions on gill net fisheries within state waters such that very little commercial gill netting takes place in Southeast waters, with the exception of North Carolina. Some illegal gill net incidental captures have been reported in South Carolina, Florida, Louisiana, and Texas (NMFS SEFSC 2001).

Gill netting is more prevalent in North Carolina state waters. Incidental captures in gill net fisheries (both lethal and nonlethal) of loggerhead, leatherback, green and Kemp's ridley sea turtles have been reported (W. Teas, pers. comm.; J. Braun-McNeill, pers. comm.). For example, gill netting activities in North Carolina associated with the southern flounder fishery had been implicated in large numbers of sea turtle mortalities. The Pamlico Sound portion of that fishery was closed and has subsequently been reopened under Section 10(a)(1)(B) permits. Since 2006, the observed and estimated sea turtle interactions with Pamlico Sound gill net fishing activates have increased significantly. As a result, the gill net fishing season has closed early for several years to ensure that sea turtle take levels authorized under the Section 10(a)(1)(B) permit are not exceeded. North Carolina is now in the process of applying for a Section 10(a)(1)(B) permit for all inshore state gill netting. In the interim, they have adopted a number of gill net fishery requirements to reduce the take and mortality of sea turtles per a May 13, 2010, settlement agreement with the Karen Beasely Sea Turtle Rescue and Rehabilitation Center which had sued the State over gill net interactions with sea turtles.

Other State Trawl Fisheries

In North Carolina, a high opening bottom trawl locally known as a "flynet" is used to target Atlantic croaker and weakfish. The North Carolina Observer program documented 33 flynet trawl trips from November through April of 1991-1994 and recorded no sea turtles caught in 218 hours of trawl effort. However, in 1994, NEFOP documented sea turtle bycatch in the Atlantic croaker and weakfish trawl fishery off North Carolina. During 9 tows targeting Atlantic croaker, a flynet without a TED took 7 loggerheads. On a previous trip, the same vessel took 12 loggerheads in 11 out of 13 observed flynet tows. In 1998, the SEFSC began developing a TED for flynets. In 2007, the Flexible Flatbar Flynet (FFF) TED was developed for the fishery and catch retention trials and usability testing was completed (Gearhart 2010).

Another state bottom trawl fisheries that is suspected of incidentally capturing sea turtles is the whelk trawl fishery in South Carolina (S. Murphy, SCDNR, pers. comm. to J. Braun-McNeill, SEFSC, November 27, 2000) and Georgia (M. Dodd, GADNR, pers. comm. to J. Braun-McNeill, NMFS, December 21, 2000). In South Carolina, the whelk trawling season opens in late winter and early spring when offshore bottom waters are < 55ºF. One criterion for closure of this fishery is water temperature: whelk trawling closes for the season and does not reopen throughout the state until 6 days after water temperatures first reach 64ºF in the Fort Johnson boat slip. Based on the SCDNR Office of Fisheries Management data, approximately 6 days will usually lapse before water temperatures reach 68ºF, the temperature at which sea turtles move into state waters. From 1996-1997, observers onboard whelk trawlers in Georgia reported a total of 3 Kemp's ridley, 2 green, and 2 loggerhead sea turtles captured in 28 tows for a CPUE of 0.3097 sea turtles/100 ft net hour. Since December 2000, TEDs have been required in Georgia state waters when trawling for whelk. There has also been 1 report of a loggerhead captured in a Florida try net. Trawls for cannonball jellyfish may also be a source of interactions.

On February 15, 2007, NMFS published an advanced notice of proposed rulemaking (ANPR) regarding potential amendments to the regulatory requirements for TEDs (72 FR 7382). The proposed changes include increasing the size of the TED escape opening currently required in the summer flounder fishery; requiring the use of TEDs in the flynet, whelk, calico scallop, and mid-Atlantic sea scallop trawl fisheries; and moving the current northern boundary of the Summer Flounder Fishery-Sea Turtle Protection Area off Cape Charles, Virginia, to a point farther north. The objective of the proposed measures would be to effectively protect all life stages and species of sea turtle in Atlantic and GOM trawl fisheries where they are vulnerable to incidental capture and mortality. On July 24, 2011, NMFS published a proposed rule stating its intent to prepare an EIS and conduct public scoping meetings regarding potential amendments to the regulatory requirements for TEDs (75 FR 37050). Scoping meetings were held from July 12-18, 2011, in Louisiana, Mississippi, Alabama, and North Carolina. To date, NMFS has not released a draft environmental impact statement.

Other State Fixed Net Fisheries

Stationary pound net gear is known to incidentally capture loggerhead sea turtles in North Carolina (Epperly et al. 2000). Although pound nets are not a significant source of mortality for loggerheads in North Carolina (Epperly et al. 2000), they have been implicated in the stranding deaths of loggerheads in the Chesapeake Bay from mid-May through early June (Bellmund et al. 1987). The sea turtles were reported entangled in the large mesh (> 8 in) pound net leads (NMFS SEFSC 2001).

The fishing activities discussed above may be correlated to regular pulses of greatly elevated sea turtle strandings along North Carolina in the late fall/early spring, coincident with their migrations. For example, in the last weeks of April through early May 2000, approximately 300 sea turtles, mostly loggerheads, stranded north of Oregon Inlet, North Carolina. Gill nets were found with 4 of the carcasses. These strandings were likely caused by state fisheries as well as federal fisheries, although not any 1 fishery has been identified as the major cause. Fishing effort data indicate that fisheries targeting monkfish, dogfish, and bluefish were operating in the area of the strandings. Strandings in this area represent, at best, 7-13% of the actual nearshore mortality (Epperly et al. 1996). Studies by Bass et al. (1998), Norrgard (1995) and Rankin-Baransky (1997) indicate that the percentage of northern loggerheads in this area is highly over-represented in the strandings when compared to the ca. 9% representation from this subpopulation in the overall U.S. sea turtle nesting populations. Specifically, the genetic composition of sea turtles in this area is 25-54% from the northern subpopulation, 46-64% from the South Florida subpopulation, and 3-16% from the Yucatan subpopulation. The cumulative removal of these sea turtles on an annual basis could potentially severely impact the northern subpopulation and leave it vulnerable to extirpation. The loss of genetic diversity as a result of distinct nesting aggregations would severely impede the recovery of this species.

Beyond commercial fisheries, observations of state recreational fisheries have shown that loggerhead, leatherback, Kemp's ridley, and green sea turtles are known to bite baited hooks, and loggerheads and Kemp's ridleys frequently ingest the hooks. Data reported through the STSSN show recreational fishers have hooked sea turtles when fishing from boats, piers, and beach, banks, and jetties. Additionally, Florida recreational fishers are known to occasionally take smalltooth sawfish. Fishers who capture smalltooth sawfish most commonly are recreationally fishing for snook (*Centropomus undecimalis*), redfish (*Scianops ocellatus*), and sharks (Simpfendorfer and Wiley 2004). Encounter data indicate that the majority of these takes are nonlethal.

Although few of these state regulated fisheries are currently authorized to incidentally take listed species, several state agencies have approached NMFS to discuss applications for a Section 10(a)(1)(B) incidental take permit. Since NMFS's issuance of a Section 10(a)(1)(B) permit requires formal consultation under Section 7 of the ESA, any fisheries that come under a Section 10(a)(1)(B) permit in the future will likewise be subject to Section 7 consultation. Although the past and current effects of these fisheries on listed species are currently not determinable, NMFS believes that ongoing state fishing activities may be responsible for seasonally high levels of observed strandings of sea turtles on both the Atlantic and GOM coasts.

4.2.2.2 Vessel Traffic

Commercial traffic and recreational boating pursuits can have adverse effects on sea turtles via propeller and boat strike damage. The STSSN includes many records of vessel interactions (propeller injury) with sea turtles off GOM coastal states such as Florida, where there are high levels of vessel traffic. Due to the benthic nature of sturgeon and sawfish, we would not expect vessel traffic to be a significant threat to these species.

4.2.3 Other Potential Sources of Impacts in the Environmental Baseline

4.2.3.1 Marine Debris and Acoustic Impacts

A number of activities that may indirectly affect listed species in the action area of this consultation include anthropogenic marine debris and acoustic impacts. The impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources.

4.2.3.2 Marine Pollution and Environmental Contamination

Sources of pollutants along the action area include atmospheric loading of pollutants such as PCBs, stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean (e.g., Mississippi River into the GOM), and groundwater and other discharges. 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 effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

Coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996). The development of marinas and docks in inshore waters can negatively impact nearshore habitats. An increase in the number of docks built increases boat and vessel traffic. Fueling facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive estuarine and coastal habitats. Although these contaminant concentrations do not likely affect the more pelagic waters, the species of turtles analyzed in this Opinion travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

The GOM is an area of high-density offshore oil extraction with chronic, low-level spills and occasional massive spills (such as the recent DWH oil spill, IXTOC I oil well blowout and fire in the Bay of Campeche in 1979, and the explosion and destruction of a loaded supertanker, the Mega Borg, near Galveston in 1990). Oil spills can impact wildlife directly through 3 primary pathways: ingestion—when animals swallow oil particles directly or consume prey items that have been exposed to oil, absorption—when animals come into direct contact with oil, and inhalation—when animals breath volatile organics released from oil or from "dispersants" applied by response teams in an effort to increase the rate of degradation of the oil in seawater. Several aspects of sea turtle biology and behavior place them at particular risk, including the lack of avoidance behavior, indiscriminate feeding in convergence zones, and large pre-dive inhalations (Milton et al. 2003). When large quantities of oil enter a body of water, chronic effects such as cancer, and direct mortality of wildlife becomes more likely (Lutcavage et al. 1997). Oil spills in the vicinity of nesting beaches just prior to or during the nesting season could place nesting females, incubating egg clutches, and hatchlings at significant risk (Fritts et al. 1982; Lutcavage et al. 1997; Witherington 1999). Continuous low-level exposure to oil in the form of tar balls, slicks, or elevated background concentrations also challenge animals facing other natural and anthropogenic stresses. Types of trauma can include skin irritation, altering of the immune system, reproductive or developmental damage, and liver disease (Keller et al. 2004; Keller et al. 2006). Chronic exposure may not be lethal by itself, but it may impair a turtle's overall fitness so that it is less able to withstand other stressors (Milton et al. 2003).

The earlier life stages of living marine resources are usually at greater risk from an oil spill than adults. This is especially true for hatchlings, since they spend a greater portion of their time at the sea surface than adults; thus, their risk of exposure to floating oil slicks is increased (Lutcavage et al. 1995). One of the reasons might be the simple effects of scale. For example, a given amount of oil may overwhelm a smaller immature organism relative to the larger adult. The metabolic machinery an animal uses to detoxify or cleanse itself of a contaminant may not be fully developed in younger life stages. Also, in early life stages, animals may contain proportionally higher concentrations of lipids, to which many contaminants such as petroleum hydrocarbons bind. Most reports of oiled hatchlings originate from convergence zones, ocean areas where currents meet to form collection, and/or salt-gland function—similar to the empirically demonstrated effects of oil alone (Shigenaka et al. 2003). Oil cleanup activities can also be harmful. Earth-moving equipment can dissuade females from nesting and destroy nests, containment booms can entrap hatchlings, and lighting from nighttime activities can misdirect turtles (Witherington 1999).

There are studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000). Mckenzie et al. (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in sea turtles tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. Sakai et al. (1995) found the presence of metal residues points for material at or near the surface of the water. Sixty-five of 103 post-hatchling loggerheads in convergence zones off Florida's east coast were found with tar in the mouth, esophagus or stomach (Loehefener et al. 1989). Thirty-four percent of post-hatchlings captured in *Sargassum* off the Florida coast had tar in the mouth or esophagus and more than 50% had tar caked in their jaws (Witherington 1994). These zones aggregate oil slicks, such as a Langmuir cell, where surface currents collide before pushing down and around, and represents a virtually closed system where a smaller weaker sea turtle can easily become trapped (Carr 1987; Witherington 2002). Lutz and Lutcavage (1989) reported that hatchlings have been found apparently starved to death, their beaks and esophagi blocked with tarballs. Hatchlings sticky with oil residue may have a more difficult time crawling and swimming, rendering them more vulnerable to predation.

Frazier (1980) suggested that olfactory impairment from chemical contamination could represent a substantial indirect effect in sea turtles, since a keen sense of smell apparently plays an important role in navigation and orientation. A related problem is the possibility that an oil spill impacting nesting beaches may affect the locational imprinting of hatchlings, and thus impair their ability to return to their natal beaches to breed and nest (Milton et al. 2003). Whether hatchlings, juveniles, or adults, tar balls in a turtle's gut are likely to have a variety of effects—starvation from gut blockage, decreased absorption efficiency, absorption of toxins, effects of general intestinal blockage (such as local necrosis or ulceration), interference with fat metabolism, and buoyancy problems caused by the buildup of fermentation gases (floating prevents turtles from feeding and increases their vulnerability to predators and boats), among others. Also, trapped oil can kill the seagrass beds that turtles feed upon.

Unfortunately, little is known about the effects of dispersants on sea turtles, and such impacts are difficult to predict in the absence of direct testing. While inhaling petroleum vapors can irritate turtles' lungs, dispersants can interfere with lung function through their surfactant (detergent) effect. Dispersant components absorbed through the lungs or gut may affect multiple organ systems, interfering with digestion, respiration, excretion occurring in loggerhead turtle organs and eggs. Storelli et al. (2008) analyzed tissues from 12 loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises (Law et al. 1991). No information on detrimental threshold concentrations is available, and little is known about the consequences of exposure of organochlorine compounds to sea turtles. Research is needed on the short- and long-term health and fecundity effects of chlorobiphenyl, organochlorine, and heavy metal accumulation in sea turtles.

Nutrient loading from land-based sources, such as coastal communities and agricultural operations, are known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. An example is the large area of the Louisiana continental shelf with seasonally-depleted oxygen levels (< 2 mg/Liter) is caused by eutrophication from both point and non-point sources. Most aquatic species cannot survive at such low oxygen levels and these areas are known as "dead zones." The oxygen depletion, referred to as hypoxia, begins in late spring, reaches a maximum in mid-summer, and disappears in the fall. Since 1993, the average extent of mid-summer, bottom-water hypoxia in the northern GOM has been approximately 16,000 km^2, approximately twice the average size measured between 1985 and 1992. The hypoxic zone attained a maximum measured extent in 2002, when it was about 22,000 km^2— larger than the state of Massachusetts (USGS 2005). The hypoxic zone has impacts on the animals found there, including sea turtles, and the ecosystem-level impacts continue to be investigated.

As previously mentioned, pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986). Yet, the impacts of many other anthropogenic toxins have not been investigated for smalltooth sawfish. As described in Section 3, no specific information is available on the effects of pollution on smalltooth sawfish, but evidence from other elasmobranchs suggests that pollution disrupts endocrine systems and potentially leads to reproductive failure (Gelsleichter et al. 2006). Smalltooth sawfish have been encountered with polyvinyl pipes and fishing gear on their rostrum (G. Poulakis, FWCC, pers. comm. to S. Norton, NMFS, 2007).

Atlantic sturgeon may be particularly susceptible to impacts from environmental contamination due to their benthic foraging behavior and long-life span. Sturgeon using estuarine habitats near urbanized areas may be exposed to numerous suites of contaminants within the substrate. Contaminants, including toxic metals, polychlorinated aromatic hydrocarbons (PAHs), organophosphate and organochlorine pesticides, PCBs, and other chlorinated hydrocarbon compounds can have substantial deleterious effects on aquatic life. Effects from these elements and compounds on fish include production of acute lesions, growth retardation and reproductive impairment (Cooper 1989; Sindermann 1994).

