

SOUTHEAST REGION

4.2 Southeast Region

The NMFS Southeast Region includes eight coastal states (North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas) that border the northwestern Atlantic Ocean and Gulf of Mexico. The Commonwealth of Puerto Rico and the territory of the U.S. Virgin Islands are also included within the Southeast Region's management jurisdiction. Three Large Marine Ecosystems (LMEs) occur within this region.¹ The Southeast U.S. Continental Shelf LME, which extends from Cape Hatteras, North Carolina, to the Straits of Florida, is wholly contained within the region, as are portions of the Caribbean Sea LME and the Gulf of Mexico LME. The South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils, in conjunction with the NMFS, are responsible for managing fisheries in the Southeast Region. The wealth and variety of habitats contained within these ecosystems support a variety of marine species, from wide-ranging pelagics to coral reef communities.

4.2.1 Fisheries Overview

A total of 48 commercial fisheries are included in this report for the Southeast Region (Table 4.2.1). Landings for these fisheries were valued at approximately \$756 million dollars in 2005.² Fisheries of the Southeast reflect the very diverse fauna of the region, with relatively few large fisheries, and many small fisheries. The region's fisheries have catches from more than 200 stocks of fish and fishery resources, and employ a variety of gear types. Two fisheries dominate economically: the menhaden purse seine fishery and the shrimp trawl fishery. While the menhaden purse seine fishery produces the most landings (annual landings approach two million tons), the shrimp trawl fishery generates the most revenue regionally. In some years, the Southeast shrimp trawl fishery is the most valuable fishery in the nation.

Management of Southeast Region fisheries is split between the Federal government and the states, with 44% managed at the Federal level and 52% at the state level (Figure 4.2.1). Only the North Carolina coastal gillnet, Southeastern Atlantic stone crab trap/pot, and Florida portion of the Florida, Puerto Rico, and U.S. Virgin Islands spiny lobster trap/pot fishery have shared Federal/state management.

Four primary regional fishery management councils have Federal FMPs in the Southeast Region: the Mid-Atlantic Fishery Management Council (MAFMC), South Atlantic Fisheries Management Council (SAFMC), Gulf of Mexico Fisheries Management Council (GMFMC), and the Caribbean Fisheries Management Council (CFMC).

¹ <http://www.lme.noaa.gov/>.

² Ex-vessel landings value, NMFS, Fisheries Economics of the U.S., 2006. Available online at http://www.st.nmfs.noaa.gov/st5/publication/fisheries_economics_2006.html.

The MAFMC FMPs are primarily focused on managing fish stocks within the U.S. EEZ waters of the northwest Atlantic Ocean. Mid-Atlantic states include Connecticut, New York, New Jersey, Delaware, Maryland, and Virginia. Most MAFMC FMPs are for fisheries managed by the Northeast Region, although some Southeast Region Federal fisheries in North Carolina are also managed under MAFMC regulations (e.g., flounder trawls).

The SAFMC manages stocks targeted by fisheries in the EEZ off North Carolina, South Carolina, Georgia, and Florida, from east Florida to Key West. In some cases, the SAFMC shares management with the Mid-Atlantic and New England Fishery Management Councils. The SAFMC currently develops regulations under eight FMPs:

- Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic
- Dolphin and Wahoo Fishery of the Atlantic
- Golden Crab Fishery of the South Atlantic Region
- Shrimp Fishery of the South Atlantic Region
- Snapper–Grouper Fishery of the South Atlantic Region
- Spiny Lobster in the Gulf of Mexico and South Atlantic
- Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region
- Pelagic Sargassum Habitat of the South Atlantic Region (Note: management of red drum (*Sciaenops ocellatus*) has been transferred to the states.)

The Coastal Migratory Pelagic Resources and Spiny Lobster FMPs are joint efforts of the GMFMC and SAFMC. The GMFMC manages stocks targeted by fisheries in the Federal waters off Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida. In addition to the two joint SAFMC/GMFMC FMPs, the GMFMC currently has five other FMPs under its jurisdiction:

- Reef Fish Resources of the Gulf of Mexico
- Shrimp Fishery of the Gulf of Mexico
- Stone Crab Fishery of the Gulf of Mexico
- Red Drum Fishery of the Gulf of Mexico
- Coral and Coral Reefs of the Gulf of Mexico

The CFMC is responsible for developing FMPs for fish stocks in the Federal waters surrounding Puerto Rico and the U.S. Virgin Islands. Currently, there are four FMPs in place:

- Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands
- Spiny Lobster Fishery of Puerto Rico and U.S. Virgin Islands
- Corals and Reef-Associated Plants and Invertebrates
- Queen Conch Resources of Puerto Rico and the U.S. Virgin Islands

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As discussed in Section 4.1 on the Northeast Region, U.S. Atlantic fisheries, tuna, swordfish, and billfish are managed by NMFS under the authority of the ATCA and the MSA. In the Southeast Region, the Atlantic and Gulf of Mexico HMS pelagic longline, large coastal and small coastal shark aggregates (drift, strike, and bottom gillnet), and the south-eastern Atlantic and Gulf of Mexico shark bottom longline fisheries are managed under the Consolidated Atlantic Highly Migratory Species FMP and monitored by both the NMFS, HMS Division, and the Southeast Fisheries Science Center (SEFSC).

Southeast Region NMFS staff also work with the ASMFC, a deliberative body representing the 15 Atlantic coastal states; the Gulf States Marine Fisheries Commission (GSMFC; a body representing the five Gulf of Mexico states); and state government agencies to coordinate the management of transboundary species. Four member states of the ASMFC border Federal waters of the Southeast Region: North Carolina, South Carolina, Georgia, and Florida. The five GSMFC states, bordering Federal waters of the Southeast Region, are Texas, Louisiana, Mississippi, Alabama, and Florida. Both the ASMFC and the GSMFC also coordinate the Regional state data-collection networks: the Atlantic Coastal Cooperative Statistics Program (ACCSP) on the Atlantic coast, and the Gulf of Mexico Fisheries Information Network (GulfFIN) in the Gulf region.

Table 4.2.1
Southeast Region fisheries included in the U.S. National Bycatch Report. Fisheries are listed alphabetically, first by management authority and then by fishery name. Rows containing fisheries for which bycatch estimates are included in this report are shaded.

Fishery ^a	Management Authority	Federal Fishery Management Plan (FMP) ^b	Gear Type	Target Species (Common Name)	Data Sources ^c
Caribbean Gillnet	Federal	Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Gillnet	Parrotfish, reef fish	
Caribbean Mixed Species Trap/Pot	Federal	Shallow Water Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands	Pots and traps, other	Caribbean spiny lobster, red snapper, reef fish	
Caribbean Spiny Lobster Trap/Pot	Federal	Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands (CFMC)	Pots and traps, lobster	Caribbean spiny lobster, reef fish	
Florida, Puerto Rico, and the U.S. Virgin Islands Spiny Lobster Trap/Pot Fishery	Federal/state ^d	Spiny Lobster in the Gulf of Mexico and South Atlantic (GMFMC/SAFMC)	Pots and traps, lobster	Caribbean spiny lobster	
Gulf of Mexico Coastal Migratory Pelagic Gillnet	Federal	Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic (GMFMC, SAFMC)	Gillnet (floating)	Cobia, king mackerel, Spanish mackerel	
Gulf of Mexico Coastal Migratory Pelagic Troll	Federal	Coastal Migratory Pelagic Resources of the Gulf of Mexico and South Atlantic (GMFMC, SAFMC)	Troll lines	Cobia, king mackerel, Spanish mackerel	Logbook
Gulf of Mexico Reef Fish Bottom Longline	Federal	Reef Fish Resources of the Gulf of Mexico	Longline (bottom)	Red grouper, gag grouper, scamp, tilefish	Logbook, observer data

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Table 4.2.1 (continued)

Fishery ^a	Management Authority	Federal Fishery Management Plan (FMP) ^b	Gear Type	Target Species (Common Name)	Data Sources ^c
Gulf of Mexico Reef Fish Handline	Federal	Reef Fish Resources of the Gulf of Mexico	Hand line	Red grouper, red snapper, vermilion snapper	Logbook, observer data
Gulf of Mexico Shrimp Trawl	Federal	Shrimp Fishery of the Gulf of Mexico (GMFMC)	Otter trawl	Brown shrimp, pink shrimp, white shrimp	Observer data, stock assessment or publication
Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)	Federal	Consolidated Atlantic Highly Migratory Species	Gillnet	Atlantic sharpnose shark, blacktip shark, bonnethead shark, sandbar shark	Logbook, observer data, stock assessment or publication
South Atlantic Coastal Migratory Pelagic Trawl	Federal	Coastal Migratory Species	Troll lines	Cobia, dolphinfish, king mackerel, Spanish mackerel, wahoo	Logbook
South Atlantic Snapper–Grouper Bottom Longline	Federal	Snapper–Grouper Fishery of the South Atlantic Region	Longline (bottom)	Tilefish, snowy grouper	Logbook
South Atlantic Snapper–Grouper Handline/ Electric Reel	Federal	Snapper–Grouper Fishery of the South Atlantic Region	Hand line, electric reel	Black sea bass, gag grouper, gray triggerfish, red snapper, scamp, yellowtail snapper, vermilion snapper, white grunt	Logbook, observer data
Southeast, Atlantic, Black Sea Bass Pot	Federal	Snapper–Grouper Fishery of the South Atlantic Region	Pots and traps (black sea bass)	Black sea bass	
Southeastern, Atlantic and Gulf of Mexico HMS Pelagic Longline	Federal	Consolidated Atlantic Highly Migratory Species	Longline (surface)	Bigeye tuna, swordfish, yellowfin tuna	Logbook, observer data
Southeastern, Atlantic and Gulf of Mexico Shark Bottom Longline	Federal	Consolidated Atlantic Highly Migratory Species	Longline (bottom)	Sandbar shark, blacktip shark, other sharks	Logbook, observer data, regional database ^e
Southeastern, Atlantic Shrimp Trawl	Federal	Shrimp Fishery of the South Atlantic Region (SAFMC)	Otter trawl	Brown shrimp, pink shrimp, white shrimp	Stock assessment or publication, observer data
Southeastern, Atlantic, Golden Crab Trap/Pot	Federal	Golden Crab Fishery of the South Atlantic Region	Pots and traps (golden crab)	Deep-sea golden crab	
Spearfishing for Tuna	Federal	Consolidated Atlantic Highly Migratory Species	Spears	Bigeye, albacore, yellowfin, and skipjack tunas	
Winter Fluke (Flounder) Trawls	Federal	Northeast Multispecies	Otter trawl (bottom), other trawls	Flounder	
North Carolina Coastal Gillnet	Federal, state		Gillnet	Striped bass, monkfish, spot, croaker, weakfish, mackerel	Observer data (2006 only)

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Table 4.2.1 (continued)

Fishery ^a	Management Authority	Federal Fishery Management Plan (FMP) ^b	Gear Type	Target Species (Common Name)	Data Sources ^c
Southeastern, Atlantic Stone Crab Trap/Pot	Federal, state	Stone Crab Fishery of the Gulf of Mexico	Pots and traps (stone crab)	Florida stone crab	
Caribbean Haul/Beach Seine	State		Haul seines	Reef fish	
Florida West Coast Sardine Purse Seine	State		Purse seine, tarp seine	Sardine	
Gulf of Mexico Blue Crab	State		Pots and traps (blue crab)	Blue crab	
Gulf of Mexico Coastal Gillnet	State		Gillnet	King mackerel, Spanish mackerel	Observer data (starting in 2006)
Gulf of Mexico Haul/Beach Seine	State		Haul seines, other seines	Striped mullet	
Gulf of Mexico Marine Shrimp Butterfly Nets	State		Butterfly nets	Brown shrimp, pink shrimp, white shrimp	Observer data (historic)
Gulf of Mexico Marine Shrimp Skimmer Trawls	State		Trawl (skimmer)	Brown shrimp, pink shrimp, white shrimp	Observer data (historic)
Gulf of Mexico Menhaden Purse Seine	State		Purse seine	Atlantic menhaden	Observer data (historic)
Gulf of Mexico Oyster	State		Dredge, tongs	Eastern oyster	
Gulf of Mexico Shrimp Cast Net	State		Cast nets	Brown shrimp, pink shrimp, white shrimp	
North Carolina Haul/Beach Seine–Long Haul	State		Haul seine	Atlantic croaker, spot, weakfish	
North Carolina Inshore (Bays and Rivers) Gillnet	State		Gillnet	Striped bass, spot, Atlantic croaker, bluefish, weakfish	Observer data
North Carolina Pound Net (Croaker, Weakfish)	State		Pound net	Atlantic croaker, weakfish	
North Carolina Southern Flounder Pound Net	State		Pound Net	Southern flounder	
North Carolina Stop Nets	State		Stop net	Striped mullet	
South Atlantic Blue Crab	State		Pots and traps (blue crab)	Blue crab	
South Atlantic Coastal Gillnet	State		Gillnet	Atlantic croaker, bluefish, king mackerel, Spanish mackerel, southern kingfish	Logbook, observer data (starting in 2006)

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Table 4.2.1 (continued)

Fishery ^a	Management Authority	Federal Fishery Management Plan (FMP) ^b	Gear Type	Target Species (Common Name)	Data Sources ^c
Southeast Calico Scallop Trawl	State		Trawl	Calico scallop	
Southeast Fish Trawl	State		Otter trawl (bottom fish)	Butterfish, squid	
Southeastern, Atlantic, Haul/Beach Seine	State		Haul seine	Brown shrimp, pink shrimp, white shrimp	
Southeastern, Atlantic Marine Shrimp Butterfly Nets	State		Butterfly net	Brown shrimp, pink shrimp, white shrimp	
Southeastern, Atlantic Marine Shrimp Cast Net	State		Cast net	Brown shrimp, pink shrimp, white shrimp	
Southeastern, Atlantic Menhaden	State		Purse seine	Atlantic menhaden	
Southeastern, Atlantic Ocean, Gulf of Mexico, Caribbean Shellfish Dive, Hand/Mechanical Collection	State		Hand, diving gear	Clams, oysters, spiny lobster	
Southeastern, Atlantic Skimmer Trawls	State		Trawl (skimmer)	Brown shrimp, pink shrimp, white shrimp	
Surface Trawl Jellyfish	State		Otter trawl (mid-water)	Jellyfish	

^a Aquaculture fisheries are listed for consistency with the Marine Mammal Protection Act List of Fisheries when they occur, but were not analyzed for the U.S. National Bycatch Report. Recreational fisheries are not included in this report.

