Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Southeast Regional Office (SERO), Sustainable Fisheries Division (F/SER2).

Activity: The Continued Authorization of Reef Fish Fishing under the Gulf of Mexico (GOM) Reef Fish Fishery Management Plan (RFFMP) and Proposed Amendment 23.

Consulting Agency: NOAA, NMFS, SERO, Protected Resources Division (F/SER3).

Approved by: for James E. Weaver
Roy E. Crabtree, Ph.D., Regional Administrator.

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Introduction

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires each federal agency to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or to result in the destruction or adverse modification of any designated critical habitat of such species. When the action of a federal agency may affect a species protected under the ESA, that agency is required to consult with either the NMFS or the U.S. Fish and Wildlife Service, depending on the protected species that may be affected. Formal consultations on most listed marine species are conducted between the action agency and NMFS. Consultations are concluded after NMFS issues a biological opinion. If jeopardy or destruction or adverse modification is found to be likely, the opinion must identify reasonable and prudent alternatives (RPAs) to the action, if any, that would avoid such impacts. The opinion also includes an incidental take statement (ITS) specifying the amount or extent of incidental taking that may result from the proposed action. Non-discretionary reasonable and prudent measures (RPMs) to minimize the impact of the incidental taking are included, and conservation recommendations are made. Notably, there are no RPMs associated with critical habitat, only RPAs that must avoid destruction or adverse modification.

This document constitutes the NMFS's opinion on the effects of the continued authorization of reef fish fishing in the U.S. 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. This consultation considers the operation of GOM reef fish fishery as managed under the GOM Reef Fish Fishery Management Plan (RFFMP), including all amendments implemented to date, as well as actions proposed in the "Final Draft for Amendment 23 to the RFFMP to Set Vermillion Snapper Sustainable Fisheries Act Targets and Thresholds and to Establish a Plan to End Overfishing and Rebuild the Stock, including a Final Supplementary Environmental Impact Statement and Regulatory Impact Review (FEIS)" (Amendment 23, GMFMC 2004a). The NMFS has dual responsibilities as both the action agency under the Magnuson-Stevenson Fishery Conservation and Management Act (MSFMCA) (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 is based on information provided in: Amendment 23; Amendment 24 to the GOM RFFMP, including an Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis (Amendment 24, GOM 2004b); the FEIS for the Generic Essential Fish Habitat Amendment to all GOM fishery management plans (FMPs) (GMFMC 2004c); sea turtle recovery plans; past and current sea turtle research and population modeling efforts; logbook data on fishery effort and protected species interactions in the GOM reef fish fishery; other relevant scientific data and reports; consultation with F/SER2 staff; and previous opinions on other fisheries.

1.0 Consultation History

An informal ESA section 7 consultation was conducted on the RFFMP prior to its implementation in 1984. The NMFS concluded the management measures proposed in the RFFMP were not likely to adversely affect any listed species under the ESA. The consultation, however, did not analyze the effects of the fishery itself.

The effects of the GOM reef fish fishery on endangered and threatened species were considered as part of an April 28, 1989, opinion, which analyzed the effects of all commercial fishing activities in the Southeast Region. The opinion concluded that commercial fishing activities in the Southeast Region were not likely to jeopardize the continued existence of any threatened or endangered species. The incidental take of ten Kemp's ridley, green, hawksbill, or leatherback sea turtles; 100 loggerhead sea turtles; and 100 shortnose sturgeon was allotted to each fishery identified in the ITS. The reef fish bottom longline and hook-and-line components of the GOM reef fish fishery were identified as a fishery in the ITS. The amount of incidental take was later reduced in a July 5, 1989, opinion to only ten documented Kemp's ridley, green, hawksbill, or leatherback sea turtles; 100 loggerhead sea turtles; and 100 shortnose sturgeon for *all* commercial fishing activities conducted in the Atlantic Ocean and the GOM fisheries combined.

Subsequent RFFMP Amendments 1-9, 11-16A and 16B, 17, and 19-22; 21 regulatory amendments; and two Secretarial plan amendments 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. All of these actions were found to not change the prosecution of reef fish fishery in any manner that would significantly alter the potential impacts to endangered and threatened species or their designated critical habitats previously considered in the July 5, 1989, opinion. A section 7 consultation was also initiated for Amendment 10, but was not completed because the Amendment was never submitted to the NMFS. Amendment 18 is currently under development and a section 7 consultation will be conducted at the appropriate time.

On August 25, 2004, F/SER2 sent a memorandum to F/SER3 requesting initiation of section 7 consultation on a draft version of Amendment 23 to the RFFMP. The amendment, if implemented, would establish stock status criteria, a rebuilding plan, and needed reductions in harvest for the recreational and commercial sectors of the vermilion snapper family. F/SER2 had determined that the proposed actions, expected to reduce the amount of fishing for vermilion snapper, would not have an impact not already considered under previous consultations on other fisheries and fishing techniques. F/SER2 requested F/SER3 provide an evaluation of that assessment as soon as possible. The original request was followed up with a second request on November 4, 2004, which included the final version Amendment 23 as an attachment.

As provided in 50 CFR 402.16, reinitiation of formal consultation is required when discretionary involvement or control over the action has been retained (or is authorized by law) and: (1) the amount or extent of the incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not previously considered; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action. These factors were considered by F/SER3 in determining whether section 7 consultation should be reinitiated on the proposed amendment.

The structure of the July 5, 1989, ITS makes it difficult to ascertain whether take has been exceeded by the GOM reef fishery because it did not specify individual anticipated take levels for each identified fishery. The opinion, however, did include the following qualitative assessment of the effects of the reef fish bottom longline and hook-and-line components of the reef fish fishery on sea turtles:

> "While some species of turtles are known to reside in reef habitats, we do not believe that mortalities of endangered and threatened species are common. Turtles taken on [hook-and-line] would probably be released when brought to the surface. However, some turtles could drown if captured on bottom longlines. To assess the magnitude of endangered and threatened species take in bottom longline fisheries, observer coverage is needed. This coverage, however, is not considered a high priority at this time."

Between December 1993 and July 1995, in cooperation with the commercial fishing industry and the GOM Fishery Management Council (GMFMC), the NMFS, Southeast Fishery Science Center (SEFSC) conducted a limited observer program to characterize the fish trap, bottom longline, and hand and power-assisted line (bandit reel, a type of hook-and-line gear) fisheries in the eastern U.S. GOM. No sea turtles were observed taken during that program (Scott-Denton 1996). Data from the recently implemented supplementary discard data form (see Section 2.1.2 and 5.3.2), however, confirm the vertical line (e.g., bandit gear and handline) and bottom longline components of the GOM reef fish fishery occasionally take sea turtles. Also, two lethal sea turtle takes were recently observed by Mote Marine Laboratory (MML) biologists aboard a bottom longline vessel fishing for grouper off southwest Florida. Lastly, data from the HMS shark bottom longline observer program also indicate bottom longline gear can result in the lethal take of sea turtles.

F/SER3 concurs with F/SER2's determination that modifications to the RFFMP proposed in Amendment 23 are not expected to modify fishing in a manner that causes an effect to listed species not previously considered. However, the NMFS believes the new data sources noted above warrant further analysis of GOM reef fish fishery. Also, new information on the status of ESA-listed species and the effect actions have on them has emerged in the 15 years elapsed since the last formal consultation. Thus, the environmental baseline, to which effects from the GOM reef fishery are added onto when considering overall impact to each species, has changed. Additionally, the NMFS listed the U.S. distinct population segment (DPS) of smalltooth sawfish as endangered under the ESA in April 2003. Based on the species' previous capture in bottom longline and other hook-and-line fisheries in the GOM, the NMFS believes the GOM reef fish fishery may adversely affect smalltooth sawfish.

After reviewing the factors for reinitiation, F/SER3 deems reinitiating consultation on the GOM reef fish fishery is necessary. This opinion, therefore, will analyze the effects of all reef fish fishing activities prosecuted under the RFFMP, as amended to date, and under Amendment 23.

2.0 Description of the Proposed Action

F/SER2 is proposing to implement Amendment 23 prepared by the GMFMC and the SER for the continued authorization and management of the GOM reef fish fishery. Amendment 23 would modify the RFFMP and associated regulations at 50 CFR Part 622 under the authority of the MSFCMA. Specifically, it would increase the recreational and commercial minimum size limit for vermilion snapper to 11 inches (27.9 cm) total length (TL) for both sectors, establish a 10-fish recreational bag limit for vermilion snapper within the existing 20-fish aggregate reef fish bag limit, and close the commercial vermilion snapper fishery from April 22 through May 31 each year. In addition, Amendment 23 would establish a stock rebuilding plan, biological reference points, and stock status determination criteria for vermilion snapper in the GOM. The intended effect is to end overfishing and to rebuild the vermilion snapper resource.
The MSFMCA is the principle federal statute governing the management of U.S. marine fisheries. The MSFMCA directs regional fishery management councils to adopt conservation and management measures that prevent overfishing while continuously achieving optimum yield (OY) from managed fisheries (MSFCMA §301(a)(1)). To assist the regional fishery management councils in achieving this mandate, FMPs are required to specify biological

reference points and status determination criteria for managed species. These criteria are intended to provide managers with the means to measure the status and performance of a fishery and to allow managers to assess whether management measures are achieving established goals.

Implementation of Amendment 23 is necessary to bring the vermilion snapper fishery into compliance with the requirements added to the MSFMA through the 1996 Sustainable Fisheries Act (SFA). The GMFMC previously defined biological reference points (maximum sustainable yield (MSY and OY) and status determination criteria (minimum stock size threshold (MSST) and maximum fishing mortality threshold (MFMT)) for vermilion snapper in the 1999 Generic SFA amendment. However, those criteria, except MFMT, were disapproved because they were not biomass-based. Additionally, on October 30, 2003, the NMFS determined that the GOM vermilion snapper fishery was overfished and undergoing overfishing. Under section 304(e)(3) of the MSFCMA, the GMFMC is required to prepare a plan to end overfishing and rebuild the stock within one year of that determination.

When consulting on FMP actions, the NMFS must consider not only the effects of the specific management measures proposed but also the effects of all fishing activity authorized under the FMP. A detailed description of the GOM vermilion snapper fishery is provided in Section 5.4 of Amendment 23. The vermilion snapper fishery, however, is only a minor component of the GOM reef fish fishery. For example, vermilion snapper comprises less than 10% of total reef fish landings (GMFMC 2004a). Although some commercial and recreational vessels do target vermilion snapper, they more frequently target other reef fish species. The following subsections, therefore, are not specific to the vermilion snapper fishery. Instead, they provide a summary of the overall characteristics of the GOM reef fish fishery authorized under the RFFMP relevant to the analysis of its potential effects on threatened and endangered species. Information was extracted mainly from the June 2004 GOM EFH FEIS and the December 2004 Draft of the Final Amendment 24 to the RFFMP. The proposed action considered in Amendment 24 is not part of this consultation and will be consulted on separately prior to approval by the Secretary of Commerce.

2.1 Overview of Management and Regulations

The GOM reef fish fishery represents the first target fishery of any consequence for demersal or pelagic fish in the GOM. The first accounts record their exploitation in an organized fashion starting in the 1850s. Originally, the emphasis centered on snapper, particularly red snapper, and grouper catches were mainly treated as a by-product and sold at a much lower price. However, as a result of the leveling off of snapper catches and growing consumer recognition of grouper as a delectable item, groupers and snappers became generally interchangeable in the marketplace by the mid- to late 1960s. As fishers extended geographically and particularly with the advent of the sizeable recreational fishery, so did the composition of the catch, and today the overall directed incidental reef fish catch includes, snappers, groupers, and other reef fish species. Although these species differ substantially in morphology, range, habitat, behavior, and stock, these species are all caught by similar methods and can be logically considered one single fishery for management purposes (GMFMC 1981).

The RFFMP was one of the first FMPs developed by the GMFMC. Implementation of the RFFMP was initiated in November 1984. Reef fish identified and managed under the original RFFMP included 14 species of snappers (*Lutjanidae* Family), 15 species of groupers (*Serranidae* Family), and three species of sea basses *(Serranidae* Family). Subsequent amendments to the RFFMP added five species of tilefish (*Branchiostegidae* Family), two species of jacks (*Carangidae* Family), white grunt *(Haemulon plumieri*), red porgy (*Pagrus pagrus*), and gray triggerfish (*Balistes capriscus*). Grouper species are divided into two management units: the shallow-water grouper management unit, including black grouper, gag grouper, red grouper, Nassau grouper, yellowfin grouper, yellowmouth grouper, rock hind, red hind, speckled hind, and scamp (until the shallow-water grouper quota is filled); and the deep-water grouper management unit, defined as misty grouper, snowy grouper, yellowedge grouper, warsaw grouper, and scamp (once the shallow-water grouper quota is filled).

The primary problem identified in the original RFFMP was that a substantial decline in reef fish stocks had occurred in some areas under jurisdiction of the GMFMC. Overfishing in many areas of the GOM by both directed recreational and commercial users was identified as a known factor in the decline. Other factors identified as potentially contributing to the decline in reef fish stocks included: (1) A reduction in habitat from both natural and man-made causes; (2) a large bycatch in other fisheries; and (3) major environmental changes. Expanded competition between users competing for the resource and the space the resource occupies was also identified as a problem. The RFFMP attributed this to: (1) Increasing fishing effort and the concentration of that effort in localized areas; (2) increasing fishing effort in other fisheries that have a bycatch of reef fish; (3) declining catch per unit effort in some areas; and (4) introduction of new gear.

The goal of the RFFMP was "[t]o manage the reef fish fishery of the United States waters of the Gulf of Mexico to attain the greatest overall benefit to the Nation with particular reference to food production and recreational opportunities on the basis of maximum sustainable yield as modified by relevant economic, social or ecological factors (GMFMC 1981)." Specific objectives in the RFFMP included: (1) To rebuild the declining reef fish stocks wherever they occur within the fishery; (2) to conserve and to increase reef fish habitats in appropriate areas and to provide protection for juveniles while protecting existing and new habitats; and (3) to minimize user conflicts between user groups of the resource and conflicts for space. RFFMP regulations, designed to rebuild declining reef fish stocks, included: (1) prohibitions on the use of fish traps, roller trawls, and powerhead-equipped spear guns within an inshore stressed area; (2) a minimum size limit of 13 inches total length (TL) for red snapper with exemptions for for-hire boats until 1987, and a 5 undersized fish limit per angler; and (3) data reporting requirements. Since implementation of the original RFFMP, a large number of amendments have been implemented to achieve the goals and objectives set forth in the RFFMP and as modified in various amendments. Management objectives are listed in Table 2.1 (pg. 7) and reference the FMP or amendment establishing the respective objectives.

Table 2.1 RFFMP Management Objectives

Management Objective	FMP/Amendment
1. Rebuild the declining reef fish stocks wherever they occur within the fishery.	Original FMP November 1984
2. Establish a fishery reporting system for monitoring the reef fish fishery.	Original FMP
3. Conserve reef fish habitats and increase reef fish habitats in appropriate areas and provide protection for juveniles while protecting existing and new habitats.	Original FMP
4. Minimize conflicts between user groups of the resource and conflicts for space.	Original FMP
5. Stabilize long-term population levels of all reef fish species by establishing a certain survival rate of biomass into the stock of spawning age to achieve at least 20% spawning stock biomass per recruit.*	Amendment 1 January 1990
6. To reduce user conflicts and nearshore fishing mortality [modifies Objectives 4].	Amendment 1
7. To re-specify the reporting requirements necessary to establish a data for monitoring the reef fish fishery and evaluating management actions [modifies Objective 2].	Amendment 1
8. To revise the definitions of the fishery management unit and fishery to reflect the current species composition of the reef fish fishery.	Amendment 1
9. To revise the definition of optimum yield to allow specifications at the species level.	Amendment 1
10. To encourage research on the effects of artificial reefs.	Amendment 1
11. To maximize net economic benefits from the reef fish fishery.	Amendment 1
12. To avoid to the extent practicable the "derby" type of fishing season.	Amendment 8 July 1995
13. To promote flexibility for the fishermen in their fishing operations.	Amendment 8
14. To provide for cost-effective and enforceable management of the fishery.	Amendment 8
15. To optimize net benefits to the fishery [modifies Objective 11].	Amendment 8

*Identified as the primary objective of the RFFMP

Numerous permit and reporting requirements, commercial and recreational species regulations, gear restrictions, and other miscellaneous regulations have been implemented over the years to manage the GOM reef fish fishery. Federal fishing permits are required for any vessel engaging in commercial fishing for GOM reef fish in the EEZ. A moratorium on these permits has been in place since May 1992. The RFFMP also includes an endorsement and license limitation for red snapper, a moratorium on fish trap endorsements, and scheduled phaseout of fish traps by 2007.

On July 29, 2002, a 3-year moratorium on permits for charter and headboat fishing in the recreational for-hire fisheries in the GOM was also established. Regulations for many of the species in the GOM reef fish management unit in place today include minimum size limits, recreational bag limits, commercial trip limits, quotas, and various time, area, and/or gear-based fishing prohibitions and restrictions. Certain species in the fishery are managed individually (e.g., red snapper, vermilion snapper, and greater amberjack), while others are managed within groups or complexes (e.g., shallow-water grouper, deep-water grouper, tilefishes). Commercial reef fish fisheries are managed primarily using "hard quotas" (i.e., fishery closures when monitoring indicates commercial quotas are harvested). Quotas have been established for shallow-water grouper, red grouper, deep-water grouper, and red snapper. Recreational reef fish fisheries are managed primarily using minimum size limits and bag limits, but other regulations apply as well. A complete history of management of the reef fish fishery is provided in Appendix A. A summary of permit and reporting requirements, commercial and recreational species regulations, gear restrictions, and area closure regulations are provided in the following tables (i.e., Tables 2.2 through 2.5, pp. 8-12). Measures proposed in Amendment 23 are included in italics on Tables 2.3 and 2.4 (pp. 9-10). Also, Figure 2.1 (p. 12) depicts GOM seasonal and year-round closures affecting the GOM reef fish fishery described in Table 2.5 (p. 11). All of these regulations may be reviewed at 50 CFR Part 622.

Table 2.2 RFFMP Permit and Reporting Requirements

Permit Type	Activity Required For
Reef fish permit	Harvest and sale of all reef fish listed in the RFFMP under quota (where applicable) and in excess of the bag limits (where applicable), except goliath grouper and Nassau grouper (for which all harvest is prohibited). Issuance of new reef fish permits is under a moratorium until December 31, 2005. Existing permits are transferable.
Red snapper Class 1 or 2 license	A Class 1 red snapper license is required in addition to a reef fish permit to harvest red snapper at the 2,000-pound trip limit. A Class 2 red snapper license is required in addition to a reef fish permit to harvest red snapper at the 200-pound trip limit. Other reef fish permitted vessels are prohibited from commercial harvest. No new red snapper licenses are being issued, but existing red snapper licenses are transferable Required in addition to a reef fish permit to harvest reef fish using fish traps. No new fish trap endorsements are being issued. Endorsements are non-transferable except to another vessel owned by the endorsement holder, immediate family members or in case of death or disability of the endorsement holder. After February 7, 2007, all fish trap endorsements become invalid and the use of fish traps to harvest reef fish will be prohibited.
Fish trap endorsement	Required in addition to a reef fish permit to harvest reef fish using fish traps. No new fish trap endorsements are being issued. Endorsements are non-transferable except to another vessel owned by the endorsement holder, immediate family members or in case of death or disability of the endorsement holder. After February 7, 2007, all fish trap endorsements become invalid and the use of fish traps to harvest reef fish will be prohibited.
Charter vessel/headboat reef fish permit	Charter vessels and headboats fishing for snappers, groupers, amberjack, tilefish, hogfish, and gray triggerfish. Issuance of new permits is under moratorium effective June 16, 2003.
*Current regulations (50 CFR Part 622.5) require commercial and recreational for-hire participants in the GOM reef fish fishery who are selected by the Southeast Science and Research Director (SRD) to maintain and submit a fishing record on forms provided by the SRD.	

Table 2.3 GOM Commercial Reef Fish Species Regulations

Species	Minimum Size Limit (unless otherwise noted)	Trip Limit	Quotas/Closed Seasons
<u>Snappers</u> Red Snapper	15" total length	2,000 lbs./trip with Class 1 red snapper license. 200 lbs./trip with Class 2 red snapper license. Commercial harvest prohibited without a Class 1 or 2 red snapper license in addition to a reef fish vessel permit.	Quota = 4.65 million lbs. - 3.10 million lbs, round wt., on a Feb. 1 opening (open first 10 days of each month until sub-quota filled), remainder on a Oct. 1 opening (open first 10 days of each month until sub-quota is reached).
Vermilion* Lane Gray (Mangrove) Mutton Yellowtail Mahogany Schoolmaster Dog Cubera Blackfin, Queen Silk, Wenchmen	10" total length (*11" total length*) 8" total length 12" total length 16" total length 12" total length 12" total length 12" total length 12" total length 12" total length None, None None, None	None None None None None None None None None None, None None, None	(*April 22 to May 31 closed season proposed*)
<u>Deep-Water Groupers</u> Misty Snowy Yellowedge Warsaw Speckled Hind Scamp*	None None None None None None	None None None None None None	Quota: 1.02 million lbs. gutted weight *Includes scamp after shallow-water grouper quota is filled
<u>Shallow-Water Groupers</u> Black Gag Red Yellowfin Scamp Yellowmouth Rock Hind Red Hind <u>Protected Groupers</u> Goliath Grouper (Jewfish) Nassau grouper	<u>Shallow-Water Groupers</u> Black Gag Red Yellowfin Scamp Yellowmouth Rock Hind Red Hind Harvest prohibited		quota: 8.80 million lbs. gutted weight for all shallow-water groupers in aggregate A red grouper quota of 5.31 mp gutted weight is included in the shallow-water grouper quota. Shallow-water grouper quota closure occurs when either the shallow-water grouper or red grouper quota is reached, whichever occurs first. Seasonal closure on commercial harvest and a prohibition on sale of gag, black, and red grouper from February 15th to March 15th.
Gray Triggerfish	12" total length	None	None
Hogfish	12" fork length	None	None
Greater amberjack	36" fork length	None	Closed season during March, April, and May
Lesser Amberjack Banded Rudderfish	14" to 22" fork length slot limit	None	None
Tilefishes	None	None	0.44 million lbs. (gutted weight)

Table 2.4 Recreational Species Regulations

Species	Minimum Size Limit (Unless otherwise indicated)	Closed Season	Recreational Daily Bag and Possession Limit
Snappers Red Snapper	16" total length	Season to open at 12:01 AM April 21 and close at 12:00 midnight October 31	4/person
Vermilion Lane	10" total length *(11" total length)* 8" total length	None None	Included in the 20 reef fish aggregate limit Included in the 20 reef fish aggregate limit
Gray Mutton Yellowtail Schoolmaster Cubera Dog Queen Mahogany Blackfin Silk Wenchman	12" total length 16" total length 12" total length 12" total length 12" total length 12" total length 12" total length None None None None	None None None None None None None None None None None	10/person in aggregate bag limit, including all snappers except red, vermilion, and lane. (*vermilion proposed to be included*)
Groupers Black Gag Red Yellowfin Scamp Yellowmouth Rock Hind Red Hind Yellowedge Misty Snowy Speckled Hind Warsaw Protected Groupers Goliath Grouper (Jewfish) Nassau Grouper	 22" total length 22" total length 20" total length 20" total length 16" total length None None None None None None None None Harvest Prohibited	 None None None None None None None None None None None None None	5/person in aggregate of all groupers except goliath grouper and Nassau grouper. No more than 2 red grouper/person (counts as part of the 5 grouper aggregate bag limit). I speckled hind and 1 warsaw grouper per vessel (counts as part of the 5 grouper aggregate bag limit).
Hogfish	12" fork length	none	5/person
Gray Triggerfish	12" total length	none	Included in 20 reef fish aggregate limit.
Greater Amberjack	28" fork length	none	1/person
Lesser Amberjack Banded Rudderfish	14" to 22" fork length slot limit	none	5-fish aggregate limit for lesser amberjack and banded rudderfish, excluded from 20 reef fish aggregate limit
Aggregate Reef Fish Bag Limit Species Vermilion Snapper, Goldface Tilefish, Tilefish Lane Snapper, Almaco Jack, Blackline Tilefish Gray Triggerfish, Anchor Tilefish, Blueline Tilefish			20/person of all listed species in aggregate

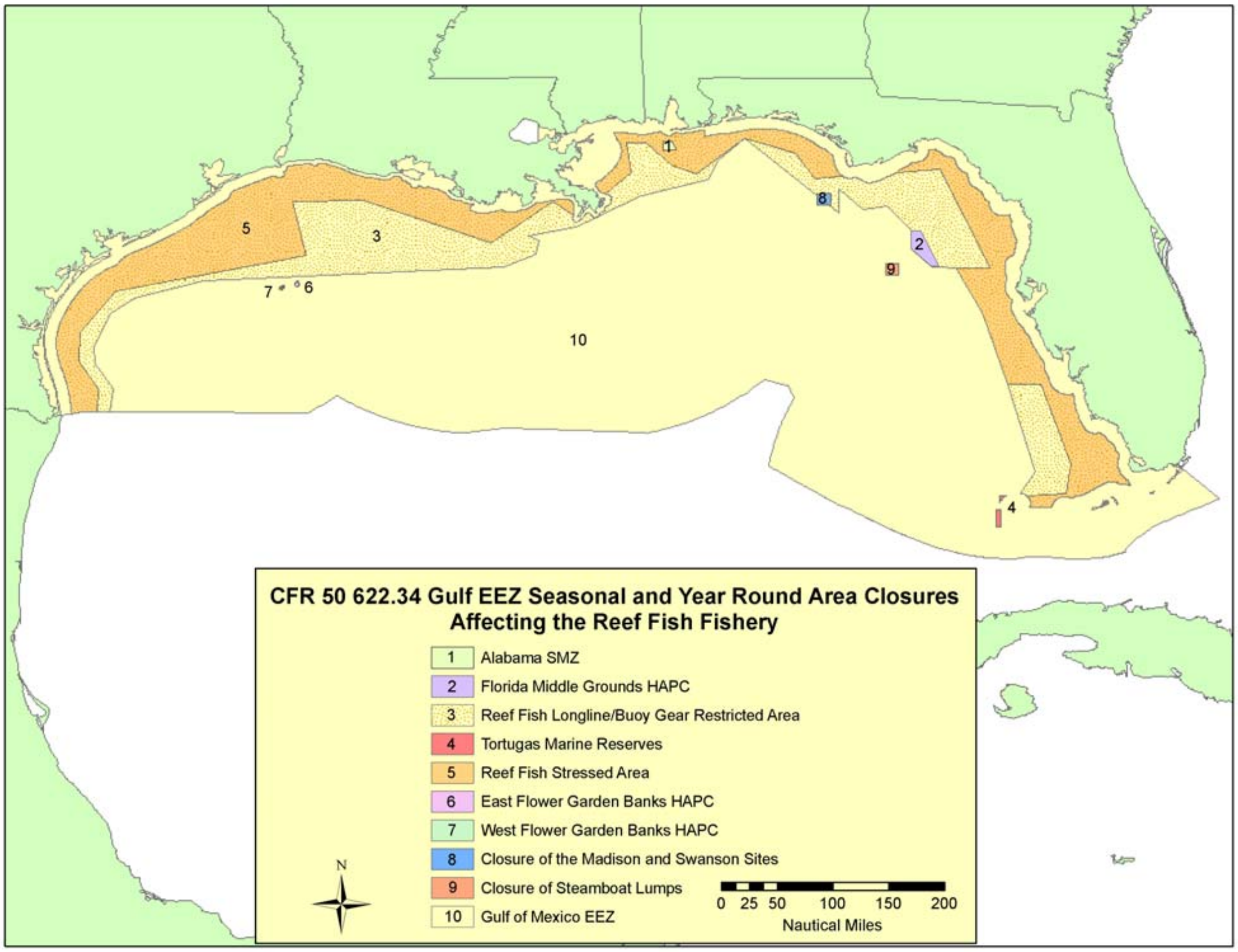
Reef fish taken under the recreational bag limit may not be sold.
All fish except for bait and oceanic migratory species taken from federal waters must have heads and fins intact through landing. Up to 1½ pounds of finfish per person is exempt from the head and fins intact rule for personal consumption provided the vessel is equipped to cook such finfish.
Persons on qualified charter vessels or headboats with two captains for trips in excess of 24 hours may possess 2 days' bag limits of reef fish species. 1-day bag limits apply on all other species and trips regardless of length.

Table 2.5 Gear Restrictions and Area Closures Affecting the GOM Reef Fish Fishery

Gear Restrictions and Area Closures
Reef fish gear is limited to no more than 3 hooks in a special management zone off Alabama*. Nonconforming gear is restricted to bag limit or for reef fish without a bag limit to 5% by weight of all fish aboard.
Use of fish traps, roller trawls, and power heads is prohibited in designated "stressed areas". Stressed areas* for reef fish begin at the shoreward boundary of federal waters and generally follow the 10 fathom contour from the Dry Tortugas to Sanibel Island; the 20 fathom contour to Tarpon Springs; the 10 fathom contour to Cape San Blas; the 25 fathom contour to south of Mobile Bay; the 13 fathom contour to Ship Island, Mississippi; the 10 fathom contour off Louisiana; and the 30 fathom contour off Texas.
The use of longlines and buoy gear for reef fish is prohibited inside of lines approximating 50 fathoms west and 20 fathoms east of Cape San Blas, Florida*. Vessels fishing within this zone and possessing longlines or buoy gear may not exceed the recreational bag limits and for reef fish without bag limits, 5% by weight of all fish aboard.
Entangling nets may not be used for directed harvest of reef fish
Vessels with shrimp trawls or entangling net gear aboard may not exceed the recreational reef fish bag limits.
Vessels fishing traps other than fish traps, stone crab traps, or spiny lobster traps may not exceed the recreational reef fish bag limits.
Vessels with reef fish trap endorsements are limited to 100 traps. Traps must be returned to shore at the end of each trip and must have degradable panels, mesh no smaller than 1" x 2", 1.5" hexagon, or 1.5" by 1.5". Inside 300' contour, traps may not exceed 33 cu. ft. Two 2" x 2" escape windows required on two sides excluding the bottom (4 openings). Hinges and fasteners of degradable panel or access door must be constructed of either untreated jute string of no more than 3/16" diameter or magnesium alloy. Buoy and trap identification required. Traps (or the ends of a string of traps) must be buoyed and may not be tended at night. Pop-up buoys are prohibited. Fish traps will be phased out after 2007
Bottom longlines and traps, as well as other gears not used by reef fish fishers are prohibited year-round in the Florida middle grounds habitat area of special concern*.
Fishing for any species and anchoring by fishing vessels is prohibited in the Tortugas marine reserves*.
No person may fish within Madison and Swanson sites or Steamboat Lumps* for any species of fish except highly migratory species (i.e., oceanic sharks, tunas, swordfish, billfish)

*See Figure 2.1 for a map of these areas.

Figure 2.1 GOM EEZ Seasonal and Year-Round Area Closures Affecting the GOM Reef Fish Fishery



2.1.1 Management of GOM Reef Fish Exempted Fishing, Scientific Research and Exempted Educational Activity

Regulations at 50 CFR 600.745 allow the Regional Administrator of the NMFS's SERO 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, the SERO may issue a small number (e.g., five in 2004, none in 2003) of exempted fishing permits (EFPs), scientific research permits (SRPs), and/or exempted educational activity authorizations (EEAA) exempting the collection of a limited number of reef fish from GOM federal waters from regulations implementing the RFFP. These EFPs, SRPs, and EEAAs involve fishing by commercial or research vessels, similar or identical to the fishing methods of the GOM reef fish fishery, which is the primary object of this opinion. In these cases, the types and rates of interactions with listed species from the EFP, SRP, and EEAA activities would be expected to be similar to those analyzed in this opinion. If the fishing type is similar and the associated fishing effort does not represent a significant increase over the effort levels for the overall fishery considered in this opinion, then issuance of some

EFPs, SRPs, and EEAAs would be expected to fall within the level of effort and impacts considered in this opinion. For example, issuance of an EFP to an active commercial vessel likely does not add additional effects than would otherwise accrue from the vessel's normal commercial activities. Similarly, issuance of an EFP, SRP, or EEAA to a vessel to conduct a minimal number of reef fish trips with vertical line (commercial or recreational) or bottom longline gear likely would not add sufficient fishing effort to produce a detectable change in the overall amount of fishing effort in a given year. Therefore, we consider the issuance of most EFPs, SRPs, and EEAAs by the SERO to be within the scope of this opinion. The included EFPs, SRPs, and EEAAs would be those involving fishing consistent with the description of reef fish fishing in Section 2 and not expected to increase fishing effort significantly.