Heavy metals and organochlorine compounds accumulate in sturgeon tissue, but their long-term effects are not known (Ruelle and Henry 1992; Ruelle and Keenlyne 1993). Elevated levels of contaminants, including chlorinated hydrocarbons, in several other fish species are associated with reproductive impairment (Cameron et al. 1992; Drevnick and Sandheinrich 2003; Hammerschmidt et al. 2002; Longwell et al. 1992), reduced egg viability (Billsson et al. 1998; Giesy et al. 1986; Mac and Edsall 1991; Matta et al. 1997; Von Westernhagen et al. 1981), reduced survival of larval fish (Berlin et al. 1981; Giesy et al. 1986), delayed maturity (Jorgensen et al. 2004) and posterior malformations (Billsson et al. 1998). Pesticide exposure in fish may affect antipredator and homing behavior, reproductive function, physiological development, and swimming speed and distance (Beauvais et al. 2000; Moore and Waring 2001; Scholz et al. 2000; Waring and Moore 2004). Moser and Ross (1995) suggested that certain deformities and ulcerations found in Atlantic sturgeon in North Carolina's Brunswick River might be due to poor water quality in addition to possible boat propeller inflicted injuries. It should be noted that the effect of multiple contaminants or mixtures of compounds at sublethal levels on fish has not been adequately studied. Atlantic sturgeon use marine, estuarine, and freshwater habitats and are in direct contact through water, diet, or dermal exposure with multiple contaminants throughout their range.

Sensitivity to environmental contaminants varies among fish species and life stages. Early life stages of fish seem to be more susceptible to environmental and pollutant stress than older life stages (Rosenthal and Alderdice 1976). In aquatic toxicity tests (Dwyer et al. 2000), Atlantic sturgeon fry were more sensitive to 5 contaminants (carbaryl, copper sulfate, 4-nonylphenol, pentachlorophenol, and permethrin) than fathead minnow (*Pimephales promelas*), sheepshead minnow (*Cyprinodon variegatus*), and rainbow trout (*Oncorhynchus mykiss*). The authors note, however, that Atlantic sturgeon were difficult to test and conclusions regarding chemical sensitivity should be interpreted with caution.

Another suite of contaminants occurring in fish are metals (mercury, cadmium, selenium, lead, etc.), also referred to as trace metals, trace elements, or inorganic contaminants. Post (1987) states that toxic metals may cause death or sublethal effects to fish in a variety of ways and that chronic toxicity of some metals may lead to the loss of reproductive capabilities, body malformation, inability to avoid predation, and susceptibility to infectious organisms.

Dioxin and furans were detected in ovarian tissue from shortnose sturgeon caught in the Sampit River/Winyah Bay system (SC). Results showed that 4 out of 7 fish tissues analyzed contained tetrachlorodibenzo-*p*-dioxin (TCDD) concentrations greater than 50 pg/g (parts-per-trillion), a level which can adversely affect the development of sturgeon fry (J. Iliff, NOAA, Damage Assessment Center, Silver Spring, MD, unpublished data).

The EPA published its second edition of the National Coastal Condition Report in 2004, which is a "report card" summarizing the status of coastal environments along the coast of the United States (EPA 2004). The report analyzes water quality, sediment, coastal habitat, benthos, and fish contaminant indices to determine status. In contrast to the Northeast (Virginia-Maine), which received an overall grade of F, the Southeast region (North Carolina-Florida) received an overall grade of B-, which is the best rating in the nation with no indices below a grade of C. Areas of concern that had poor index scores within the action area include were Pamlico Sound and the Ashepoo, Combahee and South Edisto Basin for water quality, and St. Johns River for sediment. There was also a mixture of poor benthic scores scattered along Southeast region.

4.2.4 Conservation and Recovery Actions Benefiting Listed Species

NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of listed species from commercial fisheries in the action area. These include sea turtle release gear requirements for Atlantic HMS and GOM reef fish, mandatory use of circle hooks and sea turtle release gear in longline fisheries, use of a chain-mat modified scallop dredge in the mid-Atlantic, and TED requirements for the summer flounder and Southeast shrimp trawl fisheries. These regulations have relieved some of the pressure on sea turtle populations, and in regard to TEDs, Atlantic sturgeon. Additionally, other regulations restricting the use of fishing gears known to incidentally catch smalltooth sawfish may benefit the species by reducing their incidental capture and/or mortality in these gear types. In 1994, entangling nets (including gill nets, trammel nets, and purse seines) were banned in Florida state waters. Although intended to restore the populations of inshore gamefish, this action removed possibly the greatest source of fishing mortality on smalltooth sawfish (Simpfendorfer 2002).

In 1998, the ASFMC instituted a coast-wide moratorium on the harvest of Atlantic sturgeon, which is to remain in effect until there are at least 20 protected age classes in each spawning stock (anticipated to take up to 40 or more years). NMFS followed the ASMFC moratorium with a similar moratorium for Federal waters. Amendment 1 to ASMFC's Atlantic sturgeon FMP also includes measures for preservation of existing habitat, habitat restoration and improvement, monitoring of bycatch and stock recovery, and breeding/stocking protocols.

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. NMFS has agreements with all states in the action area. Prior to issuance of these agreements, the proposal must be reviewed for compliance with Section 7 of the ESA.

Outreach and Education

NMFS and cooperating states have established an extensive network of STSSN participants along the Atlantic and GOM coasts that not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

Public outreach efforts are also helping to educate the public on smalltooth sawfish status and proper handling techniques and helping to minimize interaction, injury, and mortality of encountered smalltooth sawfish. Information regarding the status of smalltooth sawfish and what the public can do to help the species is available on the Florida Museum of Natural History and NMFS websites.[21] These organizations and individuals also educate the public about sawfish status and conservation through regular presentations at various public meetings and during interviews with the media.

Sea Turtle Handling and Resuscitation Techniques

NMFS published a Final Rule (66 FR 67495, December 31, 2001) detailing 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.

A Final Rule (70 FR 42508) published on July 25, 2005, allows any agent or employee of NMFS, the USFWS, the USCG, 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)).

On August 3, 2007, NMFS published a Final Rule requiring selected fishing vessels to carry observers on board to collect data on sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary (72 FR 43176). This rule also extended the number of days NMFS observers placed in response to a determination by the Assistant Administrator that the unauthorized take of sea turtles may be likely to jeopardize their continued existence under existing regulations, from 30-180 days.

[21] http://www.flmnh.ufl.edu/fish/Sharks/Sawfish/SRT/srt.htm and http://www.sero.nmfs.noaa.gov/pr/SmalltoothSawfish.htm

Other Actions
Five-year status reviews were completed in 2007 for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic status evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at this time. Further review of species data for the green, hawksbill, leatherback, and loggerhead sea turtles was recommended to evaluate whether DPS should be established for these species (NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e). The Services completed a revised recovery plan for the loggerhead sea turtle on December 8, 2008 (NMFS and USFWS 2008a) and published a Final Rule on September 22, 2011, listing loggerhead sea turtles as separate DPSs. A revised recovery plan for the Kemp's ridley sea turtle was completed on September 22, 2011. On October 10, 2012, NMFS announced initiation of 5-year reviews of Kemp's ridley, olive ridley (*Lepidochelys olivacea*), leatherback, and hawksbill sea turtles and requested submission of any pertinent information on those sea turtles that has become since their last status review in 2007.
On January 21, 2009, NMFS published the final recovery plan for the U.S. DPS of smalltooth sawfish. NMFS is implementing recovery actions identified in the plan based on the recovery action's priority and available funding. Additionally, a 5-year review of the species status was published in October of 2010. The 5-year review concluded that the U.S. DPS of smalltooth sawfish remains vulnerable to extinction, and the species still meets the definition of endangered under the ESA, in that the species is in danger of extinction throughout its range. The recovery plan and the 5-year review are available at http://sero.nmfs.noaa.gov/pr/SmalltoothSawfish.htm.

4.2.5 Summary and Synthesis of Environmental Baseline

Sea Turtles
Several factors adversely affect sea turtles in the action area, and these factors are ongoing and are expected to occur contemporaneously with the proposed action. Fisheries in the action area likely had the greatest adverse impacts on sea turtles in the mid- to late 1980s, when effort in most fisheries was near or at peak levels. With the decline of the health of managed species, effort since that time has generally been declining. Over the past 5 years, the impacts associated with fisheries have also been reduced through the Section 7 consultation process and regulations implementing effective bycatch reduction strategies. However, interactions with commercial and recreational fishing gear are still ongoing and are expected to occur contemporaneously with the proposed action. Other environmental impacts including effects of vessel operations, additional military activities, dredging, oil and gas exploration, permits allowing take under the ESA, private vessel traffic, and marine pollution have also had and continue to have adverse effects on sea turtles in the action area in the past. The 2010 DWH oil spill is expected to have had an adverse impact on the baseline for sea turtles, but the extent of that impact is not yet well understood.

Smalltooth Sawfish
In summary, several factors are presently adversely affecting smalltooth sawfish in the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action. Despite smalltooth sawfish being highly susceptible to entanglement, few interactions are reported or documented from the action area. Impacts on smalltooth sawfish over the last several decades may be limited in large part by the scarcity of smalltooth sawfish in the action area and due to lack of reporting. As the population slowly grows, fisheries and other activity stressors in the action area may have a greater impact on the species.

Atlantic Sturgeon
As with smalltooth sawfish, several factors are presently adversely affecting Atlantic sturgeon in the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action. Pollution in riverine waters and coastal dredging may negatively impact the various DPSs of Atlantic sturgeon. Impacts on Atlantic sturgeon over the last several decades may be limited in large part by the scarcity of the species in the action area and due to lack of reporting. As the population slowly grows, fisheries and other activity stressors in the action area may have a greater impact on the species.

5 Effects of the Action

In this section, we assess the direct and indirect effects of the continued authorization of fishing for species managed by the CMP FMP in the U.S. Atlantic and GOM EEZ on listed species likely to be adversely affected. The analysis in this section forms the foundation for our jeopardy analysis in Section 7. The quantitative and qualitative analyses in this section are based upon the best available commercial and scientific data on species biology and the effects of the proposed action. Data are limited, so we are often forced to make assumptions to overcome the limits in our knowledge. Sometimes, different analytical approaches may be applied to the same data sets. In those cases, in keeping with the direction from the U.S. Congress to resolve uncertainty by providing the "benefit of the doubt" to threatened and endangered species (House of Representatives Conference Report No. 697, 96th Congress, Second Session, 12 [1979]), we will generally select the value yielding the most conservative outcome (i.e., would lead to conclusions of higher, rather than lower, risk to endangered or threatened species).

Scope and Overall Approach to Assessment
The scope of the effect analysis for this Opinion is the effect of the federally-authorized CMP fisheries on listed species. We begin our analysis of the effects of the action by first reviewing what activities associated with the proposed action are likely to adversely affect listed species in the action area (i.e., what the proposed action stressors are). For each species likely to be adversely affected by an identified stressor, we first review the range of responses to an individual's exposure, and then the factors affecting the likelihood, frequency, and severity of exposure. After that, our focus shifts to evaluating and quantifying exposure. We estimate the number of individuals of each species likely to be exposed and the likely fate of those animals.

Activities Likely to Adversely Affect Listed Species
In Section 3, we determined listed species likely to be adversely affected via gear interactions are limited to sea turtles, smalltooth sawfish, and Atlantic sturgeon. Potential routes of direct effects of the proposed action on these species include fishing gear interactions resulting in the capture, injury, and/or death of an individual, and vessel interactions. Based on our understanding of the effects of the proposed action on these species, direct effects of the proposed action are expected to result only when listed species interact with the fishing gear. Smalltooth sawfish and sturgeon spend most of their time at or near the seafloor, where they are not subject to vessel interactions.

There are 3 basic types of gear used in the CMP fisheries: hook-and-line, cast nets, and gill nets. Section 2 describes these gears and how recreational and/or commercial fishers use them to target CMP species. The type of fishing gear, the area, and the manner in which they are used, all affect the likelihood of sea turtle, Atlantic sturgeon, or smalltooth sawfish interactions. For this reason, each gear type is evaluated separately in the following subsections.

5.1 Hook-and-Line Gear

Sea turtles, smalltooth sawfish, and Atlantic sturgeon are not likely to be adversely affected by CMP hook-and-line fishing. The hook-and-line gear used by both commercial and recreational fishers to target CMP species is limited to trolled or, to a much lesser degree (e.g., historically ~2% by landings for king mackerel), jigged handline, bandit, and rod-and-reel gear. Sea turtles, Atlantic sturgeon, and smalltooth sawfish are both vulnerable to capture on hook-and-line gear, but the techniques commonly used to target CMP species makes effects on these listed species extremely unlikely and, therefore, discountable. Sea turtles are unlikely to be caught during hook-and-line trolling because of the speed (4-10 kt) at which the lure is pulled through the water. As cedar plugs and spoons are generally used when trolling, it is unlikely that a sea turtle of any size would actively pursue the gear and get hooked. Likewise, we also believe sea turtles would be unlikely to be snagged by jigged gear as it is deployed at or near the surface and constantly reeled and jigged back to the boat. It is possible that a sea turtle could be incidentally snagged if it comes in contact with a trolled or jigged hook, but the chances of this occurring are extremely low. The same logic also applies to why we believe effects on Atlantic sturgeon and smalltooth sawfish are extremely unlikely and discountable. Fishers who capture smalltooth sawfish most commonly report that they were fishing for snook, redfish, or sharks (Simpfendorfer and Wiley 2004), not CMP species. Additionally, Atlantic sturgeon and smalltooth sawfish are largely bottom-dwelling species, whereas CMP lures and baits are typically fished near the surface of the water. This also greatly reduces the likelihood of Atlantic sturgeon and smalltooth sawfish interactions with trolling gear. We believe that CMP species caught on bandit gear or standard rod-and-reel gear (i.e., baited and deployed as passive, vertical gear) are largely bycatch when targeting other species closer to the bottom (e.g., snapper and grouper); use of the gear in this method (i.e., mid-water placement) is not effective at catching mackerel based on available information (e.g., landings data). In summary, we believe effects from these gear types on Atlantic sturgeon, smalltooth sawfish, and sea turtles are extremely unlikely to occur, and are therefore discountable.

5.2 Cast Net Gear

Sea turtles, Atlantic sturgeon, and smalltooth sawfish are not likely to be adversely affected by cast net gear. Only the commercial sector uses cast net gear to target CMP species and there are no documented interactions between CMP cast nets and sea turtles, Atlantic sturgeon, or smalltooth sawfish. As described in Section 2, cast nets are thrown over visually detected schools of CMP species and the gear is retrieved almost immediately. Sea turtles, Atlantic sturgeon, and smalltooth sawfish are significantly larger than target CMP species. In the rare event a sea turtle, Atlantic sturgeon, or smalltooth sawfish is amidst a school of mackerel, it would likely be easy for fishers to detect and avoid their incidental capture. Also, the area these nets cover is relatively small (e.g., maximum 10-12 ft diameter), thus bycatch of sea turtles, Atlantic sturgeon, and smalltooth sawfish is extremely unlikely. Based on this information, we believe effects on sea turtles, Atlantic sturgeon, or smalltooth sawfish from cast nets are discountable.

5.3 Gill Net Gear

We believe gill net gear is the only gear used in the CMP fisheries that may adversely affect sea turtles, smalltooth sawfish, and/or Atlantic sturgeon. Gill net gear is used to target both Spanish and king mackerel, but not cobia (Figure 4). Therefore, the following sections discuss this gear's potential effects on these listed species.