^b FMPs with the same name are differentiated by managing council. CFMC = Caribbean Fisheries Management Council; GMFMC = Gulf of Mexico Fisheries Management Council; MAFMC = Mid-Atlantic Fisheries Management Council; SAFMC = South Atlantic Fisheries Management Council. Note that non-Federal FMPs were not identified through this process.

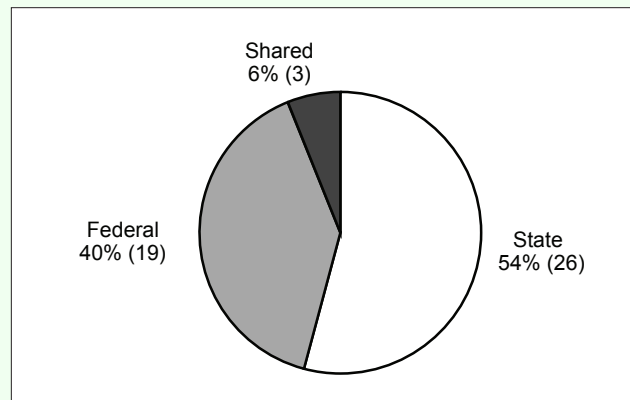
^c Data sources were evaluated only for Federal fisheries and non-Federal fisheries with Federal data-collection programs.

^d Management authority is shared with the State for the Florida for the Florida portion of the fishery. In areas other than Florida, NMFS maintains independent management of spiny lobsters in Federal waters.

^e Southeast Regional Office (SERO) permits database.

Figure 4.2.1.

Management jurisdiction for Southeast Region fisheries (percentages are based on numbers of fisheries, not volume or revenue). "Shared" indicates that international, Federal, state, and/or tribal authorities share management.



4.2.2 Addressing Regional Bycatch Concerns

The NMFS Southeast Region staff work closely with regional fisheries management agencies (state fishery management agencies, interstate marine fisheries commissions, fisheries monument councils, etc.). These partnerships have been central to addressing bycatch concerns in Southeast Region fisheries. This section discusses bycatch management measures implemented under regional FMPs.

Coastal Gillnet Fisheries

Bycatch of bottlenose dolphins (*Tursiops truncatus*) is known to occur in several Mid-Atlantic fisheries. In 2006, a final Bottlenose Dolphin Take Reduction Plan (BDTRP) was established under the MMPA. The plan includes recommendations to increase observer coverage, especially in North Carolina. Mid-Atlantic coastal gillnet fisheries, including in North Carolina and Virginia, have been observed by the Northeast Regional observer program consistently since 1996, at a low level (1–5% coverage). In 2006, the Southeast provided funds for Northeast observer programs to observe for an additional 117 sea days, in order to improve estimates of bottlenose dolphin serious injury and mortality in Mid-Atlantic coastal gillnet fisheries. An alternative platform program was also implemented in North Carolina to further augment observer coverage and improve the precision and accuracy of mortality and serious injury estimates. Both historical observer coverage and additional alternative platform data are used to develop bycatch estimates for marine mammals and to evaluate the success of the BDTRP. Sea turtle bycatch also occurs in coastal gillnet fisheries, both inshore (bays and sounds) and in coastal waters outside of the Outer Banks. A series of ESA Section 10 permits for the Pamlico Sound flounder gillnet fishery have been issued since 2000 addressing sea turtle bycatch through time and area closures, observer requirements, and gear restrictions. North Carolina Division of Marine Fisheries is initiating the application process for a Section 10 permit for all of its state gillnet fisheries as a result of observer coverage showing substantial takes in other inshore large-mesh gillnet fisheries.

Coastal Migratory Species

Southeast coastal migratory stocks were virtually unregulated prior to the 1980s. Technological advances, including the use of airplanes to locate schooling species, increased the industry's ability to harvest stocks to such a degree that harvest by all sectors exceeded capacity, leading to overfishing. Beginning in the mid-1980s, Federal regulations were implemented to control harvest and rebuild stocks. Coastal pelagics are co-managed under the Coastal Migratory Pelagic Resources FMP and regulations adopted by the SAFMC and GMFMC. Today, fisheries targeting coastal pelagic species, primarily mackerels, as well as dolphinfish (*Coryphaena hippurus*) and wahoo (*Acanthocybium solan-*

deri) are managed by quotas to contain harvest. For example, results from the most recent assessment for king mackerel (*Scomberomorus cavalla*) and Spanish mackerel (*Scomberomorus maculatus*) indicate stocks are not overfished and overfishing is not occurring. Incidental harvest is minimal and often marketable in the commercial sector. Release mortality is low for regulatory discards.

Gulf of Mexico Reef Fish

The commercial reef fish fishery in the Gulf of Mexico is another important Southeast Region fishery. Several hundred participating vessels target valuable red snapper (*Lutjanus campechanus*) and other reef fish species. The GMFMC and NMFS took action in Amendment 18A to the Reef Fish FMP (effective 8 September 2006) to comply with a 2005 ESA Biological Opinion (BiOp) requirement that any sea turtle or smalltooth sawfish taken in the reef fish fishery is handled to minimize stress to the animal and increase its survival probability. Regulations were implemented requiring that sea turtle release gear be onboard reef fish-permitted vessels when fishing, to facilitate the safe release of any sea turtles or smalltooth sawfish caught. In addition, vessels with commercial and for-hire reef fish vessel permits were required to possess specific documents providing instructions on the safe release of sea turtles or smalltooth sawfish incidentally caught with hook-and-line gear.

Amendment 22 to the Reef Fish Resources of the Gulf of Mexico FMP, which was passed in July 2005, provided NMFS the authority to implement an observer program for the commercial and for-hire sectors of this fishery. Starting in June of 2006, observers were placed on commercial reef fish vessels operating primarily in the eastern Gulf of Mexico. During its first year of operation, the observer program focused on characterization of finfish bycatch; estimation of managed finfish discard and release mortality levels, including estimates for red snapper and red grouper (*Epinephelus morio*); and estimating levels of protected species bycatch (e.g., sea turtles).

In 2007, NMFS implemented a GMFMC action to establish an individual fishing quota (IFQ) for the commercial red snapper fishery. While IFQs are intended to reduce derby fishing conditions and provide a more stable community benefit, they also tend to reduce bycatch and bycatch discards, as they allow fishermen to choose their own fishing times and target areas. This allows fishermen to better select times and locations to catch legal-size fish without the pressure of a derby situation.

The GMFMC has also developed Amendment 29 to the Reef Fish Resources of the Gulf of Mexico FMP. This amendment outlines a system of IFQs for the multi-species grouper and tilefish fisheries (based on, e.g., size limits, bag limits, or trip limits) which could lead to a reduction in regulatory discards and discard mortality. Implementation

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of this new IFQ system for the multi-species grouper and tilefish fisheries, scheduled for January 2010, may lead to allowing red snapper and grouper/tilefish fishermen to transfer allocations between the two IFQ systems, thus offsetting and reducing regulatory discards. Other regulations implemented in the reef fish fishery in 2008 require the use of non-stainless steel circle hooks, de-hooking devices, and venting tools to reduce bycatch mortalities.

Amendments 30A and 30B were developed to end overfishing of gray triggerfish (*Balistes capriscus*), greater amberjack (*Seriola dumerili*), and gag grouper (*Mycteroperca microlepis*). Regulations in these amendments could also affect the magnitude of fish bycatch. Amendment 30B addresses the overfishing of gag, adjusts the allocation of gag and red grouper catches between recreational and commercial fisheries, and makes adjustments to the red grouper Total Allowable Catch (TAC) to reflect the current status of the stock, which is currently at Optimum Yield (OY) levels. In addition, the amendment considered alternatives to monitor and reduce bycatch and bycatch mortality in reef fish fisheries, and will consider expanding the number of marine reserves for reef fish spawning areas.

Amendment 27 to the Reef Fish FMP and Amendment 14 to the Shrimp FMP (jointly referred to as Amendment 27/14) address overfishing and bycatch issues in both the red snapper directed fishery and the shrimp fishery. The amendment sets TAC for red snapper at 5.0 million pounds between 2008 and 2010. The amendment also reduces the commercial size limit to 13 inches, reduces the recreational bag limit to two fish, eliminates a bag limit for captain and crew aboard a for-hire vessel, and sets the recreational fishing season from 1 June through 30 September. In addition, all commercial and recreational reef fish fisheries are required to use non-stainless steel circle hooks when using natural baits, as well as venting tools and de-hooking devices. For the shrimp fishery, the amendment establishes a target reduction goal for juvenile red snapper mortality of 74% of the mortality in the benchmark years of 2001–03, reduces that target goal to 67% beginning in 2011, and eventually reduces the target to 60% by 2032.

In 2010, Amendment 31 to the Reef Fish FMP was approved to reduce sea turtle bycatch in the bottom longline component of the reef fish fishery. The results of a recent SEFSC observer analysis indicate that the number of loggerhead sea turtle takes authorized in the 2005 BiOp on the bottom longline reef fish fishery in the Gulf of Mexico has been substantially exceeded (NMFS 2008). Amendment 31 includes actions to 1) modify fishing effort; 2) restrict fishing in certain areas, seasons, and depths; and 3) reduce effort through a longline endorsement program. This amendment replaces the emergency rule approved by the Gulf Council at their January 2009 meeting to reduce sea turtle takes in the short term while Amendment 31 was under development.

Pelagic Longline Fisheries

Atlantic HMS fisheries are managed under the Consolidated HMS FMP. Bycatch of billfish on commercial gear, undersized swordfish, sharks on commercial gear after a seasonal closure, bluefin tuna (*Thunnus thynnus*) on pelagic longline gear, and protected species such as sea turtles and marine mammals have been a particular concern of HMS fisheries, including the Atlantic pelagic longline fishery. Conservation measures have been implemented under ESA Section 7 BiOPs and proposed under marine mammal take reduction plans to address these concerns.

In 2004, a BiOp found that Atlantic pelagic longline fishery operations jeopardized the continued existence of leatherback sea turtles in the Atlantic, Gulf of Mexico, and Caribbean. To mitigate this threat, reasonable and prudent alternatives were implemented to avoid jeopardy. An Incidental Take Statement (ITS) was issued, authorizing incidental take levels of 1,981 leatherback and 1,869 loggerhead sea turtles for a 3-year period during 2004–06. The ITS authorizes incidental take levels of 1,764 leatherback and 1,905 loggerhead sea turtles in subsequent three-year periods. Fishermen are also reminded each year of the requirement to possess and use sea turtle release and disentanglement gear, and the need to comply with safe handling and release protocols. Pelagic longline fishermen are also required to use 18/0 or 16/0 circle hooks and either whole finfish or squid bait. In the Northeast Distant (NED) fishing area off the Canadian Grand Banks, fishermen are required to use 18/0 non-offset hooks. In addition, there are permanent time/area closures in the Gulf of Mexico and off the east coast of Florida, and seasonal closures in the mid-Atlantic.

The gear regulations are designed to reduce interactions with endangered and threatened sea turtles, while the closures are primarily designed to reduce interactions with juvenile target species and billfish. All pelagic longline fishermen are required to attend safe handling and release workshops, carry de-hooking equipment onboard, and make efforts to release hooked or entangled sea turtles and sawfish. A mandatory observer program collects catch and effort data on the U.S. pelagic longline fleet. Information is also collected on bycatch of protected species, including marine mammals, sea turtles, and seabirds.

Serious injury and mortality of two species of pilot whales, long-finned (*Globicephala melas*) and short-finned (*Globicephala macrorhynchus*), and Risso's dolphins (*Grampus griseus*) is also a significant problem for the pelagic longline fishery. This fishery accounts for approximately 80% of the serious injury of long- and/or short-finned pilot whales on the U.S. Atlantic coast, and the estimated bycatch exceeds management benchmarks under the MMPA. In addition, the bycatch of pilot whales has been increasing in recent years, including the period following implementation of circle hook regulations. A Pelagic Longline Take Reduction Team (PL-

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TRT) was convened in June 2005 to develop a plan to reduce the bycatch of pilot whales and other marine mammals in this fishery. This plan includes both regulatory and non-regulatory actions to reduce bycatch (74 FR 23349, 19 May 2009).