2.1.2 GOM Reef Fish Fishery Monitoring and Reporting

As noted in Table 2.2 (p. 8), current regulations (50 CFR Part 622.5) require GOM reef fish fishery commercial and recreational for-hire participants selected by the Southeast Science and Research Director to maintain and to submit a fishing record on forms provided by the SRD (i.e., a logbook). Private and charter recreational participants in the GOM reef fish fishery are monitored mainly by the Marine Recreational Fishery Statistics Survey (MRFSS). Information describing monitoring and reporting by vessel type is presented below.

Commercial vessels
Logbook reports have been required of all vessels with GOM reef fish permits for commercial fishing for GOM reef fish since 1993. Catch and effort data per trip is reported via the Coastal Fisheries Logbook Program (CFLP). Information on the quantity (reported in pounds) caught for each species, the area of catch, the type and quantity of gear, the dates of departure and return, the dealer and location (county and state where the trip is unloaded), the duration of the trip (time away from dock), an estimate of the fishing time, and the number of crew is required.

In August 2001, the SEFSC initiated the Supplementary Discard Data Program (SDDP) to address bycatch reporting in Southeast fisheries (Poffenberger 2004). The SEFSC developed a supplemental form that is used with the CFLP to collect discard data as mandated by the Sustainable Fisheries Act. Commercial reef fish fishers are now required, if selected, to report the number and average size of fish being discarded by species and the reasons for those discards (regulatory or market conditions). The bycatch data are collected using a supplemental form sent to a stratified, random sample of the commercial reef fish permit holders (20% coverage). Sample selections are made in July of each year, and the selected fishermen (vessels) are required to complete and to submit discard forms along with their logbook forms for each trip they make during August through July of the following year. The sampling system is designed so that the 20% of fishermen selected to report for a given year are not selected for the next four years so that over the course of a 5-year period, 100% of reef fish permit holders will have been required to report in one of the five years. Failure to comply with reporting requirements can result in sanctions precluding permit renewal.

For-hire charter vessels and private recreational fishing vessels
Harvest and bycatch in the recreational for-hire charter vessel sector and the private recreational sector have been consistently monitored since 1979. Monitoring is accomplished primarily

through MRFSS and the Texas Parks and Wildlife Department's Coastal Sport Fishing Survey[1]. The survey uses a combination of random-digit-dialed telephone intercepts of coastal households for effort information and dock-side intercepts of individual trips for catch information to statistically estimate total trips, catch, and discards by species, for each subregion, state, mode, primary area and wave.[2] Bycatch is enumerated by a disposition code for each fish caught but not kept. Texas conducts its own survey, which provides similar data.

Prior to 2000, sampling of the charter vessel sector resulted in highly variable estimates of catch. In 2000, however, a new charter vessel sampling methodology was implemented. A 10% sample of charter vessel captains is called weekly to obtain trip level information. In addition, the standard dockside intercept data are collected from charter vessels, and charter vessel clients are sampled through the standard random digit dialing of coastal households. Precision of charter vessel effort estimates has improved by more than 50% due to these changes (Van Voorhees et al. 2000).

For-hire headboats
Harvest from headboats has been monitored by the NMFS, SEFSC, Beaufort Laboratory since 1986, but no bycatch information is routinely collected. Prior to 1986, headboats were monitored through the MRFSS. Daily catch records (trip reports) are filled out by headboat operators; or, in some cases, by the NMFS-approved headboat samplers based on their personal communications with captains or crew. Headboat samplers sub-sample headboat trips for data on species' lengths and weights. Biological samples (scales, otoliths, spines, gonads, and stomachs) are taken as time permits. Occasionally, onboard headboat samplers will record lengths of discarded fish; however, these trips are rare, and the data do not become part of the headboat database.

Future expansion of monitoring and reporting methodologies
The NMFS recently approved Amendment 22, which contains two preferred alternatives for improving bycatch reporting methodologies for the commercial and for-hire recreational fisheries. The preferred alternatives direct the NMFS to develop and manage an observer program for the reef fish fishery, and to enhance MRFSS by including headboats using the same sampling methodology as used for charter vessels. The NMFS will develop a random selection procedure for determining vessels that will be required to carry observers in order to collect bycatch information. In selecting vessels, the NMFS will consider the suitability of the vessel for such purpose and ensure that the universe of vessels included are representative of all statistical sub-zones in the GOM. Implementation of the observer program will be initiated as soon as the NMFS obtains sufficient funding for the program.

2.2 Status of Reef Fish Stocks

Of the 42 species managed by the GOM RFFMP, 14 are classified as major stocks, with landings greater than 200,000 pounds annually (NMFS 2004a). Nine of the fourteen major stocks managed by the GOM RFFMP species have had stock assessments performed by the NMFS (red

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[1]MRFSS covers all GOM states except Texas
[2] Waves are two-month sampling periods.

grouper, gag, goliath grouper, yellowedge grouper, red snapper, vermilion snapper, yellowtail snapper, greater amberjack, gray triggerfish, and hogfish). Four of these stocks are classified by the NMFS as overfished (red snapper, vermilion snapper, greater amberjack, and goliath grouper). Rebuilding plans for greater amberjack and red snapper have been implemented. Vermilion snapper and revised red snapper rebuilding plans are proposed in Amendments 22 and 23. While no formal rebuilding plan has been implemented for goliath grouper, current regulations prohibit the harvest of this species. The other five stock assessments have indicated species are either not considered overfished or are in an unknown condition. Red grouper is no longer considered overfished because the stock size is estimated to be above MSST; however, it is still under a rebuilding plan because the stock size has not reached the level associated with maximum sustainable yield. Gag grouper was recently reclassified from "not overfished but approaching an overfished condition" to "neither overfished nor undergoing overfishing". An assessment of yellowtail snapper indicated the stock was not overfished or undergoing overfishing. Stock assessments were not able to resolve the status of the gray triggerfish, and yellowedge grouper stocks. Therefore, these stocks were classified as "unknown" for both overfished and overfishing status.

The 28 species in the GOM RFFMP management unit whose status has not yet been discussed are considered minor stocks, with landings of less than 200,000 pounds annually (NMFS 2004a). With the exception of hogfish and Nassau grouper, the status of these remaining reef fish species have not been assessed and so are classified as unknown. A stock assessment was conducted for hogfish, but the species' overfished and overfishing status is still classified as unknown because the stock assessment did not resolve its status. In contrast, while no assessment was conducted on Nassau grouper due to insufficient data, landing trend data was sufficient to categorize this stock as overfished. To protect the stock, harvest has been prohibited.

Many of the reef fish stock assessments and reviews can be found online at the Council's website (www.gulfcouncil.org). In addition, Southeast data, assessment, and review (SEDAR) workshop products can be viewed on the SEFSC's website (www.sefsc.noaa.gov). More complete descriptions of the stock status for some of these species are also provided in the EFH EIS (GMFMC 2004c), and Amendment 22 and 23 (GMFMC 2004d and GMFMCa).

2.3 Description of the GOM Reef Fish Fishery

The GOM reef fish fishery is comprised of both commercial and recreational participants. As noted in Section 2.1, federal fishing permits are required for any vessel engaging in commercial fishing for GOM reef fish in the EEZ. In 2004, there were 1,129 commercial reef fish permitted vessels (GMFMC 2004b). Not all permits are used for reef fish fishing on an annual basis. For example, in 2003, 687 vertical line vessels, 140 longline vessels, and 36 trap vessels had commercial reef fish landings (GMFMC 2004b). Longline vessels average 42 to 44 feet in length, vertical line vessels average 35 to 36 feet in length, and fish trap vessels average 38 feet in length (GMFMC 2003). The recreational component of the GOM reef fish fishery includes charter boats,[3] headboats,[4] (i.e., party boats), and private or rental boats. Charter boats and

[3] Charter boats are generally defined as for-hire vessels with a fee charged on a small group basis. Charter boats usually carry six or fewer passengers. [4] On next page.

headboats are also required to have a permit in order to fish for reef fish. As of November 27, 2004, there were 1,551 GOM reef fish charter vessel/headboat moratorium active permits (SERO permit database). Private recreational anglers are not permitted. For 2003, MRFSS data estimates 3.3 million in-state anglers fished for marine species in the GOM. The three species most commonly caught on GOM trips fishing primarily in federally managed waters were white grunt, red snapper, and black sea bass, all of which are included in the GOM reef fish management unit.

Participants in the GOM reef fish fishery primarily target snappers and groupers. Red and gag grouper, red and vermilion snapper, and greater amberjack are the most commonly targeted reef fish species by both commercial and recreational fishermen. The grouper fishery occurs along the northeastern GOM coast primarily along the west coast of Florida (Turner et al. 2001; NMFS SEFSC 2002). Shallow-water grouper fishing is concentrated in federal waters 40 fathoms or less, whereas deep-water grouper fishing extends beyond 40 fathoms to out as far as 100 fathoms. The snapper fishery occurs along the northern and western GOM coast, in federal waters generally less than 33 fathoms (A. Strelcheck, pers. comm. 2004). Louisiana and Texas account for a majority of the commercial snapper landings, while west Florida and Alabama account for a majority of the recreational snapper landings (Schrippa and Legault 1999; Porch and Cass-Calay 2001).

Reef fish fishing generally occurs year-round. The commercial fishing season for quota-managed species (shallow-water grouper, red grouper, deep-water grouper, and red snapper), however, depends in part on the amount of time it takes to reach their quota. For example, fishing days were reduced from 365 days in 1990 to 95 days by 1992 (GMFMC 2004a). For 1992 through 1995, fishing days ranged from 52 to 95 days, distributed mostly among only three to four months. Red snapper fishing is now managed using seasonal closures, spreading the quota out throughout the year. The commercial red snapper fishery is closed during the month of January and, thereafter, only allowed during the first ten days of each consecutive month until the quota is achieved. The quota is divided into thirds; two-thirds of the quota may be captured from February through September, and the remaining third is provided for capture from October through December. In 2003, this resulted in fishing days being distributed among ten months (GMFMC 2004a). Select species also have commercial seasonal closures to protect them during their spawning season. Commercial fishers, however, typically will fish for other species during red snapper or seasonal closures. The only recreational seasonal closure is for red snapper: from January 1 through April 20, and from November 1 through December 31. This closure does not keep recreational fishermen from targeting red snapper, but only from keeping them.

Commercial federal fishermen utilize a variety of gears to harvest reef fish, including: bottom longline, vertical line gear (handline and bandit gear), fish traps, and spearfishing (see 2.3.2 for gear descriptions). Overall, vertical line gear is the predominantly used for snapper and for grouper trips (GMFMC 2004c). Of the 14,553 average annual number of trips taken for snapper and/or grouper, approximately 80% used vertical lines, 12% used longlines, 5% used traps, and

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[4] Headboats and party boats operate on a for-hire basis but with a per-person base fee charged. Party boats are large and will carry as many passengers as possible to maximize income. They usually operate on a schedule but require a minimum number of passengers in order to make a trip.

only 3% used spearfishing gear. The west Florida shelf is the area with the highest level of effort for these gears. In the northern GOM, commercial catches differ by gear with vessels using vertical lines catching primarily snapper (red and vermilion) and vessels using bottom longlines catching primarily deep-water groupers. Vessels in the eastern GOM use bottom longlines, vertical lines, and fish traps to catch primarily groupers. Based on 1993-2001 logbook data, the average annual number of trips reporting the harvest of grouper using bottom longlines (1,161 trips) is relatively small when compared to vertical lines (7,650 trips). However, based on catch data from that same time period, the annual catch of grouper by the use of longlines generally exceeds that of vertical lines by 30% to 50%. This differential reflects the significantly higher catch per trip for longline trips when compared to handline trips. Trips reporting the catch of grouper with traps fell sharply during the 1993-2001 period from 1,103 in 1993 to only 446 trips in 2001 (GMFMC 2004c). This reduction likely reflects the ten-year phaseout of traps by 2007.

From 1990 through 2003, commercial fishing vessels landed an annual average of 21.0 million pounds (MP) whole weight (WWT) of GOM reef fish species, with an annual ex-vessel value of $38.7 million.[5] For the same period, the commercial fishery landed an annual average of 8.97 MP WWT of shallow-water grouper, of which 68% was red grouper, 23% was gag, and the rest was other shallow-water grouper species. Deep-water grouper landings averaged 1.32 MP WWT during this same time period, of which 71% was yellowedge grouper. Commercial snapper landings averaged 8.18 MP WWT, of which 48% was red snapper, 25% was vermilion snapper, and 19% was yellowtail snapper. Average annual landings of jacks were 1.65 MP WWT, of which 96% was greater amberjack. The remainder of reef fish landings amounted to an annual average of 0.89 MP or 4% of the total reef fish landings for this period (GMFMC 2004b).

Reef fish are also an important part of recreational fishing in the GOM. Recreational anglers primarily use rod-and-reel gear and, to a much lesser degree, spear guns and powerheads to harvest reef fish. The majority of charter/headboat permitted vessels are home ported in Florida (966), followed by Texas (226), Alabama (142), Louisiana (125), and Mississippi (73) (R. Sadler, Southeast Regional permit database as of November 27, 2004). From 1990 through 2002, an average of 17.9 million private boat and charter fishing trips occurred, of which 3% to 5% targeted GOM reef fishes. During this time period, recreational anglers harvested greater than 13.0 MP of reef fish annually.[6] Red snapper, gag, red grouper, and greater amberjack were the most commonly harvested species (GMFMC 2004b). Recreational landings represent a significant part of landings for each of these species and have exceeded commercial landings during much of the 1990-2002 period for red snapper and during all but one year for gag grouper.

2.3.1 Gear Type Descriptions and Techniques

Vertical line gear

Vertical gear includes handline, bandit gear, and rod and reel. These gears are defined at 50 CFR Part 622.2. Handline is defined as a line with attached hook(s) that is tended directly by hand.

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[5] Commercial landings data are from the SEFSC's Accumulated Landings Database. Landings include all waters of the GOM and Monroe County.

[6] Recreational landings data are from the MRFSS and Texas Parks and Wildlife Department.

Bandit gear is defined as a rod and reel that remains attached to a vessel when in use from which a line and attached hook(s) are deployed.   Rod and reel refers to a rod and reel that is not attached to a vessel or, if attached, is readily removable. In the case of both bandit gear and rod and reel, the line is payed out from and retrieved on the reel manually, electrically, or hydraulically.

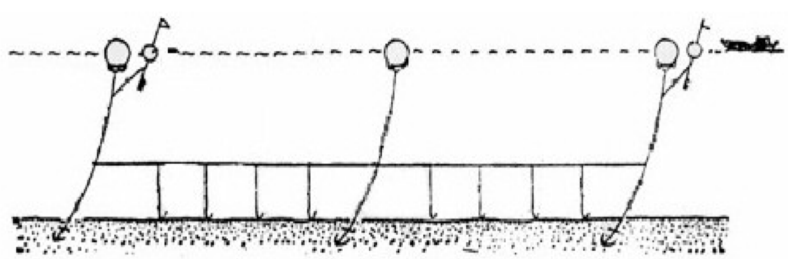
Vertical gear fishers rely on finding concentrations of fish within the range of attraction of the few hooks on vertical gear. Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus fishing generally occurs over hard bottom areas (GMFMC 2004c).

Hook sizes used on vertical line depend somewhat on the species fished for and the depth fished. Commercial fishermen frequently use Mustad #39965, 13/0 offset hooks (formerly #5) for shallow-water grouper (Dunzier, pers. comm. 2004), larger hooks (15/0 and 16/0 hooks) for deep-water grouper and golden tilefish, and smaller hooks are used for snapper (Bergmann, pers. comm. 2004).

Recreational fishers typically use rod and reel gear. Fishing tackle and techniques vary depending on the skill of the angler, the fish target and size, and water depth. Anglers fishing in deep water typically use 30-lb test monofilament line with 10 to 15 feet long 40- to 60-lb test monofilament line leaders, and 7/0 hooks (e.g. Mustad #92677) (Poveromo 1998). Anglers fishing in more shallow water typically 20-lb test, with 4 to 8 feet long 30-lb test leaders and 4/0 hooks (e.g., Eagle Claw L256). Yellowtail snapper are sometimes targeted with very hooks as small as 1/0. Many anglers in recent years have switched from using J-hooks to circle hooks. Bait varies a lot depending on availability. Common species used include pinfish, mosquito fish, cigar minnows, grunts, and squid.

Bottom longline gear
A longline is defined as any line that is deployed horizontally to which gangions and hooks are attached. Bottom longlines use baited hooks on offshoots (gangions or leaders) of a single main line to catch fish found that live near the bottom. The line is anchored at the bottom to target reef-associated species. The longline hauler may be manually, electrically, or hydraulically operated. A schematic of bottom longline gear is provided in Figure 2.2.

Figure 2.2 Schematic of Bottom Longline Gear (Barnette 2001)

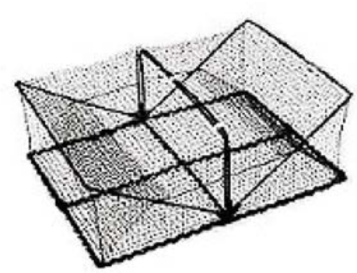


NMFS (1995) used observer data to characterize reef fish bottom longline gear use in the eastern GOM, where they are predominantly used. Mainline material was composed of cable or monofilament, with the test strength of the mainline ranging from 900 to 2,000 pounds. The average test strength was 1,281 pounds. The amount of mainline set at a location varied from 0.9 to 9.0 nm, with 2.4 nm the average. Gangion material was monofilament with length ranging from 0.46 to 1.92 m, and an average of 0.79 m. Barbed circle hooks were used for all sets, with both offset and straight hooks being used. Hooks averaged 2.2 inches in shaft length and 0.9 inches from the point to the shaft. The average number of hooks set at a location was 731.9 (± 378.0 s.d.), varying from 75 to 2,100 hooks. The average depth for the 311 sets was 26.6 m (± 14.9 s.d.), with a range of 10 to 70 m. Sets targeting red grouper averaged 18.6 m. Fishing time varied from 0.3 to 24.7 hours with 3.0 hours the average (± 2.7 s.d.). The majority of fishing occurred during daylight hours; however, lines were set at all hours. The majority of the sets occurred over rock bottom (41%), with shell (21%), coral (21%), unknown (14%), pothole depression (3%), and mud (<1%) comprising the remaining.

Recent anecdotal gear information indicates longline fishers use mainlines consisting of 1/8, 7 by 7 (refers to wrapped strands of wire, 49 wires total) galvanized or stainless steel or 3.2 to 4.0 mm monofilament line (Dunzier, pers. comm. 2004; Bergmann, pers. comm. 2004). For frame of reference, the 3.5 mm monofilament is equivalent in size to the 1/8 cable. Some boats in the northwest GOM may occasionally fish with used larger cable (3/16 and 1/4) purchased cheaply from the oil industry (Bergmann, pers. comm. 2004). The leaders used are typically made of 200-lb to 400-lb test monofilament. For hooks, longline fishers use Mustad #39960, 13/0 and 14/0 circle hooks, with 100 to 200 hooks per mile (Dunzier, pers. comm. 2004).

Fish Traps
Traps are rigid devices, often designed specifically for one species, used to entrap finfish or invertebrates. Fish traps are defined in the GOM as any trap and its component parts (including the lines and buoys) regardless the construction material, used for or capable of taking finfish, except a trap historically used in the directed fishery for crustaceans (blue crab, stone crab, and spiny lobster). Traps are weighted to rest on the bottom, marked with buoys at the surface, and are sometimes attached to numerous other traps via one long line, called a trot line. Generally baited and equipped with one or more funnel openings, they are left unattended for some time before retrieval. A schematic of a fish trap is provided in Figure 2.3.

Figure 2.3 Schematic of a Fish Trap (Barnette 2001)



NMFS (1995) used observer data to characterize fish trap usage in the eastern GOM as follows. Fish trap dimensions ranged from 1.5’ x 2.2’ x 3.2’ (10.6 cubic feet) to 4’ x 2’ x 2’ (16 cubic feet) with 3.5’ x 2’ x 2’ (14 cubic feet) being the most common. The trap mesh was made of plastic-coated wire, with meshes of 1.0” x 1.0”, 1.5” x 1.5”, or 1” x 2”, with the latter being used most commonly. Traps made of 1.0” x 1.0” mesh, had larger mesh in the trap doors. All traps had biodegradable blowout panels and escape windows. Numbers of trap sets at a location range from 6 to 37 with an average of 20.6 sets. Traps were set in depths ranging from 18 to 41.5 m with a mean depth of 31.3 meters. Average soak time varied from 0.8 to 88.9 hours with a mean of 10.0 hours. Most traps were set, tended, and retrieved during the daylight, from 0732 to 2120 hours. Traps were set in shell bottom (47%), rock (19%), sponge (16%), sand (14%), unknown (3%), and mud (1%). In sand/shell mixtures only the dominant material was recorded. The majority of trap set in the eastern GOM were made off the southwest coast of Florida.

Based on 1993-2001 logbook data, an average of 69 traps were hauled per trip, but the number of hauls averaged 236.77 (i.e., traps are hauled more than once per trip). Trips, including time to and from the fishing grounds, during that same time period averaged 4.53 days (GMFMC 2004c). The median number of traps fished in 2002 and 2003 reported in logbooks was 68 (68 median) and 73, with a trip length median of 7 days during both years.

Spear and powerhead
Divers sometimes target reef fish species such as grouper and snapper by using pneumatic or rubber band guns or slings to hurl a spear shaft at the fish. Commercial divers also sometimes employ a shotgun or pistol shell known as a powerhead at the shaft tip, which efficiently delivers a lethal charge to their quarry. This method is commonly used to harvest large species such as amberjack. A schematic of a speargun is provided in Figure 2.4.

Figure 2.4 Schematic of Spearfish Gear (Barnette 2001)

2.4 Action Area

The action area for a biological opinion is defined as all of the areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The GOM reef fish fishery is managed under the RFFMP throughout the U.S GOM EEZ, which extends from nine miles seaward of the states of Florida and Texas, and three miles seaward of the states of Alabama, Mississippi, and Louisiana, to 200 nautical miles from the seaward boundary of each coastal state. Throughout this range of operation, the GOM reef fish fishery may affect one or more listed species (detailed discussion in Section 5); therefore, the action area for this consultation includes all of the U.S GOM EEZ. Fishing activity within the action area is determined by a variety of biological (e.g., distribution of reef fish), socio-economical (e.g., market factors, location of ports, operating costs), and regulatory factors (e.g., gear-restricted areas and closed areas). Adult reef fish are typically demersal and usually are associated with bottom topographies on the continental shelf (<100 fathoms) that have high relief such as coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone croppings (GMFMC 2004a).

3.0 Status of Listed Species and Critical Habitat

The following endangered and threatened species are known to occur in or near the GOM EEZ:

Marine Mammals	**Status**
Fin whale (*Balaenoptera physalus*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Northern right whale (*Eubalaena glacialis*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered
Sea turtles	
Green turtle (*Chelonia mydas*)	Endangered/Threatened*
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Olive ridley sea turtle (*Lepidochelys olivacea*)	Threatened
Fish	
Smalltooth sawfish (*Pristis pectinata*)	Endangered**
Gulf sturgeon (Acipencer *oxyrinchus desoto)*	Threatened

Critical Habitat
There is no critical habitat designated within the action area.

**Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.*
***The U.S. distinct population segment (DPS).*

3.1 Analysis of the Species Not Likely to be Adversely Affected

Endangered whales are not likely to be adversely affected by the GOM reef fish fishery because they are extremely unlikely to overlap geographically with it. Sperm whales are the most abundant large cetacean in the GOM and are found throughout the GOM year-round, but in waters greater than 200 m (Schmidley 1981, Hansen et al. 1996, Davis et al. 2002, Mullins and Fulling 2003). In contrast, reef fishing occurs in waters less than 200 m. Other endangered whales (blue, fin, humpback, right whale, and sei whales) are uncommon or rare in the GOM. Individuals observed have likely been inexperienced juveniles straying from the normal range of these stocks or occasional transients (Mullin et al. 1994, Würsig et al. 2000). All endangered whales, therefore, are excluded from further analysis and consideration in this opinion.

Olive ridley sea turtle do not nest within the United States and are not likely to be adversely affected by the GOM ref fish fishery. Until the past several years, olive ridleys had not even been documented in U.S waters. There are now a few confirmed strandings records in the southeastern United States (off South Florida) and the U.S. Caribbean, and one confirmed individual captured on a longline in the northern Atlantic Ocean. However, there are still no confirmed records of olive ridleys in U.S. GOM waters. Given the extreme rarity of olive ridleys in the action area based on the absence of GOM records, effects from the proposed action are discountable. Olive ridleys therefore will not be discussed further in this opinion.

The Gulf sturgeon is an anadromous fish, inhabiting coastal rivers from Louisiana to Florida during the warmer months and over-wintering in estuaries, bays, and the GOM. Available data indicates Gulf sturgeon in the estuarine and 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, Parauka et al. in press). Given the GOM reef fish fishery is conducted in federal waters well beyond where Gulf sturgeon are most likely to be found, the chances of the proposed action affecting Gulf sturgeon are discountable. Gulf sturgeon therefore will not be discussed further in this opinion.

3.2 Analysis of the Species Likely to be Adversely Affected

Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles 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 and travel widely throughout the GOM. Smalltooth sawfish are known to occur in the GOM, but mainly only off of peninsula Florida. All of these species have been documented as taken incidentally in either reef fish gear or are vulnerable to one or more of the gear types used based on their capture in other southeast fisheries using similar gear. The remaining sections of this opinion, therefore, will focus solely on these species.

The following subsections are synopses of the best available information on the life history, distribution, population trends, and current status of the five species of sea turtles and the smalltooth sawfish. 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 1991a), hawksbill sea turtle (NMFS and USFWS 1993), Kemp's ridley sea turtle (USFWS and NMFS 1992), loggerhead sea turtle (NMFS and USFWS 1991b) and leatherback sea turtle (NMFS and USFWS 1992); Pacific Sea Turtle Recovery Plans (NMFS and USFWS, 1998a-e); sea turtle status reviews and biological reports (NMFS and USFWS 1995, Marine Turtle Expert Working Group (TEWG) 1998 and 2000, NMFS SEFSC 2001). Sources of background information on the smalltooth sawfish include the smalltooth sawfish status review (NMFS 2000), the proposed and final listing rules, and several publications (Simpfendorfer 2001, Seitz and Poulakis 2002, Simpfendorfer and Wiley 2004, Poulakis and Seitz 2004).

The sea turtle subsections focus primarily on the Atlantic Ocean populations of these species because these are the populations that may be directly or indirectly affected by the proposed action in the GOM. However, these species are listed as global populations (with the exception of Kemp's ridleys and northwestern Atlantic Ocean and Florida greens, whose distribution is entirely in the Atlantic, including the GOM). The global status and trends of these species, therefore, are included as well, to provide a basis and frame of reference for our final determination of the effects of the proposed action on the species as listed under the ESA.

3.2.1 Green Sea Turtle

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered. The nesting range of the green sea turtles in the southeastern United States and includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and the U. S. Virgin Islands (U.S.V.I.) and Puerto Rico (NMFS and USFWS 1991a). Principal U. S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington 1992). Green sea turtle nesting also occurs regularly on St. Croix, U.S.V.I, and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996).

3.2.1.1 Pacific Ocean

Green turtles are thought to be declining throughout the Pacific Ocean, with the exception of Hawaii, from a combination of overexploitation and habitat loss (Eckert 1993, Seminoff 2002). In the western Pacific, the only major (>2,000 nesting females) populations of green turtles occur in Australia and Malaysia, with smaller colonies throughout the area. Indonesia has a widespread distribution of green turtles, but has experienced large declines over the past 50 years. Hawaii green turtles are genetically distinct and geographically isolated, and the population appears to be increasing in size despite the prevalence of fibropapilloma and spirochidiasis (Aguirre et al. 1998 in Balazs and Chaloupka 2003). In the Eastern Pacific, mitochondrial DNA analysis has indicated that there are three key nesting populations: Michoacan, Mexico; Galapagos Islands, Ecuador; and Islas Revillagigedos, Mexico (Dutton 2003). There is also sporadic green turtle nesting along the Pacific coast of Costa Rica.

3.2.1.2 Atlantic Ocean

Life History and Distribution
The estimated age at sexual maturity for green sea turtles is between 20-50 years (Balazs 1982, Frazer and Ehrhart 1985). Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs/nest. Females usually have 2-4 or more years between breeding seasons, whereas males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas (Bjorndal 1997).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but little data are available.

Green sea turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or sea grasses. This includes areas near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997, NMFS and USFWS 1991a). 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, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs.

Population Dynamics and Status

The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995, Johnson and Ehrhart 1994). It is known that current nesting levels in Florida are reduced compared to historical levels, but the extent of the reduction is not known (Dodd 1981). However, green sea turtle nesting in Florida has been increasing since 1989 (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute Index Nesting Beach Survey Database). Total nest counts and trends at index beach sites during the past decade suggest the numbers of green sea turtles that nest within the southeastern United States are increasing.

Although nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging and breeding grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997).

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green sea turtles at the St. Lucie Power Plant (they have averaged 215 green sea turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast of Florida) show that the annual number of immature green sea turtles captured has increased significantly in the past 26 years (FPL 2002).

It is likely that immature green sea turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero. Trends at Florida beaches were previously discussed. Trends in nesting at Yucatán beaches cannot be assessed because of a lack of consistent beach surveys over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) showed a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999), and more recent information continues to show increasing nest counts (Troëng, S. and E. Rankin 2004 2004). Therefore, it seems reasonable that there is an increase in immature green sea turtles inhabiting coastal areas of the southeastern United States; however, the magnitude of this increase is unknown.

Threats
The principal cause of past declines and extirpations of green sea turtle assemblages has been the over-exploitation of green sea turtles 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. However, there are still significant and ongoing threats to green sea turtles from human-related causes in the United States. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities, and interactions with fishing gear. Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. There is also the increasing threat from green sea turtle fibropapillomatosis disease. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990, Jacobson et al. 1991).

3.2.1.3 Summary of Status for Atlantic Green Sea Turtles

Green turtles range in the western Atlantic from Massachusetts to Argentina, including the GOM and Caribbean, but are considered rare in benthic areas north of Cape Hatteras (Wynne and Schwartz 1999). Green turtles face many of the same natural and anthropogenic threats as for loggerhead sea turtles described above. In addition, green turtles are also susceptible to fibropapillomatosis, which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Recent population estimates for the western Atlantic area are not available. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in 1989. However, given the species' late sexual maturity, caution is warranted about over-interpreting nesting trend data collected for less than 15 years.

3.2.2 Hawksbill Sea Turtle

The hawksbill turtle was listed as endangered under the precursor of the ESA on June 2, 1970, and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN). The hawksbill is a medium-sized sea turtle, with adults in the Caribbean ranging in size from approximately 62.5 to 94.0 cm straight carapace length. The species occurs in all ocean basins, although it is relatively rare in the Eastern Atlantic and Eastern Pacific, and absent from the Mediterranean Sea. Hawksbills are the most tropical of the marine turtles, ranging from approximately 30EN latitude to 30ES latitude. They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays and coastal lagoons (NMFS and USFWS 1993). There are five regional nesting populations with more than 1,000 females nesting annually. These populations are in the Seychelles, Mexico, Indonesia, and two in Australia (Meylan and Donnelly 1999). There has been a global population decline of over 80% during the last three generations (105 years) (Meylan and Donnelly 1999).