5.3.1 Effects on Sea Turtles

Gill nets can adversely affect sea turtles via entanglement and forced submergence. Captured sea turtles can be released alive or can be found dead upon retrieval of the gear as a result of forced submergence. Sea turtles released alive may later succumb to injuries sustained at the time of capture or from exacerbated trauma from netting that is still attached when they were released. Entangled sea turtles that do not die from their wounds may suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns. The following discussion summarizes in greater detail the available information on how individual sea turtles are likely to respond to interactions with gill net gear and the factors affecting the likelihood of such interactions.

<u>Types of Interactions</u>

Entanglement
Sea turtles, especially leatherbacks, are particularly prone to entanglement as a result of their body configuration and behavior. Records of stranded or entangled sea turtles reveal that gill net gear can wrap around the neck, flipper, or body of a sea turtle and severely restrict swimming or feeding behavior. The gear can also inflict serious wounds, including constriction, and cuts that cause bleeding. Constriction may cut off blood flow, or cause deep gashes, some severe enough to remove an appendage. If entanglement restricts swimming capacity and prevents an individual from reaching the surface, it may begin to suffer the additional effects of forced submergence. It is possible that a sea turtle could become briefly entangled but work itself free of the net if lightly entangled. We expect these turtles would not suffer any long-term effects due to the short duration of entanglement (i.e., absence of forced submergence effects). However, we do not consider such light entanglements as likely to occur. Conversely, we expect any sea turtle that becomes entangled (e.g., beyond a flipper encountering a single strand or briefly getting under the bottom weighted line) would likely become even more entangled due to its struggle to free itself. Furthermore, we don't believe that fatally-entangled sea turtles would drift free from a gill net due to the significance of entanglement that would have led to forced submergence and death; predatory effects, natural decay (carcass buoyancy due to decompositional gasses), or other factors that could "remove" a dead entangled sea turtle are not expected to occur before the net is hauled back. Therefore, we believe observed entangled sea turtles represent an accurate CPUE estimate of all likely entanglement scenarios.

Forced Submergence
Sea turtles that are forcibly submerged undergo respiratory and metabolic stress that can lead to severe disturbance of their acid-base balance (i.e., pH level of the blood). Most voluntary dives by sea turtles appear to be an aerobic metabolic process, showing little if any increases in blood lactate and only minor changes in acid-base status. In contrast, sea turtles that are stressed as a result of being forcibly submerged due to entanglement, eventually consume all their oxygen

stores. This oxygen consumption triggers anaerobic glycolysis, which can significantly alter their acid-base balance, sometimes leading to death (Lutcavage and Lutz 1997).
Numerous factors affect the survival rate of forcibly submerged sea turtles. It is likely that the rapidity and extent of the physiological changes that occur during forced submergence are functions of the intensity of struggling, as well as the length of submergence (Lutcavage and Lutz 1997). Other factors influencing the severity of effects from forced submergence include the size, activity level, and condition of the sea turtle; the ambient water temperature, and if multiple forced submergences have recently occurred. Disease factors and hormonal status may also influence survival during forced submergence. Larger sea turtles are capable of longer voluntary dives than small sea turtles, so juveniles may be more vulnerable to the stress from forced submergence. During the warmer months, routine metabolic rates are higher. Increased metabolic rates lead to faster consumption of oxygen stores, which triggers anaerobic glycolysis. Subsequently, the onset of impacts from forced submergence may occur more quickly during these months. With each forced submergence event, lactate levels increase and require a long (up to 20 hours) time to recover to normal levels. Sea turtles are probably more susceptible to lethal metabolic acidosis if they experience multiple forced submergence events in a short period of time. Recurring submergence does not allow sea turtles sufficient time to process lactic acid loads (Lutcavage and Lutz 1997). Stabenau and Vietti (2003) illustrated that sea turtles given time to stabilize their acid-base balance after being forcibly submerged have a higher survival rate. The rate of acid-base stabilization depends on the physiological condition of the turtle (e.g., overall health, age, size), time of last breath, time of submergence, environmental conditions (e.g., sea surface temperature, wave action), and the nature of any sustained injuries at the time of submergence (NRC 1990).

Factors Affecting the Likelihood of Entanglement and Forced Submergence

A variety of factors may affect the likelihood of sea turtle entanglement and forced submergence. The spatial overlap between fishing effort and sea turtle abundance is the most noteworthy variable involved in anticipating entanglement events. Other important factors for determining entanglement and forced submergence include gear configurations and soak times. It is also possible that mesh size compared to the sizes of sea turtles exposed may influence entanglement and forced submergence frequency.

*Spatial Overlap of Fishing Effort and Sea Turtle Abundanc*e
The most critical factor affecting the likelihood of sea turtle entanglement in gill net gear is the spatial overlap between where they occur and fishing effort. The likelihood of sea turtle interactions with gill net gear increases as the amount of gear in the water increases. The likelihood of interactions also increases as sea turtle abundance increases. The more abundant sea turtles are in a given area where fishing occurs, the probability a turtle will interact with gill net gear increases.

Fishing Technique/Soak Times
Both length and profile (i.e., the percentage of the water column spanned by the net) of gill nets in the water column affect the likelihood of sea turtle exposure to gill nets. Gill nets that span

the entire water column (i.e., surface to bottom) are much more likely to catch sea turtles than low profile gill nets that span only a narrow portion of the water column. The use of tie downs, which create a "pocket" or "bag" effect in gill nets, are also believed to increase the potential for entanglement.

The length of time gill net gear is left in the water is another important consideration for both the likelihood of entanglement and the extent of impacts from forced submergence. The longer the soak time, the greater the likelihood of sea turtles encountering the gill net gear and becoming entangled. Additionally, the mortality rate of captured sea turtles increases with soak time because of the higher potential for extended forced submergence times. Incidental captures of sea turtles are most frequently documented in long sets and in lost or broken-off gear presumed to have been soaking for a long time.

Mesh Size
Generally, entanglement risks for sea turtles increase with increasing mesh size, although all mesh sizes are known to entangle sea turtles. Historically, in U.S. sea turtle fisheries, large mesh gill nets on the order of 12 in (30 cm) were typically utilized (Witzell 1994). Various federal and state regulations have been promulgated to address the disparate impacts of gill nets with larger mesh sizes. Federal ESA regulations seasonally restrict gill nets larger than 7-in stretched mesh in the mid-Atlantic. North Carolina and Virginia also use regulations and proclamations to restrict and manage the use of larger mesh gill nets (above 7 in) within their state waters during times of expected high seasonal abundance of sea turtles. It is possible that smaller sea turtles are more susceptible to entanglement in gill nets with smaller mesh sizes than are larger sea turtles. Therefore, the size classes within the area of consideration may also come into play when examining the potential impact of gill net fisheries.

<u>Extent of the Effects of CMP Gill Nets on Sea Turtles</u>

To conduct our jeopardy analysis in Section 7, we must estimate the number of sea turtles that are likely to be adversely affected as a result of the proposed action. This section focuses on quantifying the impacts on individual animals from the proposed action. This analysis first estimates the sea turtle take in the CMP gill net fisheries over the last several years. We then evaluate how the proposed action would alter those take estimates.

<u>Available Sea Turtle Interaction Data Sources</u>

In considering potential methods for estimating CMP gill nets interactions, we reviewed the available data sources for any evidence of interactions between CMP gill nets and sea turtles. Although there is no observer program implemented specifically for the CMP gill net fishery, occasional sets have been reported through other observer programs. We reviewed gill net discards reported to the Supplementary Discard Data Program (SDDP), mackerel gill net set data from the Atlantic HMS Shark Fishery Observer Program, NEFOP data on the North Carolina Spanish and king mackerel fishery, and other miscellaneous observer data from gill net fisheries and STSSN incidental capture and stranding reports.

All permitted commercial CMP fishers are required to report their catch and effort data via the CFLP. Approximately 20% of commercial CMP permit holders are also required to submit discard data via the SDDP. The SDDP database includes a single green sea turtle capture in stake gill net gear from North Carolina in 2010; the turtle reportedly was released alive.

Since 1993, a SEFSC observer program has been underway to estimate catch and bycatch in the directed Atlantic shark gill net fisheries along the southeastern U.S. Atlantic coast. In 1999, 100% observer coverage was required for the gill net component of the fishery at all times to improve estimates of catch, effort, bycatch, and bycatch mortality (Carlson and Lee 2000). Starting in 2005, a pilot observer program was begun to include all vessels that have an active directed shark permit and fish with sink gill net gear. These vessels were not previously subject to observer coverage because they either were not targeting HMS or were not fishing gill nets in a drift- or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark landings and their overall impact on shark resources when not targeting sharks (Carlson and Bethea 2006). Observations occur in both state and federal waters. As of December 31, 2013, this program has observed 966 sink gill net sets that targeted Spanish and king mackerel with 3 sea turtle captures (1 green, 1 leatherback, and 1 unknown sea turtle, all released alive), 296 drift gill net sets that targeted Spanish and king mackerel with 2 sea turtle captures (2 loggerhead, both released alive), and 3 strike gill net sets targeting Spanish and king mackerel with no sea turtles captures (A. Mathers, NMFS SEFSC, pers. comm. to M. Barnette, NMFS, October 24, 2014). All gill net sets with documented sea turtle captures were observed in state waters near Cape Hatteras, North Carolina, with the exception of 1 capture documented approximately 12 nmi west of Hernando Beach, Florida, in the GOM.

NEFOP collects, maintains and distributes data for scientific and management purposes in the northwest Atlantic Ocean. NEFOP monitors marine fisheries to identify those that interact with protected species. Fishery observers document each capture of a protected species during a fishing trip as well as other catch and discard information when possible. The selection of which fishing vessels to cover is made based on historic information on interactions in the area, the type of fishing gear used, the season, and amount of fishing effort in the area (NEFSC Fisheries Sampling Branch, http://www.nefsc.noaa.gov/femad/fishsamp/fsb/). From 2009-2013, this program observed 130 trips that encompassed 754 gill net hauls in both state and federal waters for Spanish and king mackerel with no documented sea turtle interactions. Given the lack of documented takes, the fact that the majority of CMP gill net trips documented by the CFLP occured in Florida and North Carolina, and the expectation of greater sea turtle abundance in more southern waters (versus the NEFOP coverage area), we have excluded this data set in favor of the more conservative data set and longer time series encompassed by the SEFSC Atlantic shark observer program.

The STSSN was formally established in 1980 to collect information on and document strandings and incidental captures of sea turtles along the U.S. GOM and Atlantic coasts. The SEFSC currently maintains this database. The network encompasses the coastal areas of 18 states, including all the states in the South Atlantic region. Network participants document marine turtle strandings and incidental captures, including any fishing gear or other marine debris associated with the turtle stranding in their respective states, and enter that data into a central STSSN database. Strandings that can be attributed to gill net gear are a rare event. From 2009-2013, the STSSN database includes 47 instances of stranded turtles associated with netting out of a total of 21,062 stranding records (including cold stuns, excluding post-hatchlings) from the same time period (0.22%). Of the 47 net-related strandings, the majority (n = 32; 68%) were reported from Texas. The remainder consisted of 13 stranding records reported from Florida and 2 from North Carolina. Of the 47 total records, only 3 were reported from federal waters; in November 2009, 2 loggerhead sea turtles were reported entangled in the same net approximately 5 nmi east of South Hutchinson Island, Florida, and 1 loggerhead sea turtle was reported floating entangled in a net approximately 3.6 nmi southeast of Molasses Key, Florida in June 2009. In both instances, it is unclear what type of net (e.g., drift gill net, sink gill net, seine) or what fishery the netting was associated with (e.g., CMP fisheries, shark fisheries). Regardless, we don't believe the STSSN database is an adequate gauge of net mortality, particularly in offshore fisheries, due to the nature of entanglement; most sea turtles that become entangled in a net, such as a gill net, may be "anchored" by the gear which makes the carcass unable to drift towards shore. The aforementioned fishery observer programs may record some of these interactions, but due to lack of coverage over 100% of the CMP fisheries, it may not reveal the total extent of fishery mortality.

Summary
The lack of reported sea turtle interactions in the SDDP data and mackerel observer reports from the NEFOP and Atlantic HMS Shark Fishery Observer Program indicate either: (1) incidental sea turtle captures are not voluntarily reported; or (2) occur too infrequently given the level of fishing effort in federal waters to be significantly detected under these programs. Based on our review of the factors affecting the likelihood of sea turtle exposure to gill nets, the conduct of the CMP gill net fisheries, and the current federal monitoring programs, we believe CMP gill net/sea turtle interactions are likely to be very rare. However, with documented reports of sea turtle entanglements by gill net gear in other federal fisheries and documented sea turtle entanglements in gill net gear used by fishers in state waters targeting CMP species (e.g., Atlantic Shark Fishery Observer Program data), we believe the likelihood of adverse effects to sea turtles is not discountable.

Estimating Sea Turtle Entanglements by CMP Gill Nets

There are various data sets available to use for estimating fishing effort, but attempting to determine a precise number of gill net trips is problematic. It is possible that a fisher may work in both state and federal waters, and may fish for both Spanish and king mackerel, all on a single trip, so there is a very real likelihood of double-counting trips that could inflate effort (A. Bianchi, NCDMF, pers. comm. to M. Barnette, NMFS, November 6, 2014). Furthermore, fisheries statistics from various databases generally may not agree with each other in some situations. For instance, the NCDMF trip ticket data indicates there were 154 gill net trips landing 9,540 lb of king mackerel just from the EEZ off North Carolina in 2012, whereas commercial landings information compiled by SEFSC (combined Fisheries Information Network [FIN] and Atlantic Coastal Cooperative Statistics Program [ACCSP] trip ticket data) has 180 trips landing 9,465 lb of king mackerel from the same area and time period. It is also worth pointing out that the low average poundage per trip (62 lb/trip based on NCDMF data or 53 lb/trip based on SEFSC data) is likely a function of North Carolina trips where fishers did not possess a federal CMP permit and were only landing a recreational bag limit (i.e., 3 king mackerel and 15 Spanish mackerel in North Carolina) for sale,[22] or the fish are bycatch from a gill net trip targeting other species (M. Duval, NCDMF, pers. comm. to M. Barnette, NMFS, November 9, 2014). As a result, we have opted to utilize the SEFSC data as it provides more comprehensive coverage over the entire action area and allows for more manipulation to isolate fishing activities in federal waters. In the following analysis we combine Spanish and king mackerel trips (Table 20), although this will likely result in some double-counting of individual trips that may have landed both Spanish and king mackerel. Conversely, including trips for only king mackerel or only Spanish mackerel is just as likely, if not more likely, to undercount the total number of trips by missing trips that harvested only one these two species. Cobia are generally considered a bycatch species in gill net gear (i.e., gill nets account for ~ 2% of cobia landings; Figure 4) and will be excluded from the analysis. We acknowledge there are issues with available data that may result in overestimates or underestimates of effort depending on methodology, but the combination of trips is considered the most reasonable approach for ESA analysis purposes.