The bycatch of seabirds in the U.S. Atlantic pelagic longline fishery has not been identified as a problem at this point, although it is a concern for pelagic longline fisheries worldwide. This issue is addressed in the U.S. National Plan of Action (NPOA) for Reducing the Incidental Catch of Seabirds in Longline Fisheries, which was jointly developed by NMFS, U.S. Fish and Wildlife Service, and the Department of State, and published by NMFS in February 2001. Its purpose is to outline actions that will reduce incidental catch of seabirds in U.S. longline fisheries, provide national guidance on reducing seabird bycatch, and encourage assessments of all U.S. longline fisheries to determine whether a seabird bycatch concern exists. In addition, the plan calls for the development of seabird BRDs for those fisheries identified as having a seabird bycatch concern.

Shark Fisheries

The Consolidated Atlantic Highly Migratory Species FMP also outlines measures for commercial shark fisheries. On 10 April 2008, NMFS released the Final EIS for Amendment 2 to the Consolidated HMS FMP, based on several stock assessments completed in 2005–06. Assessments for dusky (*Carcharhinus obscurus*) and sandbar (*Carcharhinus plumbeus*) sharks indicated that these species are overfished, with overfishing occurring, and that porbeagle sharks (*Lamna nasus*) are overfished. NMFS implemented management measures consistent with recent stock assessments for sandbar, porbeagle, dusky, and blacktip (*Carcharhinus limbatus*) sharks and the large coastal sharks complex. A 2008 BiOp for the Atlantic and Gulf of Mexico shark bottom longline fishery and the gill net fisheries (drift, strike, and bottom gillnet), encompassing large coastal, small coastal, and pelagic sharks, as managed under Amendment 2 to the Consolidated Atlantic Highly Migratory Species FMP, found that neither fishery was likely to jeopardize the incidental take of any ESA-listed species. NMFS anticipated a three-year total incidental take for the Atlantic shark fishery of 74 leatherback sea turtles (*Dermochelys coriacea*), 679 loggerhead sea turtles (*Caretta caretta*), 2 hawksbill sea turtles (*Eretmochelys imbricata*), 2 green sea turtles (*Chelonia mydas*), 2 Kemp's ridley sea turtles (*Lepidochelys kempii*), and 52 smalltooth sawfish (*Pristis pectinata*). The final measures in Amendment 2 implement a shark research fishery, which allows NMFS to select a limited number of commercial shark vessels on an annual basis to collect life history data and data for future stock assessments. Furthermore, the revised measures affect quotas, retention limits, and authorized species in commercial shark fisheries; affect authorized species in recreational shark fisheries; modify time/area closures for commercial

shark vessels deploying bottom longline gear; require that all sharks be landed with all fins naturally attached; and modify regions, seasons, and shark dealer reporting frequency in the commercial shark fishery. The implementing regulations for Amendment 2 were published on 24 June 2008 (73 FR 35778; corrected version published 15 July 2008; 73 FR 40658).

Shark Bottom Longline

In an attempt to reduce bycatch of dusky shark (*Carcharhinus obscurus*), juvenile sandbar shark (*Carcharhinus plumbeus*), and sea turtles, NMFS established a time/area closure off North Carolina from January to July (NMFS 2006b). Since 1993, shark trip limits have also been in place. Trip limits were also reduced under Amendment 2 to the 2006 Consolidated HMS FMP. This may also alter fishing behavior and, in turn, impact the types and amount of bycatch. As in the pelagic longline fishery, shark permit holders are required to attend workshops and carry gear onboard to increase the post-hooking survival of any non-target catch they encounter, including sea turtles and marine mammals. Other measures currently in place for the shark bottom longline fishery include mandatory use of logbooks to describe catch and fishing methods, and the mandatory requirement for selected vessels to carry observers (observer program details provided in Section 4.2.3.1).

Shark Gillnet (drift, strike, and bottom gillnet)

The shark gillnet fishery has documented bycatch of marine mammals and sea turtles including right whales (*Eubalaena glacialis*), bottlenose dolphins (*Tursiops truncatus*), Atlantic spotted dolphins (*Stenella attenuata*), leatherback sea turtles (*Dermochelys coriacea*) and loggerhead sea turtles (*Caretta caretta*). Regulations under the Atlantic Large Whale Take Reduction Plan (ALWTRP) and a BiOp issued under Section 7 of the ESA address fishing activity occurring in the southeast U.S. and the risks this gear poses to North Atlantic right whales during the calving season. Shark gillnetters are required to follow guidelines related to the ALWTRP regulations, including but not limited to vessel monitoring systems; area closures; retrieving gear completely when marine mammals are sighted; observer coverage; mesh restrictions; and net checks every two hours. Gillnet fishermen must also attend workshops on safe handling and release of non-target catch, including protected species. The fishery has also been included under the BDTRP because it interacts with bottlenose dolphins. Increasingly, the fishery is shifting away from long-duration drift net fishing to shorter-duration strike nets, reducing the risk of interactions with marine mammals and other protected species.

South Atlantic Snapper–Grouper

Size limits, trip limits, and other management measures lead to regulatory discards and discard mortality in the

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South Atlantic snapper–grouper handline/electric reel and bottom-longline fisheries, especially for the deepwater grouper complex. An observer program that monitors the vertical line fishery (i.e., electric reels and handlines) is currently underway (observer program details provided in Section 4.2.3.1).

Amendment 13C to the SAFMC's Snapper–Grouper Fishery of the South Atlantic Region FMP placed additional restrictions on snowy grouper (*Epinephelus niveatus*), tilefish (*Lopholatilus chamaeleonticeps*), black sea bass (*Centropristis striata*), and vermilion snapper (*Rhomboplites aurorubens*), which could increase the number of regulatory discards. However, actions that specified quotas and modified size and bag limits took into consideration the potential increase in dead discards and estimates of release mortality. In addition, the mesh size in pots was increased. This is expected to reduce bycatch of undersized black sea bass.

Amendment 14 established eight Type II marine protected areas (MPAs), where fishing for and retention of snapper–grouper species is prohibited, except for trolling for pelagic species (e.g., tuna, dolphinfish, and billfish). The intent is to achieve a more natural sex ratio, age, and size structure of snapper–grouper populations within the proposed MPAs.

Amendment 15B implemented a plan to monitor and assess bycatch, and established measures to minimize incidental take of sea turtles and smalltooth sawfish.

Amendment 16 established actions to end overfishing of gag and vermilion snapper, and may potentially affect the magnitude of bycatch by implementing new management measures. Other measures in Amendment 16 intended to reduce bycatch include requiring de-hooking devices for fishermen targeting snapper–grouper species with any hooking-type gear. Amendment 16 also includes actions that would reduce the magnitude of dead discards by prohibiting harvest and possession of all shallow-water groupers when catch limits for snapper–grouper species are reached.

Amendments 17A and B (approved in December 2010) outline annual catch limits (ACLs) for the 10 species managed under the FMP that are experiencing overfishing, as required under the MSA. The ACLs apply to both commercial and recreational fisheries. Management alternatives under Amendments 17A and B outline accountability measures to ensure catch limits are not exceeded, in addition to other requirements to reduce bycatch.

The SAFMC has begun developing Amendment 18 (later split into 18A and B), which could reduce the existing number of black sea bass pots and enhance data-collection programs, as well as other actions. The SAFMC is also in the early phases of development of a Limited Access Permit Program for various fisheries, which should reduce regulatory discards.

Southeastern Shrimp Fisheries

While southeast Atlantic Ocean and Gulf of Mexico shrimp stocks are not overfished, many finfish species, sea turtles, smalltooth sawfish, and bottlenose dolphins are caught as bycatch during trawling operations. Beginning in the late 1980s, TEDs were required in various parts of the shrimp fishery through regulations implemented under the ESA. By the mid-1990s, TEDs were required in all shrimp trawls, with limited exceptions. It has been estimated that TEDs exclude 97% of the turtles caught in shrimp 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), flotation, and more widespread use. Analyses by Epperly and Teas (2002) indicated that the required minimum escape opening dimensions were too small, and that as many as 47% of the loggerheads stranding annually along the Atlantic seaboard and Gulf of Mexico were too large to fit through existing openings. On 21 February 2003, NMFS published a final rule to require larger escape openings.

All Southeastern shrimp fisheries now require BRDs to reduce finfish bycatch. These requirements were implemented in 1997 under Amendment 2 to the Shrimp Fishery of the South Atlantic Region FMP. Similar regulations were implemented for the western Gulf of Mexico in 1998 (Amendment 9 to the Shrimp Fishery of the Gulf of Mexico FMP), and for the eastern Gulf of Mexico in 2004 (Amendment 10 to the Shrimp Fishery of the Gulf of Mexico FMP). New regulations implemented in February 2008 were intended to improve the quality of BRDs used by the South Atlantic and Gulf shrimp fishery to reduce bycatch. The regulations provide for a consistent criterion throughout the southeast by which a BRD can be certified for use in the fishery. In addition, three new BRDs were certified for use, which are more efficient than the industry-standard BRDs used today. In fact, the current industry-standard BRDs do not meet the new certification criterion, and NMFS has published additional regulations decertifying these BRDs.

Although the Gulf of Mexico and Southeast Atlantic shrimp trawl fisheries have been observed since 1992, participation in the observer program has been voluntary. Amendment 13 to the Shrimp Fishery of the Gulf of Mexico FMP (finalized in October 2006) and Amendment 6 to the Shrimp Fishery of the South Atlantic Region FMP (finalized in December 2005) established a mandatory observer program for Southeast shrimp fisheries. These amendments improve the observer program's ability to collect catch and bycatch data for these fisheries (observer program details are provided in Section 4.2.3.1).

Additional regulations implemented in 2008 are specifically intended to reduce fishing mortality on juvenile red snapper. The GMFMC Amendment 14, part of the joint Reef Fish Resources of the Gulf of Mexico FMP Amendment 27 and

Shrimp Fishery of the Gulf of Mexico FMP Amendment 14, established a target reduction goal for juvenile red snapper mortality of 74% of the mortality in the benchmark years of 2001–03. It also established a framework procedure whereby the Regional Administrator can seasonally close certain areas to trawling if the effort reduction target is not met for a given year.

In 2010, the Secretary of Commerce approved the Comprehensive Ecosystem-Based Amendment 1 (CE-BA 1). The intent of CE-BA 1 is to protect over 23,000 square miles of sensitive habitat, deemed coral Habitat Areas of Particular Concern (HAPCs) from impacts associated with bottom-tending fishing practices. The coral HAPCs are located off the coasts of the Carolinas, Georgia, and eastern Florida in waters ranging from 400 meters (1,200 feet) to 700 meters (2,300 feet) deep. The South Atlantic region is believed to contain the largest distribution of deepwater corals in the world, including the common *Lophelia* coral, largely responsible for reef mound construction in these cold water areas. These deep water coral areas are relatively undisturbed by the impacts of fishing.

Currently, the only commercial fisheries that operate in the areas are the wreckfish (*Polyprion americanus*), golden crab (*Chaceon feneri*), and royal red shrimp (*Pleoticus robustus*) fisheries. The CE-BA 1 creates “allowable gear areas” for the golden crab fishery and “shrimp fishery access areas” for the deepwater shrimp fishery. The establishment of these areas allows for the continuation of these fisheries in their historical fishing grounds with little or no negative impacts to protected deepwater coral habitat. The amendment establishes deepwater coral HAPCs, where the possession of coral species and the use of all bottom-tending gear is prohibited, including bottom longline; trawl (bottom and mid-water); dredge; pot or trap; or the use of an anchor, anchor and chain, or grapple and chain by all fishing vessels.

4.2.3 Data Sources

Bycatch data sources available for federally managed Southeast Region fisheries and those southeast U.S. state fisheries with Federal data-collection programs are listed in Table 4.2.1. Two primary Federal data sources are available for Southeast Region fisheries, observer programs and logbooks.

4.2.3.1 Observer Programs

Six primary observer programs operate out of the Southeast Region (Table 4.2.2):

- North Carolina Coastal Gillnet Alternative Sampling Program
- Pelagic Longline Observer Program
- Reef Fish Observer Program
- Shark Gillnet Observer Program
- Shark Bottom Longline Observer Program
- Shrimp Trawl Observer Program

Three programs provide adequate coverage levels: the Pelagic Longline, Shark Bottom Longline, and Shark Gillnet Observer Programs. Pilot/baseline coverage is provided for the Reef Fish Observer Program and the Shrimp Trawl Observer Program. In 2005, Southeast Region programs monitored a total of 2,657 sea days.