3.2.2.1 Pacific Ocean

Anecdotal reports throughout the Pacific indicate that the current Pacific hawksbill population is well below historical levels (NMFS 2004b). It is believed that this species is rapidly approaching extinction in the Pacific because of harvesting for its meat, shell, and eggs as well as destruction of nesting habitat (NMFS 2001). Hawksbill sea turtles nest in the Hawaiian Islands as well as the islands and mainland of southeast Asia, from China to Japan, and throughout the Philippines, Malaysia, Indonesia, Papua New Guinea, the Solomon Islands, and Australia (NMFS 2004b). However, along the eastern Pacific Rim where nesting was common in the 1930s, hawksbill's are now rare or absent (Cliffton et al. 1982, NMFS 2004b).

3.2.2.2 Atlantic Ocean

In the Western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Peninsula of Mexico (Garduño-Andrade et al. 1999). With respect to the United States, nesting occurs in Puerto Rico, the U.S. Virgin Islands, and the southeast coast of Florida. Nesting also occurs outside of the United States and its territories in Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999a). Outside of the nesting areas, hawksbills have been seen off of the U.S. GOM states and along the eastern seaboard as far north as Massachusetts, although sightings north of Florida are rare (NMFS and USFWS 1993).

Life History and Distribution

The best estimate of age at sexual maturity for hawksbill sea turtles is about 20-40 years (Chaloupka and Limpus 1997, Crouse 1999a, NMFS 2004b). Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest. Movements of reproductive males are less well known, but are presumed to involve migrations to their nesting beach or to courtship stations along the migratory corridor (Meylan 1999b). Females nest an average of 3-5 times per season (Meylan and Donnelly 1999, Richardson et al. 1999). Clutch size is larger on average (up to 250 eggs) than that of other turtles (Hirth 1980). Reproductive females may exhibit a high degree of fidelity to their nest sites.

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over several years (van Dam and Diéz 1998).

The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (van Dam and Diéz 1997, Mayor et al. 1998, Leon and Diéz 2000).

Population Dynamics and Status
Estimates of the annual number of nests at hawksbill sea turtle nesting sites are of the order of hundreds to a few thousand. Nesting within the southeastern United States and U.S. Caribbean is restricted to Puerto Rico (>650 nests/yr), the U.S. Virgin Islands (~400 nests/yr), and, rarely, Florida (0-4 nests/yr) (Eckert 1995, Meylan 1999a, Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute's Statewide Nesting Beach Survey data 2002). At the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out, populations appear to be increasing (Mona Island, Puerto Rico) or stable (Buck Island Reef National Monument, St. Croix, USVI) (Meylan 1999a).

Threats
As described for other sea turtle species, hawksbill sea turtles are affected by habitat loss, habitat degradation, fishery interactions, and poaching in some parts of their range. There continues to be a black market for hawksbill shell products ("tortoiseshell"), which likely contributes to the harvest of this species.

3.2.2.3 Summary of Status for Hawksbill Sea Turtles

Worldwide, hawksbill sea turtle populations are declining. They face many of the same threats affecting other sea turtle species. In addition, there continues to be a commercial market for hawksbill shell products, despite protections afforded to the species under U.S. law and international conventions.

3.2.3 Kemp's Ridley Sea Turtle

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Zwinenberg 1977, Groombridge 1982, TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. This species occurs mainly in coastal areas of the GOM and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). Adults of this species are usually confined to the GOM, although adult-sized individuals sometimes are found on the east coast of the United States.

Life History and Distribution
The TEWG (1998) estimates age at maturity from 7-15 years. Females return to their nesting beach about every 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western GOM, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Little is known of the movements of the post-hatchling stage (pelagic stage) within the GOM. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). Benthic immature Kemp's ridleys have been found along the Eastern Seaboard of the United States and in the GOM. Atlantic benthic immature sea turtles travel northward as the water warms to feed in the productive, coastal waters off Georgia through New England, returning southward with the onset of winter (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). Studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern GOM until cooling waters force them offshore or south along the Florida coast (Renaud 1995).

Stomach contents of Kemp's ridleys along the lower Texas coast consisted of nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver 1991). Pelagic stage Kemp's ridleys presumably feed on the available *Sargassum* and associated infauna or other epipelagic species found in the GOM.

Population Dynamics and Status

Of the seven extant 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 Rancho Nuevo beaches (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 nesting numbers were below 1,000 (with a low of 702 nests in 1985). However, observations of increased nesting (with 6,277 nests recorded in 2000) suggest that the decline in the ridley population has stopped and the population is now increasing (USFWS 2000).

A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets. As demonstrated by nesting increases at the main nesting sites in Mexico, adult ridley numbers have increased over the last decade. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015.

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

York and New England to form one of the densest concentrations of Kemp's ridleys outside of the GOM (Musick and Limpus 1997, Epperly et al. 1995a, Epperly et al. 1995b).

Threats
Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold-stunning. Although cold-stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999-2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and five green turtles were found on Cape Cod beaches (R. Prescott, pers. comm. 2001). Annual cold-stunning events do not always occur at this magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Many cold-stunned turtles can survive if found early enough, but cold-stunning events can still represent a significant cause of natural mortality.

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

3.2.3.1 Summary of Kemp's Ridley Status

The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). The number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3% per year from 1985 to 1999. Current totals exceed 3,000 nests per year (TEWG 2000). Kemp's ridleys mature at an earlier age (7-15 years) than other chelonids, thus 'lag effects' as a result of unknown impacts to the non-breeding life stages would likely have been seen in the increasing nest trend beginning in 1985 (USFWS and NMFS 1992).

The largest contributors to the decline of Kemp's ridleys in the past were commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the GOM trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches has allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

3.2.4 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its global range on June 2, 1970. Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, and Indian Oceans (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtle species. The large size of adult leatherbacks and their tolerance to relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NMFS and USFWS 1995). Adult leatherbacks forage in temperate and subpolar regions from 71EN to 47ES latitude in all oceans and undergo extensive migrations to and from their tropical nesting beaches. In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). That number, however, is probably an overestimation as it was based on a particularly good nesting year in 1980 (Pritchard 1996). By 1995, the global population of adult females had declined to 34,500 (Spotila et al. 1996). Pritchard (1996) also called into question the population estimates from Spotila et al. (1996), and felt it may be somewhat low, because it ended the modeling on data from a particularly bad nesting year (1994) while excluding nesting data from 1995, which was a good nesting year. However, Spotila et al. (1996) represents the best overall estimate of adult female leatherback population size.

3.2.4.1 Pacific Ocean

Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila et al. 1996, NMFS and USFWS 1998c, Sarti et al. 2000, Spotila et al. 2000). For example, the nesting assemblage on Terengganu, Malaysia – which was one of the most significant nesting sites in the western Pacific Ocean – has declined severely from an estimated 3,103 females in 1968 to two nesting females in 1994 (Chan and Liew 1996). Nesting assemblages of leatherback turtles are in decline along the coasts of the Solomon Islands, a historically important nesting area (D. Broderick, pers. comm., in Dutton et al. 1999). In Fiji, Thailand, Australia, and Papua New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 3,000 nests recorded annually (Putrawidjaja 2000, Suarez et al. 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suarez 1999). Unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region, with nesting assemblages well below abundance levels observed several decades ago (e.g., Suarez 1999).

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

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches on the Pacific coast of Mexico supported as many as half of all leatherback turtle nests for the eastern Pacific. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 individuals during 1998-99 and 1999-2000 (Sarti et al. 2000). Spotila et al. (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila et al. (2000) estimated that the colony could fall to less than 50 females by 2003-2004. Leatherback turtles in the eastern Pacific Ocean are captured, injured, or killed in commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. Because of the limited data, we cannot provide high-certainty estimates of the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8-17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992, the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,000 leatherback turtles each year, killing about 111 of them each year.

Although all causes of the declines in leatherback turtle colonies in the eastern Pacific have not been documented, Sarti et al. (1998) suggest that the declines result from egg poaching, adult and sub-adult mortalities incidental to high seas fisheries, and natural fluctuations due to changing environmental conditions. Some published reports support this suggestion. Sarti et al. (2000) reported that female leatherback turtles have been killed for meat on nesting beaches like Píedra de Tiacoyunque, Guerrero, Mexico. Eckert (1997) reported that swordfish gillnet fisheries in Peru and Chile contributed to the decline of leatherback turtles in the eastern Pacific. The decline in the nesting population at Mexiquillo, Mexico occurred at the same time that effort doubled in the Chilean driftnet fishery. In response to these effects, the eastern Pacific population has continued to decline, leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (e.g., Spotila et al. 1996, Spotila et al. 2000). The NMFS's assessment of three nesting aggregations in its February 23, 2004, opinion supports this conclusion: if no action is taken to reverse their decline, leatherback sea turtles nesting in the Pacific Ocean either have high risks of extinction in a single human generation (for example, nesting aggregations at Terrenganu and Costa Rica) or they have a high risk of declining to levels where more precipitous declines become almost certain (e.g., Irian Jaya) (NMFS 2004b).

3.2.4.2 Atlantic Ocean

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). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Suriname (NMFS SEFSC 2001). Genetic analyses of leatherbacks to date indicate that within the Atlantic basin there are genetically different nesting populations; the St. Croix nesting population (U.S. Virgin Islands), the mainland nesting Caribbean population (Florida, Costa Rica, Suriname/French Guiana), and the Trinidad nesting population (Dutton et al. 1999). When the hatchlings leave the nesting beaches, they move offshore but eventually utilize both coastal and pelagic waters. Very little is known about the pelagic habits of the hatchlings and juveniles, and they have not been documented to be associated with the *Sargassum* areas as are other species. Leatherbacks are deep divers, with recorded dives to depths in excess of 1,000 m (Eckert et al. 1989, Hayes et al. 2004).

Life History and Distribution
Leatherbacks are a long-lived species, living for over 30 years. They reach sexual maturity somewhat faster than other sea turtles (except Kemp's ridley), with an estimated range from 3-6 years (Rhodin 1985) to 13-14 years (Zug and Parham 1996). They nest frequently (up to 10 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and, thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26EC until they exceed 100 cm ccl.

Although leatherbacks are the most pelagic of the sea turtles, they enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherback sea turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates.

Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate, and tropical waters (NMFS and USFWS 1992). A 1979 aerial survey of the outer continental shelf from Cape Hatteras, North Carolina to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in waters where depths ranged from 1-4151 m, but 84.4% of sightings were in areas where the water was less than 180 m deep (Shoop and Kenney 1992). Leatherbacks were sighted in waters of a similar sea surface temperature as loggerheads; from 7-27.2EC (Shoop and Kenney 1992). However, this species appears to have a greater tolerance for colder waters because more leatherbacks were found at the lower temperatures (Shoop and Kenney 1992). This aerial survey estimated the in-water leatherback population from near Nova Scotia, Canada to Cape Hatteras, North Carolina at approximately 300-600 animals.

Population Dynamics and Status
The status of the Atlantic leatherback population is less clear than the Pacific population. The total Atlantic population size is undoubtedly larger than in the Pacific, but overall population trends are unclear. In 1996, the entire western Atlantic population was characterized as stable at best (Spotila et al. 1996), with numbers of nesting females reported to be on the order of 18,800. A subsequent analysis by Spotila (pers. comm.) indicated that by 2000, the western Atlantic nesting population had decreased to about 15,000 nesting females. According to NMFS SEFSC (2001) the nesting aggregation in French Guiana has been declining at about 15% per year since 1987. However, from 1979-1986, the number of nests was increasing at about 15% annually which could mean that the current 15% decline could be part of a nesting cycle which coincides with the erosion cycle of Guiana beaches described by Schultz (1975). In Suriname, leatherback nest numbers have shown large recent increases (with more than 10,000 nests per year since 1999 and a peak of 30,000 nests in 2001), and the long-term trend for the overall Suriname and French Guiana population may show an increase (Girondot 2002 in Hilterman and Goverse 2003). The number of nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s, but the magnitude of nesting is much smaller than that along the French Guiana coast (NMFS SEFSC 2001). Also, because leatherback females can lay 10 nests per season, the recent increases to 400 nests per year in Florida may only represent as few as 40 individual female nesters per year.

In summary, the conflicting information regarding the status of Atlantic leatherbacks makes it difficult to characterize the current status. Numbers at some nesting sites are increasing, but are decreasing at other sites. Tag return data emphasize the wide-ranging nature of the leatherback and the link between South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, Virginia. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database). Genetic studies performed within the Northeast Distant Fishery Experiment indicate that the leatherbacks captured in the Atlantic highly migratory species pelagic longline fishery were primarily from the French Guiana and Trinidad nesting stocks (over 95%), though individuals from West African stocks were surprisingly absent (Roden et al. In press).

There are a number of problems contributing to the uncertainty of the leatherback nest counts and population assessments. The nesting beaches of the Guianas (Guyana, French Guiana, and Suriname) and Trinidad are by far the most important in the western Atlantic. However, beaches in this region undergo cycles of erosion and reformation, so that the nesting beaches are not consistent over time. Additionally, leatherback sea turtles do not exhibit the same degree of nest-site fidelity demonstrated by loggerhead and other hardshell sea turtles, further confounding analysis of population trends using nesting data. Reported declines in one country and reported increases in another may be the result of migration and beach changes, not true population changes. Nesting surveys, as well as being hampered by the inconsistency of the nesting beaches, are themselves inconsistent throughout the region. Survey effort varies widely in the seasonal coverage, aerial coverage, and actual surveyed sites. Surveys have not been conducted consistently throughout time, or have even been dropped entirely as the result of wars, political turmoil, funding vagaries, etc. The methods vary in assessing total numbers of nests and total numbers of females. Many sea turtle scientists agree that the Guianas (and some would include

Trinidad) should be viewed as one population and that a synoptic evaluation of nesting at all beaches in the region is necessary to develop a true picture of population status (Reichart et al. 2001). No such region-wide assessment has been conducted recently.

The most recent, complete estimates of regional leatherback populations are in Spotila et al. (1996). As discussed above, nesting in the Guianas may have been declining in the late 1990s but may have increased again in the early 2000s. Spotila et al. estimated that the leatherback population for the Atlantic basin, including all nesting beaches in the Americas, the Caribbean, and West Africa totaled approximately 27,600 nesting females, with an estimated range of 20,082-35,133. We believe that the current population probably still lies within this range, taking into account the reported nesting declines and increases and the uncertainty surrounding them. We therefore choose to rely on Spotila et al.'s (1996) published total Atlantic population estimates, rather than attempt to construct a new population estimate here, based on our interpretation of the various, confusing nesting reports from areas within the region.

Threats

Zug and Parham (1996) pointed out that the main threat to leatherback populations in the Atlantic is the combination of fishery-related mortality (especially entanglement in gear and drowning in trawls) and the intense egg harvesting on the main nesting beaches. Other important ongoing threats to the population include pollution, loss of nesting habitat, and boat strikes.

Of sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, possibly their method of locomotion, and perhaps their attraction to the lightsticks used to attract target species in longline fisheries. They are also susceptible to entanglement in gillnets and pot/trap lines (used in various fisheries) and capture in trawl gear (e.g., shrimp trawls).

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. Unlike loggerhead turtle interactions with longline gear, leatherback turtles do not usually ingest longline bait. Instead, leatherbacks are foul hooked by longline gear (e.g., on the flipper or shoulder area) rather than mouth hooked or swallowing the hook. According to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NMFS SEFSC 2001). The U.S. fleet accounts for only 5%-8% of the hooks fished in the Atlantic Ocean, and adding up the under-represented observed takes of the other 23 countries that actively fish in the area would lead to annual take estimates of thousands of leatherbacks over different life stages. Basin-wide, Lewison et al. (2004) estimated that 30,000-60,000 leatherback sea turtle captures occurred in Atlantic pelagic longline fisheries in the year 2000 alone (note that multiple captures of the same individual are known to occur, so the actual number of individuals captured may not be as high).

Leatherbacks are also susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine (Dwyer et al. 2002). Additional leatherbacks stranded wrapped in line of unknown origin or with evidence of a past entanglement (Dwyer et al. 2002). Fixed gear fisheries in the Mid-Atlantic have also contributed to leatherback entanglements. In North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). A third leatherback was reported entangled in a crab pot buoy in Pamlico Sound near Ocracoke. This turtle was disentangled and released alive; however, lacerations on the front flippers from the lines were evident (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 was due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm. to J. Braun-McNeill in NMFS SEFSC 2001). Because many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast Atlantic shrimp fishery, which operates predominately from North Carolina through southeast Florida (NMFS 2002a), have also been a common occurrence. Leatherbacks, which migrate north annually, are likely to encounter shrimp trawls working in the coastal waters off the Atlantic coast from Cape Canaveral, Florida to the Virginia/North Carolina border. Leatherbacks also interact with the GOM shrimp fishery. For many years, TEDs required for use in these fisheries were less effective at excluding leatherbacks than the smaller, hard-shelled turtle species. To address this problem, on February 21, 2003, the NMFS issued a final rule to amend the TED regulations. Modifications to the design of TEDs are now required in order to exclude leatherbacks and large and sexually mature loggerhead and green turtles.

Other trawl fisheries are also known to interact with leatherback sea turtles. In October 2001, a Northeast Fisheries Science Center observer documented the take of a leatherback in a bottom otter trawl fishing for *Loligo* squid off of Delaware; TEDs are not required in this fishery. The winter trawl flounder fishery, which did not come under the revised TED regulations, may also interact with leatherback sea turtles.

Gillnet fisheries operating in the nearshore waters of the Mid-Atlantic states are also suspected of capturing, injuring, and/or killing leatherbacks when these fisheries and leatherbacks co-occur. Data collected by the NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54%-92%.

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

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

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

3.2.4.3 Summary of Leatherback Status

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

In the Atlantic Ocean, our understanding of the status and trends of leatherback turtles is much more confounded, although the picture does not appear nearly as bleak as in the Pacific. The number of female leatherbacks reported at some nesting sites in the Atlantic Ocean has increased, while at others they have decreased. Some of the same factors that led to precipitous declines of leatherbacks in the Pacific also affect leatherbacks in the Atlantic: leatherbacks are captured and killed in many kinds of fishing gear and interact with fisheries in state, federal and international waters. Poaching is a problem and affects leatherbacks that occur in U.S. waters. Leatherbacks also appear to be more susceptible to death or injury from ingesting marine debris than other turtle species.

3.2.5 Loggerhead Sea Turtle

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. It was listed because of direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. Loggerhead sea turtles inhabit the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. In the Atlantic, developmental habitat for small juveniles is the pelagic waters of the North Atlantic and the Mediterranean Sea (NMFS and USFWS 1991b). Within the continental United States, loggerhead sea turtles nest from Texas to New Jersey. Major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and GOM coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida.

3.2.5.1 Pacific Ocean

In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. Within the Pacific Ocean, loggerhead sea turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in eastern Australia (Great Barrier Reef and Queensland) and New Caledonia (NMFS SEFSC 2001). There are no reported loggerhead nesting sites in the eastern or central Pacific Ocean basin. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996). Recent genetic analyses on female loggerheads nesting in Japan suggest that this "subpopulation" is comprised of genetically distinct nesting colonies (Hatase et al. 2002) with precise natal homing of individual females. As a result, Hatase et al. (2002) indicate that loss of one of these colonies would decrease the genetic diversity of Japanese loggerheads; recolonization of the site would not be expected on an ecological time scale. In Australia, long-term census data has been collected at some rookeries since the late 1960s and early 1970s, and nearly all the data show marked declines in nesting populations since the mid-1980s (Limpus and Limpus 2003). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

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

3.2.5.2 Atlantic Ocean

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are at least five western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29^{o}N; (2) a south Florida nesting subpopulation, occurring from 29^{o}N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990 and TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS SEFSC 2001). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. Fidelity for nesting beaches makes recolonization of nesting beaches with sea turtles from other subpopulations unlikely.

Life History and Distribution
Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985, Frazer et al. 1994) with the benthic immature stage lasting at least 10-25 years. However, based on new data from tag returns, strandings, and nesting surveys NMFS SEFSC (2001) estimated ages of maturity ranging from 20-38 years and benthic immature stage lasting from 14-32 years.

Mating takes place in late March-early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Generally, loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U. S. Atlantic and GOM, although some loggerheads may move back and forth between the pelagic and benthic environment (Witzell 2002). Benthic immature loggerheads (sea turtles that have come back to inshore and nearshore waters), the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in Northeastern Mexico.

Tagging studies have shown loggerheads that have entered the benthic environment undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles occur year round in offshore waters off of North Carolina where water temperature is influenced by the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to immigrate to North Carolina inshore waters (e.g., Pamlico and Core Sounds) and also move up the coast (Epperly et al. 1995a, Epperly et al. 1995b, Epperly et al. 1995c), occurring in Virginia foraging areas as early as April and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September but some may remain in Mid-Atlantic and Northeast areas until late fall. By December loggerheads have emigrated from inshore North

Carolina waters and coastal waters to the north to waters offshore of North Carolina, particularly off of Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles (≥11EC) (Epperly et al. 1995a-c). Loggerhead sea turtles are year-round residents of central and south Florida.

Pelagic and benthic juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Population Dynamics and Status

A number of stock assessments (TEWG 1998, TEWG 2000, NMFS SEFSC 2001, Heppell et al. 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Based on nesting data of the five western Atlantic subpopulations, the south Florida-nesting and the northern-nesting subpopulations are the most abundant (TEWG 2000 and NMFS SEFSC 2001). Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182, annually with a mean of 73,751 (TEWG 2000). On average, 90.7% of these nests were of the south Florida subpopulation and 8.5% were from the northern subpopulation (TEWG 2000). The TEWG (2000) assessment of the status of these two better-studied populations concluded that the south Florida subpopulation is increasing, while no trend is evident (may be stable but possibly declining) for the northern subpopulation. However, a more recent analysis, including nesting data through 2003, indicates there is no discernable trend in the south Florida nesting subpopulation (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide and Index Nesting Beach Survey Programs). Another consideration that may add to the importance and vulnerability of the northern subpopulation is the sex ratios of this subpopulation. NMFS scientists have estimated that the northern subpopulation produces 65% males (NMFS SEFSC 2001). However, new research conducted over a limited time frame has found opposing sex ratios (Wyneken et al. 2004) so further information is needed to clarify the issue. Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the northern subpopulation is related to the number of female hatchlings that are produced. Producing fewer females will limit the number of subsequent offspring produced by the subpopulation.

The remaining three subpopulations (the Dry Tortugas, Florida Panhandle, and Yucatán) are much smaller subpopulations but no less relevant to the continued existence of the species. Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida’s statewide survey program. Survey effort has been relatively stable during the 9-year period from 1995-2003 (although the 2002 year was missed). Nest counts ranged from 168-270 but with no detectable trend during this period (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data). Nest counts for the Florida Panhandle subpopulation are focused on index beaches rather than all beaches where nesting occurs. Currently, there is not enough information to detect a trend for the subpopulation (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Index Nesting Beach Survey Database). Similarly, nesting survey effort has been inconsistent among the Yucatán nesting beaches and no trend can be determined for this subpopulation. However, there is some optimistic news. Zurita et al. (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico from 1987-2001 where survey effort was consistent during the period.

Threats
The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton et al. 1994). Also, many nests were destroyed during the 2004 hurricane season. Other sources of natural mortality include cold stunning and biotoxin exposure.

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

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation, marine pollution, underwater explosions, hopper dredging, offshore artificial lighting, power plant entrainment and/or impingement, entanglement in debris, ingestion of marine debris, marina and dock construction and operation, boat collisions, poaching, and fishery interactions. Loggerheads in the pelagic environment are exposed to a series of longline fisheries, which include the Atlantic highly migratory species (HMS) pelagic longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various longline fleets in the Mediterranean Sea (Aguilar et al. 1995, Bolten et al. 1994, Crouse 1999b). Loggerheads in the benthic environment in waters off the coastal U.S. are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries (see further discussion in Section 4, Environmental Baseline).

3.2.5.3 Summary of Status for Loggerhead Sea Turtles

In the Pacific Ocean, loggerhead turtles are represented by a northwestern Pacific nesting aggregation (located in Japan) and a smaller southwestern nesting aggregation that occurs in Australia (Great Barrier Reef and Queensland) and New Caledonia. The abundance of loggerhead turtles on nesting colonies throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996), but it has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

In the Atlantic Ocean, absolute population size is not known, but based on extrapolation of nesting information, loggerheads are likely much more numerous than in the Pacific Ocean. The NMFS recognizes five subpopulations of loggerhead sea turtles in the western north Atlantic based on genetic studies. Cohorts from all of these are known to occur within the action area of this consultation. There are no detectable nesting trends for the two largest western Atlantic subpopulations: the South Florida subpopulation and the northern subpopulation. Because of its size, the South Florida subpopulation may be critical to the survival of the species in the Atlantic Ocean. In the past, this nesting aggregation was considered second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991b). However, the status of the Oman colony has not been evaluated recently and it is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections for sea turtles (Meylan et al. 1995). Given the lack of updated information on this population, the status of loggerheads in the Indian Ocean basin overall is essentially unknown.

All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects that negatively influence the status of the species. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (i.e., fisheries in international waters).

3.2.6 Smalltooth Sawfish

The U.S. smalltooth sawfish distinct population segment (DPS) was listed as endangered under the ESA on April 1, 2003 (68 FR 15674). The smalltooth sawfish is the first marine fish to be listed in the United States. Critical habitat for the species has not been designated. Historically, smalltooth sawfish occurred commonly in the inshore waters of the GOM and the eastern U.S. seaboard up to North Carolina, and more rarely as far north as off of New York. Based on smalltooth sawfish encounter data, the current core range for the smalltooth sawfish is currently from the Caloosahatchee River to Florida Bay (Simpfendorfer and Wiley 2004).

All extant sawfish belong to the Suborder *Pristoidea*, Family *Pristidae*, and Genus *Pristis*. Although they are rays, sawfish appear to more resemble sharks, with only the trunk and especially the head ventrally flattened. Smalltooth sawfish are characterized by their "saw," a long, narrow, flattened rostral blade with a series of transverse teeth along either edge.

Life History and Distribution

Life history information on smalltooth sawfish is limited. Small amounts of data exist in old taxonomic works and occurrence notes (e.g., Breder 1952, Bigelow and Schroeder 1953, Wallace 1967, Thorson et al. 1966). However, as Simpfendorfer and Wiley (2004) note, these relate primarily to occurrence and size. Recent research and sawfish public encounter information is now providing new data and hypotheses about smalltooth sawfish life history (e.g., Simpfendorfer 2001 and 2003, Seitz and Poulakis 2002, Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004), but more data are still needed to confirm many of these new hypotheses.

As in all elasmobranchs, fertilization is internal. Bigelow and Schroeder report the litter size as 15 to 20. Simpfendorfer and Wiley (2004), however, caution this may be an overestimate, with recent anecdotal information suggesting smaller litter sizes (~10). Smalltooth sawfish mating and pupping seasons, gestation and reproductive periodicity are all unknown. Gestation and reproductive periodicity, however, may be inferred based on that of the largetooth sawfish, sharing the same genus and having similarities in size and habitat. Thorson (1976) reported the gestation period for largetooth sawfish was approximately five months and concluded that females probably produce litters every second year.

Bigelow and Schroeder (1953) describe smalltooth sawfish as generally about two feet long (61 cm) at birth and growing to a length of 18 feet (549 cm) or greater. Recent data from smalltooth sawfish caught off Florida, however, demonstrate young are born at 75-85 cm (Simpfendorfer and Wiley 2004), with males reaching maturity at approximately 270 cm and females at approximately 360 cm (Simpfendorfer 2002 and 2004). The maximum reported size of a smalltooth sawfish is 760 cm (Last and Stevens 1994), but the maximum size normally observed is 600 cm (Adams and Wilson 1995). No formal studies on the age and growth of the smalltooth sawfish have been conducted to date, but growth studies of largetooth sawfish suggest slow growth, late maturity (10 years) and long lifespan (25-30 years) (Thorson 1982; Simpfendorfer 2000). These characteristics suggest very a low intrinsic rate of increase (Simpfendorfer 2000).

Smalltooth sawfish feed primarily on fish, with mullet, jacks, and ladyfish believed to be their primary food resources (Simpfendorfer 2001). By moving its saw rapidly from side to side through the water, the relatively slow moving sawfish is able to strike at individual fish (Breder 1952). The teeth on the saw stun, impale, injure, or kill the fish. Smalltooth sawfish then rub their saw against bottom substrate to remove the fish, which are then eaten. In addition to fish, smalltooth sawfish also prey on crustaceans (mostly shrimp and crabs), which are located by disturbing bottom sediment with their saw (Norman and Fraser 1937, Bigelow and Schroeder 1953).

Smalltooth sawfish are euryhaline, occurring in waters with a broad range of salinities from freshwater to full seawater (Simpfendorfer 2001). Their occurrence in freshwater is suspected to be only in estuarine areas temporarily freshwater from receiving high levels of freshwater input. Many encounters are reported at the mouths of rivers or other sources of freshwater inflows, suggesting estuarine areas may be an important factor in the species distribution (Simpfendorfer and Wiley 2004).

The literature indicates that smalltooth sawfish are most common in shallow coastal waters less than 25 m (Bigelow and Schroeder 1953, Adams and Wilson 1995). Indeed, the distribution of the smallest size classes of smalltooth sawfish indicate that nursery areas occur throughout Florida in areas of shallow water, close to shore and typically associated with mangroves (Simpfendorfer and Wiley 2004). However, encounter data indicate there is a tendency for smalltooth sawfish to move offshore and into deeper water as they grow. An examination of the relationship between the depth at which sawfish occur and their estimated size indicates that larger animals are more likely to be found in deeper waters. Since large animals are also observed in very shallow waters, it is believed that smaller (younger) animals are restricted to shallow waters, while large animals roam over a much larger depth range (Simpfendorfer 2001). Recent data from sawfish encounter reports and from satellite tagging indicate mature animals occur regularly in waters in excess of 50 meters (Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004).

MML data indicate smalltooth sawfish occur over a range of temperatures but appear to prefer water temperatures greater than 64.4°F (18°C) (Simpfendorfer 2001). The data also suggest that smalltooth sawfish may utilize warm water outflows of power stations as thermal refuges during colder months to enhance their survival or become trapped by surrounding cold water from which they would normally migrate. Almost all occurrences of smalltooth sawfish in warm water outflows were during the coldest part of the year, when water temperatures in these outfalls are typically well above ambient temperatures. Further study of the importance of thermal refuges to smalltooth sawfish is needed. Significant use of these areas by sawfish may disrupt their normal migratory patterns (Simpfendorfer and Wiley 2004).

Historic records of smalltooth sawfish indicate that some large mature individuals migrate north along the U.S. Atlantic coast as temperatures warmed in the summer and then south as temperatures cooled (Bigelow and Schroeder 1953). Recent Florida encounter data, however, do not suggest such migration. One smalltooth sawfish has been recorded north of Florida since 1963--a smalltooth sawfish captured off of Georgia in July 2000--but it is unknown whether this individual resided in Georgia waters annually or had migrated north from Florida. Given the very limited number of encounter reports from the east coast of Florida, Simpfendorfer and Wiley (2004) hypothesize the population previously undertaking the summer migration has declined to a point where the migration is undetectable or does not occur. Further research focusing on states north of Florida or using satellite telemetry is needed to test this hypothesis.

Population Dynamics, Status and Trends

Despite being widely recognized as common throughout their historic range up until the middle of the 20th century, the smalltooth sawfish population declined dramatically during the middle and later parts of the century. The decline in the population of smalltooth sawfish is attributed to fishing (both commercial and recreational), habitat modification, and sawfish life history. Large numbers of smalltooth sawfish were caught as bycatch in the early part of this century. Smalltooth sawfish were historically caught as bycatch in various fishing gears throughout their historic range, including gillnet, otter trawl, trammel net, seine, and to a lesser degree, handline. Frequent accounts in earlier literature document smalltooth sawfish being entangled in fishing nets from areas where smalltooth sawfish were once common but are now rare (Everman and Bean, 1898). Loss and/or degradation of habitat contributed to the decline of many marine species and is expected to have impacted the distribution and abundance of smalltooth sawfish.

Estimates of the magnitude of the decline in the smalltooth sawfish are difficult to make. Because of the species' limited importance in commercial and recreational fisheries and its large size and toothed rostrum, making it difficult to handle, it was not well studied before incidental bycatch severely reduced its numbers. However, based on the contraction of the species' range, and other anecdotal data, Simpfendorfer (2001) estimated that the U.S. population size is currently less than 5% of its size at the time of European settlement.