Table 20. Number of Annual CMP Gill Net Trips, GOM and Atlantic Federal Waters Combined

Year	Spanish Mackerel Gill Net Trips	King Mackerel Gill Net Trips	Cobia Gill Net Trips
2009	3,277	294	116
2010	1,982	150	99
2011	2,345	218	96
2012	2,729	252	160
2013	2,865	206	165
Total	13,198	1,120	636
Average	**2,640**	**224**	**127**

Source: SEFSC data

Therefore, on average, there are 2,864 CMP gill net trips conducted annually. CMP gill net trips were reported from Louisiana through Maryland, but the majority of trips occurred in Florida and North Carolina. To utilize the observer data and calculate a sea turtle catch rate, we must convert the trips to number of hauls. Given the average observed haul time has been documented to be 2.15 hours (Passerotti et al. 2010) and 1.9 hours (Mathers et al. 2013) for mackerel drift and sink gill nets, respectively, and we anticipate that fishers may conduct 2 hauls per trip, on average, which also takes into consideration transit time to and from the dock. This

[22] On July 16, 2014, this provision changed and now North Carolina fishers are required to have a federal permit for "bag limit" sales of mackerel from federal waters.

results in an average of 5,728 hauls per year (2,864 trips per year multiplied by 2 hauls per trip) from 2009-2013.

Monitoring fisheries using 1-year estimated take levels is largely impractical due to variability in the data, particularly for those with low and/or random/erratic observed protected species interactions. For these reasons, and based on our experience monitoring other fisheries, we believe a 3-year time period is appropriate for meaningful monitoring of the federal CMP fisheries. The triennial takes are set as 3-year running sums (total for any consecutive 3-year period) and not for static 3-year periods (i.e., 2015-2017, 2016-2018, 2017-2020, and so on, as opposed to 2014-2016, 2017-2019, 2020-2022). This approach will allow us to reduce the likelihood of requiring reinitiation unnecessarily because of inherent variability in take levels, but still allow for an accurate assessment of how the proposed actions are performing versus our expectations.

Analysis of that data found that of the 1,265 observed CMP gill net sets from 1999 through 2013, 5 sea turtles were captured (A. Mathers, NMFS SEFSC, pers. comm. to M. Barnette, NMFS, October 24, 2014). Due to the lack of entanglement data solely from federal waters, we will use this data as a proxy for the federal CMP gill net fisheries, acknowledging that 4 of the 5 sea turtle captures occurred in shallower, state waters. While sea turtle abundance may be slightly higher in state waters, thereby resulting in a slightly higher probability of captures, assuming the total number of turtles is representative of captures occurring in federal waters is a conservative approach and consistent with the ESA obligation to give the benefit of the doubt to the species. By dividing the number of sea turtles entangled by CMP gill net gear into the number of hauls conducted (5 takes/1,265 trips), we estimated sea turtle entanglement rate in the CMP gill net fisheries. We estimated 0.004 sea turtles were entangled per observed haul in CMP gill net gear. To produce a triennial capture estimate, we multiplied the annual average number of hauls by 3 and then applied the calculated sea turtle catch rate. That calculation yielded a 3-year entanglement estimate of 68.7 sea turtles in the federal CMP gill net fisheries (5,728 annual hauls x 3 years x 0.004 turtle/haul = 68.7 turtles every 3 years).

Assessing CMP Sea Turtle Entanglements by Species

To conduct our jeopardy analysis and effectively assess the impacts of our entanglement estimate, we must allocate captures among individual species. The SEFSC Atlantic shark observer program did not provide species data in all cases for those documented interactions between CMP fishers and sea turtles. Therefore, we must rely on what we know about sea turtle relative abundance in the action area not canvased by observer data to apportion our entanglement estimates by species.

Sea turtle species abundance can be derived from STSSN data, which is regularly used to help determine general sea turtle abundance by species in a region. That is, all sea turtles in a given area face similar sources of anthropogenic and natural mortality. By examining the relationship or number of dead sea turtles by species to each other, we can gain insight into the proportion each species may have in that area. Distance from shore (i.e., either the proposed action or the species [e.g., coastal Kemp’s ridley versus offshore leatherback]) will potentially affect how species may manifest in the strandings, however, in the absence of other data sources we consider this our best available science. Culling sea turtle stranding data from 2009-2013 provides us a source of data from which we can estimate species abundance off Florida and North Carolina, where the majority of CMP gill net trips occur. Those data (Table 21) suggest green sea turtles are the most abundant (~ 45% of all strandings), followed by loggerhead (~ 39%) and Kemp's ridley sea turtles (12%).

Table 21. Sea Turtle Stranding and Species Abundance Estimates for Florida and North Carolina, 2009-2013

Species	Number of Strandings	% of Total
Loggerhead	4,760	38.70
Green	5,561	45.21
Leatherback	79	0.64
Hawksbill	175	1.42
Kemp's ridley	1,517	12.33
Unknown	208	1.69
TOTAL	12,300	-

Source: STSSN Database

We use this species composition estimate to apportion our triennial capture estimates by species. Specifically, we multiplied the total capture estimate of 68.7 by the percentage composition of each species in Table 21. Those estimates yield a triennial capture estimate in the CMP gill net fisheries of 31 green, 27 loggerhead, 8 Kemp's ridley, 1 hawksbill, and 1 unknown sea turtle. Due to rounding artifacts that occur during species allocation, the total number of 68 is slightly less than the calculated 68.7 cited earlier. As we expect leatherbacks to occur in more offshore waters due to their pelagic habitat preferences, which may impact accurate representation in the strandings data (i.e., distance to drift before stranding), we will include 1 leatherback in lieu of the 1 unknown sea turtle calculated above.

Sea Turtle Mortality Estimate

Estimating the sea turtle mortality from gill net interactions is challenging with our current data. We believe sea turtle interactions in CMP gill net fisheries are rare based on the SEFSC Atlantic shark observer program and NEFOP data, with only 5 recorded incidental captures documented in CMP gill net fisheries since 2005, and only 4 during the 2009-2013 time period, all of which were released alive. The STSSN data indicates that sea turtle/gill net interactions can be fatal, though attributing mortality specifically to CMP gill net gear (i.e., versus other fisheries) is problematic. Furthermore, the nature of strandings makes it difficult to know, with a high degree of certainty, if gill nets were the primary cause of death in those cases. Regardless of the type of data, our current monitoring efforts suggest that sea turtle/gill net interactions are rare.

The magnitude and severity of sea turtle/gill net interactions is dependent upon individual fishing techniques and preferences (e.g., soak times, fishing location, mesh size, if the net has a "bag"), and not just the time a turtle may spend in the gill net. These variables are rarely captured in the data. Because of these constraining factors, we believe the best available data may not accurately reflect the lethality of the sea turtle/gill net interactions currently occurring in the

CMP gill net fisheries. These same factors also prevent us from estimating the post-release survival of sea turtles with a great degree of certainty.

Snoddy and Williard (2010) estimated post-release mortality of sea turtles released from the North Carolina coastal gill net fishery. Of the 14 turtles monitored after release from entanglement episodes lasting from 20-218 minutes, there was 1 confirmed mortality and 3 suspected mortalities. Snoddy and Williard (2010) concluded post-release mortality of sea turtles from gill nets soaked less than 4 hours could range from 7.1-28.6%. Given the lack of other post-release mortality estimates for the gill net fishery and to be conservative, we will use the higher estimate to determine post-release mortality of sea turtles in the federal CMP fisheries, and multiply it by the total number of anticipated captures for each species. This results in an expected mortality of 9 of the anticipated 31 green sea turtle captures (31 multiplied by 0.286), 7 of the 25 loggerhead sea turtle captures (27 multiplied by 0.286), and 2 of the 8 Kemp's ridley sea turtle captures (8 multiplied by 0.286). To be conservative, we will assume the single hawksbill and leatherback sea turtle captures will be lethal.

5.3.2 Effects on Smalltooth Sawfish

<u>Types of Interaction</u>

Entanglement
Smalltooth sawfish are particularly vulnerable to entanglement in gill nets. Early publications document their frequent capture in this gear type and gill nets are believed to be one of the primary causes for the species' decline. As previously mentioned in Section 3.2.7, the long, toothed rostrum of the smalltooth sawfish easily penetrates netting, causing entanglement when the animal attempts to escape. The monofilament mesh can inflict abrasions and cuts, cause bleeding, and hinder feeding behavior. Even a few strands of monofilament can result in significant injury (Figure 12). For the same reasons discussed in Section 5.3.1 relative to sea turtle entanglements, and because the toothed rostrum lends itself to easy entanglement, we believe observed entangled smalltooth sawfish represent an accurate CPUE estimate of all significant entanglement scenarios.

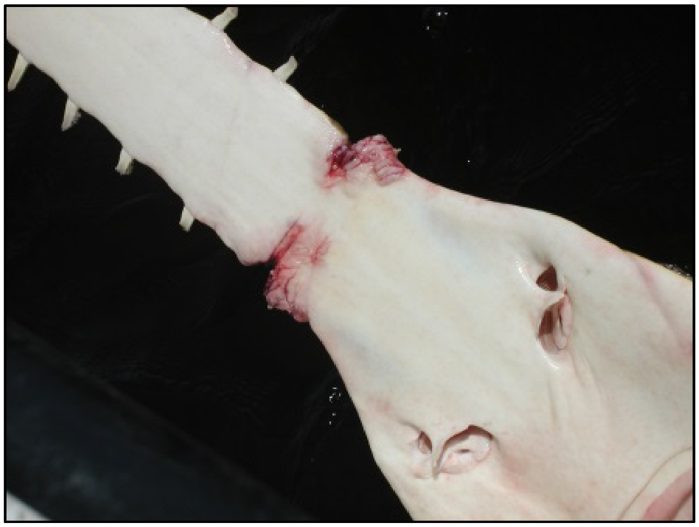

Figure 12. Example of an injury from gill net gear (C. Simpfendorfer)

The toothed rostrum also makes it very difficult to disentangle a smalltooth sawfish without harming the animal. Entangled animals frequently have to be cut free, causing extensive damage to nets. The entangled smalltooth sawfish can also endanger fishers if brought on board a vessel. For these reasons, many historical records of smalltooth sawfish catches note they were either killed or released after their saws had been removed (e.g., Henshall 1895; Evermann and Bean 1897; Bigelow and Schroeder 1953).

Effects on smalltooth sawfish from incidental capture in gill nets today likely depend on fishers' handling practices. For example: (1) the amount of gear and time fishers are willing to sacrifice to carefully remove an animal; (2) whether or not the animal is restrained while being handled to avoid damage to the rostrum and rostral teeth; (3) the length of time an animal is out of the water while being disentangled; and (4) the amount of gear left on the animal when released, are all likely to impact the overall severity of the event. An observer record of the release of a smalltooth sawfish with no visible injuries, after it had been incidentally caught in the Atlantic shark drift gill net fishery, suggests that smalltooth sawfish can be removed safely with careful handling (NMFS 2003d).

<u>Factors Affecting the Likelihood of Entanglement</u>

*Spatial Overlap of Fishing Effort and Smalltooth Sawfish Abundanc*e

The same factors that affect the likelihood of sea turtle entanglement in gill net gear (Section 5.3.1) also affect smalltooth sawfish entanglement potential. The most critical of those factors is the spatial overlap between where smalltooth sawfish occur and fishing effort. The likelihood of smalltooth sawfish entanglement increases as the amount of gear in waters where smalltooth sawfish are present increases. The likelihood of interactions also increases as smalltooth sawfish abundance in those areas increases. The more abundant smalltooth sawfish are in a given fishing area, the greater the probability a smalltooth sawfish will interact with that gear. The amount of effort occurring in those areas of overlap is also a determining factor in the frequency of smalltooth sawfish entanglement. The characteristics of fishing operations (e.g., fishing technique, soak times, mesh size) also impact the frequency and severity of entanglement events.

Mesh Size
Smalltooth sawfish can become entangled in any sized mesh, but large mesh is likely particularly problematic. As noted above, smalltooth sawfish may become entangled when their saw penetrates the netting and they try to escape. Larger mesh may allow for easier penetration into the gill netting, thus increasing entanglement potential.

Fishing Technique/Soak Times
The size (i.e., length and width), profile, and shape of gill nets in the water column affect the likelihood of smalltooth sawfish entanglement in gill nets. Gill nets that span the entire water column (i.e., surface to bottom) are much more likely to catch smalltooth sawfish than low profile gill nets that span only a narrow portion of the water column. The use of tie downs, which create a "pocket" or "bag" effect in gill nets, are also believed to increase the potential for entanglement, even though they also decrease the span of the net in the water column.
Since smalltooth sawfish are considered a benthic species, they are more likely to encounter sink gill nets or gill nets set on or near the bottom. Prior to the observed capture of a smalltooth sawfish in the Atlantic shark gill net fishery, some people speculated that because these gill nets are set above the sea floor, they may not catch smalltooth sawfish. However, smalltooth sawfish do feed on small schooling fish and could occur higher in the water column when engaged in this feeding behavior.

The amount of time gill net gear is left in the water is another important consideration. The longer amount of time gill nets are left in the water, the greater the likelihood of a smalltooth sawfish encountering the gear and becoming entangled.

<u>Extent of Effects of CMP Gill Nets on Smalltooth Sawfish</u>
As with sea turtles, we must conduct a jeopardy analysis in Section 7 for smalltooth sawfish. To conduct this analysis, we must estimate the number of smalltooth sawfish that are likely to be adversely affected as a result of the proposed action. This section focuses on quantifying the impacts on individual animals from the proposed action. This analysis first estimates the smalltooth sawfish entangled in the CMP gill net fisheries over the last several years. We then evaluate how the proposed action would alter those take estimates.

<u>Available Data Sources</u>

The data available for estimating smalltooth sawfish interaction rates with CMP gill net gear come from several sources. We evaluated SEFSC logbook data, the Atlantic HMS Shark Fishery Observer Program, and smalltooth sawfish encounter database records. Additional anecdotal information on the incidental captures of a smalltooth sawfish was also reviewed.

All permitted commercial and charter/headboat CMP fishers are required to report their catch and effort data via the CFLP. Approximately 20% of commercial CMP permit holders are also required to submit discard data via the SDDP. Selections for the SDDP are made in July of each year, and the selected fishers (vessels) are required to complete and to submit discard forms, along with their CFLP logbook forms, for each trip they make during August through July of the following year. Participants in this program have never reported an incidental capture of a smalltooth sawfish in CMP gill net gear.

Since 1993, a SEFSC observer program has been underway to estimate catch and bycatch in the directed Atlantic shark gill net fisheries along the southeastern U.S. Atlantic coast. In 1999, 100% observer coverage was required for the gill net component of the fishery at all times to improve estimates of catch, effort, bycatch, and bycatch mortality (Carlson and Lee 2000). Starting in 2005, a pilot observer program was begun to include all vessels that have an active directed shark permit and fish with sink gill net gear. These vessels were not previously subject to observer coverage because they either were not targeting HMS or were not fishing gill nets in a drift- or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark landings and their overall impact on shark resources when not targeting sharks (Carlson and Bethea 2006). Observations occur in both state and federal waters. As of December 31, 2013 this program has observed 966 sink gill net sets, 296 drift gill net sets, and 3 strike gill net sets targeting Spanish and king mackerel all with no smalltooth sawfish captures (A. Mathers, NMFS SEFSC, pers. comm. to M. Barnette, NMFS, October 24, 2014). Still, this program documented 1 entanglement of a smalltooth sawfish by Atlantic shark gill net gear approximately 4.5 nmi off Hutchinson Island, Florida, in June 2003; the smalltooth sawfish was reportedly released alive (A. Mathers, NMFS SEFSC, pers. comm. to M. Barnette, NMFS, October 24, 2014).

As of November 12, 2014, the ISED managed by the Florida Museum of Natural History has 5,859 records for smalltooth sawfish, 21 of which are related to gill net gear captures. With the exception of 1 capture off Morehead City, North Carolina, and 1 within Mesquite Bay, Texas, all of the reported captures in the ISED occurred in state waters off Florida. While not all of the records identified the specific fishery the capture occurred, the majority (33%) was associated with the Florida mullet gill net fishery; the 1995 Florida gill net ban has since eliminated this fishery. The ISED does not have any records of gill net captures attributed to the federal CMP fisheries.