Gulf of Mexico Reef Fish Observer Program

Amendment 22 to the GMFMC Reef Fish FMP includes a requirement for mandatory observer coverage of reef fish fisheries. In July 2006, a mandatory observer program was implemented for the Gulf of Mexico reef fish fishery. The primary gear types used by this fishery include bottom longline, electric reel, and hand line. Proportional sampling effort based on historical landings data across seasons in the eastern Gulf of Mexico and across seasons and gears in the western Gulf of Mexico is used to allocate observer effort. Fishery-specific data are collected by set for both retained and discarded fish species. The condition of fish when brought onboard is categorized. Non-target and undersized target species are processed first, recording length, weight, and disposition prior to release. Retained species are then processed, recording length and weight. A potential source of bias is non-compliance during the first year of the program. There was a substantial increase in compliance during 2007, primarily due to an increase in the number of industry participants that obtained USCG safety decals, as well as efforts by NMFS enforcement.

North Carolina Coastal Gillnet

The North Carolina coastal gillnet fishery encompasses the Pamlico Sound Gillnet Restricted Area (PSGNA), a shallow-water autumn gillnet fishery (Price 2007). The PSGNA observer program utilizes an alternative platform (independent boat) to observe gillnet trips within this small region of Pamlico Sound in North Carolina for interactions with sea turtles. Current North Carolina statutes prohibit the North Carolina Division of Marine Fisheries from providing contact information for commercial fishers to NMFS. Therefore, observers are unable to contact fishermen to schedule trips and a significant portion of the fishing community is not observed because observers are unable to locate them. The

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Table 4.2.2

Southeast Region Federal observer programs, fisheries observed, and coverage levels. Programs and observed fisheries are listed alphabetically. Observer programs that ended over 10 years ago are not listed.

Observer Program	U.S. National Bycatch Report Fisheries	Authority to Place Observers	Program Duration	Coverage Level
Atlantic and Gulf of Mexico Directed Shark Bottom Longline Fishery	Atlantic and Gulf of Mexico Shark Bottom Longline	MSA (50 CFR 635)	1994–present	2005: 4% 2006: 5–6% 2007: 5–6% 2008: 100% sandbar shark research fishery; 4–6% non-sandbar shark fishery
Atlantic, Gulf of Mexico, and Caribbean Pelagic Longline Fishery	Atlantic and Gulf of Mexico HMS Pelagic Longline	MMPA Cat. I (50 CFR 229); MSA (50 CFR 635); ATCA	1992–present	2005: 5–9% 2006: 5–7.5% 2007: 11% 2008: ~13%
Gulf of Mexico Reef Fish Fishery	Gulf of Mexico Reef Fish Bottom Longline ^a	MSA (50 CFR 635)	2006–present	2005: NA 2006: <5% 2007: 1% 2008: 1%
	Gulf of Mexico Reef Fish Handline/electric reel ^b			
North Carolina Coastal Gillnet Fishery: Alternative Platform Sampling of Pamlico Sound Gillnet Restricted Area	North Carolina Coastal Gillnet	MMPA Cat. I (50 CFR 229); ESA	2006	2005: NA 2006: 8–9 % 2007-2008: NA
	North Carolina inshore bays/rivers gillnet			
Southeast and Gulf of Mexico Shrimp Otter Trawl Fisheries (including rock shrimp)	Atlantic Shrimp Trawl ^b	MSA (50 CFR 635)	1992–present	2005: <1% 2006: <5% 2007: <1% 2008: 2%
	Gulf of Mexico Shrimp Trawl ^b			
	S. Atlantic skimmer trawl			
Southeast Shark Gillnet Fishery	Gulf of Mexico coastal gillnet	MMPA Cat. I (50 CFR 229); MSA (50 CFR 635)	1993–present	2005 & 2006: 100% November–March; 38% April–November 2007: 39% of drift sets April–November, 100% strike sets November–March; 20% sink–shark sets. 2008: 100% shark strike, 38% shark drift, 5% shark and teleost sink net
	Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)			
	South Atlantic coastal gillnet			

^a There is some observer coverage by the Gulf and South Atlantic Fisheries Foundation.

^b This fishery was observed on a voluntary basis until 2007.

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program has been in operation since March of 2006, but a lack of representative observer coverage may bias bycatch estimates either negatively or positively. Currently, the program's focus is on developing a database of fishermen and supplementing NEFOP's monitoring ability, to more effectively assess bottlenose dolphin bycatch and determine the success of the BDTRP.

Pelagic Observer Program

The SEFSC's Pelagic Observer Program (POP) has monitored the southeast Atlantic Ocean and Gulf of Mexico HMS pelagic longline fishery since May 1992. Each year, 3–8% of this highly mobile fleet is observed, and since 2003 the minimum coverage has been 8%, sometimes exceeding that level. This fishery ranges from the Grand Banks of Canada south to Brazil and into the Gulf of Mexico. All sets during an observed trip are observed. Statistical and biological data on all species of fish brought aboard or released (dead or alive) and all bycatch (dead or alive), including protected species such as mammals, sea turtles, and seabirds, are collected. A possible source of bias for data collected by the POP is that early coverage (pre-1992) was voluntary, with portions of the fleet non-compliant. Although carrying an observer on request has been mandatory since 1992, compliance is not linked to permits and portions of the fleet may remain non-compliant and unobserved. To decrease this source of bias, POP staff continue to work with the industry to increase overall fleet participation and cooperation with the observer program.

Shark Gillnet Observer Program

Since 1993, an observer program has been underway to estimate catch and bycatch in the directed large coastal and small coastal shark aggregates (drift, strike, and bottom gillnet) fisheries along the southeastern U.S. Atlantic coast. Statistical and biological data on all species of fish brought aboard or released at the surface (dead or alive) and all bycatch (dead or alive), including protected species such as mammals, sea turtles, and seabirds, are collected. Historically, the program provided 100% observer coverage for drift/strike gillnet vessels during the North Atlantic right whale calving season (15 November to 31 March). Outside the North Atlantic right whale calving season (1 April to 14 November), 38–40% observer coverage was maintained for drift gillnet vessels. No level of coverage was specified for other gillnet vessels. Due to the North Atlantic right whale coverage requirements and limited funding, observer coverage was limited in both time and space.

Starting in 2005, a pilot observer program was begun to include all vessels that have an active directed shark permit and fish with sink gillnet gear. These vessels were not previously subject to observer coverage because they either were targeting non-highly migratory species or were not fishing gillnets in a drift or strike fashion. These ves-

sels were selected for observer coverage in an effort to determine their impact on shark resources when targeting species other than sharks. Further, in 2007 the regulations implementing the Atlantic Large Whale Take Reduction Plan were amended to include the removal of the mandatory 100% observer coverage for drift gillnet vessels during the North Atlantic right whale calving season; but they now prohibit all gillnets in an expanded restricted area in the southeast U.S., covering an area from Cape Canaveral, Florida, to the North Carolina–South Carolina border, from 15 November to 15 April. Limited exemptions are made in waters south of 29°N for shark strike net fishing during the same period, and for Spanish mackerel gillnet fishing in the months of December and March. Based on these regulations and on current funding levels, the shark gillnet observer program now provides year-round coverage for all anchored (sink, stab, and set), strike, and drift gillnet fishing by vessels that fish from Florida to North Carolina. There is some difficulty in identifying the entire universe of vessels as some participants fish only in state waters and do not carry any type of Federal permit.

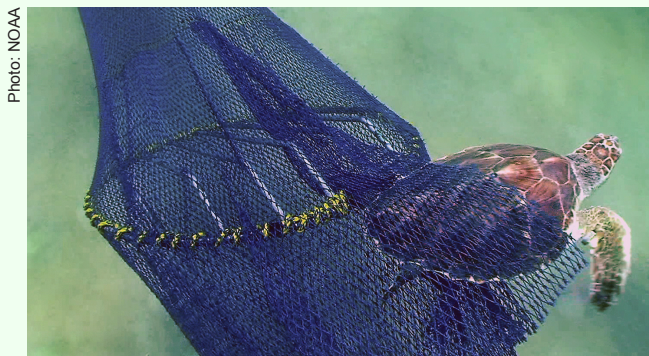
Shark Bottom Longline Observer Program

Beginning in 1994, voluntary monitoring of the southeastern Atlantic Ocean and Gulf of Mexico shark bottom longline fishery was conducted by the University of Florida's Commercial Shark Fishery Observer Program. Starting with the 2002 fishing season, carrying an observer upon request became mandatory under the HMS FMP. In June 2005, responsibility for this program was transferred to the SEFSC Panama City Laboratory. In addition to gear characteristics and other vessel information, observers record species, numbers, length, and disposition (kept, discarded alive, or discarded dead) for sharks and other species caught. Biological samples of sharks and other species are taken as time permits. Released sharks are tagged to track movement patterns and determine stock structure. A possible source of bias for data collected on the shark bottom longline fishery is that early coverage was voluntary, with portions of the fleet non-compliant. Although carrying an observer upon request is mandatory today, compliance is not linked to permits. Without this incentive, portions of the fleet remain non-compliant and unobserved.

Shrimp Trawl Observer Program

The Southeast Shrimp Trawl Fishery Observer Program has been in existence since 1987, and is administered by the SEFSC Galveston Laboratory. The program was originally developed to provide an economic evaluation of TEDs in shrimp trawls, and continues to focus on research. While the program has historically relied on voluntary participation, carrying an observer became mandatory in 2006, with implementation of the program in July 2007. All observers are required to collect data following the NMFS BRD evaluation sampling protocol. To further standardize the data col-

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A loggerhead sea turtle escapes from a net equipped with a turtle excluder device (TED).

lected by observers, a ten- to twelve-day NMFS observer training program has been established. All data collected by fisheries observers are sent to, managed, archived, and analyzed by the SEFSC Galveston Laboratory. There is some bias in the historic observer data based on the opportunistic sampling that occurred under voluntary efforts. In addition, funding is limited and fluctuates annually and impacts observer retention and vessel participation.

4.2.3.2 Logbooks

Many of the Federal fisheries that are observed in the Southeast Region also have mandatory logbook programs, including the Atlantic Ocean and Gulf of Mexico shark bottom longline fisheries; Gulf of Mexico reef fish bottom longline and hook and line fisheries; large coastal and small coastal shark aggregates (drift, strike, and bottom gillnet); South Atlantic Ocean snapper–grouper bottom longline and hook and line fisheries; and the HMS pelagic longline fishery. The majority of these logbook programs were initiated in 1986, and have continued to the present. Data collected include vessel name, documentation number, gear type used, date, time, location of beginning set/haul, average floatline length, hook types and size, bait and hook type used, species caught and/or discarded, condition (alive or dead), and bycatch of any protected species. In most cases, these data are stored in an Oracle database, with aggregated data available online (<http://www.sefsc.noaa.gov/commercialprograms.jsp>).

In August 2001, the SEFSC initiated the Supplementary Discard Data Program to address bycatch reporting in Southeast fisheries (Poffenberger 2003). The SEFSC developed a supplemental form that is used with the Coastal Fisheries Logbook Program to collect discard data as mandated by the Sustainable Fisheries Act. Commercial reef

fish fishers are 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). 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; over the course of a five-year period, 100% of reef fish permit holders will have been required to report in one of the five years.

As with most self-reported data, logbook data from the Southeast Region are subject to reporting bias. The degree of bias can often be verified through comparisons with observer data. For example, bias has been evaluated in the pelagic longline fishery by comparing observer data to data collected through the Pelagic Longline Logbook (PLL) program. The PLL is a mandatory program that requires all U.S. Atlantic Ocean, Caribbean, and Gulf of Mexico fishing vessels with a swordfish permit to provide catch and effort data, as well as bycatch information on a set-by-set basis. The program started in October 1986 on a voluntary basis and became mandatory in 1992. A comparison of observer and logbook data for this fishery indicates that, for commercially valuable species, estimates of landed catch from observer data generally agree with landing statistics, which are reported independently from the observer data. However, observer data do indicate a tendency to under-report through logbooks most, but not all, catch of species with no commercial value (and thus not retained by the vessel).

One issue with logbook data for the region's several gillnet fisheries is that effort reported in coastal fishery logbooks is coded generically as "Gillnet, Other," and therefore it is not possible to directly distinguish among the four types of gillnet sets documented by the observer program. Thus, extrapolation to estimate total takes of protected species is difficult and estimates generally have a high degree of uncertainty.

4.2.4 Southeast Region Bycatch Estimation Methods

This section presents fish, marine mammal, and other protected species bycatch estimation methods for the Southeast Region fisheries bycatch estimates included in this report. Bycatch estimation methods are discussed first for fish (Section 4.2.4.1), then for marine mammals (4.2.4.2), then for other other protected species (4.2.4.3). For some fisheries, new observer programs have generated improved bycatch data (e.g., Gulf of Mexico reef fish fisheries); the bycatch estimation methods used in this report may no longer reflect the current bycatch estimation methods being used in those fisheries.

4.2.4.1 Fish Discard Estimation Methods

4.2.4.1.1 Atlantic and Gulf of Mexico Shark Bottom Longline Fishery

Observed takes for the shark bottom longline fishery came from the SEFSC Panama City observer program database for 2005–06. A delta lognormal approach (Pennington 1983) was used to estimate the mean and variance of fish bycatch per hook per set. This method combines a binomial model for the total observations with a lognormal model for the non-zero catch-per-unit-of-effort (CPUE) data, which were assumed to be log-normally distributed in this case.