Seitz and Poulakis (2002) and Poulakis and Seitz (2004) document recent (1990 to 2002) occurrences of sawfish along the southwest coast of Florida, and in Florida Bay and the Florida Keys, respectively. The information was collected by soliciting information from anyone who would possibly encounter these fish via posters displaying an image of a sawfish and requesting anyone with information on these fish since 1990 to contact the authors. Posters were distributed beginning in January 1999 and continue to be maintained from Charlotte County to Monroe County in places where anglers and boaters would likely encounter them (e.g. bait and tackle shops, boat ramps, fishing tournaments). In addition to circulating posters, information was obtained by contacting other fishery biologists, fishing guides, guide associations, rod and gun clubs, recreational and commercial fishermen, scuba divers, mosquito control districts, and newspapers. To date, a total of 2,620 smalltooth sawfish encounters have been reported (Poulakis, pers. comm. 2005).

MML also maintains a smalltooth sawfish public encounter database, established in 2000 to compile information on the distribution and abundance of sawfish. Encounter records are collected using some of the same outreach tactics as above in Florida statewide. To ensure the requests for information are spread evenly throughout the state, awareness-raising activities were divided into six regions and focused in each region on a biannual basis between May 2002 and May 2004. Prior to 2002 awareness raising activities were organized on an ad-hoc basis because of limited resources. The records in the database extend back to the 1950s, but are mostly from 1998 to the present. The data are validated using a variety of methods (photographs, video, directed questions). A total of 478 sawfish encounters have been reported since 1998, most from recreational fishers (Simpfendorfer and Wiley 2004).

The majority of smalltooth sawfish encounters today are from the southwest coast of Florida between the Caloosahatchee River and Florida Bay. Outside of this core area, the smalltooth sawfish appears more common on the west coast of Florida and in the Florida Keys than on the east coast, and occurrences decrease the greater the distance from the core area (Simpfendorfer and Wiley 2004). The capture of a smalltooth sawfish off Georgia in 2003 is the first record north of Florida since 1963. New reports during 2004 extend the current range of the species from Panama City, offshore Louisiana (south of Timbalier Island in 100 ft of water), southern Texas and the northern coast of Cuba. The Texas sighting was not confirmed to be a smalltooth sawfish so might have been a largetooth sawfish.

There are no data available to estimate the present population size. Although smalltooth sawfish encounter databases may provide a useful future means of measuring changes in the population and its distribution over time, conclusions about the abundance of smalltooth sawfish now cannot be made because outreach efforts and observation effort is not expanded evenly across each study period. Dr. Simpfendorfer reluctantly gives an estimate of 2,000 individuals based on his four years of field experience and data collected from the public, but cautions that actual numbers may be plus or minus at least 50%.

Recent encounters with neonates (young of the year), juveniles and sexually mature sawfish indicate that the population is reproducing (Seitz and Poulakis 2002, Simpfendorfer 2003). The abundance of juveniles encountered, including very small individuals, suggests that the population remains reproductively active and viable (Simpfendorfer and Wiley 2004). Also, the declining numbers of individuals with increasing size is consistent with the historic size composition data (G. Burgess, pers. comm. in Simpfendorfer and Wiley 2004). This information and recent encounters in new areas beyond the core abundance area suggest that the population may be increasing. However, smalltooth sawfish encounters are still rare along much of their historical range and absent from areas historically abundant such as the Indian River Lagoon and John's Pass (Simpfendorfer and Wiley 2004). With recovery of the species expected to be slow on the basis of the species' life history and other threats to the species remaining (see below), the population's future remains tenuous.

Threats
Smalltooth sawfish are threatened today by the loss of Southeastern coastal habitat through such activities as agricultural and urban development, commercial activities dredge and fill operations, boating, erosion, and diversions of freshwater run-off. Dredging, canal development, sea wall construction, and mangrove clearing have degraded a significant proportion of the coastline. Smalltooth sawfish may be especially vulnerable to coastal habitat degradation due to their affinity to shallow, estuarine systems (NMFS 2000).

Fisheries also still pose a threat to smalltooth sawfish. Although changes over the past decade to U.S. fishing regulations such as Florida's net ban have started to reduce threats to the species over parts of its range, smalltooth sawfish are still occasionally incidentally caught in commercial shrimp trawls, bottom longlines, and recreational rod and reel.

The current and future abundance of smalltooth sawfish is limited by its life history characteristics (NMFS 2000). Slow growing, late maturing, and long-lived species such as the smalltooth sawfish are not able to respond effectively (rapidly) to increasing and new sources of mortality resulting from changes in their environment (Musick 1999). Simpfendorfer (2000) demonstrated that the life history of this species makes it impossible to sustain any significant level of fishing and makes it slow to recover from any population decline. Thus, the species is susceptible to population decline, even with relatively small increases in mortality.

4.0 Environmental Baseline

Sea turtles found in the action area may travel widely throughout the Atlantic, GOM, and Caribbean Sea. Individuals found in the action area can potentially be affected by activities anywhere within this wide range. The most thorough account of permitted and non-permitted activities, including research activities that are not harmful to the turtles, in the entire U.S. Atlantic, GOM, and Caribbean can be found in Appendix 2 of the NOAA Technical Memorandum NMFS-SEFSC-455, *Stock Assessments of Loggerhead and Leatherback Sea Turtles and an Assessment of the Impact of the Pelagic Longline Fishery on the Loggerhead and Leatherback Sea Turtles of the Western North Atlantic* (NMFS SEFSC 2001). The range-wide status of the five species of sea turtles described in Section 3.0 above most accurately reflects each species' status within the action area.

By regulation, environmental baselines for biological opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR402.02). This section therefore identifies and discusses the effects of past and ongoing human and natural factors within the action area leading to the current status of the species and their habitats. The environmental baseline is a snapshot of the factors affecting the species in the action area.

4.1 Factors Affecting Sea Turtles Within the Action Area

The most significant activities affecting sea turtles in the GOM are fisheries and conservation activities directed at commercial fisheries. Other environmental impacts to turtles may result from vessel operations, discharges, dredging, military activities, oil and gas development activities, industrial cooling water intake, aquaculture, recreational fishing, coastal development, directed take, and marine debris. All of these activities and their impacts on sea turtles are reviewed in the following subsections.

4.1.1 Federal Actions

In recent years, the NMFS has undertaken several ESA section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered sea turtle species, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, the NMFS has undertaken recovery actions under the ESA are addressing the problem of take of sea turtles in the fishing and shipping industries and other activities such as Army Corps of Engineers (COE) dredging operations. The summary below of anticipated sources of incidental take of sea turtles includes only those federal actions in the GOM which have already concluded or are currently undergoing formal section 7 consultation.

Fisheries

Adverse effects on threatened and endangered sea turtles from several types of fishing gear occur in the action area. These gears, including gillnet, hook-and-line (i.e., vertical line and longline), and trawl gear; have all been documented as interacting with sea turtles. For all fisheries for which there is a FMP or for which any federal action is taken to manage that fishery, the impacts have been evaluated via section 7 consultation. Formal section 7 consultations have been conducted on the following fisheries: the HMS pelagic longline fishery, HMS shark fishery, and the southeast shrimp trawl fishery. An ITS has been issued for the take of sea turtles in each of the fisheries. A summary of each consultation is provided below but more detailed information can be found in the respective opinions (NMFS 2002a, NMFS 2003a, and NMFS 2004a).

On June 1, 2004, the NMFS completed an opinion on the continued operation of the Atlantic HMS pelagic longline fishery in the Atlantic, Gulf of Mexico, and Caribbean. The opinion found that the continued prosecution of the pelagic longline fishery was likely to jeopardize the continued existence of leatherback sea turtles. However, the NMFS implemented an RPA to allow for the continuation of the pelagic longline fishery without jeopardizing that species. The provisions of the RPA included measures to: (1) Reduce post-release mortality of leatherbacks; (2) improve monitoring of the effects of the fishery; (3) confirm the effectiveness of the hook and bait combinations that are required as part of the proposed action; and (4) take management action to avoid long-term elevations in leatherback takes or mortality. All other sea turtles were found not likely to be jeopardized. The following amount of annual incidental take is anticipated in the future (2005 and beyond): 588 leatherbacks per year, 635 loggerheads, and a total of 35 individuals per year of either green, hawksbill, Kemp's ridley, and olive ridley turtles.

GOM shark fisheries include commercial shark bottom longline and drift gillnet fisheries and recreational shark fisheries under the FMP for Atlantic Tunas, Swordfish, and Sharks (HMS FMP). The shark bottom longline and drift gillnet fisheries were both found likely to adversely affect sea turtles. An ESA section 7 consultation was completed on October 29, 2003, on the continued operation of those fisheries and the July 2003, Proposed Rule for Draft Amendment 1 to the HMS FMP (NMFS 2003a). The opinion concluded the proposed action was not likely to jeopardize the continued existence of any listed sea turtles. An ITS was provided authorizing non-lethal takes.

The southeast shrimp trawl fishery affects more sea turtles than all other activities combined (NRC 1990). On December 2, 2002, the NMFS completed the opinion for shrimp trawling in the southeastern United States under proposed revisions to the TED regulations (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. This 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.

Formal section 7 consultations have also been conducted for the issuance of several exempted fishing permits (EFP). These opinions have concluded the proposed activities may adversely affect but were not likely to jeopardize the continued existence of any sea turtles. ITSs for each EFP issued were provided.

Vessel and Military Operations

Potential sources of adverse effects from federal vessel operations in the action area and throughout the range of sea turtles include operations of the U.S. Department of Defense (DoD), Navy (USN), Air Force and Coast Guard (USCG), the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the COE. The NMFS has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. Through the section 7 process, where applicable, the NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they present the potential for some level of interaction.

In addition to vessel operations, other military activities including training exercises and ordnance detonation also affect sea turtles. Consultations on individual activities have been completed, but no formal consultation on overall activities in any region has been completed at this time.

Dredging
The construction and maintenance of federal navigation channels and sand mining ("borrow") areas has also been identified as a source of sea turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving sea turtle. A regional opinion for the COE's GOM hopper dredging operations was completed in November 2003. The opinion concluded "no jeopardy" for sea turtles. An ITS was provided, as well as reasonable and prudent measures specified to minimize impacts included the use of temporal dredging windows, intake and overflow screening, the use of sea turtle deflector dragheads, observer and reporting requirements, and sea turtle relocation trawling.

Oil and Gas Exploration
The COE and the Minerals Management Service (MMS) authorize oil and gas exploration, well development, production, and abandonment/rig removal activities that may adversely affect sea turtles. Both of these agencies have consulted numerously with the NMFS on these types of activities. These activities include the use of seismic arrays for oil and gas exploration in the GOM, the impacts of which have been analyzed in opinions for individual and multi-lease sales (e.g. . The NMFS anticipates incidental takes of sea turtles from vessel strikes, noise, marine debris, and the use of explosives to remove oil and gas structures.

Explosive removal of offshore structures may adversely affect sea turtles. For COE activities, an incidental take (by injury or mortality) of one documented Kemp's ridley, green, hawksbill, leatherback, or loggerhead turtle is anticipated under a rig removal consultation for the New Orleans District (NMFS 1998). MMS activities are anticipated to result in annual incidental take (by injury or mortality) of 30 sea turtles, including no more than 5 Kemp's ridley, green, hawksbill, or leatherback turtles and no more than 10 loggerhead turtles. In July 2004, MMS completed a programmatic environmental assessment (PEA) on geological and geophysical exploration on the GOM Outer Continental Shelf, and is preparing to release a PEA on removal and abandonment of offshore structures and effects on protected species in the GOM.

Coal-Fueled and Nuclear Generating Plants
Another action with federal oversight (the Nuclear Regulatory Commission) impacting sea turtles is the operation of nuclear generating plants. Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of coal-fueled and nuclear generating plants; though it is important to note that the majority of sea turtles caught are released alive. In the GOM, the NMFS has conducted section 7 consultations on the operation of the Crystal River Energy Complex's (CREC) cooling water intake system located near the Gulf of Mexico in Citrus County, Florida. The most recent opinion, dated August 8, 2002, concluded the proposed action is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill and leatherback sea turtles (NMFS 2002b). The NMFS anticipates an annual incidental take of up to seventy-five live sea turtles and three sea turtles killed as a result of CREC operations. Most these takes are expected to be loggerhead, Kemp's ridley, and green sea turtles. The ITS contains reasonable and prudent measures with implementing terms and conditions to help minimize this take.

ESA Permits
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. In addition, the ESA allows for the NMFS to enter into cooperative agreements with states developed under section 6 of the ESA, to assist in recovery actions of listed species. Prior to issuance of these authorizations, the proposal must be reviewed for compliance with section 7 of the ESA.

Sea turtles are the focus of research activities authorized by a section 10 permit under the ESA. There are currently 11 active scientific research permits directed toward sea turtles that are applicable to the action area of this opinion. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, blood sampling, tissue sampling (biopsy) and performing laparoscopy on intentionally captured turtles. The number of authorized takes varies widely depending on the research and species involved but may involve the taking of hundreds of turtles annually. Most of takes authorized under these permits are expected to be non-lethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, since issuance of the permit is a federal activity, issuance of the permit by the 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. However, despite these safeguards research activities may result in cumulative effects on sea turtle populations.

4.1.2 State or Private Actions

Vessel Traffic
Commercial traffic and recreational pursuits can adversely effect sea turtles through propeller and boat strikes. The Sea Turtle Stranding and Salvage Network (STSSN) reports many records of vessel interaction (propeller injury) with sea turtles off GOM coastal states such as Florida, where there are high levels of vessel traffic. The extent of the problem is difficult to assess because of not knowing whether the majority of sea turtles are struck pre- or post-mortem. Private vessels in the GOM participating in high-speed marine events (e.g., boat races) are a particular threat to sea turtles. The NMFS and the USCG are in early consultation on GOM marine events, but a thorough analysis has not been completed.

State Fisheries
Various fishing methods used in state commercial and recreational fisheries, including trawling, pot fisheries, gillnets, and vertical line are all known to incidentally take sea turtles, but information on these fisheries is sparse (NMFS SEFSC 2001). Florida banned all but very small nets in state waters, as has the state of Texas. Louisiana, Mississippi, and Alabama have also placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in GOM waters. However, illegal gillnet incidental captures have been reported in Florida, Louisiana, and Texas (NMFS SEFSC 2001).

Although few of these state regulated fisheries are currently authorized to incidentally take listed species, several state agencies have approached the NMFS to discuss applications for a section 10(a)(1)(B) incidental take permit. Since the NMFS' issuance of a section 10(a)(1)(B) permit requires formal consultation under section 7 of the ESA, the effects of these activities are considered in section 7 consultation. 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, the NMFS believes that ongoing state fishing activities may be responsible for seasonally high levels of observed strandings of sea turtles on GOM coastlines. Most state data are based on extremely low observer coverage or sea turtles were not part of data collection; thus, these data provide insight into gear interactions that could occur but are not indicative of the magnitude of the overall problem. Additional information on impact of take (i.e., associated mortality) is also needed for analysis of impacts to sea turtles from these fisheries. Certain gear types may have high levels of sea turtle takes, but very low rates of serious injury or mortality. For example, hook-and-line takes rarely are dead upon retrieval of gear, but trawls and gillnets frequently result in immediate mortality. Leatherbacks seem to be susceptible to a more restricted list of fisheries, while hardshell turtles, particularly loggerheads, seem to appear in data from almost all state fisheries.

Coastal Development
Beachfront development, lighting and beach erosion control all are ongoing activities along GOM coastlines. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, more and more coastal counties are adopting stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

4.1.3 Other Sources of Impacts

A number of activities that may indirectly affect listed species in the action area of this consultation include discharges from wastewater systems, dredging, ocean dumping and disposal, aquaculture, and anthropogenic marine debris. The impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources. Close coordination is occurring through the section 7 process on both dredging and disposal sites to develop monitoring programs and ensure that vessel operators do not contribute to vessel-related impacts.

Marine Pollution
Sources of pollutants in the GOM coastal regions include atmospheric loading of pollutants such as PCBs, storm water runoff from coastal towns, cities and villages, runoff into rivers emptying into the bays, groundwater and other discharges, and river input and runoff. 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.

A large area of the Louisiana continental shelf with seasonally-depleted oxygen levels (< 2mg/l) 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, which is largest than the state of Massachusetts (U.S. Geological Service, 2005). The hypoxic zone has impacts on the animals found there, including sea turtles, and the ecosystem-level impacts continue to be investigated.

Disease
A little understood disease may pose a new threat to loggerheads sea turtles. From October 5, 2000, to March 24, 2001, 49 debilitated loggerheads associated with the disease were found in southern Florida from Manatee County on the west coast through Brevard County on the east coast (Foley 2002). From the onset of the epizootic through its conclusion, effected sea turtles were found throughout south Florida. Most (N=34) were found in the Florida Keys (Monroe County). The number of dead or debilitated loggerheads found during the epizootic (N=189) was almost six times greater than the average number found in south Florida from October to March during the previous ten years. After determining that no other unusual mortality factors appeared to have been operating during the epizootic, 156 of the strandings were likely to be attributed to disease outbreak. These numbers may represent only 10% to 20% of the turtles that were affected by this disease because many dead or dying turtles likely never wash ashore. Overall mortality associated with the epizootic was estimated between 156 and 2,229 loggerheads (Foley 2002). Scientists were unable to attribute the illness and epidemic to any one specific pathogen or toxin. Symptoms of the unknown disease include extreme lethargy and pneumonia. If the agent responsible for debilitating these turtles re-emerges in Florida, and if the agent is infectious, nesting females could spread the disease throughout the range of the adult loggerhead population.

Acoustic impacts
The NMFS and the USN have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts to sea turtles can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns.

4.1.4 Conservation and Recovery Actions

The NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the GOM. The regulations have primarily focused on the Southeastern shrimp trawl fishery and the HMS pelagic longline fishery.

The NMFS has required the use of TEDs in GOM shrimp trawls since 1989. It has been estimated that TEDs exclude 97% of the sea turtles caught in such trawls. 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), floatation, and more widespread use. Analyses by Epperly and Teas (2002) indicated that the minimum requirements for the escape opening dimensions in TEDs in use at that time were too small, and that as many as 47% of the loggerheads stranding annually along the Atlantic Seaboard and GOM were too large to fit through existing openings. On February 21, 2003, the NMFS published a final rule to require larger escape openings in TEDs used in the southeast shrimp trawl fishery (68 FR 8456, February 21, 2003). Based upon the analyses in Epperly et al. (2002), leatherback and loggerhead sea turtles will greatly benefit from the new regulations, with expected reductions of 97% and 94%, respectively, in mortality from shrimp trawling. Several states have regulations requiring the use of TEDs in state-regulated trawl fisheries, and the federal regulations also apply in state waters.

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 significant benefits to endangered and threatened Atlantic sea turtles.

The NMFS has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. As well as making this information widely available to all fishermen, the NMFS recently conducted a number of workshops with Atlantic HMS pelagic longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. The NMFS intends to continue these outreach efforts and hopes to reach all fishermen participating in the Atlantic HMS pelagic longline fishery over the next one to two years. There is also an extensive network of Sea Turtle Stranding and Salvage Network participants along the GOM coast that not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

The Recovery Plans for loggerhead and Kemp's ridley sea turtles are in the process of being updated. Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising these plans based upon the latest and best available information. NMFS also recently convened an expert working group on leatherback sea turtles and is developing a leatherback research plan for obtaining the necessary demographic data for conducting a stock assessment and better understanding the species status.

4.2 Factors Affecting Smalltooth Sawfish Within the Action Area

Smalltooth sawfish greater than 200 cm TL 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. Individuals found in the action area, therefore, can potentially be affected by activities both within the southeast portion of the action area and adjacent nearshore waters.

4.2.1 Federal Actions

Fisheries
GOM shark fisheries include commercial shark bottom longline and drift gillnet fisheries and recreational shark fisheries under the FMP for Atlantic Tunas, Swordfish, and Sharks (HMS

FMP). An ESA section 7 consultation was completed on October 29, 2003, on the continued operation of those fisheries and the July 2003, Proposed Rule for Draft Amendment 1 to the HMS FMP (NMFS 2003a). The shark bottom longline and drift gillnet fisheries were both found likely to adversely affect smalltooth sawfish. Seven smalltooth sawfish have been observed caught in the bottom longline fishery to date. All of these caught animals, with the exception of one for which data are missing, were released alive. Only one smalltooth sawfish has been observed incidentally caught in the shark drift gillnet fishery. The incidental capture occurred in Atlantic, where the shark drift gillnet fishery predominantly operates. The consultation concluded the proposed action was not likely to jeopardize the continued existence of the smalltooth sawfish. An ITS was provided authorizing non-lethal takes.

Smalltooth sawfish may infrequently be taken in various other GOM federal fisheries involving trawl, gillnet, bottom longline gear, and hook-and-line gear. However, the NMFS has little data to substantiate such takings. The NMFS is collecting data to analyze the impacts of these fisheries and will conduct section 7 consultations as appropriate.

ESA Permits
Regulations developed under the ESA allow for the taking of ESA-listed species for scientific research purposes. Prior to issuance of these authorizations for taking, the proposal must be reviewed for compliance with section 7 of the ESA. There is currently one active research permit issued for the smalltooth sawfish. The permit allows researchers to capture, handle, collect tissue samples and tag up to 60 smalltooth sawfish per year. Although the research may result in disturbance and injury of smalltooth sawfish, the activities are not expected to affect the reproduction of the individuals that are caught, nor result in mortality.

4.2.2 State or Private Actions

A significant proportion of the Florida coast has been degraded by inland hydrological projects, urbanization, agricultural activities, and other anthropogenic activities such as dredging, canal development, sea wall construction, and mangrove clearing. These activities have led to the loss and degradation of smalltooth sawfish habitat and may adversely affect their recovery.

Florida state recreational fisheries, particularly those in southwest Florida, are known to occasionally take smalltooth sawfish. Fishers who capture smalltooth sawfish most commonly are fishing for snook (*Centropomus undecimalis*), redfish (*Scianops ocellatus*) and sharks (Simpfendorfer and Wiley 2004). Available data indicate that these takes are non-lethal. The NMFS is strongly encouraging the Florida Fish and Wildlife Commission to apply for an ESA section 10 incidental take permit for its fisheries.

4.2.3 Conservation and Recovery Actions

State regulations restricting the use of gear 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 gillnets, 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). Florida's ban of the use of shrimp trawls within three miles of the GOM coast may also aid recovery of this species.

Under section 4(f)(1) of the ESA, the NMFS is required to develop and implement a recovery plan for the conservation and survival of endangered and threatened species. NOAA fisheries convened a smalltooth sawfish recovery team in September 2003. The team has met several times and is currently drafting the plan. The team anticipates having a draft plan for public comment in the fall of 2005.

MML has been conducting a research project on the conservation biology of smalltooth sawfish since 1999. Funded in part by the NMFS, the project's aim is to provide data on the current status of smalltooth sawfish and to provide scientific information on which to base effective conservation measures. The project has several components including: surveys conducted using a variety of gears, a public sightings database, acoustic tagging and tracking, and genetic analysis. Data collected are providing new information on the species' current distribution and abundance, habitat use patterns, and the impact of population decline. Computer models of smalltooth sawfish populations are also being developed to investigate the rate of change in the population and how the population will recover under different conservation strategies. In addition to these benefits, public outreach efforts to increase awareness of the database are helping to also educate the public regarding smalltooth sawfish status and handling techniques.

5.0 Effects of the Action

In this section of the opinion, we assess the probable direct and indirect effects of the continued operation of the GOM reef fish fishery on listed species. The analysis in this section forms the foundation for our jeopardy analysis in Section 7.0. A jeopardy determination is reached if we would reasonably expect a proposed action to cause reductions in numbers, reproduction, or distribution that would appreciably reduce a listed species' likelihood of surviving and recovering in the wild. The ESA defines an endangered species as "...in danger of extinction throughout all or a significant portion of its range..." and a threatened species as "...likely to become an endangered species within the foreseeable future..." The status of each listed sea turtle species and the smalltooth sawfish likely to be adversely affected by the continued operation of the GOM reef fish fishery are reviewed in Section 3. Sea turtle species are listed because of their global status; a jeopardy determination must therefore find the proposed action will appreciably reduce the likelihood of survival and recovery of each global species. Only the U.S. DPS of smalltooth sawfish is listed; a jeopardy determination must therefore find the proposed action will appreciably reduce the likelihood of survival and recovery of the U.S. DPS.

The quantitative and qualitative analyses in this section are based upon the best available commercial and scientific data on sea turtle and smalltooth sawfish biology and the effects of the proposed action. Data pertaining to the GOM reef fish fishery relative to interactions with sea turtles and smalltooth sawfish are limited, so we are often forced to make assumptions to overcome the limits in our knowledge. Frequently, 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).

When analyzing the effects of any action, it is important to consider indirect effects as well as the direct effects. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects include aspects such as habitat degradation, reduction of prey/foraging base, etc. For the proposed action analyzed in this opinion, there are no expected indirect effects to sea turtles or smalltooth sawfish. The operation of the GOM reef fish fishery (i.e., vessel operations, gear deployment and retrieval) is not expected to impact the water column or benthic habitat in any measurable manner. Unlike mobile trawls and dredges that physically disturb habitat as they are dragged along the bottom, the gears used in the GOM reef fish fishery are suspended in the water column or essentially stationary on the bottom and do not effect water column or benthic habitat characteristics. The fishery's target and bycatch species are not foraged on by sea turtles nor are they a primary prey species for smalltooth sawfish (Hopkins et al. 2003, Simpfendorfer 2001) so prey competition is also not a factor. Therefore, all analyses will be based on direct effects.

Direct effects of the GOM reef fish fishery on threatened and endangered species are from interactions with its fishing gear resulting in the capture, injury, or death of the species. Our analysis therefore assumes sea turtles and smalltooth sawfish are not likely to be adversely affected by a gear type unless they interact with it. We also assume the potential effects of each gear type are proportional to the number of interactions between the gear and each species. There are three basic types of gear used in the GOM reef fish fishery: spear and powerhead, trap, and hook-and-line gear. Hook-and-and line gear includes both vertical line (handline, bandit gear, rod and reel) and bottom longline. Section 2 describes these fishing gears and how recreational and commercial fishers use them to target reef fish. The type of fishing gear and the area and manner in which it is used will all affect the likelihood and severity of sea turtle or smalltooth sawfish interactions. For the purpose of our analyses, the GOM reef fish fishery is sorted into four groups: spear and powerhead, trap, commercial hook-and-line (i.e., bottom longline and vertical line gear) and recreational vertical line. Each of these groups is evaluated separately in the following subsections.

5.1 Spear and Powerhead Gear

The distribution of spearfishing effort overlaps with that of sea turtles and smalltooth sawfish. However, divers spearfishing only occasionally encounter sea turtles and only rarely encounter smalltooth sawfish. Anecdotal information from encounters indicates some sea turtles and smalltooth sawfish change their route to avoid coming in close proximity to divers, whereas others appear unaware of the presence of divers. There are no reports of sea turtles or smalltooth sawfish actually being incidentally taken by spearfishing. Given the selectivity of spearfishing gear and the careful aim divers exercise to strike a fish, divers spearfishing will easily be able to avoid aiming in any direction where sea turtles or smalltooth sawfish are within their striking range. Any behavioral effects on sea turtles or smalltooth sawfish from the presence of divers spearfishing are expected to be insignificant. We therefore conclude fishing with spear and powerhead gear for reef fish is not likely to adversely affect sea turtles or smalltooth sawfish.

5.2 Fish Trap Gear

Sea turtles encountering trap gear can become entangled in trap line resulting in injury and, if entangled below the surface of the water, death by drowning. Loggerhead sea turtles may be particularly vulnerable to entanglement in trap lines because of their attraction to or attempts to feed on species caught in the traps and epibonts growing on traps, trap lines, and floats (NMFS and FWS 1991b). Leatherback sea turtles are also thought to be particularly prone to entanglement in trap lines.

Fish trap effort is concentrated along the eastern GOM where sea turtles are generally more common. Although there are no reports of sea turtles interacting specifically with fish trap gear, GOM sea turtle incidental captures and strandings attributed to entanglement in trap lines are occasionally reported to the STSSN[7]. For example, there were five offshore[8] incidental captures (four leatherbacks, one loggerhead) and nine offshore strandings (10 loggerhead, two leatherback) reported in 2003 as trap line entanglements. In 2002, there were three incidental captures (two leatherbacks, one loggerhead) and 10 strandings (six loggerheads, two greens, one leatherback, and one Kemp's ridley) reported as entangled in trap line. None of these records specifically stated that they were entangled in fish trap line. In fact, most specifically said crab trap line; a couple specified lobster trap; and a few just said nylon trap line and did not specify trap type.

Too much emphasis should not be placed on the type of trap specified in incidental capture and stranding reports because we have no way of knowing if the observer/person who filled out the report form knows the different gear type. However, crab trap gear is certainly the most probable. For example, in 2004, there were 1,660 commercial stone crab endorsements and 2,931 blue crab endorsements issued in Florida (J. Granger, FWC, pers. comm. 2005) compared to only 57 fishers with federal commercial reef fish trap endorsements (R. Sadler, pers. comm. 2005). Reef fish trap fishers are restricted each to using only 100 traps and the traps must be returned to shore at the end of each trip. Besides being more abundant, crab traps may also be more likely to attract sea turtles than reef fish traps because crabs are a common prey of sea turtles. The NMFS, in cooperation with industry, carried out an observer study of the GOM fish trap fishery from December 1993 through February 1995. Thirteen trips (576 sets, 96 sea days) were observed aboard six reef fish trap vessels. Although 41 loggerheads, two hawksbills, one green, and 11 unidentified sea turtles were sighted at set locations or during travel between sites, no sea turtles were observed captured (Scott-Denton 1996).

Based on the available information on sea turtle trap line entanglements and the limited amount of reef fish trap effort today, we believe sea turtle interactions with fish trap gear are extremely

[7] The distinction between incidental capture and stranding is whether the gear is actively fished/fishing or not. To be characterized as an incidental capture, the turtles may be either dead or alive, but the gear must be active. Sea stranding can be dead or alive and beached or floating, but the gear they are entangled in is not actively fishing (e.g. line only, old gear - disrepair/heavily fouled, gear on beach with turtle, etc.)
[8] Offshore means on, or seaward, of a GOM beach. Inshore refers to captures and strandings in bays, river, sounds, etc., or their beaches.

unlikely. This gear type is also scheduled to be phased out by 2007. We therefore conclude reef fish trap fishing is not likely to adversely affect any listed sea turtles.

Smalltooth sawfish may also be present where reef fish traps are located. There are no historic or recent reports of smalltooth sawfish entangled in fish trap lines (Simpfendorfer, pers. comm., 2004). A recent report of a smalltooth sawfish being entangled in a lobster pot line is the only documented interaction (Poulakis and Seitz 2004) between a smalltooth sawfish and a trap line of any kind. A trap line consists of a single thick rope so it would not likely become tangled around the teeth of smalltooth sawfish's rostrum like other entangling nets (e.g. gillnet). We also have no information suggesting smalltooth sawfish attempt to feed on animals caught inside traps; this is how other animals such as sea turtles become entangled. Based on this information and the limited amount of reef fish trap effort today, we believe smalltooth sawfish interactions with fish trap gear are extremely unlikely. We therefore conclude reef fish trap fishing is not likely to adversely affect the smalltooth sawfish. As noted preciously noted, this gear is scheduled to be phased out by 2007.

5.3 Commercial Hook-and-Line Gear--Sea Turtle Effects

5.3.1 Types of Interactions

Hook-and-line gear is known to adversely affect sea turtles via hooking, entanglement, trailing line, 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 fishing hooks or lines that were ingested, entangling, or otherwise still attached when they were released. Of the sea turtles hooked or entangled that do not die from their wounds, some 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 hook-and-line gear.