Anecdotal Observations

In the late 1970s or early 1980s, an incidentally captured smalltooth sawfish was documented in the run-around gill net king mackerel fishery. Mark Godcharles, who was with the Florida Department of Natural Resources at that time, observed a smalltooth sawfish entangled in a gill net still loaded with mackerel at Ming's Seafood dock on Stock Island, Florida, just east of Key West.

A review of the logbook data and recent observer data did not reveal any records of entanglement in the CMP fisheries. There are also no reports of entanglement of smalltooth sawfish attributed to the CMP fisheries in the smalltooth sawfish encounter databases. In a few instances, smalltooth sawfish caught on hook-and-line have shown signs of previous entanglements with gill net gear. Close evaluation of these reports suggest the pompano gill net fishery is the most likely source of these entanglements, based on mesh size (NMFS 2007d).

The information available suggests entanglements have either not occurred recently in the federal CMP fisheries, or have been too rare to be detected by current monitoring programs. However, the documented entanglement of a smalltooth sawfish in the late 1970s or early 1980s, in conjunction with the June 2003 take by the Atlantic shark gill net fishery, suggests entanglements do occasionally occur.

Estimating Smalltooth Sawfish Entanglements by CMP Gill Nets

We believe the Florida Spanish and king mackerel gill net fishery may adversely affect smalltooth sawfish. As previously mentioned, the morphology of the smalltooth sawfish make them especially vulnerable to entanglement in gill net gear.

We previously estimated 5,280 CMP gill net hauls per year from 2009-2013 based on SEFSC commercial landings information (FIN and ACCSP trip ticket data). As we expect smalltooth sawfish interactions with gill net fisheries to be isolated to Florida due to the species habitat preference and range, we can refine this data to calculate average gill net hauls strictly for Florida federal waters. Given the average observed haul time has been documented to be 2.15 hours (Passerotti et al. 2010) and 1.9 hours (Mathers et al. 2013) for mackerel drift and sink gill nets, respectively, and we anticipate that fishers may conduct 2 hauls per trip, on average, which also takes into consideration transit time to and from the dock. There were a total of 12,377 Spanish mackerel trips reported from Florida federal waters during the period of 2009-2013, yielding an annual average of 2,475 trips or 4,950 hauls (2,475 trips multiplied by 2 hauls per trip).

With only 1 anecdotal smalltooth sawfish take in the CMP fisheries in the past, that may or may not be attributed to the federal fishery, and 1 recently documented smalltooth take in the Atlantic HMS shark drift gill net fishery, we believe that take in the CMP fisheries would be very rare in the future. Still, since Florida banned gill nets in 1995, smalltooth sawfish are believed to have increased in the action area. And as smalltooth sawfish populations increase in the action area in the future, the CMP gill net fishery might experience more frequent captures. Based on our review of this information, and with the potential for more interactions to occur in the future, we estimate 1 smalltooth sawfish will be captured over the next 3 years as a result of the use of gill nets in the federal CMP gill net fisheries off Florida.

Smalltooth Sawfish Mortality Estimate

As previously discussed, the observed smalltooth sawfish entangled in the Atlantic shark drift gill net fishery in June 2003 was cut from the net and released alive. The smalltooth sawfish had no visible injuries and was not expected to have experienced post-release mortality. Based on this information, and the short soak times documented in the CMP fishery (i.e., average of 1.9 hours for complete set and haul), we believe any smalltooth sawfish take in the CMP fisheries would also be nonlethal, and the animal would experience only short-term effects from the capture.

5.3.3 Effects on Atlantic Sturgeon

Types of Interaction

Entanglement

Direct effects of CMP fisheries on Atlantic sturgeon are expected to result from physical interactions with gear use, particularly with the sink gill net component of the fishery. Bycatch mortality for Atlantic sturgeon is known to occur predominantly in sink gill net gear (Stein et al. 2004a; ASMFC 2007), and is an issue documented in several riverine, estuarine, and coastal gill net fisheries (e.g., striped bass, flounder, shad). It is possible that a sturgeon could become briefly entangled but work itself free of the net if lightly entangled (e.g., loosely gilled depending on mesh and fish size). We expect these fish would not suffer any long-term effects due to the short duration of entanglement (i.e., not leading to mortality). However, we do not consider such light entanglements as likely to occur. Conversely, we expect any sturgeon that becomes entangled (e.g., gilled or wrapped and anchored to net) would likely become even more entangled due to its struggle to free itself. Furthermore, we don't believe that fatally-entangled sturgeon would drift free from a gill net due to the significance of entanglement that would have led to mortality; predatory effects, natural decay (carcass buoyancy due to decompositional gasses), or other factors that could "remove" a dead entangled sturgeon are not expected to occur before the net is hauled back. It is possible, however, that a very large, heavy sturgeon could potentially break free from a gill net during gear recovery as it clears the surface, but we expect an observer would notice the event. Therefore, we believe any observed entangled sturgeon represent an accurate CPUE estimate of all likely entanglement scenarios.

Factors Affecting the Likelihood of Entanglement and Mortality

The same factors that affect the likelihood of sea turtle and smalltooth sawfish entanglement in gill net gear also affect Atlantic sturgeon entanglement potential. Seasonality, mesh size, the use of tie-downs, water temperature and soak time impact the frequency and severity of entanglement events (ASMFC 2007, Fox et al. 2013). For all Atlantic sink gill net fisheries, higher incidence of sturgeon bycatch was associated with depths < 40 m, mesh sizes > 10 in, and during the months of April-May. Across the range of temperatures, incidence of death increased with rising temperatures (ASMFC 2007).

Sturgeon are traditionally referred to as benthic cruisers (Findeis 1997) though there is a growing body of evidence to suggest that they commonly are in the water column (Sulak et al. 2002; Erickson and Hightower 2007). Fox et al. (2013) examined catch rates in the large-mesh monkfish gill net fishery off New Jersey and found Atlantic sturgeon catch rates to be the lowest in the bottom of the net.

Extent of Effects of CMP Gill Nets on Atlantic Sturgeon

As with sea turtles and smalltooth sawfish, we must conduct a jeopardy analysis in Section 7 for Atlantic sturgeon. To conduct this analysis, we must estimate the number of Atlantic sturgeon that are likely to be entangled as a result of the proposed action. This section focuses on quantifying the impacts on individual animals from the proposed action. This analysis first estimates the Atlantic sturgeon entanglement in the CMP gill net fisheries over the last several years. We then evaluate how the proposed action would alter those take estimates.

Available Data Sources

All permitted commercial CMP fishers are required to report their catch and effort data via the CFLP. Approximately 20% of commercial CMP permit holders are also required to submit discard data via the SDDP. The SDDP database includes 5 entries for sturgeon (species unclassified): 1 sturgeon captured in drift run-around gill net gear off North Carolina in 2008 and released alive; 1 sturgeon captured in stake gill net gear off the Eastern Shore of Virginia in 2008 and discarded dead (given the gear type, this was likely within the Chesapeake Bay or embayed coastal waters); and 3 sturgeon captured in "other" gill net gear off the Eastern Shore of Virginia in 2003 and all released alive.

Since 1993, a SEFSC observer program has been underway to estimate catch and bycatch in the directed Atlantic shark gill net fisheries along the southeastern U.S. Atlantic coast. In 1999, 100% observer coverage was required for the gill net component of the fishery at all times to improve estimates of catch, effort, bycatch, and bycatch mortality (Carlson and Lee 2000). Starting in 2005, a pilot observer program was begun to include all vessels that have an active directed shark permit and fish with sink gill net gear. These vessels were not previously subject to observer coverage because they either were not targeting HMS or were not fishing gill nets in a drift- or strike fashion. These vessels were selected for observer coverage in an effort to determine their impact on finetooth shark landings and their overall impact on shark resources when not targeting sharks (Carlson and Bethea 2006). Observations occur in both state and federal waters. As of December 31, 2013, this program has observed 966 sink gill net sets, 296 drift gill net sets, and 3 strike gill net sets for Spanish mackerel with no documented Atlantic sturgeon captures. In the king mackerel fisheries there have also been 62 drift gill net and 26 strike gill net sets with no Atlantic sturgeon captures, though there have been 2 Atlantic sturgeon captures documented in the 50 observed sink gill net sets (A. Mathers, NMFS SEFSC, pers. comm. to M. Barnette, NMFS, October 28, 2014). The 2 Atlantic sturgeon captured in the king mackerel gill net fishery occurred during the same set approximately 6 nmi off Hatteras Inlet, North Carolina in December 2011, and both were released alive. Additionally, the Atlantic HMS Shark Fishery Observer Program documented 3 other Atlantic sturgeon captures, 1 in the shark drift gill net fishery (released alive), 1 in the Atlantic croaker sink gill net fishery (discarded dead), and 1 on the monkfish sink gill net fishery (discarded dead). The 4% incidence rate in the king mackerel sink gill net fishery (2 entanglements/50 observed sets) is higher than the overall 1.8% incidence rate documented for all (i.e., all combined fisheries) mid-Atlantic sink gill net trips from 2001-2006 (511 sturgeon encountered/ 28,543 sets), though this may be a result of concentrated observer coverage that was noted off Cape Hatteras, North Carolina (ASMFC 2007) where king mackerel fishing is more significant compared to states farther north, as discussed in Section 2.3.2. When considering the combined mackerel gill net fisheries, the incidence rate is much lower, at 0.14% (2 Atlantic sturgeon captures/1,403 total observed mackerel gill net sets).

Atlantic sturgeon bycatch has been documented in other gill net fisheries, notably the monkfish fishery off the mid-Atlantic (Fox et al. 2013); however, monkfish are targeted passively while nets set for other species occur once schools are observed in abundance in order to maximize catch. Furthermore, monkfish sets are the only sets left overnight off North Carolina. Therefore, this fishery is not a useful proxy for the federal CMP gill net fisheries.

<u>Estimating Atlantic Sturgeon Entanglements by CMP Gill Nets</u>

We believe the Spanish and king mackerel gill net fisheries, particularly the sink gill net fisheries, operating off North Carolina and northward, may adversely affect Atlantic sturgeon based on the species' range. We previously estimated 5,280 CMP gill net hauls per year from 2009-2013 based on SEFSC commercial landings information (FIN and ACCSP trip ticket data), however, we can refine this data to calculate average sink gill net hauls strictly for the northern states. The data indicates a total of 562 Spanish mackerel gill net trips reported from North Carolina and Virginia federal waters during the period of 2009-2013, yielding an annual average of 112 trips or 224 hauls. As previously discussed, this may be an overestimate given a significant number of these trips may not have targeted mackerel and may have merely landed recreational bag limits (i.e., 3 king mackerel and 15 Spanish mackerel) for sale.

It is unclear if the 2 documented Atlantic sturgeon captured in the same Atlantic mackerel sink gill net set in federal CMP fisheries in the past was an anomaly, or indicative of potential high incidental bycatch. If we assumed the 4% sink gill net rate to be a likely bycatch rate for the federal CMP gill net fisheries, it would yield a triennial estimate of 27 Atlantic sturgeon. Conversely, utilizing the combined observed 0.14% bycatch rate, it would yield a triennial estimate of 0.94 Atlantic sturgeon. The 4% estimate is based on a much smaller sample size and was further influenced by 1 set with 2 fish (the only 2 fish observed in the data set), and for a segment of the fishery that has significantly less effort by trips (king mackerel has only about 10% of the trips reporting Spanish mackerel). Therefore, the 4% estimate is considered less representative of all CMP gill net fisheries. The 1.8% estimate is based on a longer time frame, a much larger sample size, and includes observed sets targeting other species; thus, it is considered more accurate and representative of real world conditions expected to be encountered in the fishery. Because of the significant difference in the 4% and 0.14% estimates, as well as the factors just discussed, we have opted to use the 1.8% incidence rate documented for all mid-Atlantic sink gill net trips from 2001-2006 to estimate bycatch. This results in a triennial entanglement estimate of 12 Atlantic sturgeon for the federal CMP gill net fisheries.

Atlantic Sturgeon Mortality Estimate
As previously discussed, the 2 observed Atlantic sturgeon captured in the king mackerel sink gill net fishery off North Carolina in December 2011 were reportedly released alive. Given the short soak time of the king mackerel sink gill net fishery (i.e., average of 1.9 hours for complete set and haul), we believe Atlantic sturgeon are likely to survive potential entanglement in mackerel sink gill nets. Based on this information, we believe any Atlantic sturgeon entanglement in the federal CMP fisheries would also be nonlethal, experiencing only short-term effects from the capture.

<u>Assigning Interactions to the 5 Atlantic Sturgeon DPSs</u>

Atlantic sturgeon mix extensively in the marine environment, and individuals from all 5 Atlantic sturgeon DPSs could interact with the CMP fisheries in the Atlantic. The NMFS Northeast Region did a Mixed Stock Analysis (MSA), an analysis of the composition of Atlantic sturgeon stocks along the East Coast, using tag-recapture data and genetic samples that identify captured fish back to their DPS of origin. Atlantic sturgeon can be assigned to their DPS based on genetic analyses with 92-96% accuracy (ASSRT and NMFS 2007), though some fish used in the MSA could not be assigned to a DPS. Data from the NEFOP and the At Sea Monitoring programs were used in the MSA to determine the percentage of fish from each of the DPSs at the selected locations along the coast.

The raw results of the genetic analyses were examined to determine if natural geographic boundaries emerged where DPS composition made significant shifts. Given the relatively small number of samples, boundaries were not obvious from the genetics data alone. In looking at the coastal samples, there appeared to be 3 zones that coincided with biogeographic zones. These biogeographic zones or marine ecoregions were defined by The Nature Conservancy (TNC) and refined in 2007. Marine ecoregions are zones in which the species composition is relatively homogenous and is clearly distinct from adjacent systems. The dominant biogeographic features used to define the ecoregions included features such as isolation, upwelling, nutrient inputs, freshwater influx, temperature regimes, ice regimes, exposure, sediments, currents, and bathymetric or coastal complexity. Along the East Coast of the United States, there are 3 marine ecoregions. Based on TNC ecoregions, the Carolinian marine ecoregion, which extends from Cape Hatteras to the tip of Florida, corresponds to the South Atlantic portion of the action area where the most significant portion of the CMP fisheries occur in the Atlantic. According to the MSA, the composition of Atlantic sturgeon in this ecoregion by DPS is as follows:

1) 0-9% GM DPS
2) 4-26% NYB DPS
3) 7-18% CB DPS
4) 10-29% Carolina DPS
5) 46-79% SA DPS

To be conservative, we will assume that the maximum percentage presented for each DPS is representative of the composition of Atlantic sturgeon in the Atlantic. Based on the calculated triennial estimate of 12 Atlantic sturgeon entanglement, we anticipate that up to 10 sturgeon may be from the SA DPS (12 sturgeon x 0.79 = 9.48), 4 may be from the Carolina DPS (12 sturgeon x 0.29 = 3.48), 3 may be from the CB DPS (12 sturgeon x 0.18 = 2.16), 4 may be from the NYB DPS (12 sturgeon x 0.26 = 3.12), and 2 may be from the GM DPS (12 sturgeon x 0.09 = 1.08). Standard rounding protocol was implemented due to the inability to entangle a portion of an animal. Note that the percentages will add up to more than 100% and the resultant total estimate of interactions by DPS will be greater than the triennial entanglement estimate previously presented (i.e., 12 Atlantic sturgeon) due to the usage of the highest percentage calculated by the MSA for each DPS. This results in estimating that up to the specified number of each DPS being entangled, but still not more than the total number of animals estimated to become entangled.