Extrapolation to estimate total takes by the fishery was achieved by simply multiplying by total hook effort extracted from the logbooks. Because the final estimate of total effort depends on the method used to extract total hook effort, a Monte Carlo simulation, consisting of randomly selecting values from a probability distribution assumed to describe the level of effort (total number of hooks/year), was performed to represent the variability in total effort. Effort was assumed to follow a uniform distribution, with upper and lower bounds reflecting the range of annual effort. The process was repeated 10,000 times, yielding means and confidence intervals (calculated as the 2.5th and 97.5th percentiles) for the sampling estimates.

4.2.4.1.2 Southeast Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)

Observed takes for the shark gillnet fishery came from the SEFSC Panama City observer program database. A simple ratio estimator (number of animals/number of observed sets) was used to calculate bycatch rates. Estimates were derived for three gear types: drift, strike, and sink gillnet. Extrapolation to estimate total takes by the fishery was achieved by simply multiplying by total effort (number of sets) extracted from the logbooks. Because the vast majority of gillnet sets reported in the logbooks were coded generically as “Gillnet, Other” it was not possible to distinguish among the three types of sets represented by the observer program. Thus, a Monte Carlo simulation was conducted, as described above (Section 4.2.4.1.1) consisting of randomly selecting values from a probability distribution assumed to describe the level of effort (total number of sets/year) was performed. Effort was assumed to follow a uniform distribution, with upper and lower bounds reflecting the range of annual effort for all gillnet sets. The process was repeated 10,000 times, yielding means and confidence intervals (calculated as the 2.5th and 97.5th percentiles) for the sampling estimates.

4.2.4.1.3 Gulf of Mexico Shrimp Trawl Fishery

Species total weights and numbers were extrapolated from subsample weight to the total catch weight, and were based on one net per tow, and then extrapolated to an average of 3.1 nets per vessel. The nets used in the analyses were consistent with current BRD regulations at that time. Total weight and number were derived by multiplying the sample weight (or number) of the species of interest by the total weight of the sampled net, divided by the subsample weight for that net. In the absence of a weight or number for a given species, the entire tow was set aside from the analysis.

Ratio estimation and testing procedures were used for statistical analyses to determine specific catch rates. As described by Snedecor and Cochran (1967), the ratio estimation in equation (1) was used as the sample estimate of the mean:

$$(1) R = \frac{\sum Y}{\sum X}$$

where

R = ratio estimate

Y = extrapolated kilograms for species of interest for selected strata

X = hours towed for selected strata.

The estimated standard error of the estimate was calculated as

$$(2) s(R) = \frac{1}{\bar{x}} \sqrt{\frac{\sum (Y - RX)^2}{n(n-1)}}$$

where

\bar{X} = mean of hours towed for selected strata

n = number of tows occurring in selected strata

To standardize bycatch estimates as prescribed in Evaluating Bycatch: A National Approach to Standardized Bycatch Monitoring Programs (NMFS 2004b), the coefficient of variation (CV) was calculated for selected species. The CV estimates were calculated by dividing the estimated standard error by the estimate of the mean for selected species.

4.2.4.1.4 Atlantic and Gulf of Mexico HMS Pelagic Longline Fishery

For management purposes, it is necessary to estimate the biomass (in numbers and weight) of the dead discards by this fleet. In the case of fish species, earlier studies have indicated that discarded catch is often inaccurately reported (Cramer et al. 1998). Cramer and Adams (1999) developed a technique to improve the estimation of fish dead discards by the pelagic longline fleet. This technique was revised

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and approved by the Standing Committee on Research and Statistics (SCRS) of the ICCAT. This technique, described below, is used for most pelagic longline fish bycatch estimates. The sole exception at this time is bluefin tuna, for which a somewhat different approach (described later) is used.

The estimation of fish bycatch by the U.S. pelagic longline fleet utilizes data from the PLL and the POP. Bycatch estimates are prepared annually for each stock, species, or species complex for area/quarter stratum, where the areas correspond to the domestic fishing areas. Because several shark species are caught in very low numbers they are grouped into two categories to improve the accuracy of the estimates. "Pelagic sharks" includes the longfin mako (*Isurus paucus*), shortfin mako (*Isurus oxyrinchus*), oceanic whitetip (*Carcharhinus longimanus*), porbeagle (*Lamna nasus*), and unidentified pelagic sharks; while the "coastal sharks" category includes the bignose shark (*Carcharhinus altimus*), blacktip (*Carcharhinus limbatus*), sandbar (*Carcharhinus plumbeus*), tiger shark (*Galeocerdo cuvieri*), white shark (*Carcharodon carcharias*), spinner shark (*Carcharhinus brevipinna*), and other identified coastal sharks.

Dead discards were estimated in weight, using the estimated number of dead discards and the average weight (median in the case of swordfish) estimated from data collected by the POP. Observers in POP make measurements or estimations of the length of dead discards, which were used to estimate weight. When less than 30 lengths were recorded for a particular area/quarter stratum, the average or median weight for the year was used.

Three different cases were considered for the estimation of fish dead discards:

- 1) Area/quarter stratum with no observed sets in the POP
- 2) Area/quarter stratum with ten or more observed sets in the POP
- 3) Area/quarter stratum with at least one set observed but less than ten observed in the POP.

Case 1: In the case of area/quarter strata where no sets were observed, the reported number of dead discards in the logbook was accepted and reported. Therefore, there was no measure of uncertainty associated with the number of discards.

Case 2: Observed catch rates were estimated for those area/quarter strata with more than ten observed sets using catch and effort data collected by the POP. The total number of hooks tended and the dead discards by species or species group in each stratum were used to estimate catch rates as number/1,000 hooks. These estimated catch rates were then multiplied by the reported total effort in the PLL for each stratum to estimate catch in numbers. This approach relies on the assumption that the catch rates of the observed trips were representative of the catch rates of the entire fleet. Because the catch rates for each stratum were

estimated from the sum of all the effort (number of hooks) and the catch in that particular stratum, there was no measure of uncertainty associated with them.

Case 3: GLMs were run to obtain an estimate of catch rates for those strata with limited observer coverage (less than ten observed sets): $\ln(\text{catch rate}) = \text{area/quarter source}$.

Where "catch rate" is the number of dead discards/1,000 hooks, "area/quarter" is a unique identifier for each area and quarter stratum, and "source" is PLL or POP. The GLM estimated catch rate was multiplied by the reported PLL effort (number of hooks) to estimate total number of discards. Measures of uncertainty could have been obtained for Case 3. However, given that they could not be estimated for the first two cases, the measures of uncertainty associated with this case were not reported.

Estimation of dead discards of pelagic longline bluefin tuna

Historical estimates of dead discards in the bluefin tuna longline fishery were revised in preparation for the 2006 IC-CAT bluefin tuna stock assessment. The revised estimates make use of U.S. pelagic longline observer program data, which comprise numbers (and lengths) of bluefin tuna dead discards beginning in 1992. This approach was originally documented in Brown (2001).

Estimates of the dead discards of bluefin tuna by the U.S. Atlantic pelagic longline fleet permitted to land and sell Atlantic swordfish (*Xiphias gladius*) were based on logbook reports of fishing effort levels and scientific observer records of catch rates from a representative sample of the fleet. Estimates were constructed using the delta lognormal method described by Pennington (1983), taking into account possible geographical and seasonal effects, and coefficients of variation were calculated. The estimates ignored information that might have been available in self-reported data on catch rates of bluefin tuna. Catch rate samples were pooled as necessary across strata to achieve a minimum sample size of 30 observations. Since several closed areas were implemented at the end of 2001 and beginning of 2002 (which likely would have altered the bluefin tuna discard rates), the Brown (2001) approach was modified slightly so that the time periods 1992–2000 and 2001–05 were analyzed separately to preclude pooling across the two periods. The estimates of bluefin tuna dead discards in numbers were converted to weight using relevant observer data (if available) or comparable gear/area data.

Previously reported bluefin tuna longline dead discards were based upon tallies from the logbooks. However, since reported discard rates from the logbooks tend to be substantially lower than those reported by scientific observers, there was concern that discards might not be fully documented through the logbooks. However, the approach of

reporting logbook tallies to ICCAT was continued pending a review of the approach (Brown 2001). O'Brien et al. (2004) completed a detailed testing of model assumptions and validation and concluded that previous estimates in Brown (2001) were appropriate.

4.2.4.1.5 Gulf of Mexico Reef Fish Bottom Longline Fishery

Discard rates for all species except red grouper in the Gulf of Mexico reef fish bottom longline fishery were calculated from discard reports made to the SEFSC Miami coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook fished for each trip. Mean discard rate for each species was determined by year, along with between-trip CVs.

Total effort (in hooks fished) for the fishery was calculated from the SEFSC Miami coastal logbook program database for the years 2005–06. Extrapolation to estimate total discards by the fishery was accomplished by multiplying total hooks fished by species-specific mean discards per hook. Between-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

Red grouper discards from Gulf of Mexico bottom longline vessels had been estimated during the Southeast Data, Assessment, and Review (SEDAR) 12 red grouper assessment (McCarthy 2006a) and those results were included in this analysis. Initial estimates of red grouper discards from the Gulf of Mexico bottom longline fishery were much lower than those estimated from handline vessels, even though red grouper landings from bottom longline vessels were higher than handline vessel landings. The ratio of longline red grouper discards to pounds of red grouper landed was six to ten times lower than discards/landings ratios for other species. However, the ratio of handline red grouper discards to pounds landed was similar to ratios calculated for other species. Longline red grouper discards were estimated by applying the ratio of red grouper handline discards/pounds landed to the bottom longline red grouper landings. Data were stratified by areas fished (Gulf of Mexico statistical areas) and by target species (red grouper vs. targeting other species). Targeting was determined using the Stephens and MacCall (2004) approach, in which trips are categorized based upon reported species composition of the landings. The method is intended to identify trips that fished in locations containing red grouper habitat and therefore had the potential of catching (and discarding, as necessary) red grouper. The discards/pounds landed ratio for each stratum

was then applied to the summed longline landings in the corresponding stratum to estimate the number of discards. Estimates were summed by year and the annual average was reported.

4.2.4.1.6 Gulf of Mexico Reef Fish Handline Fishery

Discard rates for the Gulf of Mexico reef fish handline fishery were calculated from discard reports made to the SEFSC Miami coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook-hour fished for each trip. Mean discard rate for each species was determined by year, along with among-trip coefficients of variation.

Total effort (in hook-hours fished) for the fishery was calculated from the SEFSC Miami coastal logbook program database for the years 2005–06. Extrapolation in order to estimate total discards by the fishery was accomplished by multiplying total hook-hours fished by species-specific mean discards per hook-hour. Between-year coefficients of variation of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

Gulf of Mexico handline vessel discards of greater amberjack, vermilion snapper, and gray triggerfish had been previously estimated for the SEDAR 9 assessment process (McCarthy 2005) and were used for the Gulf of Mexico reef fish handline fishery discard estimates. Estimates followed similar methods to those described above, with the exception that the data were stratified by year (2003 and 2004), discard period (January–July, August–December), and the number of hooks fished per handline. A GLM analysis identified the above factors as having a significant effect on discard rate. For these species, discard rate was calculated as discards per trip and the extrapolation to total discards was made by multiplying the mean discard rate per trip by the total trips reported within each stratum. Gray triggerfish data were not stratified beyond year because of sample size constraints.

Gag grouper handline vessel discards were also previously estimated for the SEDAR 10 gag grouper assessment (McCarthy 2006b) and were used for the Gulf of Mexico reef fish handline fishery discard estimates. Methods were similar to those described above for greater amberjack and vermilion snapper. A GLM was again used to identify factors that significantly affected discard rate. Discard rates (discards per trip) and total effort were calculated for each stratum. Estimated total discards were summed across strata.

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A lane snapper, *Lutjanus synagris*.

Red grouper handline vessel discards were estimated for the SEDAR 12 red grouper assessment (McCarthy 2006a) and were used for the Gulf of Mexico reef fish handline fishery discard estimates. Methods differed from those previously described, primarily in the way red grouper trips were identified. The Stephens and MacCall (2004) approach (described in Section 4.2.4.1.5) was used to identify trips with the potential of catching and discarding red grouper. Factors that significantly affected discard rate were again identified using a GLM, and the data were then stratified appropriately. Discard rates were calculated as discards per hook-hour fished and multiplied by total hook-hours reported to the coastal logbook program for the fishery.

4.2.4.1.7 South Atlantic Snapper–Grouper Handline Fishery

Discard rates for the South Atlantic snapper–grouper handline fishery were calculated from discard reports made to the SEFSC's coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook-hour fished for each trip. Mean discard rate for each species was determined by year along with among-trips CVs.

Total effort (in hook-hours fished) for the fishery was calculated from the SEFSC's coastal logbook program database for the years 2005–06. Extrapolation to total discards by the fishery was accomplished by multiplying total hook-hours fished by the number of species-specific mean discards per hook-hour. Between-year coefficients of variation of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in

only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

Gag grouper handline vessel discards, estimated for the SEDAR 10 gag grouper assessment (McCarthy 2006b), were used for the South Atlantic snapper–grouper handline fishery discard estimates. Methods are described in Section 4.2.4.1.6.