Entanglement
Sea turtles are particularly prone to entanglement as a result of their body configuration and behavior. Records of stranded or entangled sea turtles reveal that hook-and-line gear can wrap around the neck, flipper, or body of a sea turtle and severely restrict swimming or feeding. If the sea turtle is entangled when young, the fishing line becomes tighter and more constricting as the sea turtle grows, cutting off blood flow and causing deep gashes, some severe enough to remove an appendage.

Fishing gear can drift according to oceanographic conditions, including wind and waves, surface and subsurface currents, etc.; therefore, depending on sea turtle behavior, environmental conditions, and location of the set, turtles can become entangled in the gear. On longline gear, sea turtles have been found entangled in branchlines (gangions), mainlines, and float lines. Pelagic longline data indicates sea turtles entangled in longline are most often entangled around the neck and foreflippers, and, in the case of leatherback turtles, are often found snarled in mainlines, float lines, and gangions (e.g*.,* Hoey 2000). If sea turtles become entangled in monofilament line the gear can inflict serious wounds, including cuts, constriction, or bleeding anywhere on a turtle's body. In addition, entangling gear can interfere with a turtle's ability to swim or impair its feeding, breeding, or migration and can force the turtle to remain submerged, causing it to drown.

Hooking

In addition to being entangled in hook-and-line gear, sea turtles are also injured and killed by being hooked. Hooking can occur as a result of a variety of scenarios, some of which will depend on foraging strategies and diving and swimming behavior of the various species of sea turtles. Sea turtles are either hooked externally — generally in the flippers, head, shoulders, armpits, or beak — or internally, inside the mouth or when the animal has swallowed the bait and the hook is ingested into the gastro-intestinal tract, often a major site of hooking (E. Jacobson in Balazs et al. 1995). Pelagic longline hooking data indicates entanglement and foul hooking are the primary forms of interaction between leatherback turtles and longline gear, whereas internal hooking is much more prevalent in hard-shelled turtles, especially loggerheads. Internal hooking of leatherback turtles is much more rare. Data on hooking location from the Atlantic longline observer program in 1999 and 2000 (NMFS SEFSC 2001) and from the Northeast Distant experiment (Watson et al. 2003) agreed closely. For leatherback turtles, the large majority of interactions (at least 75%) are external foul-hookings, usually in the front flipper, shoulder, or armpit. The remaining interactions are primarily entanglements without hooking, and only a few leatherbacks are hooked in the mouth. For loggerheads, almost all interactions result from taking the bait and hook; only a very small percentage of loggerheads are entangled or foul-hooked externally. Loggerheads caught on J-hooks most often swallow the hooks (67% of interactions in Watson et al. [2003]). The J-hook was the standard hook style in the HMS pelagic longline fishery until July 2004. The use of circle hooks, however, has shown to significantly reduced the rate of hook ingestion by loggerheads, reducing the post-hooking mortality associated with the interactions. This is because circle hooks, the predominant gear used in the GOM reef fish fishery, are designed so that they typically result in hooking of the lower and are not swallowed (Watson et al. 2003).

Turtles that have swallowed hooks are of the greatest concern. The esophagus is lined with strong conical papillae directed caudally towards the stomach (White 1994). The presence of these papillae in combination with an S-shaped bend in the esophagus make it difficult to see hooks when looking through a turtle's mouth, especially if the hooks have been deeply ingested. Because of a turtle's digestive structure, deeply ingested hooks are also very difficult to remove without seriously injuring the turtle. A turtle's esophagus is attached firmly to underlying tissue; therefore, if a turtle swallows a hook and tries to free itself or is hauled on board a vessel, the hook can pierce the turtle's esophagus or stomach and can pull organs from their connective tissue. These injuries can cause the turtle to bleed internally or can result in infections, both of which can kill the turtle.

If a hook does not lodge into, or pierce, a turtle's digestive organs, it can pass through to the turtle's colon or it can pass through the turtle entirely (E. Jacobson in Balazs et al. 1995; Aguilar et al. 1995) with little damage (Work 2000). Of 38 loggerheads deeply hooked by the Spanish Mediterranean longline fleet and subsequently held in captivity, six loggerheads expelled hooks after 53 to 285 days (average 118 days) (Aguilar et al. 1995). If a hook passes through a turtle's digestive tract without getting lodged, the hook probably has not harmed the turtle. Tissue necrosis that may have developed around the hook may also get passed along through the turtle as a foreign body (E. Jacobson in Balazs et al. 1995).

Trailing Line

Trailing line (i.e*.,* line left on a turtle after it has been captured and released), particularly line trailing from an ingested hook, poses a serious risk to sea turtles. Line trailing from an ingested hook is likely to be swallowed, which may occlude the gastrointestinal tract, or it may prevent or hamper foraging, leading to eventual death. Sea turtles that swallow monofilament still attached to an embedded hook may suffer from the "accordion effect" described by Mediterranean sea turtle researchers, usually fatal, whereby the intestine, perhaps by its peristaltic action in attempting to pass the unmoving monofilament line through the alimentary canal, coils and wraps upon itself (Pont, pers. comm. 2001). Trailing line may also become snagged on a floating or fixed object, further entangling a turtle and potentially slicing its appendages and affecting its ability to swim, feed, avoid predators, or reproduce. Sea turtles have been found trailing gear that has been snagged on the bottom, or has the potential to snag, thus anchoring them in place (Balazs 1985; Hickerson, pers. comm. 2001). Long lengths of trailing gear are likely to entangle the turtle eventually, leading to impaired movement, constriction wounds, and potentially death.

Forcible Submergence

Sea turtles can be forcibly submerged by longline gear. Forcible submergence may occur through a hooking or entanglement event, where the turtle is unable to reach the surface to breathe. This can occur at any time during the set, including the setting and hauling of the gear. Forced submergence can occur when the sea turtle encounters a line deep below the surface and the line is too short and/or too heavy to be brought up to the surface by the swimming sea turtle, as would generally be the case with bottom longline gear.

Sea turtles forcibly submerged for extended periods show marked, even severe, metabolic acidosis as a result of high blood lactate levels. With such increased lactate levels, lactate recovery times are as long even as 20 hours. Kemp's ridley turtles stressed from capture in an experimental trawl (#7.3 minute forcible submergence) experienced significant blood acidosis, which originated primarily from non-respiratory (metabolic) sources. Visual observations indicated that the average breathing frequency increased from approximately 1-2 breaths/minute pre-trawl to 11 breaths/minute post-trawl (a 5 to 10-fold increase). Given the magnitude of the observed acid-base imbalance created by these trawl experiments, complete recovery of homeostasis may have required 7 to 9 hours (Stabenau et al. 1991). Similar results were reported for Kemp's ridleys captured in entanglement nets, where turtles showed significant physiological disturbance, and post-capture recovery depended greatly on holding protocol (Hoopes et al. 2000).

Observed long recovery times suggest that turtles would be more susceptible to lethal metabolic acidosis if they experience multiple captures in a short period of time (Lutcavage and Lutz 1997). Presumably, a sea turtle recovering from a forced submergence would most likely remain resting on the surface (given it had the energy stores to do so), which would reduce the likelihood of being recaptured by a submerged bottom longline or vertical line. Recapture would also depend on the condition of the turtle and the intensity of fishing pressure in the area. The

NMFS has no information on the likelihood of recapture of sea turtles by hook-and-line. However, turtles in the Atlantic Ocean have been captured more than once by pelagic longliners (on subsequent days), as observers reported clean hooks already in the jaw of captured turtles. Such multiple captures were thought to be most likely on three or four trips that had the highest number of interactions (Hoey 1998).

Stabenau and Vietti (2003) studied the physiological effects of multiple forced submergences in loggerhead turtles. The initial submergence produced severe and pronounced metabolic and respiratory acidosis in all turtles. Successive submergences produced significant changes in blood pH, PCO_2, and lactate, but as the number of submergences increased, the acid-base imbalances were substantially reduced relative to the imbalance caused by the first submergence. Increasing the time interval between successive submergences resulted in greater recovery of blood homeostasis. The authors conclude that as long as sea turtles have an adequate rest interval at the surface between submergences, their survival potential should not change with repetitive submergences.

Respiratory and metabolic stress from forcible submergence is also correlated with additional factors such as size and activity of the sea turtle (including dive limits), water temperature, and biological and behavioral differences between species. These factors affect the survivability of an individual turtle. For example, larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to the stress of forced submergence than adults. Gregory et al. (1996) found that corticosterone concentrations of captured small loggerheads were higher than those of large loggerheads captured during the same season. During the warmer months, routine metabolic rates are higher, so the impacts of the stress from entanglement or hooking may be magnified (e.g., Gregory et al., 1996). In addition, disease factors and hormonal status may play a role in anoxic survival during forced submergence. Any disease that causes a reduction in the blood oxygen transport capacity could severely reduce a sea turtle's endurance on a longline. Because thyroid hormones appear to have a role in setting metabolic rate, they may also play a role in increasing or reducing the survival rate of an entangled sea turtle (Lutcavage and Lutz 1997). Turtles necropsied following capture (and subsequent death) by pelagic longliners were found to have pathologic lesions. Two of the seven turtles (both leatherbacks) had lesions severe enough to cause probable organ dysfunction, although whether or not the lesions predisposed these turtles to being hooked could not be determined (Work 2000).

Sea turtles also exhibit dynamic endocrine responses to stress. In male vertebrates, androgen and glucocorticoid hormones (corticosterone (CORT) in reptiles) can mediate physiological and behavioral responses to various stimuli, influencing both the success and costs of reproduction. Typically, the glucocorticoid hormones increase in response to a stressor in the environment, including interaction with fishing gear. For example, Jessop et al. (2002) states "during reproduction, elevated circulating CORT levels in response to a stressor can inhibit synthesis of testosterone or other hormones mediating reproduction, thus leading to a disruption in the physiology or behavior underlying male reproductive success." A study in Australia examined whether adult male green turtles decreased CORT or androgen responsiveness to a capture/restraint stressor to maintain reproduction. Researchers found that migrant breeders, which typically had overall poor body condition because they were relying on stored energy to maintain reproduction, had decreased adrenocortical activity in response to a capture/restraint stressor. Smaller males in poor condition exhibited a pronounced and classic endocrine stress response compared to the larger males with good body condition. The authors state: "We speculate that the stress-induced decrease in plasma androgen may function to reduce the temporary expression of reproductive behaviors until the stressor has abated. Decreased androgen levels, particularly during stress, are known to reduce the expression of reproductive behavior in other vertebrates, including reptiles." Small males with poor body condition that are exposed to stressors during reproduction and experience shifting hormonal levels may abandon their breeding behavior (Jessop et al. 2002). Female green turtles have also been studied to evaluate their stress response to capture/restraint. Studies showed that female green turtles during the breeding season exhibited a limited adrenocortical stress response when exposed to ecological stressors and when captured and restrained. Researchers speculate that the apparent adrenocortical modulation could function as a hormonal tactic to maximize maternal investment in reproductive behavior such as breeding and nesting (Jessop et al. 2002).

In the worst scenario, sea turtles will drown from being forcibly submerged. Such drowning may be either "wet" or "dry." With wet drowning, water enters the lungs, causing damage to the organs and/or causing asphyxiation, leading to death. In the case of dry drowning, a reflex spasm seals the lungs from both air and water. Before death due to drowning occurs, sea turtles may become comatose or unconscious. Studies have shown that sea turtles that are allowed time to stabilize after being forcibly submerged have a higher survival rate. This 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, etc.), and the nature of any sustained injuries at the time of submergence (NRC 1990).

5.3.2 Sources of Data for Estimating Sea Turtle Take Rates

Sea turtles occur throughout the action area where commercial bottom longline and vertical line gear are fished. There are several sources of data to consider in estimating sea turtle takes from these hook-and-line gear types. Sources include SEFSC observer data, reported bycatch and fishing effort data in the CFLP and SDDP, MML observer data, and anecdotal reports. Each of these sources is reviewed below.

NMFS, SEFSC Observer Data
In December 1993, in cooperation with the commercial fishing industry and the GMFMC, the SEFSC implemented a scientific observer program to characterize the reef fish fishery of the eastern U.S. GOM. The primary objective was to quantify and document release mortality and bycatch levels aboard reef fish vessels. Catch and effort data for targeted and bycatch species were collected and analyzed by area, season, and gear type. Opportunistic sighting of sea turtles were also documented.

Between April 1994 and May 1995, the SEFSC observed 13 trips aboard nine bottom longline vessels operating primarily off the west coast of Florida from Steinhatchee to the Dry Tortugas. A total of 317 sets (229,467 hooks) were sampled during 112 sea days of observations. Although one loggerhead and three unidentified sea turtles species were sighted at set locations or during travel between sites, no sea turtles were observed captured (Scott-Denton 1996, Scott-Denton, pers. comm. 2004).

Between January and July 1995, the SEFSC observed 16 trips aboard bandit-rigged vessels resulting in 81 sea days of observation. A contractor, Russell Research and Associates, observed an additional six trips. As on the bottom longline trips, sea turtles (ten loggerheads and five unidentified) were sighted at set locations or during travel between sites but none captured (Scott-Denton 1996, Scott-Denton, pers. comm. 2004).

Logbook data (CFLP and SDDP Data)
As discussed in Section 2.1.2, all GOM commercial reef fish fishers are required to report their catch and effort data via the CFLP and approximately 20% of GOM commercial reef fish fishers are also required to submit discard data via the recent SDDP. Sample selections for the SDDP are made in July of each year, and the selected fishermen (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. Over the past three reporting periods (i.e., August 2001 through July 2004) participants in the SDDP, representing 11% to 13% of all GOM reef fish CFPL fishing effort, reported catching 20 sea turtles: one leatherback, one loggerhead, and nine unidentified sea turtles on vertical lines; and one green, three loggerheads, and five unidentified sea turtles on bottom longlines.

Reported sea turtle catch data for both bottom longlines and vertical lines are provided in Table 5.1 (p. 63) and reveals no obvious take pattern. The sea turtles caught on bottom longlines were spread out fairly evenly among the three reporting periods, with captures in February through June, November, and August. Nine of the eleven sea turtles caught on vertical lines were all caught during the first reporting period. Captures during that period were fairly spread out, however, occurring in the months of January, April, and August through November. The greatest number of sea turtles caught per bottom longline or vertical line trip was two. Estimated average weights were reported for six of the nine sea turtles caught on bottom longlines and for two of the eleven sea turtles caught on vertical lines. Given anecdotal information indicating most fishers reportedly just cut the line, as well as describe the sea turtles caught as being large, we have no confidence in the reported average weight estimates and believe they are highly inaccurate.

Figure 5.1 (p. 63) depicts commercial longline effort by GOM statistical zone and the number of sea turtles reported in the SDDP in each zone. The majority of bottom longline effort occurs in the eastern GOM, with the greatest concentration of effort occurring in statistical zone five offshore of Tampa Bay, Florida to Englewood, Florida. Fishing effort continues to be relatively high in statistical zone four, south of Englewood to just north of Naples, Florida, as well as in statistical zone nine, a relatively small area off of the Florida Panhandle between Pensacola and Panama City. Although no sea turtles were reported as caught from statistical zone five, four sea turtles were caught in statistical zone 4 and three in statistical zone six. The remaining two sea turtles were caught in statistical zone nine.

Table 5.1 SDDP GOM Commercial Reef Fish Sea Turtle Catch Data

Period	Month	Trip Area (Statistical Zone)	Species Caught	Number Caught	Average Weight	Discard Condition
Bottom Longline Sea Turtle Catch Data						
1	May	6	Green	1	NR	Alive
1	June	6	Unidentified	1	NR	Alive
1	February	6	Unidentified	1	NR	Alive
2	November	4	Loggerhead	1	75	Alive
2	December	4	Unidentified	1	100	Alive
3	May	4	Loggerhead	1	100	Dead
3	March	4	Loggerhead	1	30	Alive
3	April	9	Unidentified	2	50	Alive
Vertical Line Sea Turtle Catch Data						
1	August	7	Loggerhead	1	NR	Alive
1	April	6	Unidentified	2	NR	Alive
1	August	4	Unidentified	1	NR	Alive
1	October	4	Unidentified	1	NR	Alive
1	January	7	Unidentified	1	NR	NR
1	January	7	Unidentified	1	NR	NR
1	October	4	Unidentified	1	NR	Alive
1	August	4	Unidentified	1	NR	Alive
3	September	11	Leatherback	1	80	Alive
3	November	11	Unidentified	1	7	Alive

Figure 5.1. GOM Reef Fish Bottom Longline Effort and Sea Turtle Bycatch By Statistical Zone

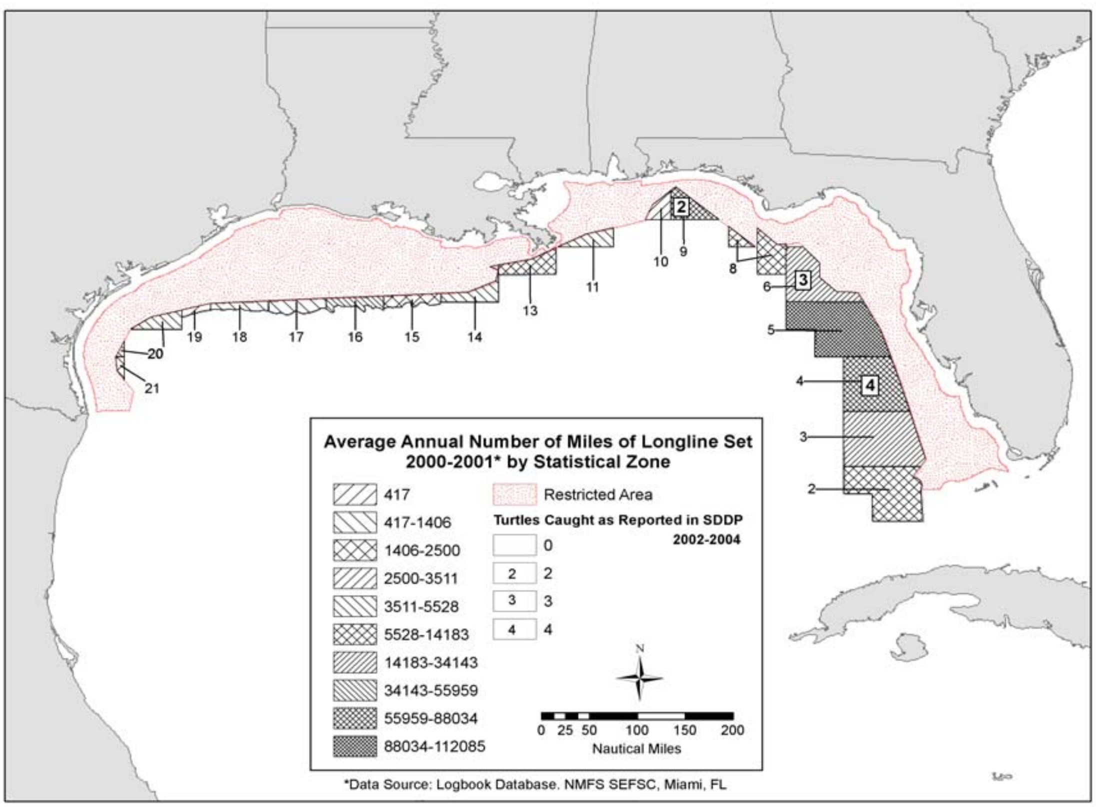
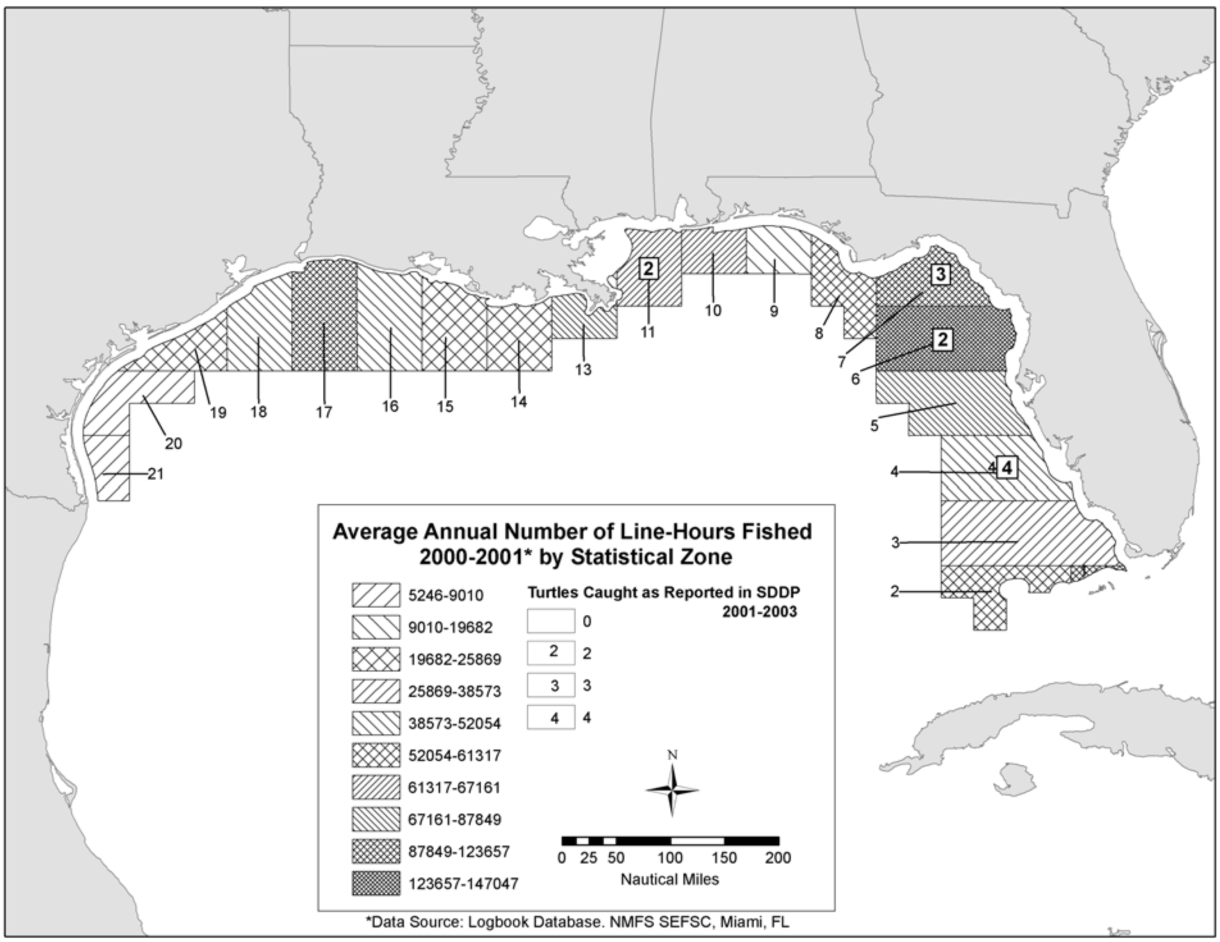


Figure 5.2 depicts commercial vertical line effort and the number of sea turtles reported in the SDDP for each zone. The greatest concentrations of commercial vertical line effort occur in zones 6 and 7, the region collectively known as Florida's Northern Big Bend, including offshore of the Econfina River west to the Apalachicola River, and also off of the western coastline of Louisiana. Sea turtles were caught in statistical zones four, six, seven, and 11. Five of the 11 sea turtles were caught in statistical zones six and seven, where fishing effort is most concentrated. Four sea turtles were caught in zone four. The remaining two sea turtles caught were from zone 11, off the Alabama- Mississippi border.

Figure 5.2 GOM Reef Fish Commercial Vertical Line Effort and Sea Turtle Bycatch By Statistical Zone



MML Cooperative Longline Sampling Observer Data

MML is currently conducting a project titled "Cooperative longline sampling of the west Florida shelf shallow-water grouper complex: characterization of life history, undersized bycatch and targeted habitat." Bycatch data and biological samples are collected for the project by a MML observer aboard commercial reef fish longline vessels fishing off southwest Florida. Of the ten trips (10-14 days each) observed to date, only one trip caught sea turtles (N. Parnell, pers. comm. 2004). On May 20, 2004, an unidentified sea turtle was caught during a deepwater grouper 10-mile set (1200-1500 hooks) around 27.05EN latitude, 84.09EW longitude at 17:30 hours in 325 ft of water. The total set and haul time was five hours. A second sea turtle take occurred on May 21, 2004, at 27.03EN latitude, 84.07EW longitude at 17:35 hours in 315 ft of water. Total duration of this 10-mile set with a comparable number of hooks was three hours.

Additional Anecdotal Information
Commercial GOM reef fish fishers typically say they see sea turtles in the water when fishing with vertical line and bottom longline gear, but only rarely catch them (K. Burns, pers. comm. 2004). This characterization seems consistent with observed and reported data, which suggests takes are infrequent. There is one anecdotal report of a vessel catching 35 to 40 sea turtles during one 2004 trip, but the incident was reportedly "the talk of the dock" because it was so highly unusual and incredible (K. Burns, pers. comm. 2004). The captain of the vessel was said to be a transient fisherman, who does not regularly fish in the GOM. Given the stir among fishers created by this incident, it is not believed to be indicative of the normal catch. Our attempts to verify the accuracy and source of this incident were unsuccessful.

5.3.3 Estimated Sea Turtle Takes

Although no sea turtle captures were observed during the SEFSC program, the more recent SDDP, MML, and anecdotal data sources summarized in Section 5.3.2 clearly demonstrate that both GOM reef fish commercial bottom longline gear and vertical line gear have caught sea turtles over the past three SDDP reporting years. It is our belief that sea turtles have likely always been occasionally caught but too few trips were previously observed to detect such infrequent events. However, both the total number of sea turtles previously caught and the total number previously caught of each species are unknown.

Credit to the SDDP data collected over the past three years, we know for certain that at least 20 sea turtles were taken during that time frame the total number of sea turtles caught and the total number caught of each species are unknown. However, even for that time period, based on our knowledge of under-reporting in other self-reported logbook programs, fishers selected for the SDDP may have caught additional sea turtles but not reported them. Also, since only 20% of commercial fishers are selected for the SDDP, it is reasonable to assume the other 80% of fishers also caught sea turtles. MML's observer data documenting two lethal takes in bottom longline gear from fishers not selected to report in the SDDP corroborates this assumption. There is also the unconfirmed report of 35 to 40 sea turtles being caught in 2004. Thus, the total number of sea turtle takes with GOM reef fish commercial bottom longlines and vertical gear over the past three years is certainly more than 20 and likely much greater.

Given the paucity of data, we use extrapolation to estimate the total number of GOM reef fish commercial bottom longline and vertical line sea turtle takes over the past three SDDP reporting years, the only years for which bycatch data is available. An extrapolation is an inference about some hypothetical situation based on known facts and observations. In mathematical terms, it is a calculation of the value of a function outside the range of known values. In this case, we try to infer the number of sea turtles taken on each of these commercial gear types based on available logbook data from the past three years, including the number of sea turtle takes reported by fishermen participating in the SDDP, the amount of effort reported by SDDP participants, and the amount of effort reported by all GOM reef fish participants combined. With observer data too limited in scope to extrapolate, logbook data from the past three are the best available data on which to base our estimates, despite potential under-reporting. Data from the three reporting periods were combined prior to extrapolation to minimize error resulting from our small sample bycatch sample size and annual variability (see Table 5.1, p. 63).

The NMFS did not validate any of the reported species' identifications and we cannot attest to the knowledge of fishermen regarding the identity of various sea turtle species. Thus, some of the sea turtles reported by species may be falsely identified. Leatherbacks are easy to identify and distinguish from hardshell species, but hardshell species can be difficult to tell apart from each other. As noted earlier, only two of the 11 sea turtles caught on vertical line gear (a loggerhead and a leatherback) and only four of the nine sea turtles caught on longline gear (three loggerheads and one green) were identified. Of the identified species, therefore, we are only confident in the accuracy of the one leatherback reported and that all other identified captures were not leatherbacks. On the same basis, we also assume all unidentified sea turtles reported were hardshell sea turtles, believing any leatherbacks would have been identified because of their uniqueness from other species. Based on this information, three sea turtle take extrapolations were prepared: one for the number of hardshell sea turtles caught on vertical lines (i.e., ten), one for the number of leatherbacks caught on vertical lines, and one for the number of hardshell sea turtles caught on bottom longline.

Take estimate formulas are as follows:

- Total number of hardshell sea turtles reported caught on vertical lines/SDDP participant reported effort*total CFLP reported effort
- Total number of leatherback sea turtles reported caught on vertical lines/SDDP participant reported effort*total CFLP reported effort
- Total number of hardshell sea turtles reported caught on bottom longlines/SDDP participant reported effort*total CFLP reported effort

Available summary GOM reef fish bottom longline effort and vertical line CFLP effort data for the past three reporting periods is provided in Table 5.2 (p. 66). Effort data are measured using a variety of variables reported in logbooks including hooks, days, hours, hook-hours, and lines fished. Vertical line data are available for each of these variables. For bottom longlines, data are available for hooks, days, and sets, but not for hook-hours. This is because the number of hours fished has been reported as two different values in the CFLP. The number of hours fished was initially required to be reported as hours per longline set but later changed to total hours fished. Unfortunately, not all fishers switched to reporting total hours fished; some continued to report hours per set. Therefore, in many cases it is impossible to determine which value (hours per set or total hours) is reported.

Table 5.2 Recent GOM Reef Fish Commercial Fishing Effort

Reporting Period	Hooks Fished	Days Fished	Hook-hours Fished	Hours Fished	Lines Fished
SDDP Participant Reported Bottom Longline Effort					
Period 1	2,082,712	856	NA	NA	2,803
Period 2	3,712,390	1,447	NA	NA	3,785
Period 3	3,625,285	1,504	NA	NA	3,467
Periods 1-3	9,420,387	3,807	NA	NA	10,055
All Reported Reef fish Bottom Longline Effort					
Period 1	41,140,922	14,883	NA	NA	40,238
Period 2	39.385,438	14,606	NA	NA	38,084
Period 3	37,275,514	13,263	NA	NA	33,497
Periods 1-3	117,801,874	42,752	NA	NA	111,819
SDDP Participant Reported Vertical Line Effort					
Period 1	21,662	2,706	897,905	24,254	3,248
Period 2	70,655	5,071	1,496,646	41,676	7,027
Period 3	40,993	4,242	1,143,777	37,047	4,747
Periods 1-3	133,310	12,019	3,538,328	102,977	15,022
All Reported Reef fish Vertical Line Effort					
Period 1	345,321	36,497	10,648,713	314,853	45,237
Period 2	360,897	36,736	11,615,869	318,547	44,021
Period 3	284,633	30,585	8,549,019	261,230	34,489
Periods 1-3	990,851	103,818	30,813,601	894,630	123,747

Total take estimates were calculated separately using the take estimate formulas (presented on p. 66) with each effort variable available. The results are presented in Table 5.3.

Table 5.3 Sea Turtle 3-Year Take Estimates by Gear and Effort Data Type

Commercial Gear Type	3-Year Take Estimate	Fishing Effort Variables				
		Hooks	Days	Sets/Lines[9]	Hours	Hook-Hours
Bottom Longline	Hardshell	113	101	100	NA	NA
	Leatherback	0	0	0	0	0
Vertical line	Hardshell	74	86	82	87	87
	Leatherback	7	9	8	9	9

Which estimate most accurately estimates take for each gear type depends on which factors are driving the sea turtle interaction. In the absence of such information, we take the precautionary approach and assume the highest calculated take level. We therefore estimated that over the past three SDDP reporting years (i.e., August 2001 through July 2004) there were 113 bottom longline hardshell sea turtles takes, 87 vertical line hardshell sea turtle takes, and 9 vertical line leatherback sea turtle takes.

No leatherback takes were estimated for bottom longline because no leatherbacks were reported taken. With a total bycatch sample size of nine sea turtles, however, we are hesitant to assume no leatherbacks were caught on this gear. Based on one observed capture in the GOM HMS

[9] Bottom longline estimates are calculated using set effort data and vertical line estimates are calculated using line effort data.

bottom longline shark fishery over the past ten years, we think captures are probably rare but feasible. For precautionary purposes, therefore, we estimate that one leatherback sea turtle may have been taken over the past three SDDP reporting years (i.e., August 2001 through July 2004).