5.4 Effect of CMP Management and Regulations; Anticipated Future Interaction Levels

We believe management of the federal CMP fisheries has directly benefited sea turtles, smalltooth sawfish, and Atlantic sturgeon. Regulations restricting gear in the fisheries have had the most benefit. In 1989, 51 vessels used gill nets to target king mackerel and 314 vessels used gill nets to target Spanish mackerel. In 2004, there were fewer than 30 vessels permitted to fish for Spanish mackerel with gill nets (GMFMC et al. 2004) and as of November 2014, there are only 20 vessels permitted to fish for king mackerel with gill nets. This shift in gear effort has likely greatly reduced the fisheries' potential impact on sea turtles, smalltooth sawfish, and Atlantic sturgeon.

There are no proposed changes to existing management of the federal CMP fisheries that would alter future levels of entanglement. The current regulations have been in place for some time, thus the same levels estimated in the past are expected to continue into the future, barring anticipated population growth of sea turtles, smalltooth sawfish, and Atlantic sturgeon over time, as previously discussed.

5.5 Summary

Based on our review in this section, gill net gear used in the federal CMP fisheries of the Atlantic and GOM have adversely affected sea turtles, smalltooth sawfish, and Atlantic sturgeon in the past via entanglement and, in the case of sea turtles, via forced submergence. Commercial and recreational hook-and-line gear and commercial cast net gear have not likely adversely affected these species. We anticipate the continued authorization of the federal CMP fisheries, as currently managed, will not change this conclusion or alter the entanglement patterns documented in the past. Table 22 summarizes the anticipated take we expect on a 3-year basis in the future.

Table 22. Summary of Anticipated 3-Year Take and Mortality Estimates

Species	Take	Total
Green sea turtle North Atlantic DPS	Total	31
	Lethal	9
Loggerhead sea turtle NWA DPS	Total	27
	Lethal	7
Kemp's ridley sea turtle	Total	8
	Lethal	2
Hawksbill sea turtle	Total	1
	Lethal	1
Leatherback sea turtle	Total	1
	Lethal	1
Smalltooth sawfish	Total	1
	Lethal	0
Atlantic sturgeon GM DPS	Total	2 (12)
	Lethal	0
Atlantic sturgeon NYB DPS	Total	4 (12)
	Lethal	0
Atlantic sturgeon CB DPS	Total	3 (12)
	Lethal	0
Atlantic sturgeon Carolina DPS	Total	4 (12)
	Lethal	0
Atlantic sturgeon SA DPS	Total	10 (12)
	Lethal	0

6 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions reasonably certain to occur within the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

Cumulative effects from unrelated, non-federal actions occurring in the action area may affect sea turtles, smalltooth sawfish, and Atlantic sturgeon. Stranding data indicate sea turtles in the action area die of various natural causes, including cold stunning and hurricanes, as well as human activities, such as incidental capture in state fisheries, ingestion of and/or entanglement in debris, ship strikes, and degradation of nesting habitat. The cause of death of most sea turtles recovered by the STSSN is unknown.

The fisheries described as occurring within the action area (Sections 3 and 4) are expected to continue as described into the foreseeable future, concurrent with the proposed action. Numerous fisheries in state waters of the South Atlantic and GOM regions have also been known to adversely affect sea turtles, smalltooth sawfish, and Atlantic sturgeon. The past and present impacts of these activities have been discussed in Section 4 of this Opinion. NMFS is not aware of any proposed or anticipated changes in these fisheries that would substantially change the impacts each fishery has on sea turtles, smalltooth sawfish, and Atlantic sturgeon covered by this Opinion.

In addition to fisheries, NMFS is not aware of any proposed or anticipated changes in other human-related actions (e.g., poaching, habitat degradation, or activities that affect water quality and quantity such as farming) or natural conditions (e.g., over-abundance of land or sea predators, changes in oceanic conditions) that would substantially change the impacts that each threat has on the sea turtles, smalltooth sawfish, and Atlantic sturgeon covered by this Opinion. NMFS will continue to work with states to develop ESA Section 6 agreements and with researchers in Section 10 permits to enhance programs to quantify and mitigate these takes. Therefore, NMFS expects that the levels of take of sea turtles, smalltooth sawfish, and Atlantic sturgeon described for each of the fisheries and non-fisheries will continue at similar levels into the foreseeable future.

7 Jeopardy Analyses

The analyses conducted in the previous sections of this Opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of any ESA-listed sea turtles, smalltooth sawfish, or sturgeon species. In Section 5, we outlined how the proposed action would affect these species at the individual level and the extent of those effects in terms of the number of associated interactions, captures, and mortalities of each species to the extent possible with the best available data. Now we assess each of these species' response to this impact, in terms of overall population effects, and whether those effects of the proposed action, in the context of the status of the species (Section 3), the environmental baseline (Section 4), and the cumulative effects (Section 6), will jeopardize their continued existence.

"To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). In making this conclusion for each species, we first look at whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in 1 or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

The NMFS and USFWS's ESA Section 7 Handbook (USFWS and NMFS 1998) defines survival and recovery, as they apply to the ESA's jeopardy standard. Survival means "the species' persistence… beyond the conditions leading to its endangerment, with sufficient resilience to allow recovery from endangerment." Survival is the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a sufficiently large population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter. Recovery means "improvement in the status of a listed species to the point at which listing is no longer appropriate under the criteria set out in Section 4(a)(1) of the Act." Recovery is the process by which species' ecosystems are restored and/or threats to the species are removed so self-sustaining and self-regulating populations of listed species can be supported as persistent members of native biotic communities.

All of our species analyses focus on the effects of lethal interactions attributed to the proposed action. The anticipated nonlethal interactions (i.e., smalltooth sawfish and Atlantic sturgeon) are not expected to impact the reproductive potential, fitness, or growth of any of the captured species because they will be released unharmed from gill net gear, or released with only minor injuries. The individuals are expected to fully recover such that no reductions in reproduction or numbers from the nonlethal interactions are anticipated. Also, since these interactions may generally occur anywhere in the action area, and animals would be released within the general area where each individual is caught, no changes in the distribution of any affected species are anticipated.

The analyses conducted in the previous sections of this Opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of any ESA-listed sea turtles, smalltooth sawfish, or Atlantic sturgeon known to interact with the federal CMP fisheries. In Section 5, we have outlined how interactions with the CMP fisheries can affect sea turtles, smalltooth sawfish, and Atlantic sturgeon. That section also evaluated the extent of those effects in terms of triennial estimates of the numbers of sea turtles, smalltooth sawfish, and Atlantic sturgeon captured and killed. Now we must assess each species' response to this impact, in terms of overall population effects from the estimated take. This assessment requires us to determine whether the effects of the proposed action, when added to the status of the species (Section 3), the environmental baseline (Section 4), and the cumulative effects (Section 6), will jeopardize the continued existence of any ESA-listed sea turtles, smalltooth sawfish, or Atlantic sturgeon known to interact with the CMP fisheries.

7.1 Loggerhead Sea Turtles (NWA DPS)

In Section 5, we estimated the federal CMP fisheries would capture and kill 7 loggerhead sea turtles every 3 years. The mortalities associated with the proposed action represent a reduction in numbers. This lethal take would also result in a future reduction in reproduction as a result of lost reproductive potential; if any of the mortalities are female sea turtles that would have survived other threats and reproduced in the future, death would eliminate those females' individual contributions to future generations. For example, an adult female loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2-4 years, with 100-130 eggs per clutch. The annual loss of an adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. A reduction in the distribution of loggerhead sea turtles is not expected from lethal takes attributed to the proposed action. Because all the potential mortalities are expected to occur at random throughout the proposed action area and sea turtles generally have large ranges in which they disperse, the distribution of loggerhead sea turtles in the action area is expected to be unaffected.

Whether or not the reductions in loggerhead sea turtle numbers and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival for loggerheads depends on what effect these reductions in numbers and reproduction would have on overall population sizes and trends. In other words, likelihood of survival depends on whether the estimated reductions, when viewed within the context of the environmental baseline and status of the species, are to such extent that adverse effects on population dynamics are appreciable.

SEFSC (2009) estimated the adult female population size for the NW Atlantic DPS is likely between approximately 20,000-40,000 individuals, with a low likelihood of being up to 70,000 individuals. A more recent conservative estimate for the entire western North Atlantic population was a mean of 38,334 adult females using data from 2001-2010 (Richards et al. In Review). A much less robust estimate for total benthic females in the western North Atlantic was also obtained, with a likely range of approximately 30,000-300,000 individuals, up to less than 1 million. Further insight into the numbers of loggerhead sea turtles along the U.S. coast is available in NEFSC (2011), which reported a conservative estimate of 588,000 juvenile and adult loggerhead sea turtles present on the continental shelf from the mouth of the Gulf of St. Lawrence to Cape Canaveral, Florida, when using only positively identified loggerhead sightings from an aerial survey. A less conservative analysis from the same study resulted in an estimate of 801,000 loggerheads in the same geographical area when a proportion of the unidentified hardshell turtles were categorized as loggerheads. This study did not include Florida's east coast south of Cape Canaveral or the GOM, which are areas where large numbers of loggerheads are also expected.

As previously mentioned, numbers of nests and nesting females can vary widely from year to year. A detailed analysis of Florida's long-term loggerhead nesting data (1989-2013) revealed 3 distinct annual trends. Following a 23% increase between 1989 and 1998, nest counts declined sharply over nearly a decade. However, annual nest counts show a strong increase over the last 5 years. Examining only the period between the high-count nesting season in 1998 and the most recent (2012) nesting season, researchers found no demonstrable trend, indicating a reversal of the post-1998 decline. The overall change in counts from 1989 to 2012 is positive. Nest counts in 2012, corrected for subtle variation in survey effort, were slightly below the high nest count recorded in 1998. Florida accounts for more than 90% of U.S. loggerhead nesting (FWC data, http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

In addition to the total nest count estimates, FWRI uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. This provides a better tool for understanding the nesting trends (Figure 7). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2013) (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Over that time period, 3 distinct trends were identified. From 1989-1998 there was a 30% increase that was then followed by a sharp decline over the subsequent decade. Large increases in loggerhead nesting occurred since then. FWRI examined the trend from the 1998 nesting high through 2013 and found the decade-long post-1998 decline had reversed and there was no longer a demonstrable trend. Looking at the data from 1989 through 2014 (an increase of over 32%), FWRI concluded that there was an overall positive change in the nest counts.

As described in the Environmental Baseline section, we believe that the DWH oil spill event had an adverse impact on loggerhead sea turtles, and resulted in mortalities to an unquantified number of individuals, along with unknown lingering impacts resulting from nest relocations, nonlethal exposure, and foraging resource impacts. However, there is no information to indicate, or basis to believe, that a significant population-level impact has occurred that would have changed the species' status to an extent that the expected interactions from the federal CMP fisheries would result in a detectable change in the population status of the NWA DPS of loggerhead turtles. This is especially true given the size of the population and that, unlike Kemp's ridleys, the NWA DPS is proportionally much less intrinsically linked with the GOM.

It is possible that the DWH oil spill event reduced that survival rate of all age classes to varying degrees, and may continue to do so for some undetermined time into the future. However, there is no information at this time that it has, or should be expected to have, substantially altered the long-term survival rates in a manner that would significantly change the population dynamics compared to the conservative estimates used in this Opinion. Any impacts are not thought to alter the population status to a degree in which the number of mortalities from the proposed action could be seen as reducing the likelihood of survival and recovery of the species.

We believe that the incidental take and resulting mortality of loggerhead sea turtles associated with the proposed action are not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NWA DPS of loggerhead sea turtles. We believe the current population is large (i.e., several hundred thousand individuals) and is showing encouraging signs of stabilizing and possibly increasing. Over at least the next several decades, we expect the western North Atlantic population to remain large (i.e., hundreds of thousands of individuals) and to retain the potential for recovery, and the proposed action to not cause the population to lose genetic heterogeneity, broad demographic representation, or successful reproduction, nor affect loggerheads' ability to meet their lifecycle requirements, including reproduction, sustenance, and shelter.

The Services' recovery plan for the Northwest Atlantic population of the loggerhead turtle (NMFS and USFWS 2008a), which is the same as the NWA DPS, provides additional explanation of the goals and vision for recovery for this population. The following objectives of the recovery plan are most pertinent to the threats posed by the proposed action:

- Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females

- Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes

- Minimize bycatch in domestic and international commercial and artisanal fisheries

- Minimize trophic changes from fishery harvest and habitat alteration

The recovery plan anticipates that, with implementation of the plan, the western North Atlantic population will recover within 50-150 years, but notes that reaching recovery in only 50 years would require a rapid reversal of the then-declining trends of the NRU, PFRU, and NGMRU. Recovery is the process of removing threats so self-sustaining populations persist in the wild. The proposed action would not impede progress on carrying out any aspect of the recovery program or achieving the overall recovery strategy. The recovery plan estimates that the population will reach recovery in 50-150 years following implementation of recovery actions. The minimum end of the range assumes a rapid reversal of the current declining trends; the higher end assumes that additional time will be needed for recovery actions to bring about population growth.

Recovery Objective No. 1, "Ensure that the number of nests in each recovery unit is increasing…," is the plan's overarching objective and has associated demographic criteria. Currently, none of the plan's criteria are being met, but the plan acknowledges that it will take 50-150 years to do so. Further reduction of multiple threats throughout the North Atlantic, GOM, and Greater Caribbean will be needed for strong, positive population growth, following implementation of more of the plan's actions. Although any continuing mortality in what might be an already declining population can affect the potential for population growth, we believe the effects of the proposed action would not appreciably reduce the likelihood of a recovery that is not anticipated for 50-150 years.

Continuation of the proposed action is not believed to be counter to the recovery plan's Objective No. 10: "minimize bycatch in domestic and international commercial and artisanal fisheries." While the proposed action does not reduce bycatch in the federal CMP fisheries, it is designed to document and minimize the impact of those interactions. Our estimate of potential future mortalities is based our belief that the same level of interactions occurred in the past, and with that level we have still seen positive trends in the status of this species. Therefore, we believe that the effects on loggerhead turtles associated with the proposed action are not reasonably expected to cause an appreciable reduction in the likelihood of recovery of the NWA loggerhead DPS, even in light of the impacts of the DWH oil spill event.

In conclusion, we believe that the effects associated with the federal CMP fisheries are not expected to cause an appreciable reduction in the likelihood of both the survival and recovery of the NWA loggerhead DPS in the wild. This analysis has been conducted in light of the most recently available information on its status as well as the environmental baseline that describes the environmental conditions that impact them, including what information we currently have available on the recent DWH oil spill event. The remaining impacts from the proposed action will not appreciably affect the population's persistence into the future or its potential for recovery.

7.2 Green Sea Turtles

In Section 5, we estimated the federal CMP fisheries would capture and kill 9 green sea turtles every 3 years. The mortalities associated with the proposed action represent a reduction in numbers. This lethal take would also result in a future reduction in reproduction as a result of lost reproductive potential; if any of the mortalities are female sea turtles that would have survived other threats and reproduced in the future, they would eliminate those females' individual contributions to future generations. For example, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every 2-4 years, with 110-115 eggs/nest, of which a small percentage is expected to survive to sexual maturity. The anticipated lethal interactions are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of green sea turtles is expected from these interactions.

Whether the reductions in numbers and reproduction of these species would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends.