South Atlantic handline vessel discards of greater amberjack and red snapper were estimated for the SEDAR 15 assessment process (McCarthy 2007) and were used for the discard estimates for the South Atlantic snapper–grouper handline fishery. Methods were similar to those described above, with discard rate calculated from coastal discard logbook data and total effort calculated from coastal logbook data. A GLM was used to identify factors with significant effects on discard rate, and data were stratified by those factors. Discards were estimated by stratum (mean stratum discard rate multiplied by stratum total effort) and summed across strata within each year.

Snowy grouper (*Epinephelus niveatus*), speckled hind (*Epinephelus drummondhayi*), and warsaw grouper (*Epinephelus nigritus*) discards for the South Atlantic handline vessel discard estimates were produced for the SEDAR 4 assessment process (Poffenberger 2003) and were used for the discard estimates of the South Atlantic snapper–grouper handline fishery. Data were stratified by year, area fished, and species targeted (defined as the species making up the largest percentage of the reported landings for the trip). For

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each year, the areas fished and target species of all trips that reported discards of snowy grouper, speckled hind, or warsaw grouper were identified. Total effort was defined as the total number of trips made by handline vessels within strata that also contained trips reporting discards. Discard rate was defined as number of discards per trip. Total discards were estimated by multiplying the stratum mean discard rate by the total number of trips in the stratum, then summing across strata.

4.2.4.1.8 Gulf of Mexico Coastal Migratory Pelagic Troll Fishery

Discard rates for the Gulf of Mexico coastal migratory pelagic troll fishery were calculated from discard reports made to the SEFSC Miami's coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook–hour fished for each trip. Mean discard rate for each species was determined by year, along with the among-trips coefficients of variation.

Total effort (in hook–hours fished) for the fishery was calculated from the SEFSC coastal logbook program database for the years 2005–06. Extrapolation to estimate total discards by the fishery was accomplished by multiplying total hook–hours fished by the number of species-specific mean discards per hook–hour. Among-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

4.2.4.1.9 South Atlantic Coastal Migratory Pelagic Troll Fishery (includes Atlantic Dolphin Wahoo Fishery)

Fishing effort directed to the South Atlantic coastal migratory pelagic troll fishery could not be differentiated from effort directed to the Atlantic dolphin wahoo fishery, based on the available coastal logbook and coastal discard logbook data. Discard estimates were confounded between those fisheries, and discards were estimated for the South Atlantic coastal migratory pelagic troll fishery only.

Discard rates for the South Atlantic coastal migratory pelagic troll fishery were calculated from discard reports made to the SEFSC coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook–hour fished for each trip. Mean discard rate for each species was determined by year, along with the among trip CVs.

Total effort (in hook–hours fished) for the fishery was calculated from the SEFSC coastal logbook program database for the years 2005–06. Extrapolation to total discards by the fishery was accomplished by multiplying total hook–hours fished by species-specific mean discards per hook–hour. Among-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

Discards of greater amberjack (*Seriola dumerili*) from South Atlantic trolling vessels were estimated during SEDAR 15 (McCarthy 2007); those estimates were used for the South Atlantic coastal migratory pelagic troll fishery. Methods are described in Section 4.2.4.1.7.

4.2.4.1.10 Southeastern Atlantic Shrimp Trawl Fishery

Bycatch estimates were not available for inclusion in this report. The region is currently undergoing a peer review of fish bycatch estimates, which will be included in future editions of this report.

4.2.4.1.11 Fish Discard Estimation Methods for the North Carolina Inshore (Bays and Rivers) Gillnet Fishery

This is a state-managed fishery, so while some protected species bycatch estimates were developed from Federal observer program data, no fish discard estimates were available.

4.2.4.2 Marine Mammal Bycatch Estimation Methods

4.2.4.2.1 Atlantic and Gulf of Mexico Shark Bottom Longline Fishery

A delta lognormal-based ratio estimator method was used for estimating catch rates of marine mammals in the commercial directed shark bottom longline fishery. Extrapolation factors were based on logbook data. For a description of data and methods see Fairfield Walsh and Garrison (2006).

4.2.4.2.2 Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)

Several methods have been applied to estimate marine mammal bycatch rates in shark gillnet fisheries. Initially, a

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delta lognormal-based ratio estimator method was used for estimating catch rates in drift nets only. However, a more recent examination of the available data, along with the expansion of the observer program to include other components of the fishery, resulted in the use of a simple ratio estimator. Bycatch rate estimates were expanded to total estimates using logbook-reported effort data. Estimates of bycatch were likely biased and highly uncertain, due to two factors. First, there was direct evidence of underreporting of fishing effort in the logbook. Second, the fishermen did not report the type of fishing (e.g., strike, sink, or drift) used in a particular set. Therefore, it was difficult to reliably attribute the bycatch rate of a particular set to the appropriate type of fishing employed. The most recent estimates of marine mammal bycatch are available in Garrison (2007).

4.2.4.2.3 Gulf of Mexico Shrimp Trawl Fishery

There have been occasional documented mortalities of bottlenose dolphins in shrimp trawls in both the Atlantic and the Gulf of Mexico. In addition, depredation of catch and scavenging of discarded bycatch by bottlenose dolphins is a common occurrence. There has been recent video documentation of bottlenose dolphins feeding inside TEDs during active trawling. Because the observer program for the shrimp fisheries has been voluntary and research driven, the extent and magnitude of marine mammal bycatch is unknown. Recent changes to the observer programs should allow estimation of bycatch for inclusion in future editions of this report.

4.2.4.2.4 Atlantic and Gulf of Mexico HMS Pelagic Longline Fishery

A delta lognormal-based ratio estimator method is used for estimating catch rates of marine mammal species in the Atlantic and Gulf of Mexico HMS pelagic longline fishery. For a description of data and methods see Garrison (2003b).

4.2.4.2.5 Gulf of Mexico Reef Fish Bottom Longline Fishery

Bycatch estimates were not available for inclusion in this report. The region is currently undergoing a peer review of marine mammal bycatch estimates, which will be included in future editions of this report.

4.2.4.2.6 Gulf of Mexico Reef Fish Handline Fishery

Marine mammal bycatch has not been documented in this fishery. No bycatch estimates were developed.

4.2.4.2.7 South Atlantic Snapper–Grouper Handline Fishery

Marine mammal bycatch has not been documented in this fishery. No bycatch estimates were developed.

4.2.4.2.8 Gulf of Mexico Coastal Migratory Pelagic Troll Fishery

Marine mammal bycatch has not been documented in this fishery. No bycatch estimates were developed.

4.2.4.2.9 South Atlantic Coastal Migratory Pelagic Troll Fishery (includes Atlantic Dolphin Wahoo Fishery)

Marine mammal bycatch has not been documented in this fishery. No bycatch estimates were developed.

4.2.4.2.10 Southeastern Atlantic Shrimp Trawl Fishery

There have been occasional documented mortalities of bottlenose dolphins in shrimp trawls in both the Atlantic and the Gulf of Mexico. In addition, depredation of catch and scavenging of discarded bycatch by bottlenose dolphins is a common occurrence. There has been recent video documentation of bottlenose dolphins feeding inside TEDs during active trawling. Because the observer program for the shrimp fisheries have been voluntary and research driven, the extent and magnitude of marine mammal bycatch is unknown. Recent changes to the observer programs should allow estimation of bycatch.

4.2.4.2.11 North Carolina Inshore (Bays and Rivers) Gillnet Fishery

Bycatch estimates were not available for inclusion in this report. The region is currently undergoing a peer review of marine mammal bycatch estimates, which will be included in future editions of this report.

4.2.4.3 Other Protected Species Bycatch Estimation Methods

The delta estimator (Pennington 1993) is the primary method used for estimating protected species bycatch rates at the SEFSC. This method has been used to develop estimates of sea turtle bycatch in pelagic longline fisheries since 1999 (Johnson et al. 1999) through 2005 (Fairfield Walsh and Garrison 2006), has recently been used in estimates made for the shark drift gillnet fishery, and is being used in the shark bottom longline fishery. The remainder

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of this section on the details of the method has been taken from Garrison (2003a).

The mean and variance of catch rates for marine mammals and turtles in observed longline sets were calculated using a delta estimator (Pennington 1993). The unit of effort in this analysis is the number of hooks, consistent with methods used to estimate total catch and bycatch of finfish and previous analyses of protected species interactions (Johnson et al. 1999; Garrison 2003a). The delta mean bycatch rate for each analytical stratum t is calculated as

$$(1) \quad C_t = \frac{m_t}{n_t} e^{L_t} G(s_L^2/2)$$

where

m_t is the number of sets with observed bycatch

n_t is the total number of observed sets

L_t is the mean of the log-transformed number of animals taken per 1000 hooks when bycatch occurred

s_L^2 is the observed sample variance of the log-transformed bycatch rate

G is the cumulative probability function from the Poisson distribution given as:

$$(2) \quad G(s_L^2/2) = 1 + \frac{m_t - 1}{m_t} (s_L^2/2) + \sum_{j=2}^{\infty} \frac{(m_t - 1)^{2j-1}}{m_t^j (m_t + 1)(m_t + 3) \dots (m_t + 2j - 3)} \times \frac{(s_L^2/2)^j}{j!}.$$

The series was computed numerically over j terms until it met a convergence criterion of a change in the function value of <0.0001 with additional terms j . Convergence was generally achieved with <10 terms. The variance of the delta estimator is:

$$(3) \quad \text{var}(C_t) = \frac{m_t}{n_t} (e^{2L_t}) \left[\frac{m_t}{n_t} G^2(s_L^2/2) - \left(\frac{m_t - 1}{n_t - 1} \right) G\left(\frac{m_t - 2}{m_t - 1} s_L^2\right) \right].$$

When m_t is equal to 1, the mean bycatch rate reduces to the simple mean rate where

$$(4) \quad C_t = \frac{\exp(L_t)}{n_t}$$

and

$$(5) \quad \text{var}(C_t) = \left(\frac{\exp(L_t)}{n_t} \right)^2.$$

The C_t calculated above gives the mean number of animals killed per 1,000 hooks in the observed trips. To estimate total interactions, N , these rates were multiplied by the total number of hooks reported to the Fisheries Logbook System for each analytical stratum. The stratified estimates and associated variances were summed to provide annual estimates for each species. Approximate 95% confidence intervals were calculated, assuming lognormal distribution of total mortality as N/C and $N \times C$ for the lower and upper confidence bounds, respectively, where

$$(6) \quad C = \exp \left[z_\alpha \sqrt{\text{var}(\ln N)} \right]$$

and

$$(7) \quad \text{var}(\ln N) = \ln \left[1 + \text{var}(N)/N^2 \right]$$

where z_α is 1.906, the z score for $\alpha = 0.05$.

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4.2.4.3.1 Atlantic and Gulf of Mexico Shark Bottom Longline Fishery

A binomial-based and delta lognormal-based ratio estimator method was used for estimating catch rates of ESA-listed species for the commercial directed Atlantic and Gulf of Mexico shark bottom longline fishery for 2004 and 2005. These were estimated as annual fully stratified (area and season) and annual pooled, expanded using logbook data. The largest estimate by species was used in the report. For a full description of data and methods see Richards (2007).

4.2.4.3.2 Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)

Several methods have been applied to estimate sea turtle bycatch rates in the shark gillnet fisheries. Initially, a delta lognormal-based ratio estimator method was used for estimating catch rates in drift nets only. However, a more recent examination of the available data, along with the expansion of the observer program to include other components of the fishery, resulted in the use of a simple ratio estimator. Bycatch rate estimates were expanded to total estimates using logbook-reported effort data. Estimates of bycatch were likely biased and were highly uncertain due to two factors. First, there was direct evidence of underreporting of fishing effort to the logbook. Second, the fishermen do not report the type of fishing (e.g., strike, sink, or drift) used in a particular set. Therefore, it was difficult to reliably attribute the bycatch rate of a reported set to the appropriate type of fishing employed. The most recent estimates of sea turtle bycatch were in Garrison (2007).

4.2.4.3.3 Gulf of Mexico Shrimp Trawl Fishery

A ratio estimator was used for estimating catch rates of sea turtle species in both the Southeast Atlantic shrimp trawl and Gulf of Mexico shrimp trawl fisheries. Expansion factors were based on logbook data. The most recent estimate available for loggerhead and leatherback sea turtles is from Epperly et al. (2002), and for green and Kemp's ridley is from NMFS (2002). The confidence intervals provided in Epperly et al. (2002) are not appropriate. For a description of data and methods see Epperly et al. (2002) and NMFS (2002). The estimates provided in both were based on catch rates in naked nets, i.e., nets without turtle excluder devices (TEDs) and were estimates of expected interactions. Because most trawls used in the shrimp fishery are required to use TEDs, the vast majority of the expected interactions never would be observed as the turtles should escape the trawl through the TED opening and presumably survive the interaction. TED designs must be certified by NMFS, based on specific protocols (Department of Commerce 1987; Renaud et al., 1990). Foremost among the criteria for certifica-

tion is the requirement that a prospective design releases 97% of the turtles; however, at the time many loggerheads and leatherbacks were too large to escape (Epperly and Teas, 2002). For sea turtle bycatch we report the proportion of the catch expected to be retained in the TED-equipped nets and subjected to forced submergence, not the expected total number of interactions.