Our extrapolation assumes that the probability of catching any hardshell sea turtle species is equal through time and space. We also assume that the probability of catching a leatherback sea turtle is equal through time and space. Factors potentially affecting sea turtle capture but for which sufficient data are not available to analyze include fishing depth, area, time of day, time of year, etc. The relationship between the number of turtles taken and effort is assumed to be linear (i.e., the more hooks fished, the more sea turtles caught). Even though the self reported sea turtle takes tend to be under reported, the fact that we extrapolated for the entire fishery based on take reported in the eastern portion of the fishery gives us a conservative estimate of take for the entire fishery.

Given our limited data and the broad assumptions applied, the take estimates are uncertain but not unreasonable. Based on the best available information, we believe basing our jeopardy analysis on these numbers is appropriate.

5.3.3.1 Hardshell Sea Turtle Takes by Species

To conduct our jeopardy analysis and assess take for each individual species, we need to estimate the number of sea turtle takes for each species. This is particularly challenging with extremely limited take information. As discussed above, most of the sea turtle takes reported were not identified by species and those few identified by species were not verified. For the reasons described in Section 5.3.3 we were able to use the SDDP data to break down our take estimates by species only for leatherbacks. We therefore must rely on what we know about sea turtle relative abundance in the action area, behavior characteristics, and any sea turtle take information from other GOM commercial hook-and-line fisheries to arrive at estimates for each hardshell sea turtle species.

Epperly et al. (2002) used the results of aerial surveys conducted in the GOM to calculate relative abundance indices for sea turtles using line transect methodology. The surveys were conducted during the fall (September to November) between 1992 and 1994 and in 1996. Although the purpose of these surveys was to estimate the abundance and distribution of cetaceans in GOM coastal and continental waters, sea turtle sighting were also recorded. GOM survey data were post-stratified into two subregions: the eastern (≥ 89EE longitude) GOM and western (≤ 89EE longitude) GOM, and into two depth strata: inshore (0-10 fathoms) and offshore (10-40 fathoms). A total of 637 sightings of sea turtles were made in GOM waters <40 fathoms. The hardshell sea turtle relative abundance indices for these strata are presented in Table 5.4 (p. 69).

Table 5.4 Hardshell Sea Turtle Relative Abundance Estimates (i.e., Proportion of Total Abundance) for the GOM from Epperly et al. (2002)

Subregion, Depth	Greens	Hawksbills	Kemp's ridleys	Loggerheads
West, 0-10 fathoms	.064	0	.032	.902
West, 10-40 fathoms	.200	0	0	.800
East, 0-10 fathoms	.017	.473	.065	.443
East, 10-40 fathoms	.150	.344	.013	.493

The relative abundance estimates indicate differences in sea turtle density and species composition as a function of geographic region. In general, sighting rates were much higher in the eastern GOM and inshore strata than in the western GOM. Loggerhead sea turtles were sighted throughout the GOM though they had a very low occurrence in the offshore strata in the western GOM. Kemp's ridley sea turtles were sighted primarily in the inshore strata and most commonly occurred in the eastern GOM. Green sea turtles were sighted further offshore and primarily in the southern portion of the Florida GOM coast. Hawksbill turtles likewise occurred primarily in southwest Florida. Leatherback turtles were more broadly distributed and were observed in the offshore strata. Finally, many sightings could not be accurately identified to species and were described as unidentified hardshells. The majority of these sightings occurred in southern Florida where green, hawksbill, Kemp's ridley, and loggerheads were common. A proportion of the hardshell density was allocated to each hardshell species as their relative abundance within a stratum (Epperly et al. 2002).

The relative abundance estimates suffer from a number of potential biases discussed in Epperly et al. (2002). However, given the quantified differences in relative density, these estimates provide useful information with which to infer the number of sea turtles taken by the GOM commercial reef fish fishery by species. By multiplying our total take estimates for each gear type by the relative abundance estimates for each sea turtle we can derive sea turtle numbers by species.

To select which of the four relative abundance estimates is most appropriate to use in our take estimate calculation for each species, we first consider the distribution of reef fish fishing effort in the GOM. Bottom longline reef fish effort occurs mainly in the eastern GOM. For example, during the 3-year reporting period, 88% and 12% of reported GOM reef fish longline effort occurred in the East and West subregions, respectively. In contrast, vertical line reef fish effort is slightly more spread out in the GOM, with the majority occurring in the western GOM. During the 3-year reporting period, 43% and 57% of reported GOM reef fish vertical line effort occurred in the East and West subregions, respectively. Based on this information, we believe 88% of the total 113 (i.e., 99) bottom longline takes would resemble one of the East subregion relative abundance estimates and the remaining 12% (i.e., 14) would resemble one of the West subregion relative abundance estimates. Similarly, for our vertical line estimates, we believe 43% of the 87 vertical line takes (i.e., 37) would resemble one of the East subregion relative abundance estimates and the other 57% (i.e., 50) would resemble one of the West subregion relative abundance estimates.

Next, we select which of the East and West subregion depth ranges most closely represents where GOM reef fish fishing effort occurs. The use of bottom longlines and buoy gear for reef fish is prohibited inside of lines approximating 20 fathoms east of Cape San Blas, Florida. Shallow-water grouper fishing occurs in federal waters approximately 20 to 40 fathoms deep, with effort concentrated in waters near 40 fathoms deep. The snapper fishery occurs along the northern and western GOM coast, in federal waters generally 10 to 33 fathoms deep. Based on this information, the majority of GOM reef fish fishing occurs in waters between 10 and 40 fathoms deep. The main exception is fishing for deep-water grouper. Deep-water grouper fishing extends beyond waters 40 fathoms deep to as far as waters 100 fathoms deep. Also, GOM reef fish fishing west of Cape San Blas using bottom longlines and buoy gear is prohibited inside of lines approximating the 50-fathom contour. Considering this information, we selected the reported relative sea turtle abundance for the 10-40 fathom stratum as likely the most representative of both East and West GOM commercial reef fish effort.

Estimated hardshell sea turtle takes by species over the past three SDDP reporting years (i.e., August 2001 through July 2004) based solely on the species relative abundance assignments discussed above and our total hardshell take estimates are presented in Table 5.5.

Table 5.5 Hardshell Sea Turtle 3-Year Take Estimates by Species

Hardshell Species	Bottom Longline 3-Year Estimated Take			Vertical Line 3-Year Estimated Take		
	West, 10-40 fathoms	East, 10-40 fathoms	Total, 10-40 fathoms	West, 10-40 fathoms	East, 10-40 fathoms	Total, 10-40 fathoms
Greens	3	15	18	3	6	9
Hawksbills	0	34	34	0	13	13
Kemp's ridleys	0	1	1	0	0	0
Loggerheads	11	49	60	47	18	65

By using the relative sea turtle abundances in the GOM, our analysis assumes each hardshell species is equally likely to be caught per unit of effort proportional to its overall abundance within each subregion. Differences in sea turtle behavior, sea turtles distribution, and fishing effort distribution within each selected subregion, however, may result in certain species being more likely to be caught than others. This assumption would be particularly problematic for species having very site/habitat-specific distributions within each subregion.

Of the four hardshell species, the distribution of hawksbill sightings were the least broadly distributed. Aerial survey sightings of hawksbills were all in southwest Florida, with none sighted north of Charlotte Harbor, Florida. Thus, their overall relative abundance estimate reflects their concentrated abundance in that localized area rather than throughout the eastern GOM and very likely inflates our hawksbill take estimates. Also, the hawksbills sighted during the aerial surveys in the eastern GOM, 10 to 40 fathom subregion were sighted only in the shallowest part of this subregion. In contrast, most GOM commercial reef fish fishing effort is concentrated in the deeper part of this subregion, with bottom longlines banned in waters less than 20 fathoms. The distribution of green sea turtle sightings was also mainly in southwest Florida, but with a few isolated sightings off Florida's Big Bend area and the Texas coast. Green sea turtle sighting were also typically further offshore. Considering this information, the green take estimates may be positively biased, but by not as much as the hawksbill results.

Sea turtle behavioral characteristics and observed sea turtle takes in other GOM commercial hook-and-line fisheries can also be used to arrive at estimates for each hardshell sea turtle species' relative abundance. All four species of hardshell sea turtles present in the action area have been found entangled in line and with embedded hooks. However, the hawksbill's diet is highly specialized consisting primarily of sponges; therefore, this species may not be as attracted to baited hooks and therefore be taken much less frequently. Also, green sea turtles are primarily herbivores and typically are associated with sea grass beds and not hard-bottom areas. Sea turtles observed caught in GOM HMS shark fishery during 1994 to 2003 included 15 loggerheads, one leatherback, and only five unidentified sea turtles. There are no observed sea turtle take data for the vertical line fishery.

Based on our knowledge of the abundance and distribution of hawksbills and the absence of hawksbill capture records in other bottom longline fisheries, the 34 GOM reef fish bottom longline hawksbills takes estimated by using Epperly et al.'s (2002) East, 10-40 fathoms relative abundance estimate for hawksbills seems unreasonably high. We believe instead that hawksbill captures on reef fish bottom longlines would be extremely unlikely. Although our green take estimates may be overestimated, we believe they are reasonable. We therefore adjusted Epperly et al.'s (2002) relative abundance estimate for hawksbills to zero and recalculated the relative abundance estimates for loggerheads, Kemp's ridleys, and greens to reflect this change. Table 5.6 presents these adjusted relative abundance estimates, as well as our corresponding adjusted bottom longline 3-year estimated take.

Table 5.6 Adjusted Bottom Longline Hardshell Sea Turtle 3-Year Take Estimates by Species

Hardshell Species	Adjusted Hardshell Sea Turtle Relative Abundance Estimates		Adjusted Bottom Longline 3-Year Estimated Take		
	West, 10-40 fathoms	East, 10-40 fathoms	West, 10-40 fathoms	East, 10-40 fathoms	Total, 10-40 fathoms
Greens	.200	.2286	3	23	26
Kemp's ridleys	0	.0198	0	2	2
Loggerheads	.800	.7515	11	74	85

For our vertical line take estimates, we did not discount hawksbills because commercial vertical line fishers are not restricted to waters greater than 20 fathoms and, therefore, may fish in waters where hawkbills are more likely to be present and may be potentially caught. Green sea turtles were also again not discounted for the same reasons noted in our bottom longline take estimate discussion above. Although we believe hawksbill and green sea turtle takes may be biased high, the estimates are reasonable based on the best available data. The estimates attributed to GOM reef fish vertical line presented in Table 5.5 (p. 70) therefore remain unchanged.

5.3.4 Sea Turtle Mortality Estimates

To estimate the total impact of the GOM reef fish fishery, it is necessary to estimate the mortality associated with the anticipated takes to better understand its impact on species. As discussed in 5.3.1, sea turtle mortality can occur prior to release (i.e., immediate mortality) or later in time (i.e., post-release mortality). Both types of mortality are reviewed and estimated in the following subsections.

5.3.4.1 Mortality at Time of Capture (Immediate Mortality)

Bottom Longline
Of the nine sea turtles reported in the SDDP as caught on bottom longlines, eight were reportedly released alive and one (a loggerhead) was reported as dead. We also know that both of the unidentified sea turtles observed by MML were dead (Section 5.3.2). Based on this information 27% of all known sea turtle captures in the GOM reef fish bottom longline fishery have been reported dead. Although all of these reported sea turtles are thought to have been hardshell species, leatherbacks caught on bottom longline could also potentially experience immediate mortality from not being able to get to the surface and breath. Immediate mortality of sea turtles taken in the Atlantic shark bottom longline fishery is estimated to be 23% based on the disposition of 43 sea turtles observed (NMFS 2003a). Based on that information, we believe 27% mortality is plausible for longline-hooked sea turtles rather than just a result of the very few takes on which the rate is based. Applying this rate to our estimated sea turtles caught on bottom longline over the past three reporting periods and rounding the products to the nearest whole number, 23 (22.95) loggerheads, seven (7.02) greens, and one (.54) Kemp's ridley were dead upon capturing them. Rounding had little effect on the percent mortality our green and loggerhead estimates. Although we applied a 27% mortality rate to our estimated two Kemp's ridley takes, our result represents a cautious 50% mortality rate as a result of rounding of our product. In contrast, applying a 27% mortality rate to our one estimated take resulted in a less conservative estimate of no mortality for leatherback. To avoid underestimating total leatherback mortality, our discussion of post-release mortality (Section 5.3.4.2) will take into account this decision.

Vertical Line
Nine of the eleven sea turtles caught on vertical lines were reported as released alive. The release conditions of the other two sea turtles taken on vertical line gear were not accurately reported (i.e., the code number reported does not exist). Since fishermen typically retrieve vertical lines within fifteen minutes of their deployment and because sea turtles can easily breath-hold for periods in excess of an hour, we believe it is highly unlikely that a sea turtle caught on a vertical line would be dead upon retrieval of the line. We therefore believe all 101 hardshell sea turtles and nine leatherbacks caught by vertical lines over the past three reporting periods were released alive.

5.3.4.2 Post-release mortality

Most, if not all sea turtles released alive from bottom longline gear will have experienced a physiological injury from forced submergence and/or traumatic injury from hooking and entanglement and many may still carry penetrating or entangling gear. Although sea turtles caught on vertical line gear are less likely to have physiological injury from forced submergence because of the short soak times, the other effects are still applicable. Thus, some level of post-release mortality might occur for sea turtles released alive on either gear type.

Bottom Longline
In January 2004, the NMFS developed new draft criteria for estimating post-release mortality of sea turtles, based on the best available information on the subject, to set standard guidelines for

assessing post-release mortality from pelagic longline interactions. The new draft criteria are presented in Table 5.6 (p. 74). The criteria are still subject to additional review, but nonetheless constitute the best available science on this topic at this time. Under the new criteria, overall mortality ratios are dependent upon the type of reaction (i.e., where hooked; entangled or not) and the amount of gear left following the release (i.e., hook remaining, amount of line remaining, entangled or not). Therefore, in addition to how the turtle interacted with the gear, the experience, ability, and willingness of the crew to remove the gear, and the availability of gear-removal equipment are very important factors in the post-release mortality ratios. The new criteria also take into account differences in post-release mortality between hard-shelled sea turtles and leatherback sea turtles, with slightly higher rates of post-release mortality assigned to leatherbacks.

Table 5.6 Criteria for assessing marine turtle post-interaction mortality after release from pelagic longline gear. Percentage rates of mortality are shown for hardshell turtles, followed by percentages for leatherbacks (in parentheses).

Nature of Interaction	**Released with hook and with line greater than or equal to half the length of the carapace**	**Release with hook and with line less than half the length of the carapace**	**Released with all gear removed**
	Hardshell (Leatherback)	Hardshell (Leatherback)	Hardshell (Leatherback)
Hooked externally with or without entanglement	20 (30)	10 (15)	5 (10)
Hooked in cervical esophagus, glottis, jaw joint, soft palate, or adnexa (and the insertion point of the hook is visible when viewed through the mouth) with or without entanglement	30 (40)	20 (30)	10 (15)
Hooked in lower jaw (not adnexa[10]) with or without entanglement	45 (55)	35 (45)	25 (35)
Hooked in esophagus at or below level of the heart (includes all hooks where the insertion point of the hook is not visible when viewed through the mouth) with or without entanglement	60 (70)	50 (60)	n/a[11]
Entangled Only	Released Entangled 50 (60)		Fully Disentangled 1 (2)
Comatose/resuscitated	n/a[3]	70(80)	60(70)

[10] Subordinate part such as tongue, extraembryonic membranes

[11] Per veterinary recommendation hooks would not be removed if the insertion point of the hook is not visible when viewed through the open mouth.

The June 1, 2004, HMS pelagic longline opinion uses the January 2004 post-release mortality criteria and ratios, along with sea turtle bycatch and release data from the pelagic longline observer program to generate post-release mortality estimates for hardshell and leatherback sea turtles. Data describing the interaction type and release condition of GOM reef fish fishery sea turtle takes to date are not available for determining what interaction type and release condition category of the January 2004 post-release mortality ratios is applicable. Following the guidance provided in Epperly and Boggs (2004), takes were included in the most conservative likely category based on what we know about the fishery's general operation. Given commercial GOM reef fish bottom longline fishers use circle hooks, and circle hooks are known to typically result in hooking of the lower jaw, we infer that most hardshell sea turtles caught will likely be hooked in the lower jaw. Anecdotal information indicates fishers typically just cut the line when sea turtles are caught. We therefore assume sea turtles are released still hooked and with trailing line. Based on these conditions and the January 2004 post-release criteria, post-release mortality is estimated to be 30% for hardshell sea turtles released alive and 40% for leatherbacks.

Applying the above rates to our estimated hardshell and leatherback sea turtles caught on bottom longline and released alive over the past three reporting periods (i.e., 19 greens, zero Kemp's ridleys, one leatherback, 62 loggerheads) and rounding to the nearest whole number, we estimate six (5.7) greens and 19 (18.6) loggerheads died as a result of post-release mortality. No post-release was estimated because we estimated our one Kemp's ridley take would be dead up capture. No leatherback mortality was estimated though based on the rounding of our product. Given the 27% immediate mortality dismissed earlier, we think the chance that the one leatherback take was lethal is too plausible to discount. We therefore concluded that this take was lethal. Our sea turtle post-release mortality estimates, as well as our immediate mortality are provided and summed for each species in Table 5.7.

Table 5.7 Bottom Longline Sea Turtle 3-Year Take Mortality Estimates

Hardshell Species	Immediate Mortality	Post-release Mortality	Total
Greens	7	6	13
Kemp ridleys	1	0	1
Leatherbacks	0	1	1
Loggerheads	23	19	42

Similar post-release mortality criteria are not available for assessing post-release mortality from vertical line interactions. Sea turtles caught on vertical line gear and released alive would presumably be in better overall health than if released alive from bottom longline gear because of the shorter soak times and ability to reach the surface of the water to breathe. However, we see no reason why the same factors affecting post-release mortality of sea turtles hooked on bottom longlines (interaction type and amount of gear remaining) would not apply. In the absence of other quantitative data, we conservatively apply the same post-release mortality criteria (i.e, 30% for hardshells and 40% for leatherbacks) to our commercial vertical line take estimates (i.e., nine greens, 13 hawksbills, 0 Kemp's ridleys, 9 leatherbacks, and 65 loggerheads). The results are presented in Table 5.8 (p.76).

Table 5.8 Vertical Line Hardshell Sea Turtle 3-Year Take Mortality Estimates

Hardshell Species	Immediate Mortality	Post-release Mortality	Total
Greens	0	3	3
Hawksbills	0	4	4
Kemp ridleys	0	0	0
Leatherbacks	0	4	4
Loggerheads	0	20	20

5.4 Commercial Hook-and-Line Gear--Smalltooth Sawfish Effects

5.4.1 Types of Interactions

Bottom longlines and vertical line gear can adversely affect smalltooth sawfish via hooking and entanglement. Based on hooking observation data from MML bottom longline research surveys and reported recreational rod and reel fishing encounters, the vast majority of smalltooth sawfish are hooked in the mouth (Simpfendorfer, pers. comm. 2003; Burgess, pers. comm. 2003; Seitz and Poulakis, pers. comm. 2003). Foul hooking (i.e., hooking in fin, near eye, etc.) reports are not nearly as frequent, but do occasionally occur. There are no reports, however, of smalltooth sawfish being deeply hooked. Once hooked, the gangion or leader frequently becomes wrapped around the animals' saw (Burgess, pers. comm. 2003; Seitz and Poulakis, pers. comm. 2003). This may be from slashing during the fight, spinning on the line as it is retrieved, or any other action bringing the rostrum in contact with the line.

Smalltooth sawfish captured on vertical line and bottom longline gear have all been observed or reported as alive upon capture and as released in good condition. Between 1994 and 2003, eight smalltooth sawfish have been observed caught in the Atlantic and GOM HMS shark bottom longline fishery. All individuals observed were very active when reaching the water's surface and were released in apparent good health. Soak times do not seem to be a factor for smalltooth sawfish. Simpfendorfer speculates this is because the animal's natural habit consists of laying on the seafloor, using its spiracles to breathe (Simpfendorfer, pers. comm. 2003). Thorson (1982) reports that largetooth sawfish caught by fishermen at night or when no one was present to tag them were left tethered in the water with a line tied around the rostrum for several hours with no apparent harmful effects. Additional information stems from Dr. Simpfendorfer of MML, who has been conducting smalltooth sawfish surveys since 2000 using bottom longline, nets, and rod and reel. To date, he has caught and handled over 50 individuals ranging in size from 87 cm to 450 cm, about half of which were caught on bottom longlines. All of these fish were alive upon capture and safely released with no apparent harm to the fish. There are no studies on the post-release mortality of smalltooth sawfish. Based on their lively condition at capture and MML tagging recapture data, we believe post-release mortality is extremely rare.

Temporary sub-lethal effects on smalltooth sawfish may occur. A few rare reports from recreational fishers indicate smalltooth sawfish can damage their rostrum by hitting it against the vessel or other nearby objects (e.g., piling, bridge) while the fishers are preparing to release the fish. Reported damage ranges from broken rostral teeth to broken rostrums. Smalltooth sawfish have been caught missing their entire rostrum, otherwise appearing healthy, so they appear to be able to survive without it. Given the rostrum's role in smalltooth sawfish feeding activities, however, damage to their rostrum, depending on the extent, is likely to hinder their ability to feed and may ultimately impact the affected animal's growth.

5.4.2 Sources of Data for Smalltooth Sawfish Take Rates

Sources of data reviewed for our sea turtle commercial hook-and-line analysis (i.e., the SEFSC and MML observed trips, SDDP data, and pers. comm.) did not include any reports of smalltooth sawfish being caught. However, incidental captures observed in the Atlantic and GOM HMS shark bottom longline fishery, as well as a recent smalltooth sawfish encounter report documented by Poulakis and Seitz (2004), indicate takes may occur. Each of these data sources is reviewed below.

Shark Bottom Longline Observer Data
The HMS shark fishery operates in both the Atlantic and the GOM EEZ. As noted earlier, between 1994 and 2002, eight smalltooth sawfish were observed caught in the HMS shark bottom longline fishery. Six of the eight captures were located in the Atlantic EEZ: five off the Florida Keys, including four that were caught on one set in 1997, and one off of Georgia in 2002. The remaining two observed captures were in the GOM EEZ: in 1999 one was caught west of the Dry Tortugas and in 2003 the other was caught on GOM shark fishing grounds off Madeira Beach (NMFS 2003a).

Encounter Database Reports
Two encounter databases are maintained to provide information on smalltooth sawfish abundance, distribution, and habitat use. Biologists Gregg Poulakis (Florida Fish and Wildlife Commission, Fish and Wildlife Research Institute) and Jason Seitz (Collier County Environmental Services) maintain a database of recent records (1990 to present) from GOM waters off southwest Florida. MML maintains a statewide encounter database from 1998 to the present.

Poulakis and Seitz (2004) document 1,632 sawfish encounters in Florida Bay and the Keys between 1990 and 2002, approximately 89% of these occurred between 1998 and 2002. Most sawfish encounters were reported as single fish being observed or caught on hook-and-line, but there were also several sawfish observed together. Virtually all of the captured sawfish were the bycatch of fishers targeting sharks, tarpon, snook, or red drum. At least 33% (n = 210) of sawfish reported as encountered were in water greater than ten m (five fathoms) deep off the Florida Keys. Longline vessels, shrimp trawlers, anglers, and SCUBA divers provided these reports. Of these deep-water reports, 70% (n=148) were reported as encountered on the bottom in waters greater than 70 m (38 fathoms). Based on their data, Poulakis and Seitz (2004) conclude smalltooth sawfish in south Florida are regularly found in waters greater than 10 m and up to 122 m in depth.

Only one of the longline Poulakis and Seitz (2004) encounter reports is a bottom longline capture: in 2001, a smalltooth sawfish estimated to be 2.4 m in total length was caught on bottom longline targeting grouper in federal waters off of the Dry Tortugas. There have been no reports of commercial vertical line smalltooth sawfish encounters.

Figure 5.3 depicts MML sawfish encounter data, including the two smalltooth sawfish caught by the HMS shark bottom longline in the action area, and GOM reef fish commercial longline effort. West of Cape San Blas, Florida, reef fish bottom longline gear is prohibited inside of approximately 50 fathoms. East of Cape San Blas, reef fish longline gear is prohibited inside of approximately 20 fathoms. Most of the GOM reef fish bottom longline component occurs in the eastern GOM. The greatest concentration of effort occurs in statistical zone 5 offshore of Madeira Beach, Florida. This statistical zone is where the HMS bottom longline shark fishery previously encountered a smalltooth sawfish. There are only five other MML data encounters overlapping with effort. Four of these occur in statistical zone 2; one is just north in statistical zone 3; and the remaining one occurred in statistical zone 4. Poulakis and Seitz document an additional 24 encounters in deep waters, west of the Dry Tortugas, which would be contained within statistical zone 2.

Figure 5.3 GOM Reef Fish Bottom Longline Effort and MML Smalltooth Sawfish Encounter Database Record Locations From All Sources)

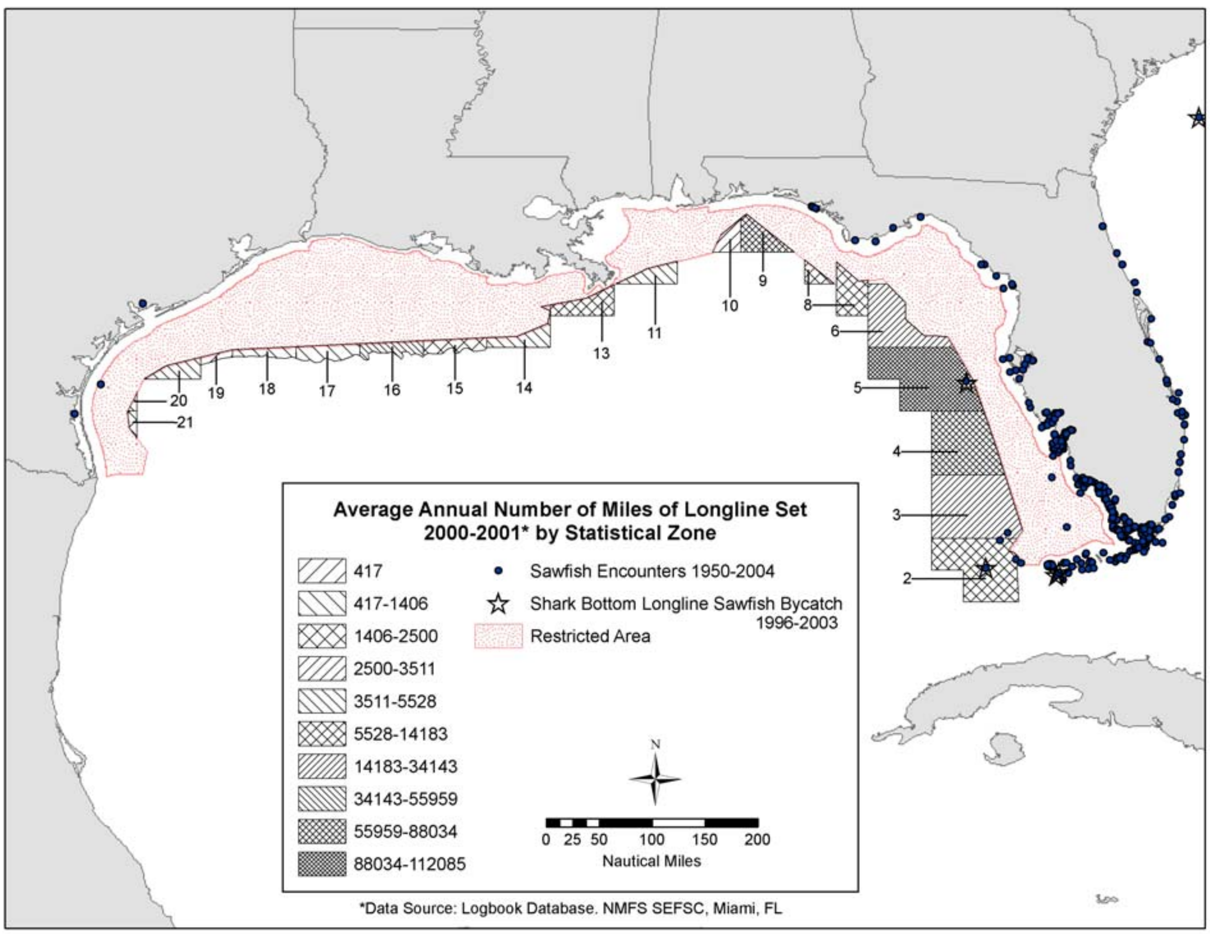
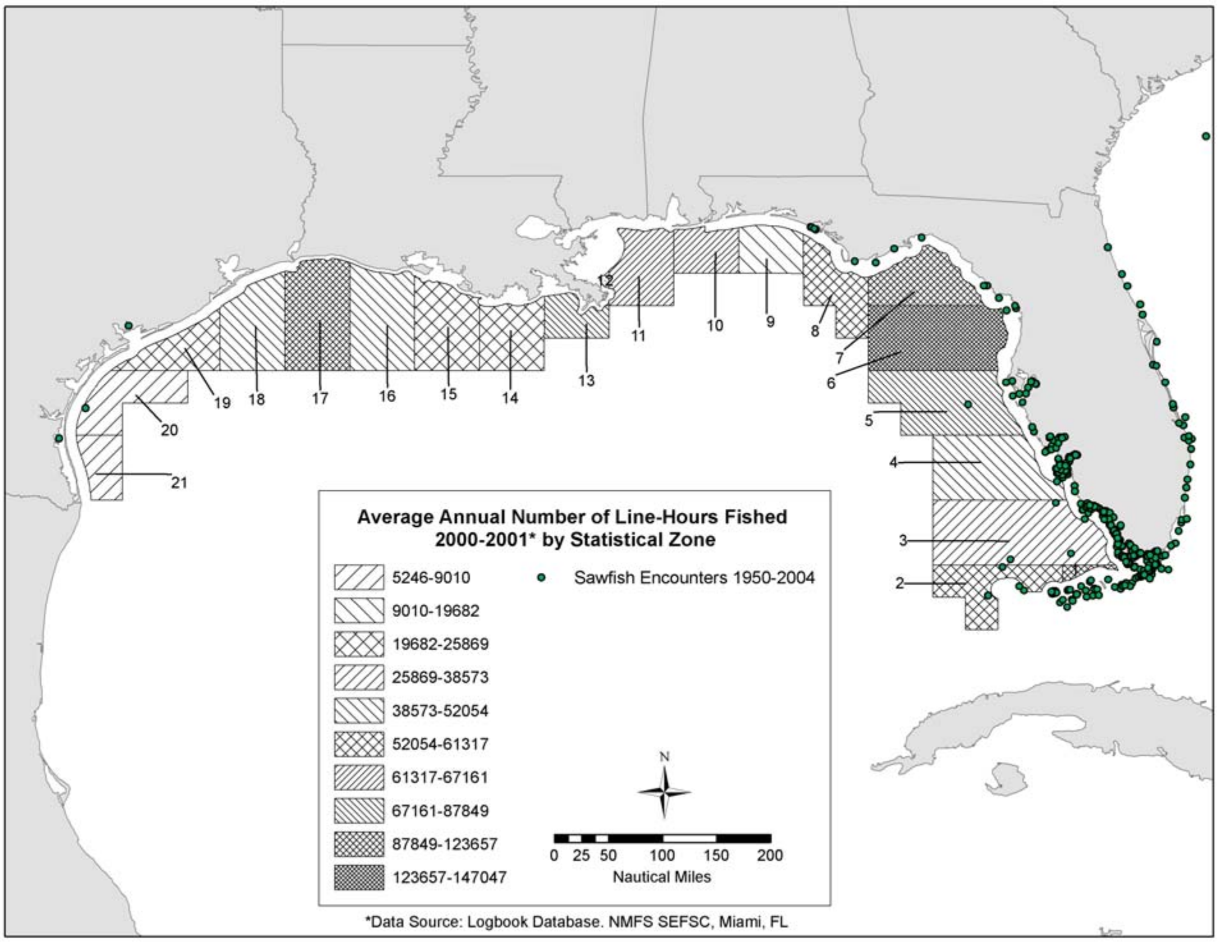


Figure 5.4 (p. 79) depicts commercial vertical line effort in the GOM EEZ by statistical zone and sawfish encounter locations from MML sightings database. Commercial fishers primarily use vertical line gear to target snappers along the northern and western GOM coast in federal waters generally less than 33 fathoms. The greatest concentrations of commercial vertical line effort

occur in zones 6 and 7, off Florida's Northern Big Bend and in zone 17 off of the western coastline of Louisiana. In contrast, smalltooth sawfish are most commonly encountered in Florida state waters south of 26.2EN latitude (Simpfendorfer and Wiley 2004, Poulakis and Seitz 2004). The most northern record of a smalltooth sawfish in the eastern GOM EEZ is at approximately 27.4EN latitude. Records north of this latitude consist of only immature individuals in state waters. Although Poulakis and Seitz document additional encounters in federal waters not illustrated in Figure 5.4, these encounters are all from areas well south of 27.4EN latitude.