The 5-year status review for green sea turtles states that of the 7 green sea turtle nesting concentrations in the Atlantic Basin for which abundance trend information is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). That review also states that the annual nesting female population in the Atlantic basin ranges from 29,243-50,539 individuals. Additionally, the pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend during the 10 years of regular monitoring since establishment of index beaches in Florida in 1989. An average of 5,039 green turtle nests were 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 USFWS 2007a). Data from the index nesting beaches program in Florida substantiate the dramatic increase in nesting. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008 and further dropped under 3,000 in 2009, but that consecutive drop was a temporary deviation from the normal biennial nesting cycle for green turtles, as 2013 documented a record high of 25,553 nests (FWC Index Nesting Beach Survey Database). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9% annually.

We believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of the green sea turtle in the wild. Although 9 anticipated mortalities every 3 years would result in an instantaneous reduction in absolute population numbers, the U.S. populations of green sea turtles would not be appreciably affected. For a population to remain stable, sea turtles must replace themselves through successful reproduction at least once over the course of their reproductive lives, and at least 1 offspring must survive to reproduce itself. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be exceeded through recruitment of new breeding individuals from successful reproduction of surviving sea turtles. Since the abundance trend information for green sea turtles is clearly increasing, we believe the anticipated lethal interactions every 3 years attributed to the proposed action will not have any measurable effect on that trend. As described in the environmental baseline section, although the DWH oil spill is expected to have resulted in adverse impacts to green turtles, there is no information to indicate, or basis to believe, that a significant population-level impact has occurred that would have changed the species' status to an extent that the expected interactions from the federal CMP fisheries would result in a detectable change in the population status of green sea turtles. Any impacts are not thought to alter the population status to a degree in which the number of mortalities from the proposed action could be seen as reducing the likelihood of survival and recovery of the species.

The Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) lists the following relevant recovery objectives over a period of 25 continuous years:

- The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years.

  Green sea turtle nesting in Florida between 2008-2013 was documented as follows: 2008—6,385 nests; 2009—4,462 nests; 2010—13,247 nests; 2011—15,369 nests; 2012—9,617 nests; and 2013—36,195 nests. The average is 14,213 nests annually over those 6 years (2008-2013). Thus, this recovery criteria has been met.

- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.

  Several actions are being taken to address this objective; however, there are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the clear increases in nesting, however, it is likely that numbers on foraging grounds have increased by at least the same amount. This Opinion's effects analysis assumes that in-water abundance has increased at the same rate as Tortuguero nesting.

The recovery plan includes 2 different recovery actions directly related to the proposed action of this Opinion: (1) monitor other fisheries causing mortality (Priority 2); and (2) promulgate regulations to reduce fishery-related mortality (Priority 2). The continued authorization of the federal CMP fisheries promotes Action 1 relative to this fishery. Should information arise from that recovery action, regulations may be promulgated to reduce fishery-related mortality.

In conclusion, the 9 anticipated green sea turtle mortalities every 3 years attributed to the proposed action is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Our estimate of potential future mortalities is based our belief that the same level of interactions occurred in the past, and with that level we have still seen positive trends in the status of this species. Thus, the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles' recovery in the wild.

7.3 Leatherback Sea Turtles

Leatherback and hawksbill sea turtles are the least affected sea turtle species by the proposed action. Due to the number of unknown sea turtles in the stranding database exceeding the number of leatherbacks, and the expectation that leatherbacks are more abundant in offshore waters where the federal CMP fisheries operate, we assigned the single entanglement of an unknown sea turtle to that of a leatherback sea turtle. Likewise, while we estimated only this single leatherback sea turtle entanglement in the federal CMP fisheries, and Snoddy and Williard (2010) only indicate a high-end post-release mortality rate of 28.6%, we will assume the single entanglement will result in mortality to be conservative for the jeopardy analysis. The possible mortality of 1 leatherback sea turtle would reduce the number of leatherback sea turtles, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. This lethal take could also result in a reduction in future reproduction, assuming the individual would be female and would survive otherwise to reproduce in the future. For example, an adult female leatherback sea turtle can produce up to 700 eggs or more per nesting season (Schultz 1975). Although a significant portion (up to approximately 30%) of the eggs can be infertile, the annual loss of adult female sea turtles, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. Thus, the death of any female leatherbacks that would have survived otherwise to reproduce would eliminate its and its future offspring's contribution to future generations. The anticipated lethal take is expected to occur anywhere in the action area. Given these sea turtles generally have large ranges in which they disperse, no reduction in the distribution of leatherback sea turtles is expected from the proposed action.

Whether the estimated reduction in number and reproduction of this species would appreciably reduce their likelihood of survival depends on the probable effect the changes in number and reproduction would have relative to current population sizes and trends. The Leatherback TEWG estimates there are between 34,000-95,000 total adults (20,000-56,000 adult females; 10,000-21,000 nesting females) in the North Atlantic. Of the 5 leatherback populations or groups of populations in the North Atlantic, 3 show an increasing or stable trend (Florida, Northern Caribbean, and Southern Caribbean). This includes the largest nesting population, located in the Southern Caribbean at Suriname and French Guiana. Of the remaining 2 populations, there is not enough information available on the West African population to conduct a trend analysis, and, for the Western Caribbean, a slight decline in annual population growth rate was detected (TEWG 2007). An annual growth rate of 1.0 is considered a stable population; the growth rates of 2 nesting populations in the Western Caribbean were 0.98 and 0.96 (TEWG 2007).

We believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of leatherback sea turtles in the wild. Although the anticipated mortality of a single leatherback sea turtle would result in a reduction in absolute population numbers, it is not likely this reduction would appreciably reduce the likelihood of survival of this sea turtle species. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of sea turtles unaffected by the proposed action. Considering that nesting trends for the Florida and Northern Caribbean populations and the largest nesting population, the Southern Caribbean population, are all either stable or increasing, we believe the proposed action is not likely to have any measurable effect on overall population trends. As explained in the Environmental Baseline section, although no direct leatherback impacts (i.e., oiled turtles or nests) from the DWH oil spill in the northern GOM were observed, some impacts from that event may be expected. However, there is no information to indicate, or basis to believe, that a significant population-level impact has occurred that would change the species' status to an extent that the expected interactions from the federal CMP fisheries would result in a detectable change in the population status of leatherback sea turtles. Any impacts are not thought to alter the population status to a degree in which the number of mortalities from the proposed action could be seen as reducing the likelihood of survival and recovery of the species.

The Atlantic recovery plan for the U.S. population of the leatherback sea turtles (NMFS and USFWS 1992a) lists the following relevant recovery objective:

- The adult female population increases over the next 25 years, as evidenced by a statistically significant trend in the number of nests at Culebra, Puerto Rico; St. Croix, U.S. Virgin Islands; and along the east coast of Florida.

We believe the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of leatherback sea turtles' recovery in the wild. In Puerto Rico, the main nesting areas are at Fajardo on the main island of Puerto Rico and on the island of Culebra. Between 1978 and 2005, nesting increased in Puerto Rico from a minimum of 9 nests recorded in 1978 and to 469-882 nests recorded each year between 2000 and 2005. Annual growth rate was estimated to be 1.1 with a growth rate interval between 1.04 and 1.12, using nest numbers between 1978 and 2005 (NMFS and USFWS 2007d). In the U.S. Virgin Islands, researchers estimated a population growth of approximately 13% per year on Sandy Point National Wildlife Refuge from 1994 through 2001. Between 1990 and 2005, the number of nests recorded has ranged from 143 (1990) to 1,008 (2001). The average annual growth rate was calculated as approximately 1.10 (with an estimated interval of 1.07 to 1.13) (NMFS and USFWS 2007d). In Florida, a Statewide Nesting Beach Survey program has documented an increase in leatherback nesting numbers from 98 (1989) to 800-900 (early 2000s). Based on standardized nest counts made at Index Nesting Beach Survey sites surveyed with constant effort over time, there has been a substantial increase in leatherback nesting in Florida since 1989. The estimated annual growth rate was approximately 1.18 (with an estimated 95% interval of 1.1 to 1.21) (NMFS and USFWS 2007d).

The potential lethal entanglement of a single leatherback sea turtle every 3 years from the proposed action is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Our estimate of potential future mortalities is based our belief that the same level of interactions occurred in the past, and with that level we have still seen positive trends in the status of this species. Thus, the proposed action is not likely to impede the recovery objective above and will not result in an appreciable reduction in the likelihood of leatherback sea turtles' recovery in the wild.

7.4 Hawksbill Sea Turtles

As mentioned above, along with leatherback sea turtles, hawksbill sea turtles are the least affected sea turtle species by the proposed action. While we estimated only a single hawksbill sea turtle interaction in the CMP fisheries, and Snoddy and Williard (2010) only indicate a high-end post-release mortality rate of 28.6%, we will assume the single interaction will result in mortality to be conservative for the jeopardy analysis. The possible mortality of 1 hawksbill sea turtle would reduce the number of hawksbill sea turtles, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. This lethal take could also result in a reduction in future reproduction, assuming the individual would be female and would survive otherwise to reproduce in the future. For example, an adult hawksbill sea turtle can lay 3-5 clutches of eggs every few years (Meylan and Donnelly 1999; Richardson et al. 1999) with up to 250 eggs/nest (Hirth 1980). Thus, the loss of a single female could preclude the production of thousands of eggs and hatchlings, of which a fraction would otherwise survive to sexual maturity and contribute to future generations. Sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of hawksbill sea turtles is expected from this single mortality. Likewise, as explained in the Environmental Baseline section, while a few individuals were found to have been impacted by the DWH oil event, there is no information to indicate, or basis to believe, that a significant population-level impact has occurred that would have changed the species' status to an extent that the expected interaction from the federal CMP fisheries would result in a detectable change in the population status of hawksbill turtles in the Atlantic. Any impacts are not thought to alter the population status to a degree in which the mortality from the proposed action could be seen as reducing the likelihood of survival and recovery of the species.

We believe hawksbill sea turtles have a sufficiently large population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter. There are currently no reliable estimates of population abundance and trends for non-nesting hawksbills at the time of this consultation; therefore, nesting beach data is currently the primary information source for evaluating trends in abundance. Mortimer and Donnelly (2008) found that nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland), 9 of the 10 sites with recent data (within past 20 years), showed recent nesting increases were located in the Caribbean. These increases have been observed in spite of the fact that the federal CMP fisheries have been operating and adversely affecting the population for decades. Since the number of interactions is expected to be no greater than has occurred in recent years, and much lower than had been occurring in past decades, we believe the proposed action will not result in an appreciable reduction in the likelihood of hawksbill sea turtles' survival in the wild.

The Recovery Plan for the population of the hawksbill sea turtles (NMFS and USFWS 1993) lists the following relevant recovery objectives over a period of 25 continuous years:

- The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests at five index beaches, including Mona Island and Buck Island Reef National Monument

- The numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, U.S. Virgin Islands, and Florida.

The recovery plan lists 6 major actions that are needed to achieve recovery:

- Provide long-term protection to important nesting beaches
- Ensure at least 75% hatching success rate on major nesting beaches
- Determine distribution and seasonal movements of turtles in all life stages in the marine environment
- Minimize threat from illegal exploitation
- End international trade in hawksbill products
- Ensure long-term protection of important foraging habitats

Of the hawksbill sea turtle rookeries regularly monitored—Jumby Bay (Antigua/Barbuda), Barbados, Mona Island (Puerto Rico), and Buck Island Reef National Monument (U.S. Virgin Islands), all show increasing trends in the annual number of nests (NMFS and USFWS 2007b). In-water research projects at Mona Island, Puerto Rico, and the Marquesas, Florida, which involve the observation and capture of juvenile hawksbill turtles, are underway. Although there are 15 years of data for the Mona Island project, abundance indices have not yet been incorporated into a rigorous analysis or a published trend assessment. The time series for the Marquesas project is not long enough to detect a trend (NMFS and USFWS 2007b).

Unlike the case for other sea turtle species, none of the major actions specified for recovery are specific to CMP fisheries bycatch or even fisheries bycatch in general. While incidental capture in commercial and recreational fisheries is listed as one of the threats to the species, the only related action, "Monitor and reduce mortality from incidental capture in fisheries" is ranked as Priority No. 3.

The potential effects on hawksbill sea turtles from the proposed action are not likely to reduce overall population numbers over time due to current population sizes and expected recruitment and the relatively low potential impact of the federal CMP fisheries on hawksbills. Our estimate of potential future mortalities is based our belief that the same level of interactions occurred in the past, and with that level we have still seen positive trends in the status of this species. Thus, we believe the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of hawksbill sea turtles' recovery in the wild. In conclusion, we believe that the effects associated with the proposed action are not expected to cause an appreciable reduction in the likelihood of both the survival and recovery of hawksbill sea turtles in the wild.

7.5 Kemp's Ridley Sea Turtles

In Section 5, we estimated the federal CMP fisheries would capture and kill 2 Kemp's ridley sea turtles every 3 years. The mortalities associated with the proposed action represent a reduction in numbers. The proposed action would reduce the species' population compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. The proposed action could also result in a potential reduction in future reproduction, assuming at least 1 of these individuals would be female and would have survived to reproduce in the future. The annual loss of an adult female could preclude the production of thousands of eggs and hatchlings, of which a small percentage is expected to survive to sexual maturity. Thus, the death of any female would eliminate their contribution to future generations, and result in a reduction in sea turtle reproduction. The anticipated entanglements are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse; thus, no reduction in the distribution of Kemp's ridley sea turtles is expected from the loss of these individuals.

Whether the reductions in numbers and reproduction of Kemp's ridley sea turtles would appreciably reduce their likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. Heppell et al. (2005) predicted in a population model that the Kemp's ridley sea turtle population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011b) contains an updated model which predicts that the population is expected to increase 19% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. In 2009, the population was on track with 21,144 nests, but an unexpected and as yet unexplained drop in nesting occurred in 2010 (13,302), deviating from the NMFS et al. (2011b) model prediction. A subsequent increase to 20,570 nests in 2011 occurred and then a record high of 21,797 occurred in 2012, but in 2013 there was a second significant decline, with only 16,385 nests recorded (Gladys Porter Zoo nesting database 2013). We will not know if the population is continuing the general trajectory predicted by the model until future nesting data are available. Of course, this updated model assumes that current survival rates within each life stage remain constant. The recent increases in Kemp's ridley sea turtle nesting seen in the last two decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of TEDs, reduced trawling effort in Mexico and the U.S., and possibly other changes in vital rates (TEWG 1998; TEWG 2000a). While these results are encouraging, the species' limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty.

Kemp's ridleys mature and nest at an age of 7-15 years, which is earlier than other sea turtles. A younger age at maturity may be a factor in the response of this species to recovery actions. It is likely that the Kemp's ridley sea turtle was the sea turtle species most affected by the DWH oil spill on a population level. Additionally, the sea turtle strandings documented in 2011-2013 in Alabama, Louisiana, and Mississippi primarily involved Kemp's ridley sea turtles (see Environmental Baseline section). Nevertheless, the effects on Kemp's ridley sea turtles from the proposed action are not likely to appreciably reduce overall population numbers over time due to current population sizes, expected recruitment, and continuing strong nesting numbers relative to the past decade, even in light of the adverse impacts expected to have occurred from the DWH oil spill and the strandings documented in 2011-2013. It is worth noting that despite higher levels of effects in the past, we have still seen tremendous growth in the population. Thus, we believe the proposed action is will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' survival in the wild.

The recovery plan for the Kemp's ridley sea turtle (NMFS et al. 2011b) lists the following relevant recovery objective:

- A population of at least 10,000 nesting females in a season (as measured by clutch frequency per female per season) distributed at the primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) in Mexico is attained. Methodology and capacity to implement and ensure accurate nesting female counts have been developed.