4.2.4.3.4 Atlantic and Gulf of Mexico HMS Pelagic Longline Fishery

A delta lognormal-based ratio estimator method was used for estimating catch rates of ESA-listed species in the Atlantic and Gulf of Mexico HMS pelagic longline fishery. For sea turtle estimate details see Fairfield Walsh and Garrison (2006). For sea bird estimates see Hata (2006).

4.2.4.3.5 Gulf of Mexico Reef Fish Bottom Longline Fishery³

Discard rates for the Gulf of Mexico reef fish bottom longline fishery were calculated from discard reports made to the SEFSC coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook fished for each trip. Mean discard rate for each species was determined by year, along with among-trip CVs.

Total effort (in hooks fished) for the fishery was calculated from the SEFSC coastal logbook program database for the years 2005–06. Extrapolation to the total discards by the fishery was accomplished by multiplying total hooks fished by the species-specific mean discards per hook. Among-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

4.2.4.3.6 Gulf of Mexico Reef Fish Handline Fishery

Discard rates for the Gulf of Mexico reef fish handline fishery were calculated from discard reports made to the SEFSC coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook-hour fished for each trip. Mean discard rate for each species was determined by year, along with among-trips coefficients of variation.

³ New bycatch estimation methods are discussed in SEFSC (2008).

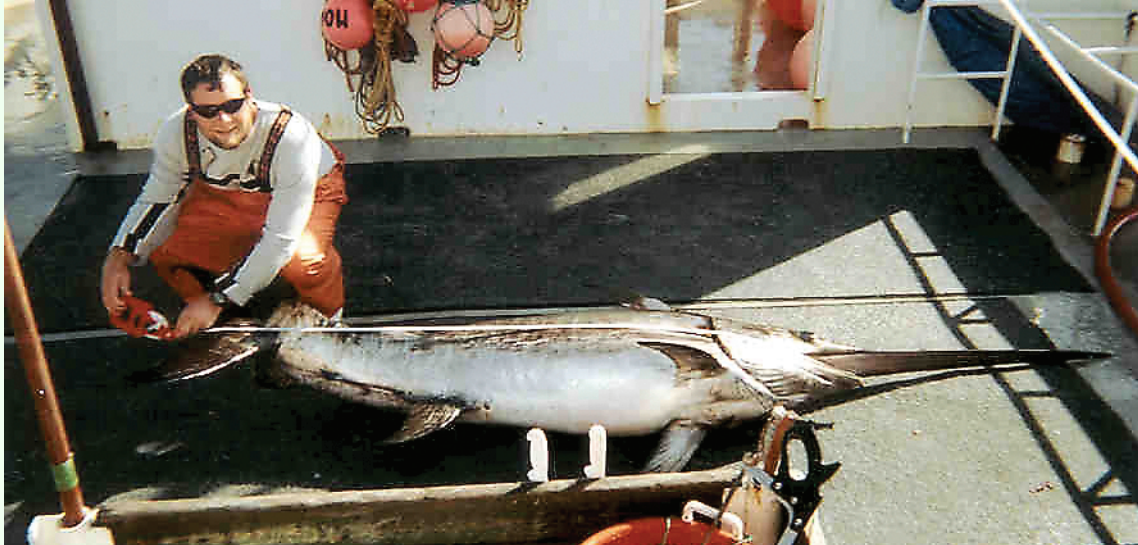


Photo: NMFS, SEFSC

An observer measures a swordfish.

Total effort for the fishery (in hook-hours fished) was calculated from the SEFSC coastal logbook program database for the years 2005–06. Extrapolation to the total discards by the fishery was accomplished by multiplying total hook-hours fished by the species-specific mean discards per hook-hour. Among-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

4.2.4.3.7 South Atlantic Snapper–Grouper Handline Fishery

Discard rates for the South Atlantic snapper–grouper handline fishery were calculated from discard reports made to the SEFSC coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook-hour fished for each trip. Mean discard rate for each species was determined by year along, with among-trip CVs.

Total effort (in hook-hours fished) for the fishery was calculated from the SEFSC coastal logbook program database for the years 2005–06. Extrapolation to the total discards by the fishery was accomplished by multiplying total hook-hours fished by the species-specific mean discards per hook-hour. Among-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years

examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

4.2.4.3.8 Gulf of Mexico Coastal Migratory Pelagic Troll Fishery

Discard rates for the Gulf of Mexico coastal migratory pelagic troll fishery were calculated from discard reports made to the SEFSC coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook-hour fished for each trip. Mean discard rate for each species was determined by year, along with among-trip CVs.

Total effort (in hook-hours fished) for the fishery was calculated from the SEFSC Miami coastal logbook program database for the years 2005–06. Extrapolation to total discards by the fishery was accomplished by multiplying total hook-hours fished by the species-specific mean discards per hook-hour. Among-year coefficients of variation of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

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4.2.4.3.9 South Atlantic Coastal Migratory Pelagic Troll Fishery (includes Atlantic Dolphin Wahoo Fishery)

Fishing effort directed to the South Atlantic coastal migratory pelagic troll fishery cannot be differentiated from effort directed to the Atlantic Dolphin Wahoo fishery with the available coastal logbook and coastal discard logbook data. Discard estimates are therefore confounded between those fisheries and discards were estimated for the South Atlantic coastal migratory pelagic troll fishery only.

Discard rates for the South Atlantic coastal migratory pelagic troll fishery were calculated from discard reports made to the SEFSC, Miami's coastal discard logbook program for the years 2005–06. Discard rate for each species was defined as the reported number of discards of a species per hook-hour fished for each trip. Mean discard rate for each species was determined by year, along with among-trip CVs.

Total effort (in hook-hours fished) for the fishery was calculated from the SEFSC Miami's coastal logbook program database for the years 2005–06. Extrapolation to total discards by the fishery was accomplished by multiplying total hook-hours fished by the species-specific mean discards per hook-hour. Among-year CVs of the estimated discards were also calculated for each species. In instances where a species was reported as discarded in only one of the two years examined, discards were estimated for the single year in which the species was reported discarded. Coefficients of variation of calculated discards could not be calculated for species reported from single years.

4.2.4.3.10 Southeastern Atlantic Shrimp Trawl Fishery

A ratio estimator was used for estimating catch rates of sea turtle species in both the Southeast Atlantic shrimp trawl and Gulf of Mexico shrimp trawl fisheries. Expansion factors were based on logbook data. The most recent estimates available are from Epperly et al. (2002) for loggerhead and leatherback sea turtles and from NMFS (2002) for green and Kemp's ridley. The confidence intervals provided in Epperly et al. (2002) are not appropriate. For a description of data and methods see Epperly et al. (2002) and NMFS (2002). The estimates provided in both were based on catch rates in naked nets, i.e., nets without turtle excluder devices (TEDs) and were estimates of expected interactions. Because most trawls used in the shrimp fishery are required to use TEDs, the vast majority of the expected interactions never would be observed as the turtles should escape the trawl through the TED opening and presumably survive the interaction. TED designs must be certified by NMFS, based on specific protocols (Department of Commerce 1987, 1990). Foremost among the criteria for certification is the requirement that a prospective design releases

97% of the turtles; however, at the time many loggerheads and leatherbacks were too large to escape (Epperly and Teas, 2002). For sea turtle bycatch we report the proportion of the catch expected retained in the TED-equipped nets and subjected to forced submergence, not the expected total number of interactions.

4.2.4.3.11 North Carolina Inshore (Bays and Rivers) Gillnet Fishery

A ratio estimator with no measure of uncertainty was used for the North Carolina inshore gillnet fishery. Extrapolation factors were based on fishers' reports to the North Carolina Division of Marine Fisheries. For details of data see Price (2007).

4.2.4.3.12 North Carolina Southern Flounder Pound Net Fishery

A delta lognormal approach (Pennington 1983) was used to estimate the mean and variance of sea turtle catch per pound per week by stratum from data collected as part of a relative abundance index study. Weekly estimates from aerial surveys of the total pounds fished by stratum were used to extrapolate to total bycatch by week. Estimated total catch was summed across weeks and strata to produce annual estimates of estimated total catch.

4.2.5 Tier Classification for Southeast Region Fisheries

The quality of bycatch data and estimation methods were analyzed for 26 Southeast Region fisheries with Federal management authority or relevant Federal data-collection programs. Other data may be available for state, international, and tribal fisheries; however, these programs were beyond the scope of this initial report. The remaining 22 fisheries are not federally managed and have no relevant Federal data-collection programs, and were therefore excluded from the analysis.

Unique tier scores were assigned to each fishery using the tier scoring procedures outlined in Section 3 for fish, marine mammals, and other protected species (Table 4.2.3). Over half of Southeast Region fisheries were classified in Tiers 1, 2, or 3 for fish (Figure 4.2.2A). The remaining 10 fisheries (38%) were classified as Tier 0. Tier scores for marine mammals and other protected species were the same, with 10 fisheries (38%) scoring in tiers 1, 2, or 3, and the remaining 16 fisheries (62%) scoring in tier 0 (Figures 4.2.2B and C). No fisheries in the Southeast Region were classified as Tier 4.

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Table 4.2.3

The 2005 fishery tier classifications for Southeast Region fisheries (listed alphabetically, first by management authority and then by fishery name). Shaded fisheries were evaluated for this report. Only relevant Federal data sources were evaluated for this report.

Fishery Name	Management Authority	Fish Tier	Marine Mammal Tier	Other Protected Species Tier
Caribbean Gillnet	Federal	0	0	0
Caribbean Mixed Species Trap/Pot	Federal	0	0	0
Caribbean Spiny Lobster Trap/Pot	Federal	0	0	0
Gulf of Mexico Coastal Migratory Pelagic Gillnet	Federal	1	0	0
Gulf of Mexico Coastal Migratory Pelagic Troll	Federal	1	0	0
Gulf of Mexico Reef Fish Bottom Longline	Federal	2	1	1
Gulf of Mexico Reef Fish Handline	Federal	2	1	1
Gulf of Mexico Shrimp Trawl	Federal	2	2	2
Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)	Federal	3	3	3
South Atlantic Coastal Migratory Pelagic Troll	Federal	1	0	0
South Atlantic Snapper–Grouper Bottom Longline	Federal	1	0	0
South Atlantic Snapper–Grouper Handline	Federal	1	0	0
Southeast Atlantic Black Sea Bass Pot	Federal	1	0	0
Atlantic and Gulf of Mexico HMS Pelagic Longline	Federal	3	2	2
Atlantic and Gulf of Mexico Shark Bottom Longline	Federal	3	2	2
Southeastern Atlantic Shrimp Trawl	Federal	2	2	2
Southeastern Atlantic, Gulf of Mexico Golden Crab Trap/Pot	Federal	0	0	0
Spearfishing for Tuna	Federal	0	0	0
Winter Fluke (Flounder) Trawls	Federal	0	0	0
Florida, Puerto Rico, and the U.S. Virgin Islands Spiny Lobster Trap/Pot Fishery	Federal, state	0	0	0
North Carolina Coastal Gillnet ^a	Federal, state	0	0	0
Southeastern Atlantic Stone Crab Trap/Pot	Federal, state	0	0	0
Southeastern Atlantic Skimmer Trawls	State			
Caribbean Haul/Beach Seine	State			
Florida West Coast Sardine Purse Seine	State			

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Table 4.2.3 (continued)

Fishery Name	Management Authority	Fish Tier	Marine Mammal Tier	Other Protected Species Tier
Gulf of Mexico Blue Crab	State			
Gulf of Mexico Coastal Gillnet ^b	State			
Gulf of Mexico Haul/Beach Seine	State			
Gulf of Mexico Marine Shrimp Butterfly Nets	State	1	1	1
Gulf of Mexico Marine Shrimp Skimmer Trawls	State	1	1	1
Gulf of Mexico Menhaden Purse Seine	State	1	1	1
Gulf of Mexico Oyster	State			
Gulf of Mexico Shrimp Cast Net	State			
North Carolina Haul/Beach Seine - Long Haul	State			
North Carolina Inshore (Bays and Rivers) Gillnet	State			
North Carolina Pound Net (Croaker, Weakfish)	State			
North Carolina Southern Flounder Pound Net	State			
North Carolina Stop Nets	State			
South Atlantic Blue Crab	State			
South Atlantic Coastal Gillnet ^b	State			
Southeast Calico Scallop Trawl	State	0	0	0
Southeast Fish Trawl	State			
Southeastern Atlantic Marine Shrimp Butterfly Nets	State			
Southeastern Atlantic Marine Shrimp Cast Net	State			
Southeastern Atlantic Menhaden	State			
Southeastern Atlantic Ocean, Gulf of Mexico, and Caribbean Shellfish Dive, Hand/Mechanical Collection	State			
Southeastern Atlantic, Haul/Beach Seine	State			
Surface Trawl Jellyfish	State			

^a The North Carolina coastal gillnet fishery was classified as Tier 0 in all three categories because, although there is a developing observer program in place, the observer program is for a relatively small portion of the entire fishery and is not considered representative.

^b Federal data-collection programs for these fisheries were initiated in 2006; however, since the report is based on 2005 data, these fisheries were not evaluated for this report.