Figure 5.4 GOM Reef Fish Vertical Line Effort and MML Smalltooth Sawfish Encounter Database Record Locations From All Sources



5.4.3 Estimated Smalltooth Sawfish Takes

Although the distribution of reef fish and shark bottom longline sets overlap in some areas of the GOM, the fisheries operate quite differently. Shark bottom longlines are allowed inside of 20 fathoms east of Cape San Blas and 50 fathoms west of Cape San Blas, where reef fish bottom longlines are prohibited. Shark bottom longlines are set overnight, with average soak times of 11.5 hours per set. In contrast, reef fish bottom longlines are fished during the day and have an average soak time of only three hours. Reef fish sets also have shorter gangions and smaller hooks. With so many differences, we do not feel it is appropriate to apply the observed smalltooth sawfish catch per unit of effort in the shark bottom longline fishery to the GOM reef fish fishery.

Based on available data, we know at least one smalltooth sawfish was taken on reef fish bottom longline gear in GOM U.S. EEZ waters in the past three years. Additional smalltooth sawfish may have been caught but not reported. Smalltooth sawfish were not listed as an endangered species until April 1, 2003, so its listing status has not likely served as a disincentive to reporting until recently. Given the extensive public outreach efforts within southwest Florida over the past several years soliciting smalltooth sawfish encounter reports, we believe additional unreported takes in southwest Florida, are unlikely. However, the chance of take not being reported likely increases outside of southwest Florida. This is because public outreach efforts in the central and northern GOM have only been implemented recently and area coverage has not been as extensive. Given, smalltooth sawfish are less common in the central and northern GOM, however, we would expect smalltooth sawfish take levels in this area to not exceed southwest Florida reports. We therefore conclude up to two smalltooth sawfish were caught on bottom longlines over the past three years. Based on previous interaction observations, these captures were released alive with only short-term sublethal effects.

Although smalltooth sawfish takes in commercial vertical line gear have not been reported, based on two reports of smalltooth sawfish in the GOM EEZ off southwest Florida on recreational vertical line gear (see Section 5.6, p. 82), we see no reason why commercial interactions could not have also occurred in this area. However, as discussed in Section 5.3.3.1, 57% of commercial vertical line effort over the past three years occurred in the eastern GOM where recent records of smalltooth sawfish are extremely rare. In contrast, approximately 90% of recreational vertical line effort occurs in the eastern GOM. Based on this information we would expect commercial vertical line encounters to be less common than takes on recreational vertical line. We therefore believe only one smalltooth sawfish was likely taken over the past three years in the GOM EEZ off southwest Florida. Based on the same rational presented for unreported takes in our commercial take estimates, we also assume one more smalltooth sawfish may have been taken in the central and northern GOM. We therefore conclude up to two smalltooth sawfish were caught on commercial vertical lines over the past three years. Based on interaction observations (see Section 5.4.1, pg. 76), these captures were likely released alive with only short-term sublethal effects.

5.5 Recreational Vertical Line -- Sea turtles

Anecdotal information indicates recreational fishermen occasionally take sea turtles. 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. Hooked sea turtles have been reported by the public fishing from boats, piers, the beach, banks, and jetties (TEWG 2000). Most sea turtles incidentally caught on hook-and-line are from fishing piers. Fishing piers are suspected to actually attract sea turtles that learn to forage there for discarded bait and fish carcasses. The amount of persistent debris, including monofilament line, fishing tackle, and other man-made items, has also been found to increase around piers (NMFS 2004c), posing additional threat to sea turtles in the area.

Information on recreational rod and reel sea turtle interactions in U.S. EEZ waters is lacking. In 1991 and 1992, the MRFSS provided synoptic data on spatio-temporal distribution of sea turtles by asking recreational anglers if they had observed a sea turtle on their fishing trip (Braun-Mcneil and Epperly 2002). Of the 6,157 people interviewed[12] who fished in GOM federal[13] waters, only 12% overall reported seeing a live sea turtle. Florida had the highest federal waters sightings rate (24%), followed by Alabama (7%), Mississippi (3%), and Louisiana (2%) (Braun-Mcneil, pers. comm. 2004). Unfortunately, anglers were not asked to elaborate (i.e., number, species type, observed or caught), only to indicate the presence or absence of sea turtle sightings during their fishing trip. Thus, we have no way of knowing whether any of the sea turtles sighted were actually caught.

Based on anecdotal information, we believe sea turtles will be affected by recreational hook-and-line gear. Offshore reefs in the U.S. EEZ where recreational fishing is typically concentrated may create an environment similar to a pier and make sea turtle takes likely. We therefore believe recreational fishing will have adverse effects on sea turtles.

5.5.1 Estimated Sea Turtle Takes

Absent sea turtle interaction data for recreational vertical line gear, the only way we can quantify past takes attributed to this gear is to use what we know from our commercial vertical line gear take analysis. Here, we assume recreational vertical line gear would have the same hardshell and leatherback sea turtle capture per unit effort as documented for commercial vertical lines. Differences exist between the type of commercial and recreational vertical line gear used and where it is fished; some suggest recreational sea turtle take levels may be higher while other differences indicate they would be lower. For example, commercial vertical line gear may have higher hardshell and leatherback catches per unit of effort per hook than recreational vertical line because sea turtles may be more attracted to the greater concentration of bait. Commercial vertical line fishers typically use bandit gear rigged with anywhere from five to as many as 20 hooks per line, whereas recreational fishermen mainly use rod and reel with only one or two hooks per line. Commercial vertical line fishers may also have a higher leatherback sea turtle catch per unit because they typically fish further offshore where leatherbacks are more abundant. However, recreational anglers may have a higher hardshell sea turtle catch per unit of effort than commercial vertical line fishers because they typically fish in the eastern GOM and somewhat closer to shore where sea turtles, with the exception of leatherbacks, are believed to be more abundant. A substantial portion of commercial vertical line effort occurs in the EEZ off of Louisiana and Texas, where sea turtles are less abundant. The differences between the type of commercial and recreational vertical line gear used and where they are used may therefore result in overall negligible differences in hardshell sea turtle catch per unit effort and slightly biased high leatherback estimates.

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[12] The question was asked in all states participating in MRFSS along the GOM coast of the United States except for Texas.

[13] Federal waters include waters greater than three miles from shore of AL, MS, and LA, and waters greater than 10 miles from shore of FL.

As explained in greater detail in Section 5.3.3 (p. 65), the commercial vertical line take estimates were based on reported catch per unit effort over the past three years. For consistency purposes, we therefore apply the commercial vertical line gear catch per unit effort to recreational effort data from approximately the same time frame.[14]

For private angler and charter boat (non-headboat) reef fish effort, we used MRFSS data. Reef fish trips were defined in our analysis as any trip where reef fish included in the GOM reef fish management unit were either reported as one of the target species or caught. For each fishing mode and year, we multiplied the total estimated number of reef fish trips in the GOM EEZ by state times the average number of reported hours fished per trip by state. This produced the total estimated number of reef fish fishing hours in the GOM EEZ by state. We then had to estimate the number of hooks fished per angler hour to derive total hook-hours by state. Anecdotal information indicates some private anglers fishing for reef fish use one hook per line while others use two per line, so we estimated an average of 1.5 hooks were fished per private angler hour. On charter trips one hook per angler line is probably most common, but two hooks are still used by some anglers (R. Zales, pers. comm. 2004). For hooks fished per charter angler hour therefore we again estimated an average of 1.5 hooks per angler hour were used, to be precautionary. Each of these estimates were multiplied by our total estimated number of reef fish fishing hours in the GOM U.S.EEZ by state to estimate GOM recreational vertical line reef fish fishing effort in total hook hours.

For headboat reef fish effort, we used data from the SEFSC, Headboat Survey. Effort is recorded in the Headboat Survey database as angler days fished by statistical area. Headboats take both half-day and full-day trips, each of which includes a portion of time in transit to and from offshore fishing grounds. Overall, the average estimated number of hours fished per reported angler day is five hours (R. Dixon, pers. comm. 2004). The reported number of angler days fished per statistical area was converted to hours fished by multiplying by five. The product was then multiplied by two, the number of hooks per line typically used by headboat anglers (R. Dixon, pers. comm. 2004), to derive the total number of headboat hook-hours fished for the 2001-2003 period. Out of the total number of headboat trips reportedly taken in the GOM EEZ, 78% caught reef fish. Although individual anglers may not always catch their target species, we believe it is reasonable to assume headboat trips targeting reef fish would catch at least one reef fish. We therefore used 78% of our total headboat hook-hours reported effort to represent all reef fish headboat effort.

Results

Over the past three years, recreational fishing resulted in an estimated 35.7 million (35,653,521) hook-hours of fishing effort. Using the commercial vertical line leatherback and hardshell capture per unit of effort, an estimated total of 101 hardshell sea turtles and 10 leatherbacks were caught over that time period.

[14] MRFSS and Headboat Survey 2001-2003 data.

5.5.2 Hardshell Sea Turtle Take by Species

As stated in our commercial take analysis, to conduct our jeopardy analysis and assess take for each individual species, we need to estimate the number of sea turtles takes for each species. We therefore must also break down our total recreational take estimate by species. In the absence of recreational reef fish take data, we rely solely on what we know about relative abundance in the action area (Epperly et al. 2002) and what we know about each sea turtle's behavior characteristics to derive estimates for each hardshell sea turtle species.

The Epperly et al. (2002) relative abundance proportions are provided in Table 5.4 (p. 69). Over the past three years, approximately 90% of all recreational fishing effort occurred in the eastern GOM. Although some recreational anglers may not go as far offshore as commercial fishers when targeting reef fish, the majority of angler effort would still be within the 10-40 fathoms. We therefore multiplied 90% of the total 101 (i.e., 91) recreational sea turtle takes by the East, 10-40 fathoms subregion relative abundance estimate and multiplied the remaining 10% of recreational sea turtle takes by the West, 10-40 fathom subregion relative abundance estimate. The results are summarized in Table 5.9.

Table 5.9 Recreational Vertical Line 3-Year Estimated Take

Hardshell Species	Vertical Line 3-Year Estimated Take		
	West, 10-40 fathoms	East, 10-40 fathoms	Total
Loggerheads	8	45	53
Kemp's ridleys	0	1	1
Greens	2	14	16
Hawksbills	0	31	31

The same general assumptions and biases discussed in Section 5.3.3.1 (pp. 68-71) for our commercial vertical line take estimates by species apply to our recreational vertical line 3-year take estimates. Although we believe hawksbill and green sea turtle takes may be biased high, the estimates are reasonable based on the best available information.

5.5.3 Estimated Mortality

As noted in Section 5.3.4.2, there are no criteria for assessing sea turtle post-release mortality from vertical line interactions. Again, we assume sea turtles caught on vertical line gear and released alive would presumably be in better overall health than if released alive from bottom longline gear because of the shorter soak times and ability to reach the surface of the water to breathe. However, we see no reason why the same factors affecting post-release mortality of sea turtles hooked on bottom longlines (interaction type and amount of gear remaining) would not apply. Anecdotal information indicates that many anglers today now use circle hooks (R. Zales, pers. comm. 2004). Sea turtles occasionally found stranded (both live and dead) with hooks and line still attached indicates gear is sometimes left on individuals caught. Some post-release mortality may be experienced from stress of multiple captures, entanglement causing limited mobility, and ingestion of hooks and line potentially interfering with food intake and digestion. In the absence of other quantitative data, we conservatively apply the same post-release mortality criteria (i.e., 30% for hardshells and 40% for leatherbacks) as used for our commercial estimates. The results are presented in Table 5.10 (p. 84).

Table 5.10 Estimated Vertical Line 3-Year Take Sea Turtle Mortality

Species	Instantaneous mortality	Post-release mortality	Total Mortality
Loggerheads	0	16	16
Kemp's ridleys	0	0	0
Greens	0	5	5
Hawksbills	0	0	9
Leatherbacks	0	4	4

5.6 Recreational Vertical Line – Smalltooth sawfish

Smalltooth sawfish are occasionally hooked with rod-and-reel gear during recreational fishing. Fishers who captured smalltooth sawfish most commonly reported that they were fishing for snook, red drum, tarpon, or sharks (Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004). The majority of reported captures are from state waters and mainly within their core distribution in Florida.

The majority of recreational fishing effort in the GOM EEZ occurs off of Florida, where smalltooth sawfish may be present. Although mature smalltooth sawfish are known to at least intermittently occur in this area, encounter reports in this area are relatively rare. Of the reported encounters, only two were likely from reef fish fishing. In April 2002, a smalltooth sawfish about 4.6 m long was caught on vertical line gear by an angler fishing for reef fish near an oil rig structure in the GOM, nine and a half miles west southwest of Flamingo, Florida. The other smalltooth sawfish, estimated to be 6.1 m in total length, was reported as being caught "recently" on vertical line gear in the GOM, ten miles off East Cape, Florida. Although the fishing target and structure were not noted for the second report, given the location, the angler was likely targeting groupers or snappers over some sort of hard bottom (Poulakis, pers. comm. 2004). We therefore believe recreational reef fish fishing in the GOM EEZ may have adverse effects on smalltooth sawfish.

Estimating Smalltooth Sawfish Takes

Given the overall rarity of smalltooth sawfish in the action area, the chance of a smalltooth sawfish being encountered during reef fish fishing in this area is minimal. However, with two reports documented from GOM U.S. EEZ waters over the past three years, we believe it probably does occur every so often. Additional smalltooth sawfish may also have been caught but not reported. Based on the same rational we presented for our commercial take estimates (Section 5.4.3, pg. 79), we assume two more smalltooth sawfish may have been caught, but not reported. We therefore conclude up to four smalltooth sawfish were caught over the past three years. Based on previous interaction observations, all these captures were released alive with only short-term sub-lethal effects**.**

5.7 Anticipated Future Take After implementation of Amendment 23

In the preceding sections, we estimated the number of sea turtle and smalltooth sawfish takes over the past three years resulting from operation of the GOM reef fish fishery. We now must consider what effect, if any, implementation of Amendment 23 would have on future levels of take; i.e., whether the estimated past take and mortality levels would increase or decrease and by how much, or whether the same levels would continue in the future. We do this by looking at what component of the GOM reef fish fishery will potentially be affected by Amendment 23, how this component will be affected, and whether that effect will result in any changes to the overall operation of the GOM reef fish fishery.

Amendment 23 pertains exclusively to management of the vermilion snapper component of the GOM reef fish fishery, which is a relatively small component of the GOM reef fish fishery. For example, total landings for vermilion snapper in 2002 are estimated to be approximately 2.5 mp, whereas total reef fish landings in 2002 are nearly 32 mp (GMFMC 2004a). Most vermilion snapper are caught commercially, representing nearly 80% of total vermilion landings. Vermillion snapper are not a primary species in the commercial reef fish fishery, however, and make up less than 10% of the total reef fish commercial landings. The commercial sector includes both a vertical line (primarily bandit gear) and bottom longline segment, and much of the commercial catch of vermilion snapper is incidental to targeting other reef fish species. The recreational sector includes both private and for-hire boats (headboats and charter boats) using rod-and-reel to target and/or catch vermilion snapper. Headboats are responsible for about 37% of the GOM recreational vermilion snapper landings, while charter vessels harvest an average of 47% and private recreational fishers average 16%. Individual angler trips targeting vermilion snapper are rare relative to overall fish trips (less than 0.05%). Most angler trips target no particular species (GMFMC 2004a).

Amendment 23 includes proposed biological reference points and status determination criteria for vermilion snapper and establishes a rebuilding plan for the species. Regulations proposed in Amendment 23 for reducing vermilion snapper harvest include minimum size limits, bag limits, and closed seasons.

The proposed biological reference points, status determination criteria, and rebuilding plan for vermilion snapper would have no direct effects on sea turtles because they simply provide managers with a defined harvest target to consider in developing fishery management measures. Indirect impacts may occur due to subsequent management action in response to an evaluation of the fishery with respect to these criteria, particularly if the future management action results in an increase or a decrease in fishing effort. However, such impacts cannot be identified until a specific management action is proposed. Such a future proposal would be subject to section 7 consultation at that time.

None of the measures proposed would alter the gear used or the technique in which it is fished in the GOM reef fish fishery. Although the actions proposed in Amendment 23 are expected to reduce the amount of fishing for and harvest of vermilion snapper, reductions in overall reef fish effort are not expected. Fishers are likely to continue fishing for other species when they meet the new limit for vermilion snapper or during the proposed commercial closure. Thus, the reductions in fishing effort targeting vermilion snapper would likely be made up by fishing for other reef fish species. We therefore do not expect future effort to change based on these new measures and believe the sea turtle and smalltooth sawfish interaction patterns that existed in the recent past will continue on into the future.

5. 8 Summary

Based on our review in this section, GOM reef fish bottom longlines and commercial and recreational vertical lines have all adversely affected sea turtles and smalltooth sawfish in the past via hooking and entanglement. The other two gear types used in the GOM Reef fish fishery, traps and spearfishing gear, have not likely adversely affected sea turtles or smalltooth sawfish. Implementation of Amendment 23 is not expected to change this conclusion or alter the take patterns documented over the past. Table 5.11 summarizes the anticipated take we expect on a three-year basis.

Table 5.11 Summary of Anticipated 3-Year Take and Mortality Estimates

Species	Amount of Take	Bottom Longline	Commercial Vertical Line	Recreational Vertical Line	Total
Green	Total Take	26	9	16	51
	Lethal Take	13	3	5	21
Hawksbill	Total Take	0	13	31	44
	Lethal Take	0	4	9	13
Kemp's ridleys	Total Take	2	0	1	3
	Lethal Take	1	0	6	1
Leatherback	Total Take	1	9	10	20
	Lethal Take	1	4	4	9
Loggerheads	Total Take	85	65	53	203
	Lethal Take	42	20	16	78
Smalltooth sawfish	Total Take	2	2	4	8
	Lethal Take	0	0	0	0

6.0 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 (i.e., GOM federal EEZ). 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 GOM may affect sea turtles and smalltooth sawfish and their habitats. Stranding data indicate sea turtles in GOM waters 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 stranding network is unknown.

The fisheries described as occurring within the action area (see Sections 3 and 4, the Status of the Species and the Environmental Baseline, respectively), are expected to continue as described into the foreseeable future, concurrent with the GOM reef fish fishery. Numerous fisheries in state waters along the GOM coast have also been known to adversely affect threatened and endangered sea turtles and the endangered smalltooth sawfish. The past and present impacts of these fisheries have been discussed in the Environmental Baseline section of this opinion. The NMFS is not aware of any proposed or anticipated changes in these fisheries that would substantially change the impacts each fishery have on the sea turtles and smalltooth sawfish covered by this opinion.

In addition to fisheries, the NMFS is not aware of any proposed or anticipated changes in other human-related actions (e.g., poaching, habitat degradation) or natural conditions (e.g., over-abundance of land or sea predators, changes in oceanic conditions, etc.) that would substantially change the impacts that each threat has on the sea turtles and smalltooth sawfish covered by this opinion. Therefore, the NMFS expects that the levels of take of sea turtles and smalltooth sawfish described for each of the fisheries and non-fisheries will continue at similar levels into the foreseeable future.

7.0 Jeopardy Analyses: Effect of the Proposed Action on Likelihood of Survival and Recovery

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 or smalltooth sawfish known to interact with the GOM reef fish fishery. In Section 5, we have outlined how interactions with the GOM reef fish fishery can affect sea turtles and smalltooth sawfish and the extent of those effects in terms of triennial estimates of the numbers of sea turtles and smalltooth sawfish captured and killed. Now we turn to an assessment of each species' response to this impact, in terms of overall population effects from the estimated take, and whether those 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 or smalltooth sawfish known to interact with the GOM reef fish fishery.

"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). Thus, 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 one or more of these elements, we explore whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

7.1 Green Sea Turtles

The proposed action is expected to result in the taking of up to 51 green sea turtles every three years. Based on our knowledge of green sea turtles in the GOM, we expect these takes would consist of both benthic immature and adult males and female individuals. Of these takes, 21 are expected to be lethal; the other green sea turtles are expected to survive the interaction and have no effect on reproduction, numbers, or distribution.

The loss of 21 green sea turtles over any given 3-year period would result in a reduction in the number of green sea turtles for that time period. These lethal takes could also result in a potential reduction in future reproduction, assuming at least some of these individuals would be females and would have survived other threats and reproduced in the future. Sub-lethal effects on adult females may also reduce reproduction by hindering foraging success, as sufficient energy reserves are probably necessary for producing multiple clutches of eggs in a breeding year. Reductions in the distribution of green sea turtles would not occur as these randomly occurring takes would have no significant effect on the overall position, arrangement, or frequency of green sea turtles occurrences in the GOM. The proposed action has been ongoing for decades, with no perceived changes in the distribution of green sea turtles to date.

Whether the reductions in numbers and reproduction of green sea turtles attributed to the GOM reef fish fishery would appreciably reduce the green sea turtle's likelihood of survival and recovery depends on the probable effect the changes in numbers and reproduction would have on the population's growth rate, and whether the growth rate would allow the species to recover from this relatively small number of deaths. Although caution is warranted about optimistically interpreting the future of green sea turtle populations based on this nesting trend data given the late sexual maturity of the species, as discussed in Section 3 (Status of the Species), available green sea turtle nesting trend data from major nesting beaches in Florida, Yucatán, and Tortuguero indicate green sea turtle populations are increasing. The proportional change in overall survival of benthic immature and adult green sea turtles from the loss of 21 individuals on a future triennial basis would therefore likely be undetectable. The death of 21 individuals and their future reproduction value is likely to be exceeded by the number of younger green sea turtles recruiting into the adult or subadult population (i.e., increased survivability of benthic adults from the new TED rule) and their future potential reproductive value. As a result, we believe the proposed action will not appreciably reduce the green sea turtle's likelihood of surviving and recovering in the wild. We therefore conclude the proposed action is not likely to jeopardize the continued existence of this species.

7.2 Hawksbill Sea Turtles

The proposed action is expected to result in the taking of 44 hawksbills every three years. Based on our knowledge of hawksbills in the GOM, we expect these takes would be both benthic immature and adult individuals. Only 13 of these takes are expected to be lethal; the other 31 are expected to survive the interaction and have no effect on reproduction, numbers, or distribution.

The loss of 13 hawksbills over any given 3-year period would result in a reduction in the number of hawksbills for that time period. These lethal takes could also result in a potential reduction in future reproduction assuming at least some of the individuals taken would be females and would have survived other threats and reproduced in the future. Reductions in the distribution of hawksbills would not occur as these randomly occurring takes would have no significant effect on the overall position, arrangement, or frequency of hawksbills occurrences in the GOM. The proposed action has been ongoing for decades, with no perceived changes in the distribution of hawksbill sea turtles to date.

Whether the reductions in numbers and reproduction attributed to the GOM reef fish fishery would appreciably reduce the hawksbill's likelihood of survival and recovery depends on the probable effect the changes in numbers and reproduction would have on the population's growth rate and whether the growth rate would allow the species to recover from this relatively small number of deaths. As noted in Section 3 (Status of the Species), hawksbill populations appear to be increasing or stable at the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out (Meylan 1999a). Although today's nesting population is only a fraction of what it was, nesting activity in recent years by hawksbill has increased on well-protected beaches in Mexico, Barbados, and Puerto Rico (Caribbean Conservation Corporation 2005). Increasing protections for live coral habitat in the Atlantic, GOM, and Caribbean over the last decade that have limited fishing activity in live coral habitat may also increase hawksbill survival rates in the marine environment. Benefits may also be gained by hawksbills from the larger-sized TED requirements implemented. The proportional change in overall survival rates of benthic immature and adult hawksbills from the loss of 13 individuals every three years would be insignificant. The death of these individual and their future reproductive value is likely to be exceeded by the number of younger hawksbills recruiting into the adult or subadult population and their future potential reproductive value. As a result, we believe the proposed action will not appreciably reduce the hawksbill's likelihood of surviving and recovering in the wild. We therefore conclude the proposed action is not likely to jeopardize the continued existence of this species.

7.3 Kemp's Ridley Sea Turtles

The proposed action is expected to result in the taking of three Kemp's ridleys every three years. Based on our knowledge of Kemp's ridleys in the GOM, we expect these takes would be both benthic immature and adult individuals. Only one of these takes is expected to be lethal; the other two are expected to survive the interaction, thus, these takes would have no effect on reproduction, numbers, or distribution.

The loss of one Kemp's ridley over any given 3-year period would result in a reduction in the number of Kemp's ridleys for that time period. Kemps' ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State, outside of the proposed action area, so the chance of that individual being an inter-nesting adult female and causing an immediate reduction in reproduction is unlikely. However, the lethal take could still result in a potential reduction in future reproduction if that individual were a female and would have survived other threats and reproduced in the future. Reductions in the distribution of Kemp's ridleys would not occur as this one take would have no bearing on the overall position, arrangement, or frequency of Kemp's ridleys occurrences in the GOM.

The required use of TEDs in shrimp trawls in the U.S. under the sea turtle conservation regulations has had dramatic effects on the recovery of Kemp's ridleys. Their population, which had declined to critical levels in the 1980s, increased rapidly in the 1990s (TEWG 2000). Nesting beach survey data indicates the population is increasing (TEWG 2000). Over 1,000 nesting females were documented on one single day during 2002 (J. Péna, pers. comm. 2005). In 2004, there were 7,747 nests documented in Mexico (B. Higgins, pers. comm. 2005). The proportional change in overall survival of Kemp's ridleys from the loss of one individual would be insignificant. The number of younger turtles recruiting into the adult or subadult population and their future potential reproductive value would quickly exceed the death of one individual and its future reproductive value. As a result, we believe the proposed action will not appreciably reduce the Kemp's ridley's likelihood of surviving and recovering in the wild. We therefore conclude the proposed action is not likely to jeopardize the continued existence of this species.

7.4 Leatherback Sea Turtles

The proposed action is expected to result in the taking of 20 leatherbacks every three years. Based our knowledge of leatherbacks in the GOM, we expect these takes would be both benthic immature and adult individuals. Only nine of these takes are expected to be lethal; the other 11 are expected to survive the interaction and have no effect on reproduction, numbers, or distribution.

The lethal removal of up to nine leatherback sea turtles over any given 3-year period would result in a reduction in the number of leatherbacks for that time period. These lethal takes could also result in a potential reduction in future reproduction, assuming at least a portion of the individuals killed would be females and would have survived other threats and reproduced in the future. Reductions in leatherback distribution would not occur because these randomly intermittent takes would have no significant effect on the overall position, arrangement, or frequency of leatherbacks occurrences in the GOM. The proposed action has been ongoing for decades, with no perceived changes in the distribution of leatherback sea turtles to date.

The best available stock assessment for evaluating Atlantic leatherback populations is NMFS SEFSC (2001). That assessment is somewhat confounded by the near absence of data or high uncertainty for estimates of juvenile and adult survival and mortality, age and growth; and also, by the intermittence of nesting data from the major leatherback nesting beaches on the north coast of South America. Nevertheless, a very strong signal of declining nesting was detected for the nesting aggregation of Suriname and French Guiana, the largest remaining leatherback nesting aggregation in the world. Nesting there had been declining at about 15% per year since 1987 through the 1990s. From the period 1979-1986, however, the number of nests had been increasing at about 15% annually. As explained in Section 3, there is a great degree of uncertainty and inconsistency regarding the leatherback sea turtle population status and trends. The uncertain trends in nesting at U.S. beaches versus South American beaches complicate our evaluation. Additionally, because of a lack of sufficient data, the population modeling scenarios performed for loggerhead sea turtles are not possible at this point for leatherback sea turtles. Therefore, we use Spotila et al. (1996) as the latest, most complete estimation of leatherback populations throughout the Atlantic basin (from all nesting beaches in the Americas, the Caribbean, and West Africa) (approximately 27,600 nesting females with an estimated range of 20,082-35,133).

As stated earlier, the GOM reef fish fishery is expected to take 20 individuals and result in nine mortalities every three years. The size ratio of leatherbacks captured in the GOM reef fish fishery is unknown. However, the HMS pelagic longline observer program data, which records leatherback size information based on the observer's best estimate of the turtle's carapace length, to the nearest foot, suggests that at least half of the leatherbacks caught in the GOM reef fish fishery may be mature breeders, and the rest are sub-adult animals. Information on the sex ratios of the leatherbacks caught in the GOM reef fish fishery is not available. Following the assumption used in leatherback population model published in Spotila et al. (1996), we assume the population sex ratio is 50%. Using a 50% sex-ratio and a 50% adult to juvenile ratio,

therefore, an estimated two or three breeding-age (adult) females and another two or three subadult females are expected to be every three years.
The U.S. has taken action to reduce the number and severity of leatherback interactions with the two leading known causes of leatherback fishing mortality - the U.S. Atlantic longline fisheries, and the Southeast shrimp trawl fishery. The proportional change in overall survival of leatherbacks from the loss of a total of nine leatherbacks every three years, with no more than two or three adult females and two or three subadult females would be insignificant. With an estimate of twenty to thirty-five thousand nesting females, we believe that the effects of these losses will not result in detectable change in leatherback populations. The death of these individuals every three years and their future reproductive value is likely to be exceeded by the number of younger turtles recruiting into the adult or subadult population and their future potential reproductive value. As a result, we believe the proposed action will not appreciably reduce the leatherback's likelihood of surviving and recovering in the wild. We therefore conclude the proposed action is not likely to jeopardize the continued existence of this species.

7.5 Loggerhead Sea Turtles

The proposed action is expected to result in take of up to 203 loggerheads every three years, of which 78 are expected to be lethal. Based on our knowledge of loggerhead sea turtles in the GOM, we expect these takes would be either benthic immature or adult individuals. As discussed in the status of the species section, five northwestern Atlantic loggerhead subpopulations have been identified (NMFS SEFSC 2001), with the South Florida nesting and the northern nesting subpopulations being the most abundant. Based on Bowen et al. (2004), approximately 90.2% of loggerheads in the GOM are from the southwest Florida subpopulation, 5.8% are from the northern nesting subpopulation, 2.5 % are from the Yucatán, Mexico subpopulation, 0.8% are from the northwest Florida (Panhandle subpopulation) and 0.3% are from the Dry Tortugas.

The lethal removal of 78 loggerheads over a given 3-year period would result in a reduction in the number of loggerheads for that time period. The lethal takes could also result in a potential reduction in future reproduction, assuming at least a portion of the individuals killed were females and would have survived other threats and reproduced in the future. Reductions in loggerhead distribution are not expected because these randomly occurring takes would have no significant effect on the overall position, arrangement, or frequency of loggerhead occurrences in the GOM. The proposed action has been ongoing for decades, with no perceived changes in the distribution of loggerhead sea turtles to date.

Loggerhead sea turtles are the most abundant sea turtle in the GOM. The TEWG (2000) was able to assess the status of the South Florida nesting and the northern nesting subpopulations, and concluded that the South Florida subpopulation is increasing, while no trend is evident for the northern subpopulation, which is thought to be stable. However, more recent analysis, including nesting data through 2003, indicate that there is no discernable trend over the past 15 years in the South Florida nesting subpopulation (Witherington pers. comm. 2004). For the three smaller nesting aggregations (Yucatán, Florida Panhandle, and Dry Tortugas), there are not sufficient or consistent data to determine trends, as explained in section 3 of this opinion.