NMFS and USFWS (2011b) states "the highest priority needs for Kemp's ridley recovery are to maintain and strengthen the conservation efforts that have proven successful. In the water, successful conservation efforts include maintaining the use of TEDs in fisheries currently required to use them, expanding TED use to all trawl fisheries of concern, and reducing mortality in gillnet fisheries. Adequate enforcement in both the terrestrial and marine environment also is also noted essential to meeting recovery goals." We believe the proposed action supports the recovery objective above and will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

The recovery plan states Kemp's ridley sea turtles have 2.5 average nests per female and the recovery goal of 10,000 nesting females is associated with 25,000 nests. About 30,000 nests are indicative of 10,000 nesting females in a season (NMFS and USFWS 2007c). As of February 2011, 13,302 nests had been observed in the state of Tamaulipas, Mexico (Gladys Porter Zoo 2011). A small nesting population is emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 128 in 2007, to a record high of 209 nests in 2012 (National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm).

In conclusion, the 2 anticipated Kemp's ridley sea turtle mortalities every 3 years attributed to the proposed action is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Our estimate of potential future mortalities is based our belief that the same level of interactions occurred in the past, and with that level we have still seen positive trends in the status of this species. Thus, the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

7.6 Smalltooth Sawfish

The proposed action is expected to result in the taking of 1 adult smalltooth sawfish, but no mortality is anticipated. Our best available information indicates the short-term non-lethal effects anticipated on smalltooth sawfish are not expected to affect the reproduction, numbers, or distribution. The abundance of adults relative to juvenile smalltooth sawfish, including very small individuals, encountered in shallow waters outside of the proposed action area suggests the population remains reproductively active and viable. Based on this information, the CMP fisheries would not affect the reproduction, numbers, or distribution of wild populations of smalltooth sawfish. Therefore, the proposed action will not reduce the smalltooth sawfish population's likelihood of surviving and recovering in the wild.

7.7 Atlantic Sturgeon

The proposed action is expected to result in the taking of 12 Atlantic sturgeon potentially originating across all 5 DPSs; the potential DPS take number are specified in Table 22, but no mortality is anticipated. Our best available information indicates the short-term non-lethal effects anticipated on sturgeon are not expected to affect the reproduction, numbers, or distribution. Based on this information, the CMP fisheries would not affect the reproduction, numbers, or distribution of wild populations of Atlantic sturgeon, and, therefore, will not reduce any Atlantic sturgeon DPS's likelihood of surviving and recovering in the wild.

8 Conclusion

We have analyzed the best available data, the current status of the species, the environmental baseline, the effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of any listed species. Our loggerhead and green sea turtle analyses focused on the impacts to, and population response of, the respective species' DPSs (i.e., NWA DPS and proposed North Atlantic DPS). However, the impact of the effects of the proposed action on these Atlantic sea turtles populations must be directly linked to the global populations of the species, and the final jeopardy analysis is for the global populations as listed in the ESA. Because the proposed action will not reduce the likelihood of survival and recovery of either of these DPSs of sea turtles, it is our Opinion that the proposed action is not likely to jeopardize the continued existence of loggerhead (the NWA DPS) or green (both the Florida breeding population and non-Florida breeding population, as well as the proposed North Atlantic DPS) sea turtles. It is also our Opinion that the proposed action is not likely to jeopardize the continued existence of Kemp's ridley, hawksbill, or leatherback sea turtles, Atlantic sturgeon (GM, NYB, CB, Carolina, or SA DPSs), or smalltooth sawfish (U.S. DPS).

9 Incidental Take Statement (ITS)

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a 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. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 7(b)(4) and Section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, if that action is performed in compliance with the terms and conditions of this incidental take statement.

This Opinion establishes an ITS with RPMs and terms and conditions for incidental take coverage in the federal CMP fisheries for sea turtles, smalltooth sawfish, and Atlantic sturgeon takes throughout the action area.

9.1 Anticipated Amount or Extent of Incidental Take

Based on the above information and analyses, we believe that the continued authorization of the federal CMP fisheries will adversely affect green, loggerhead, Kemp's ridley, hawksbill, and leatherback sea turtles, as well as smalltooth sawfish and Atlantic sturgeon. These effects will result from capture in federal CMP gill net fisheries. NMFS anticipates the following incidental takes may occur in the future as a result of the continued authorization of the federal CMP fisheries. We anticipate these takes will occur over consecutive 3-calendar-year periods (i.e., 2015-2017; 2018-2020). Table 23 reports these takes. However, as previously stated, the triennial takes are set as 3-year running sums (total for any consecutive 3-year period) and not for static 3-year periods (i.e., 2015-2017, 2016-2018, 2017-2020, and so on, as opposed to 2014-2016, 2017-2019, 2020-2022). This approach will allow us to reduce the likelihood of requiring reinitiation unnecessarily because of inherent variability in take levels, but still allow for an accurate assessment of how the proposed actions are performing versus our expectations.

Table 23. Summary of Anticipated 3-Year Take and Mortality Estimates

Species	Take	Total
Green sea turtle North Atlantic DPS	Total	31
	Lethal	9
Loggerhead sea turtle NWA DPS	Total	27
	Lethal	7
Kemp's ridley sea turtle	Total	8
	Lethal	2
Hawksbill sea turtle	Total	1
	Lethal	1
Leatherback sea turtle	Total	1
	Lethal	1
Smalltooth sawfish	Total	1
	Lethal	0
Atlantic sturgeon GM DPS	Total	2 (12)
	Lethal	0
Atlantic sturgeon NYB DPS	Total	4 (12)
	Lethal	0
Atlantic sturgeon CB DPS	Total	3 (12)
	Lethal	0
Atlantic sturgeon Carolina DPS	Total	4 (12)
	Lethal	0
Atlantic sturgeon SA DPS	Total	10 (12)
	Lethal	0

Sea Turtle Captures and Mortalities Subject to Consultation
Our best estimate is that during consecutive 3-year periods there will be 31 captures with 9 mortalities for green sea turtles, 27 captures with 7 mortalities for loggerhead sea turtles, 8 captures with 2 mortalities for Kemp's ridley sea turtles, and 1 lethal capture for both hawksbill and leatherback sea turtles associated with the federal CMP fisheries. We will not consider our take estimates exceeded if no more than the aforementioned lethal or nonlethal take occurs for each species.

Smalltooth Sawfish and Atlantic Sturgeon Captures Subject to Consultation
We anticipate that 1 smalltooth sawfish and 12 Atlantic sturgeon may be captured during consecutive 3-year periods by the federal CMP fisheries subject to consultation. Based on available information, however, we do not believe any of these takes will result in mortality. For the purposes of authorizing incidental take, we will not consider our take estimates exceeded if nonlethal take does not exceed 1 or 12 captures for smalltooth sawfish or Atlantic sturgeon, respectively; lethal take of either species will breach this Opinion's coverage.

9.2 Effect of the Take

NMFS has determined that the level of anticipated take associated with the proposed action and exempted from ESA Section 9 take prohibitions in this ITS is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or the NWA DPS of loggerhead sea turtles, as well as Atlantic sturgeon (any DPS) or smalltooth sawfish (U.S. DPS).

9.3 Reasonable and Prudent Measures (RPMs)

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles, Atlantic sturgeon, and smalltooth sawfish:

1) NMFS must ensure that any caught sea turtle, sturgeon, or smalltooth sawfish is handled in such a way as to minimize stress to the animal and increase its survival rate.

2) NMFS must ensure that monitoring and reporting of any sea turtles, sturgeon, or smalltooth sawfish encountered: (1) detects any adverse effects resulting from the federal CMP fisheries; (2) assesses the actual level of incidental take in comparison with the anticipated incidental take documented in this Opinion; (3) detects when the level of anticipated take is exceeded; and (4) collects improved data from individual encounters.

9.4 Terms and Conditions

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

The following terms and conditions implement RPM No. 1:

1) NMFS must distribute information to permit holders specifying handling and/or resuscitation requirements fishers must undertake for any caught sea turtles, sturgeon, or smalltooth sawfish.

The following terms and conditions implement RPM No. 2:

1) NMFS must maintain its current SDDP and improve future sea turtle data potentially reported under the SDDP by distributing educational outreach materials regarding the specific information to be reported and sea turtle identification to CMP gill net vessels selected to participate in this program prior to each reporting period.

2) NMFS must use available observer data and any other appropriate data sources to update the 3-year take average as new data becomes available.

3) NMFS must continue to observe the gill net component of the CMP fisheries indirectly via the Atlantic Shark observer program in the CMP commercial gill net sector. Observers must record information as specified on the SEFSC sea turtle life history form for any sea turtle captured. For any smalltooth sawfish captured, observers must record the date, time, location

(latitude/longitude), water depth, estimated total length, estimated length of saw, tag ID(s) if present, gear, target species, tackle (hook brand, type, size, etc.), where hooked and/or entangled, and bait type. For any Atlantic sturgeon captured, observers must record the date, time, location (latitude/longitude), water depth, estimated total length, tag ID(s) if present, gear, target species, tackle (hook brand, type, size, etc.), where hooked and/or entangled, and bait type. Photographs must be taken whenever feasible to confirm species identity and release condition. If feasible, observers should also tag any sea turtles, sturgeon, or smalltooth sawfish caught and collect tissue samples for genetic analysis. This Opinion serves as the permitting authority for such tagging and tissue samples (without the need for an additional Section 10 permit). NMFS must ensure that any observers employed are equipped with the tools, supplies, training, and instructions to collect and store tissue samples. Samples collected must be analyzed to determine the genetic identity of individual sea turtles, sturgeon, or smalltooth sawfish caught in the fisheries. Retrieved dead sea turtles, sturgeon, and smalltooth sawfish must not be returned to the water. All dead carcasses of sea turtles must be placed on ice and transferred to the local STSSN coordinator. All dead observed Atlantic sturgeon must be reported to Ms. Kelly Shotts (Kelly.Shotts@noaa.gov or [727] 551-5603) and carcasses must be preserved (iced or refrigerated) until sampling and disposal procedures are discussed with NMFS. All dead carcasses of smalltooth sawfish must be placed on ice and transferred to SEFSC (Dr. John Carlson).

4) SERO must collaborate with SEFSC to monitor stranding data for records showing signs of being attributed to the CMP fisheries.

5) SERO must work with the U.S. Coast Guard and to ensure at-sea enforcement of regulations during the run-around king mackerel fishery in the GOM.

6) SERO must collaborate with the SEFSC to submit an annual report to F/SER3 that includes the following information:

    a) detailed information on any take reported or observed
    b) total reported gill net effort (yards fished x soak time [days]) by fishers selected for the SDDP
    c) total reported gill net effort data from the CFLP
    d) observer coverage level obtained in the CMP gill net fisheries
    e) total observed effort
    f) observed CPUEs for species observed taken
    g) total take estimates for each species taken in the fisheries

10 Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities 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) NMFS should support in-water abundance estimates of sea turtles to achieve more accurate status assessments for these species and to better assess the impacts of incidental take in CMP fisheries.

2) NMFS should conduct or fund research or alternative methods (e.g., surveys) on the distribution, abundance, and migratory behavior of adult smalltooth sawfish off southwest Florida to better understand their occurrence in federal waters and potential for interaction with CMP fisheries.

3) NMFS should expand the SDDP's current requirement that 20% of commercial permit holders record and submit trip discard data to NMFS to 100% coverage.

4) NMFS should collect data describing Atlantic sturgeon location and movement in the Atlantic and GOM, respectively, by depth and substrate to assist in future assessments of interactions between the CMP fisheries and sturgeon migratory and feeding behavior.

11 Reinitiation of Consultation

This concludes formal consultation on the proposed action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required if 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 the taking specified in the incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, F/SER2 must immediately request reinitiation of formal consultation.

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Appendix 1. Anticipated Incidental Take of ESA-Listed Species in NMFS-Authorized Federal Fisheries in the Action Area

Table A.1. Fishery Incidental Take Authorized in the Action Area
(T = total; L = lethal; NL = nonlethal)

Fishery	ITS Authorization Period	Listed Species						
		Loggerhead	Leatherback	Kemp's Ridley	Green	Hawksbill	Atlantic Sturgeon	Smalltooth Sawfish
Dolphin, Wahoo	1 year	12 T; ≤ 2 L	12 T; ≤ 1 L	3 T combined; ≤ 1 L			-	0
GOM Reef Fish	3 years	1,044 T; ≤ 572 L	11 L	108 T; ≤ 41 L	116 T; ≤ 75 L	9 T; ≤ 8 L	-	8 NL
GOM and South Atlantic Spiny Lobster	3 years	3 NL or L	1 NL or L combined*		3 NL or L	1 NL or L combined*	-	2 NL
South Atlantic Snapper-Grouper	3 years	202 T; ≤ 67 L	25 T; ≤ 15 L	19 T; ≤ 8 L	39 T; ≤ 14 L	4 T; ≤ 1 L	-	8 NL
Southeast Shrimp	3 years	163,160 T; ≤ 3,948 L	3,090 T; ≤ 80 L	155,503 T; ≤ 4,208 L	18,757 T; ≤ 514 L	640 L	GOM DPS 156 T; ≤ 3 L NYB DPS 450 T; ≤ 9 L CB DPS 312 T; ≤ 6 L Carolina DPS 498 T; ≤ 9 L SA DPS 1,356 T; ≤ 24 L	240 T; ≤ 90 L
HMS Pelagic Longline	3 years	1,905 T; ≤ 339 L	1,764 T; ≤ 252 L	105 T combined; ≤ 18 L	-	0	-	-
HMS Shark	3 years	126 T; ≤ 78 L	18 T; ≤ 9 L	36 T; ≤ 21 L	57 T; ≤ 33 L	18 T; ≤ 9 L	GOM DPS 36 T; ≤ 9 L NYB DPS 159 T; ≤ 30 L CB DPS 45 T; ≤ 9 L Carolina DPS 18 T; ≤ 6 L SA DPS 63 T; ≤ 12 L	32 T; ≤ 7 L
Atlantic Herring	1 year	6 T; ≤ 3 L	1 NL or L	1 NL or L	1 NL or L	0	-	-
American Lobster	1 year	1 NL or L	5 NL or L	0	0	0	-	-

Fishery	ITS Authorization Period	Listed Species						
		Loggerhead	Leatherback	Kemp's Ridley	Green	Hawksbill	Atlantic Sturgeon	Smalltooth Sawfish
Tilefish	1 year	6 T; ≤ 3 L	1 NL or L	0	0	0	-	-
Atlantic Sea Scallop (Dredge)	2 years	929 T; ≤ 595 L	1 NL	2 NL or L	2 NL or L	0	-	-
Atlantic Sea Scallop (Trawl)	1 year	154 T; ≤ 20 L	1 NL	1 NL	1 NL	0	-	-
Northeast Multispecies	1 year	483 T; ≤ 239 L combined for all 7 fisheries	12 T; ≤ 9 L combined for all 7 fisheries	7 T; ≤ 5 L combined for all 7 fisheries	7 T; ≤ 5 L combined for all 7 fisheries	0	GOM DPS 285 T; ≤ 22 L NYB DPS 1,317 T; ≤ 100 L CB DPS 337 T; ≤ 27 L Carolina DPS 52 T; ≤ 5 L SA DPS 569 T; ≤ 43 L combined for all 7 fisheries	0
Monkfish	1 year							
Spiny Dogfish	1 year							
Atlantic Bluefish	1 year							
Northeast Skate	1 year							
Mackerel, Squid, Butterfish	1 year							

Fishery	ITS Authorization Period	Listed Species						
		Loggerhead	Leatherback	Kemp's Ridley	Green	Hawksbill	Atlantic Sturgeon	Smalltooth Sawfish
Summer Flounder, Scup, Black Sea Bass	1 year							