Although nesting trends can provide an important indicator of subpopulation status, they can not be viewed in isolation. Loggerheads mature at a late age (20-30 years), therefore current nesting trends reflect natural and anthropogenic effects on female loggerheads that occurred over the last two decades. Using nesting trend data to make conclusions about the status of the entire subpopulation, therefore, requires making certain assumptions. These assumptions are that the current impacts to mature females are experienced to the same degree amongst all age classes regardless of sex, and/or that the impacts leading to the current abundance of nesting females are affecting the current immature females to the same extent.

Actions have been taken to reduce anthropogenic impacts to loggerhead sea turtles from various sources, particularly since the early 1990's. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes in various fisheries and other marine activities. Recent actions have taken significant steps towards reducing the environmental baseline and improving the status of all loggerhead subpopulations. For example, the new TED regulation (published on February 21, 2003 [68 FR 8456]) represents a significant improvement in the baseline affecting loggerhead sea turtles. Shrimp trawling is considered to be the largest source of anthropogenic mortality on loggerheads.

Given the late maturity of loggerheads, the benefits of many of these actions in terms of positive effect on nesting trends will not be apparent for many years to come. Current modeling data suggests that all western loggerhead subpopulations should experience positive or at least stabilizing subpopulation growth as a result of new TED regulations (NMFS SEFSC 2001). Management action to increase pelagic immature survival in the U.S Atlantic longline fisheries is expected to further drive the subpopulations to positive growth. Based on SEFSC (2001) models, the proportional change in overall survival of loggerheads from the loss of 78 individuals every three years and their future reproductive value would be insignificant. The losses are likely to be exceeded by the number of younger turtles recruiting into the adult or subadult population and their future potential reproductive value. As a result, we believe the proposed action will not appreciably reduce the loggerhead's likelihood of surviving and recovering in the wild. We therefore conclude the proposed action is not likely to jeopardize the continued existence of this species.

7.6 Smalltooth sawfish

The proposed action is expected to result in the taking of eight adult smalltooth sawfish on a triennial future basis, but no mortality is anticipated. Our best available information indicates the short-term non-lethal effects anticipated on smalltooth sawfish are therefore not expected to affect the reproduction, numbers, or distribution of wild populations of smalltooth sawfish. 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 GOM reef fish fishery 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. Thus, the NMFS believes that the proposed action is not likely to jeopardize the continued existence of smalltooth sawfish.

8.0 Conclusion

We have analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of any sea turtle species or smalltooth sawfish.

Smalltooth sawfish
The smalltooth sawfish analyses focused on the impacts and population response of the U.S DPS of smalltooth sawfish. Based on these analyses, it is our opinion that the continued operation of the GOM reef fish fishery is not likely to jeopardize the continued existence of smalltooth sawfish.

Loggerhead, green, hawksbill, Kemp's ridley, and leatherback sea turtles
Our sea turtle analyses focused on the impacts and population response of sea turtles in the Atlantic basin. However, the impact of the effects of the proposed action on the Atlantic 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 any Atlantic populations of sea turtles, it is our opinion that the continued operation of the GOM reef fish fishery is also not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp's ridley, or leatherback sea turtles.

9.0 Incidental Take Statement (ITS)

Section 9 of the ESA and protective regulations issued 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 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. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the RPAs and terms and conditions of the ITS.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the MMPA. Since no incidental take of listed marine mammals is expected or has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered whales is provided and no take is authorized. Nevertheless, F/SER2 must immediately notify (within 24 hours, if communication is possible) the NMFS's Office of Protected Resources should a take of a listed marine mammal occur.

9.1 Anticipated Amount or Extent of Incidental Take

The NMFS anticipates the following incidental takes may occur as a result of the continued operation of the GOM reef fish fishery. These numbers represent the total takes over three-year periods, beginning with August 2004.

Table 9.1 Anticipated 3-Year Incidental Take in the GOM Reef Fish Fishery

Species	Amount of Take	Bottom Longline	Commercial Vertical Line	Recreational Vertical Line	Total
Green	Total Take	26	9	16	51
	Lethal Take	13	3	5	21
Hawksbill	Total Take	0	13	31	44
	Lethal Take	0	4	9	13
Kemp's ridley	Total Take	2	0	1	3
	Lethal Take	1	0	0	1
Leatherback	Total Take	1	9	10	20
	Lethal Take	1	4	4	9
Loggerhead	Total Take	85	65	53	203
	Lethal Take	42	20	16	78
Smalltooth sawfish	Total Take	2	2	4	8
	Lethal Take	0	0	0	0

9.2 Effect of the Take

The NMFS has determined the level of anticipated take specified in Section 9.1 is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles or smalltooth sawfish.

9.3 Reasonable and Prudent Measures (RPMs)

Section 7(b)(4) of the ESA requires the NMFS to issue any agency action found to comply with section 7(a)(2) of the ESA and whose proposed action may incidentally take individuals of listed species a statement specifying the impact of any incidental taking. It also states that RPMs necessary to minimize impacts, and terms and conditions to implement those measures, must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency or applicant that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required by 50 CFR 402.14 (i)(1)(ii) and (iv) to document the incidental take by the proposed action and to minimize the impact of that take on sea turtles and smalltooth sawfish. These measures and terms and conditions are non-discretionary, and must be implemented by the NMFS in order for the protection of section 7(o)(2) to apply. The NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If the NMFS fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of the incidental take, F/SER2 must report the progress of the action and its impact on the species to the NMFS as specified in the incidental take statement [50 CFR 402.14(i)(3)].

The NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles and sawfish during reef fish fishing.

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

2. The NMFS must ensure that monitoring and reporting of any sea turtles or smalltooth sawfish encountered: (1) detects any adverse effects resulting from the GOM reef fish fishery; (2) assesses the actual level of incidental take in comparison with the anticipated incidental take documented in that 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 liability for take prohibited by section 9 of the ESA, the NMFS must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

The following terms and conditions implement RPM No. 1.

1. The NMFS, in cooperation with the GMFMC, must implement sea turtle bycatch release equipment requirements and sea turtle and smalltooth sawfish handling protocols and/or guidelines in the commercial and for-hire permitted GOM reef fish fishery. Use of the sea turtle release equipment requirements and sea turtle handling and release protocols recently implemented for HMS pelagic longline vessels must be considered (50 CFR 635.21(c)(5)(i) and (ii), see Appendix 1). At a minimum, regulations similar to those currently in place for Atlantic HMS bottom longline vessels must be implemented to the maximum extent practicable (50 CFR 635.21(a)(3) and 635.21(d)(3), see Appendix 2). Implementation of these requirements and guidelines must occur as soon as operationally feasible and no later than 2007.

2. The NMFS, in cooperation with the GMFMC, must develop and implement an outreach program to train commercial and recreational fishermen in the use of any sea turtle release equipment and/or sea turtle and smalltooth sawfish handling protocols and guidelines implemented. In developing and implementing this outreach program, the HMS pelagic longline educational outreach program should be used as a model. The outreach program must be implemented in conjunction with term and condition No. 1.

The following terms and conditions implement RPM No. 2.

1. The NMFS must maintain its current SDDP and improve the sea turtle data reported under the SDDP by distributing educational outreach materials regarding the specific information to be reported and sea turtle identification to commercial reef fish fishermen

selected to participate in this program prior to each reporting period (i.e., by August of each year).

2. The NMFS must implement an observer program in the GOM reef fish fishery or ensure that financial support is provided to fund an external program (e.g., MARFIN observer project). In either case, the observer program must be operative by August 2005. At least some of the trips observed must be from areas typically fished off southwest Florida and adjacent to where smalltooth sawfish are most common, such as off of the Florida Keys. 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 (lat./long.), 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. Photographs must be taken to confirm species identity and release condition. If feasible, observers should tag any sea turtles or smalltooth sawfish caught. Observers must also collect tissue samples from sea turtles for genetic analysis. This opinion serves as the permitting authority for taking such tissue samples (without the need for an additional section 10 permit). The 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 turtles caught in the fishery.

3. F/SER2 must collaborate with the SEFSC to ensure the following information is reported to F/SER3 annually based on available information:
   - detailed information on each sea turtle take reported
   - total reported effort by gear type by fishermen selected for the SDDP
   - total reported effort data by gear type from the CPL
   - observer coverage level obtained in the commercial GOM reef fish fishery,
   - detailed information on any observed takes,
   - total observed effort
   - observed CPUEs for species observed taken; and
   - total take estimates for each species in the GOM reef fish fishery.

4. The NMFS must add protected species encounter questions into existing recreational fishing surveys (e.g., MRFSS and Headboat Survey) by 2006.

10.0 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. The NMFS should conduct or fund smalltooth sawfish research on the demographic, behavioral, spatial, and temporal patterns of smalltooth sawfish in the GOM to improve

understanding of the co-occurrence between the GOM reef fish fishery and smalltooth sawfish.

2. The NMFS should conduct or fund surveys or other alternative methods for determining smalltooth sawfish abundance in federal GOM reef fish fishing areas off southwest Florida, adjacent to areas where smalltooth sawfish are known to occur in the greatest concentration (e.g., off the Florida Keys).

3. The NMFS, in cooperation with federal and non-federal researchers, should conduct research to develop and evaluate fishing gear modifications and tactics to reduce the likelihood of interactions between sea turtles and fishing gear and reduce the immediate or delayed mortality rates of captured sea turtles in the GOM reef fish fishery.

4. The NMFS should support in-water abundance estimates of sea turtles to achieve more accurate status assessments for these species and better assess the impacts of incidental take in fisheries.

5. The NMFS should investigate methods to evaluate and estimate takes in recreational fisheries.

11 Reinitiation of Consultation

This concludes formal consultation on the GOM reef fish fishery. 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 biological 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 A: Gear operation and deployment restrictions (§635.21(c)(5)(i) and (ii))

§ 635.21 (c) (5) The operator of a vessel required to be permitted under this part and that has pelagic longline gear on board must undertake the following sea turtle bycatch mitigation measures:

(i) *Possession and use of required mitigation gear.* Required sea turtle bycatch mitigation gear, which NMFS has approved under paragraph (c)(5)(iv) of this section as meeting the minimum design standards specified in paragraphs (c)(5)(i)(A) through (c)(5)(i)(L) of this section, must be carried on board, and must be used to disengage any hooked or entangled sea turtles in accordance with the handling requirements specified in paragraph (c)(5)(ii) of this section.

(A) *Long-handled line clipper or cutter.* Line cutters are intended to cut high test monofilament line as close as possible to the hook, and assist in removing line from entangled sea turtles to minimize any remaining gear upon release. NMFS has established minimum design standards for the line cutters. The LaForce line cutter and the Arceneaux line clipper are models that meet these minimum design standards, and may be purchased or fabricated from readily available and low-cost materials. One long-handled line clipper or cutter and a set of replacement blades are required to be onboard. The minimum design standards for line cutters are as follows:

(*1*) *A protected and secured cutting blade.* The cutting blade(s) must be capable of cutting 2.0–2.1 mm (0.078 in. - 0.083 in.) monofilament line (400–lb test) or polypropylene multistrand material, known as braided or tarred mainline, and must be maintained in working order. The cutting blade must be curved, recessed, contained in a holder, or otherwise designed to facilitate its safe use so that direct contact between the cutting surface and the sea turtle or the user is prevented. The cutting instrument must be securely attached to an extended reach handle and be easily replaceable. One extra set of replacement blades meeting these standards must also be carried on board to replace all cutting surfaces on the line cutter or clipper.

(*2*) *An extended reach handle.* The line cutter blade must be securely fastened to an extended reach handle or pole with a minimum length equal to, or greater than, 150 percent of the freeboard, or a minimum of 6 feet (1.83 m), whichever is greater. It is recommended, but not required, that the handle break down into sections. There is no restriction on the type of material used to construct this handle as long as it is sturdy and facilitates the secure attachment of the cutting blade.

(B) *Long-handled dehooker for ingested hooks.* A long-handled dehooking device is intended to remove ingested hooks from sea turtles that cannot be boated. It should also be used to engage a loose hook when a turtle is entangled but not hooked, and line is being removed. The design must shield the barb of the hook and prevent it from re-engaging during the removal process. One long-handled device to remove ingested hooks is required onboard. The minimum design standards are as follows:

(*1*) *Hook removal device.* The hook removal device must be constructed of 5/16–inch (7.94 mm) 316 L stainless steel and have a dehooking end no larger than 1 7/8–inches (4.76 cm) outside diameter. The device must securely engage and control the leader while shielding the barb to prevent the hook from re-engaging during removal. It may not have any unprotected terminal points (including blunt ones), as these could cause injury to the esophagus during hook removal. The device must be of a size appropriate to secure the range of hook sizes and styles used in the pelagic longline fishery targeting swordfish and tuna.

(*2*) *Extended reach handle.* The dehooking end must be securely fastened to an extended reach handle or pole with a minimum length equal to or greater than 150 percent of the freeboard, or a minimum of 6 ft (1.83 m), whichever is greater. It is recommended, but not required, that the handle break down into sections. The handle must be sturdy and strong enough to facilitate the secure attachment of the hook removal device.

(C) *Long-handled dehooker for external hooks.* A long-handled dehooker is required for use on externally-hooked sea turtles that cannot be boated. The long-handled dehooker for ingested hooks described in paragraph (c)(5)(i)(B) of this section would meet this requirement. The minimum design standards are as follows:

(*1*) *Construction.* A long-handled dehooker must be constructed of 5/16–inch (7.94 mm) 316 L stainless steel rod. A 5–inch (12.7–cm) tube T-handle of 1–inch (2.54 cm) outside diameter is recommended, but not required. The design should be such that a fish hook can be rotated out, without pulling it out at an angle. The dehooking end must be blunt with all edges rounded. The device must be of a size appropriate to secure the range of hook sizes and styles used in the pelagic longline fishery targeting swordfish and tuna.

(*2*) *Extended reach handle.* The handle must be a minimum length equal to the freeboard of the vessel or 6 ft (1.83 m), whichever is greater.

(D) *Long-handled device to pull an "inverted V".* This tool is used to pull a "V" in the fishing line when implementing the "inverted V" dehooking technique, as described in the document entitled "Careful Release Protocols for Sea Turtle Release With Minimal Injury," required under paragraph (a)(3) of this section, for disentangling and dehooking entangled sea turtles. One long-handled device to pull an "inverted V" is required onboard. If a 6–ft (1.83 m) J-style dehooker is used to comply with paragraph (c)(5)(i)(C) of this section, it will also satisfy this requirement. Minimum design standards are as follows:

(*1*) *Hook end.* This device, such as a standard boat hook or gaff, must be constructed of stainless steel or aluminum. A sharp point, such as on a gaff hook, is to be used only for holding the monofilament fishing line and should never contact the sea turtle.

(*2*) *Extended reach handle.* The handle must have a minimum length equal to the freeboard of the vessel, or 6 ft (1.83 m), whichever is greater. The handle must be sturdy and strong enough to facilitate the secure attachment of the gaff hook.

(E) *Dipnet.* One dipnet is required onboard. Dipnets are to be used to facilitate safe handling of sea turtles by allowing them to be brought onboard for fishing gear removal, without causing further injury to the animal. Turtles must not be brought onboard without the use of a dipnet. The minimum design standards for dipnets are as follows:

(*1*) *Size of dipnet.* The dipnet must have a sturdy net hoop of at least 31 inches (78.74 cm) inside diameter and a bag depth of at least 38 inches (96.52 cm) to accommodate turtles below 3 ft (0.914 m) carapace length. The bag mesh openings may not exceed 3 inches (7.62 cm) 3 inches (7.62 cm). There must be no sharp edges or burrs on the hoop, or where it is attached to the handle.

(*2*) *Extended reach handle.* The dipnet hoop must be securely fastened to an extended reach handle or pole with a minimum length equal to, or greater than, 150 percent of the freeboard, or at least 6 ft (1.83 m), whichever is greater. The handle must made of a rigid material strong enough to facilitate the sturdy attachment of the net hoop and able to support a minimum of 100 lbs (34.1 kg) without breaking or significant bending or distortion. It is recommended, but not required, that the extended reach handle break down into sections.

(F) *Tire.* A minimum of one tire is required for supporting a turtle in an upright orientation while it is onboard, although an assortment of sizes is recommended to accommodate a range of turtle sizes. The required tire must be a standard passenger vehicle tire, and must be free of exposed steel belts.

(G) *Short-handled dehooker for ingested hooks.* One short-handled device for removing ingested hooks is required onboard. This dehooker is designed to remove ingested hooks from boated sea turtles. It can also be used on external hooks or hooks in the front of the mouth. Minimum design standards are as follows:

(*1*) *Hook removal device.* The hook removal device must be constructed of 1/4–inch (6.35 mm) 316 L stainless steel, and must allow the hook to be secured and the barb shielded without re-engaging during the removal process. It must be no larger than 1 5/16 inch (3.33 cm) outside diameter. It may not have any unprotected terminal points (including blunt ones), as this could cause injury to the esophagus during hook removal. A sliding PVC bite block must be used to protect the beak and facilitate hook removal if the turtle bites down on the dehooking device. The bite block should be constructed of a 3/4 -inch (1.91 cm) inside diameter high impact plastic cylinder (e.g., Schedule 80 PVC) that is 10 inches (25.4 cm) long to allow for 5 inches (12.7 cm) of slide along the shaft. The device must be of a size appropriate to secure the range of hook sizes and styles used in the pelagic longline fishery targeting swordfish and tuna.

(*2*) *Handle length.* The handle should be approximately 16 - 24 inches (40.64 cm - 60.69 cm) in length, with approximately a 5–inch (12.7 cm) long tube T-handle of approximately 1 inch (2.54 cm) in diameter.

(H) *Short-handled dehooker for external hooks.* One short-handled dehooker for external hooks is required onboard. The short-handled dehooker for ingested hooks required to comply with paragraph (c)(5)(i)(G) of this section will also satisfy this requirement. Minimum design standards are as follows:

(*1*) *Hook removal device.* The dehooker must be constructed of 5/16–inch (7.94 cm) 316 L stainless steel, and the design must be such that a hook can be rotated out without pulling it out at an angle. The dehooking end must be blunt, and all edges rounded. The device must be of a size appropriate to secure the range of hook sizes and styles used in the pelagic longline fishery targeting swordfish and tuna.

(*2*) *Handle length.* The handle should be approximately 16 - 24 inches (40.64 cm - 60.69 cm) long with approximately a 5–inch (12.7 cm) long tube T-handle of approximately 1 inch (2.54 cm) in diameter.

(I) *Long-nose or needle-nose pliers.* One pair of long-nose or needle-nose pliers is required on board. Required long-nose or needle-nose pliers can be used to remove deeply embedded hooks from the turtle's flesh that must be twisted during removal. They can also hold PVC splice couplings, when used as mouth openers, in place. Minimum design standards are as follows:

(*1*) *General.* They must be approximately 12 inches (30.48 cm) in length, and should be constructed of stainless steel material.
(*2*) [Reserved]

(J) *Bolt cutters.* One pair of bolt cutters is required on board. Required bolt cutters may be used to cut hooks to facilitate their removal. They should be used to cut off the eye or barb of a hook, so that it can safely be pushed through a sea turtle without causing further injury. They should also be used to cut off as much of the hook as possible, when the remainder of the hook cannot be removed. Minimum design standards are as follows:

(*1*) *General.* They must be approximately 17 inches (43.18 cm) in total length, with 4–inch (10.16 cm) long blades that are 2 1/4 inches (5.72 cm) wide, when closed, and with 13–inch (33.02 cm) long handles. Required bolt cutters must be able to cut hard metals, such as stainless or carbon steel hooks, up to 1/4–inch (6.35 mm) diameter.

(*2*) [Reserved]

(K) *Monofilament line cutters.* One pair of monofilament line cutters is required on board. Required monofilament line cutters must be used to remove fishing line as close to the eye of the hook as possible, if the hook is swallowed or cannot be removed. Minimum design standards are as follows:

(*1*) *General*. Monofilament line cutters must be approximately 7 1/2 inches (19.05 cm) in length. The blades must be 1 in (4.45 cm) in length and 5/8 in (1.59 cm) wide, when closed, and are recommended to be coated with Teflon (a trademark owned by E.I. DuPont de Nemours and Company Corp.).

(*2*) [Reserved]

(L) *Mouth openers/mouth gags.* Required mouth openers and mouth gags are used to open sea turtle mouths, and to keep them open when removing ingested hooks from boated turtles. They must allow access to the hook or line without causing further injury to the turtle. Design standards are included in the item descriptions. At least two of the seven different types of mouth openers/gags described below are required:

(*1*) *A block of hard wood.* Placed in the corner of the jaw, a block of hard wood may be used to gag open a turtle's mouth. A smooth block of hard wood of a type that does not splinter (e.g. maple) with rounded edges should be sanded smooth, if necessary, and soaked in water to soften the wood. The dimensions should be approximately 11 inches (27.94 cm) 1 inch (2.54 cm) 1 inch (2.54 cm). A long-handled, wire shoe brush with a wooden handle, and with the wires removed, is an inexpensive, effective and practical mouth-opening device that meets these requirements.

(*2*) *A set of three canine mouth gags.* Canine mouth gags are highly recommended to hold a turtle's mouth open, because the gag locks into an open position to allow for hands-free operation after it is in place. A set of canine mouth gags must include one of each of the following sizes: small (5 inches)(12.7 cm), medium (6 inches) (15.24 cm), and large (7 inches)(17.78 cm). They must be constructed of stainless steel. A 1 -inch (4.45 cm) piece of vinyl tubing (3/4–inch (1.91 cm) outside diameter and 5/8–inch (1.59 cm) inside diameter) must be placed over the ends to protect the turtle's beak.

(*3*) *A set of two sturdy dog chew bones.* Placed in the corner of a turtle's jaw, canine chew bones are used to gag open a sea turtle's mouth. Required canine chews must be constructed of durable nylon, zylene resin, or thermoplastic polymer, and strong enough to withstand biting without splintering. To accommodate a variety of turtle beak sizes, a set must include one large (5 1/2 - 8 inches(13.97 cm - 20.32 cm) in length), and one small (3 1/2 - 4 1/2 inches (8.89 cm - 11.43 cm) in length) canine chew bones.

(*4*) *A set of two rope loops covered with hose.* A set of two rope loops covered with a piece of hose can be used as a mouth opener, and to keep a turtle's mouth open during hook and/or line removal. A required set consists of two 3–foot (0.91 m) lengths of poly braid rope (3/8–inch (9.52 mm) diameter suggested), each covered with an 8–inch (20.32 cm) section of 1/2 inch (1.27 cm) or 3/4 inch (1.91 cm) light-duty garden hose, and each tied into a loop. The upper loop of rope covered with hose is secured on the upper beak to give control with one hand, and the second piece of rope covered with hose is secured on the lower beak to give control with the user's foot.

(*5*) *A hank of rope.* Placed in the corner of a turtle's jaw, a hank of rope can be used to gag open a sea turtle's mouth. A 6–foot (1.83 m) lanyard of approximately 3/16–inch (4.76 mm) braided nylon rope may be folded to create a hank, or looped bundle, of rope.

Any size soft-braided nylon rope is allowed, however it must create a hank of approximately 2 - 4 inches (5.08 cm - 10.16 cm) in thickness.

(*6*) *A set of four PVC splice couplings.* PVC splice couplings can be positioned inside a turtle's mouth to allow access to the back of the mouth for hook and line removal. They are to be held in place with the needle-nose pliers. To ensure proper fit and access, a required set must consist of the following Schedule 40 PVC splice coupling sizes: 1 inch (2.54 cm), 1 1/4 inch (3.18 cm), 1 1/2 inch (3.81 cm), and 2 inches (5.08 cm).

(*7*) *A large avian oral speculum.* A large avian oral speculum provides the ability to hold a turtle's mouth open and to control the head with one hand, while removing a hook with the other hand. The avian oral speculum must be 9–inches (22.86 cm) long, and constructed of 3/16–inch (4.76 mm) wire diameter surgical stainless steel (Type 304). It must be covered with 8 inches (20.32 cm) of clear vinyl tubing (5/16–inch (7.9 mm) outside diameter, 3/16–inch (4.76 mm) inside diameter).

(ii) *Handling and release requirements.* (A) Sea turtle bycatch mitigation gear, as required by paragraphs (c)(5)(i)(A)–(D) of this section, must be used to disengage any hooked or entangled sea turtles that cannot be brought on board. Sea turtle bycatch mitigation gear, as required by paragraphs (c)(5)(i)(E)–(L) of this section, must be used to facilitate access, safe handling, disentanglement, and hook removal or hook cutting of sea turtles that can be brought on board, where feasible. Sea turtles must be handled, and bycatch mitigation gear must be used, in accordance with the careful release protocols and handling/release guidelines specified in paragraph (a)(3) of this section, and in accordance with the onboard handling and resuscitation requirements specified in §223.206(d)(1)of this title.

(B) *Boated turtles.* When practicable, active and comatose sea turtles must be brought on board, with a minimum of injury, using a dipnet as required by paragraph (c)(5)(i)(E) of this section. All turtles less than 3 ft (.91 m) carapace length should be boated, if sea conditions permit.

(*1*) A boated turtle should be placed on a standard automobile tire, or cushioned surface, in an upright orientation to immobilize it and facilitate gear removal. Then, it should be determined if the hook can be removed without causing further injury. All externally embedded hooks should be removed, unless hook removal would result in further injury to the turtle. No attempt to remove a hook should be made if it has been swallowed and the insertion point is not visible, or if it is determined that removal would result in further injury. If a hook cannot be removed, as much line as possible should be removed from the turtle using monofilament cutters as required by paragraph (c)(5)(i) of this section, and the hook should be cut as close as possible to the insertion point before releasing the turtle, using boltcutters as required by paragraph (c)(5)(i) of this section. If a hook can be removed, an effective technique may be to cut off either the barb, or the eye, of the hook using bolt cutters, and then to slide the hook out. When the hook is visible in the front of the mouth, a mouth-opener, as required by paragraph (c)(5)(i) of this section, may facilitate opening the turtle's mouth and a gag may facilitate keeping the mouth open.

Short-handled dehookers for ingested hooks, long-nose pliers, or needle-nose pliers, as required by paragraph (c)(5)(i) of this section, should be used to remove visible hooks from the mouth that have not been swallowed on boated turtles, as appropriate. As much gear as possible must be removed from the turtle without causing further injury prior to its release. Refer to the careful release protocols and handling/release guidelines required in paragraph (a)(3) of this section, and the handling and resuscitation requirements specified in §223.206(d)(1) of this title, for additional information.

(*2*) [Reserved]

(C) *Non-boated turtles.* If a sea turtle is too large, or hooked in a manner that precludes safe boating without causing further damage or injury to the turtle, sea turtle bycatch mitigation gear required by paragraphs (c)(5)(i)(A)–(D) of this section must be used to disentangle sea turtles from fishing gear and disengage any hooks, or to clip the line and remove as much line as possible from a hook that cannot be removed, prior to releasing the turtle, in accordance with the protocols specified in paragraph (a)(3) of this section.

(*1*) Non-boated turtles should be brought close to the boat and provided with time to calm down. Then, it must be determined whether or not the hook can be removed without causing further injury. All externally embedded hooks must be removed, unless hook removal would result in further injury to the turtle. No attempt should be made to remove a hook if it has been swallowed, or if it is determined that removal would result in further injury. If the hook cannot be removed and/or if the animal is entangled, as much line as possible must be removed prior to release, using a line cutter as required by paragraph (c)(5)(i) of this section. If the hook can be removed, it must be removed using a long-handled dehooker as required by paragraph (c)(5)(i) of this section. Without causing further injury, as much gear as possible must be removed from the turtle prior to its release. Refer to the careful release protocols and handling/release guidelines required in paragraph (a)(3) of this section, and the handling and resuscitation requirements specified in §223.206(d)(1) for additional information.

(*2*) [Reserved]

Appendix B: Gear operation and deployment restrictions (§ 635.21(a)(3) and (d)(3))

§ 635.21(a)(3) All vessels that have pelagic longline gear on board and that have been issued, or are required to have, a limited access swordfish, shark, or tuna longline category permit for use in the Atlantic Ocean including the Caribbean Sea and the Gulf of Mexico must possess inside the wheelhouse the document provided by NMFS entitled, "Careful Release Protocols for Sea Turtle Release with Minimal Injury," and all vessels with pelagic or bottom longline gear on board must post inside the wheelhouse the sea turtle handling and release guidelines provided by NMFS.

§ 635.21 (d)(3) The operator of a vessel required to be permitted under this part and that has bottom longline gear on board must undertake the following bycatch mitigation measures to release sea turtles, prohibited sharks, or smalltooth sawfish, as appropriate.

(i) Possession and use of required mitigation gear. Line clippers meeting minimum design specifications as specified in paragraph (d)(3)(i)(A) of this section and dipnets meeting minimum standards prescribed in paragraph (d)(3)(i)(B) of this section must be carried on board and must be used to disengage any hooked or entangled sea turtles, prohibited sharks, or smalltooth sawfish, in accordance with the requirements specified in paragraph (d)(3)(ii) of this section.

(A) Line clippers. Line clippers are intended to cut fishing line as close as possible to hooked or entangled sea turtles, prohibited sharks, or smalltooth sawfish. NMFS has established minimum design standards for line clippers. The Arceneaux line clipper is a model that meets these minimum design standards and may be fabricated from readily available and low-cost materials (65 FR 16347, March 28, 2000). The minimum design standards for line clippers are as follows:

(1) A protected cutting blade. The cutting blade must be curved, recessed, contained in a holder, or otherwise designed to minimize direct contact of the cutting surface with sea turtles, prohibited sharks, smalltooth sawfish, or users of the cutting blade.

(2) Cutting blade edge. The blade must be able to cut 2.0–2.1 mm monofilament line and nylon or polypropylene multistrand material commonly known as braided mainline or tarred mainline.

(3) An extended reach holder for the cutting blade. The line clipper must have an extended reach handle or pole of at least 6 ft (1.82 m).

(4) Secure fastener. The cutting blade must be securely fastened to the extended reach handle or pole to ensure effective deployment and use.

(B) Dipnets. Dipnets are intended to facilitate safe handling of sea turtles and access to sea turtles for purposes of cutting lines in a manner that prevents injury and trauma to sea turtles. The minimum design standards for dipnets are as follows:

(1) Extended reach handle. The dipnet must have an extended reach handle of at least 6 ft (1.82 m) of wood or other rigid material able to support a minimum of 100 lb (34.1 kg) without breaking or significant bending or distortion.

(2) Size of dipnet. The dipnet must have a net hoop of at least 31 inches (78.74 cm) inside diameter and a bag depth of at least 38 inches (96.52 cm). The bag mesh openings may not exceed 3 inches x 3 inches (7.62 cm x 7.62 cm).

(ii) Handling requirements.

(A) The dipnets required by this paragraph should be used to facilitate access and safe handling of sea turtles where feasible. The line clippers must be used to disentangle sea turtles, prohibited sharks, or smalltooth sawfish from fishing gear or to cut fishing line as close as possible to a hook that cannot be removed without causing further injury.

(B) When practicable, active and comatose sea turtles must be brought on board immediately, with a minimum of injury, and handled in accordance with the procedures specified in §223.206(d)(1) of this title.

(C) If a sea turtle is too large or hooked in a manner that precludes safe boarding without causing further damage or injury to the turtle, line clippers described in paragraph (c)(5)(i)(A) of this section must be used to clip the line and remove as much line as possible prior to releasing the turtle.

(D) If a smalltooth sawfish is caught, the fish should be kept in the water while maintaining water flow over the gills and examined for research tags and the line should be cut as close to the hook as possible.

(iii) Corrodible hooks. Vessels that have bottom longline gear on board and that have been issued, or required to have, a limited access shark permit for use in the Atlantic Ocean, including the Caribbean Sea and the Gulf of Mexico, must only have corrodible hooks on board.

(iv) Possess and use a dehooking device that meets the minimum design standards[15]. The dehooking device must be carried on board and must be used to remove the hook from any hooked sea turtle, prohibited shark, or other animal, as appropriate. The dehooking device should not be used to release smalltooth sawfish. NMFS will file with the Office of the Federal Register for publication the minimum design standards for approved dehooking devices. NMFS may also file with the Office of the Federal Register for publication any additions and/or amendments to the minimum design standards.

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[15] At this time no minimum design standards have been specified.