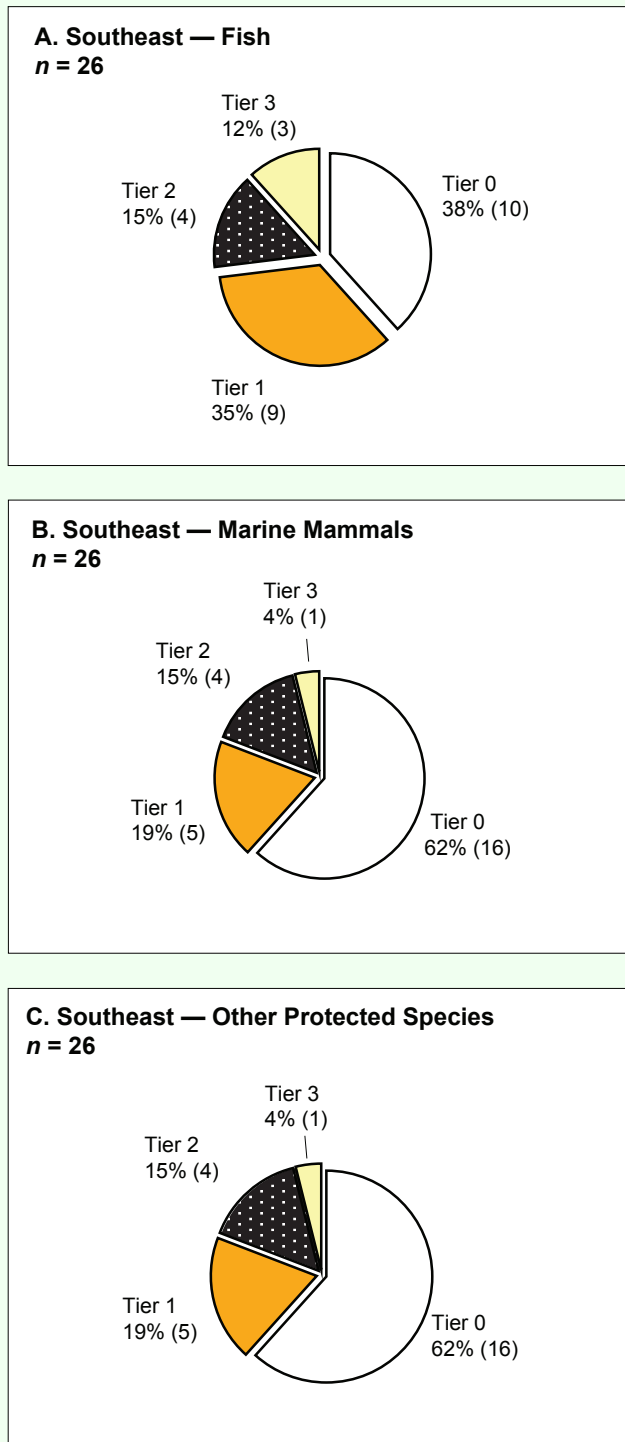


Figure 4.2.2

Southeast Region tier classifications by number and percentage for fisheries with Federal management or Federal data-collection programs for A) fish, B) marine mammals, and C) other protected species. Tier scores are for the year 2005.

4.2.6 Southeast Region Key Stocks

Eighty-two key stocks were identified in the Southeast Region (Table 4.2.4). As in all regions, not all stocks and populations listed as key stocks have bycatch estimates. For example, all ESA-listed populations found in the Southeast Region (16) were prioritized for inclusion in the list of key species, regardless of whether bycatch occurs.

Seventy-eight percent (63) of the key stocks identified in the Southeast were fish stocks (Figure 4.2.3). This includes three ESA-listed species: Gulf sturgeon (*Acipenser oxyrinchus desotio*), shortnose sturgeon (*Acipenser brevirostrum desotoi*), and smalltooth sawfish (*Pristis pectinata*). The majority of fish stocks were added through the quantitative analysis process, as described in Section 3. Nine FSSI fish stocks were added through the qualitative process: bigeye tuna (*Thunnus obesus*), the South Atlantic stock of red drum, the Gulf of Mexico stock of cobia (*Rachycentron canadum*), the South Atlantic/Gulf of Mexico stock of dolphinfish (*Coryphaena hippurus*), Gulf and Atlantic stocks of king mackerel (*Scomberomorus cavalla*), Gulf and Atlantic stocks of Spanish mackerel (*Scomberomorus maculatus*), and the Gulf of Mexico stock of tilefish (*Lopholatilus chamaeleonticeps*). Bigeye tuna was added due to increased public concern over the sustainability of Atlantic tuna harvests, while the South Atlantic stock of red drum was added for regional consistency (so that all substocks of red drum would be included, as it is impossible to determine which substock an individual fish comes from in some fisheries). The remaining five stocks were added due to high visibility/public concern, as they support regionally important fisheries. Four stocks were removed from the key stocks list due to high rates of post-release survival: blacktip shark (*Carcharhinus limbatus*), nurse shark (*Ginglymostoma cirratum*), tiger shark (*Galeocerdo cuvier*), and vermilion snapper⁴ (*Rhomboplites aurorbens*).

The remaining 19 stocks are composed of 11 marine mammal stocks (six ESA-listed), six sea turtle populations (all ESA-listed), and two seabird populations (both ESA-listed). Five non-ESA-listed marine mammal species were added through the quantitative process. Both *Globicephala* species (long- and/or short-finned pilot whales) are included as key stocks; differentiating between the two species is difficult because they are physically similar and their ranges overlap, thus it is often unclear whether an individual belongs to one species or the other without detailed analysis. No protected species were added through the qualitative process.

⁴ The post-release survival for vermilion rockfish differs between recreational (25%) and commercial fisheries (40%); this species was removed from the key stocks list because the report focused only on commercial fisheries. However, vermilion rockfish will be evaluated for inclusion as a key stock in future editions of this report.

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Table 4.2.4

Key fish and marine mammal stocks and key sea turtle and seabird populations for the Southeast Region. Overfishing/Overfished status based on First Quarter 2008 FSSI report.

Key Fish Stocks Listed by FSSI			
Species/stock name		Overfishing	Overfished
Common name	Scientific name		
Bigeye tuna, South Atlantic	<i>Thunnus obesus</i>	No	No — rebuilding
Black grouper, South Atlantic	<i>Mycteroperca bonaci</i>	Yes	Unknown
Black grouper, Gulf of Mexico	<i>Mycteroperca bonaci</i>	Unknown	Undefined
Black sea bass, South Atlantic	<i>Centropristis striata</i>	Yes	Yes
Blue marlin, South Atlantic	<i>Makaira nigricans</i>	Yes	Yes
Blue shark, South Atlantic ^a	<i>Prionace glauca</i>	Unknown	Unknown
Bluefin tuna, West Atlantic	<i>Thunnus thynnus</i>	Yes	Yes
Cobia, Gulf of Mexico	<i>Rachycentron canadum</i>	No	No
Dolphinfish, South Atlantic/Gulf of Mexico	<i>Coryphaena hippurus</i>	No	No
Dusky shark	<i>Carcharhinus obscurus</i>	Yes	Yes
Gag, Gulf of Mexico	<i>Mycteroperca microlepis</i>	Yes	Undefined
Gag, South Atlantic	<i>Mycteroperca microlepis</i>	Yes	No
Goliath grouper, South Atlantic/Gulf of Mexico	<i>Epinephelus itajara</i>	No	Unknown
Gray triggerfish, Gulf of Mexico	<i>Balistes capriscus</i>	Yes	Undefined
Gray triggerfish, South Atlantic	<i>Balistes capriscus</i>	No	Unknown
Greater amberjack, Gulf of Mexico	<i>Seriola dumerili</i>	Yes	Yes
Greater amberjack, South Atlantic	<i>Seriola dumerili</i>	No	No
Hogfish, Gulf of Mexico	<i>Lachnolaimus maximus</i>	Unknown	Undefined
Hogfish, South Atlantic	<i>Lachnolaimus maximus</i>	Unknown	Unknown
King mackerel, Gulf group	<i>Scomberomorus cavalla</i>	No	No — rebuilding
King mackerel, Atlantic group	<i>Scomberomorus cavalla</i>	No	No
Little tunny	<i>Euthynnus alletteratus</i>	No	Unknown
Nassau grouper, Gulf of Mexico	<i>Epinephelus striatus</i>	No	Undefined
Red drum, Gulf of Mexico	<i>Sciaenops ocellatus</i>	No	Undefined
Red drum, South Atlantic	<i>Sciaenops ocellatus</i>	Yes	Unknown
Red grouper, Gulf of Mexico	<i>Epinephelus morio</i>	No	No
Red grouper, South Atlantic	<i>Epinephelus morio</i>	Yes	Unknown
Red porgy, South Atlantic	<i>Pagrus pagrus</i>	No	Yes
Red snapper, Gulf of Mexico	<i>Lutjanus campechanus</i>	Yes	Yes
Red snapper, South Atlantic	<i>Lutjanus campechanus</i>	Yes	Unknown
Sailfish, West Atlantic	<i>Istiophorus platypterus</i>	Yes	Yes
Sandbar shark ^a	<i>Carcharhinus plumbeus</i>	Yes	Yes

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Table 4.2.4 (continued)

Key Fish Stocks Listed by FSSI (cont.)			
Species/stock name		Overfishing	Overfished
Common name	Scientific name		
Scamp, South Atlantic	<i>Mycteroperca phenax</i>	No	Unknown
Snowy grouper, Gulf of Mexico	<i>Epinephelus niveatus</i>	Unknown	Undefined
Snowy grouper, South Atlantic	<i>Epinephelus niveatus</i>	Yes	Yes
Spanish mackerel, Gulf Group	<i>Scomberomorus maculatus</i>	No	No
Spanish mackerel, Atlantic Group	<i>Scomberomorus maculatus</i>	No	No
Speckled hind, South Atlantic	<i>Epinephelus drummondhayi</i>	Yes	Unknown
Tilefish, Gulf of Mexico	<i>Lopholatilus chamaeleonticeps</i>	Yes	No
Warsaw grouper, South Atlantic	<i>Epinephelus nigritus</i>	Yes	Unknown
White grunt	<i>Haemulon plumieri</i>	No	Unknown
White marlin, South Atlantic	<i>Tetrapturus albidus</i>	Yes	Yes
Wreckfish	<i>Polyprion americanus</i>	No	Unknown
Yellowedge grouper, Gulf of Mexico	<i>Epinephelus flavolimbatus</i>	Unknown	Undefined
Yellowtail snapper, South Atlantic/Gulf of Mexico	<i>Ocyurus chrysurus</i>	No	No
Large Coastal Shark Complex (key stocks only)		Unknown	Unknown
Bull shark	<i>Carcharhinus leucas</i>		
Lemon shark	<i>Negaprion brevirostris</i>		
Scalloped hammerhead, South Atlantic	<i>Sphyrna lewini</i>		
Scalloped hammerhead, South Atlantic/Gulf of Mexico	<i>Sphyrna lewini</i>		
Silky shark	<i>Carcharhinus falciformis</i>		
Spinner shark	<i>Carcharhinus brevipinna</i>		
Key Fish Stocks Listed by ESA			
Species/stock name		Stock status	
Common name	Scientific name		
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	Threatened	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	
Smalltooth sawfish	<i>Pristis pectinata</i>	Endangered	

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Table 4.2.4 (continued)

Key Fish Stocks Not Listed by FSSI or ESA			
Species/stock name		Stock status	
Common name	Scientific name		
Black snapper	<i>Apsilus dentatus</i>	Not applicable	
Blackfin snapper	<i>Lutjanus buccanella</i>		
Gray snapper	<i>Lutjanus griseus</i>		
Great hammerhead, South Atlantic/Gulf of Mexico	<i>Sphyrna mokarran</i>		
Lane snapper	<i>Lutjanus synagris</i>		
Mutton snapper	<i>Lutjanus analis</i>		
Red drum, South Atlantic/Gulf of Mexico	<i>Sciaenops ocellatus</i>		
Silk snapper	<i>Lutjanus vivanus</i>		
Yellowfin grouper	<i>Mycteroperca venenosa</i>		
Key Marine Mammal Stocks Listed by ESA			
Species/stock name		Stock status	
Common name	Scientific name		
Blue whale	<i>Balaenoptera musculus</i>	Endangered	
Fin whale	<i>Balaenoptera physalus</i>	Endangered	
Humpback whale	<i>Megaptera novaeangliae</i>	Endangered	
North Atlantic right whale	<i>Eubalaena glacialis</i>	Endangered	
Sei whale	<i>Balaenoptera borealis</i>	Endangered	
Sperm whale	<i>Physeter macrocephalus</i>	Endangered	
Key Marine Mammal Stocks Not Listed by ESA			
Species/stock name		ZMRG	Stock status ^b
Common name	Scientific name		
Bottlenose dolphin, Western North Atlantic Coastal	<i>Tursiops truncatus</i>	Variable	Variable
Pantropical spotted dolphin, Western North Atlantic	<i>Stenella attenuata</i>	0.3	Unknown
Pilot whale, long-finned	<i>Globicephala melaena (melas)</i>	24.9	Unknown
Pilot whale, short-finned	<i>Globicephala macrorhynchus</i>	24.9	Unknown
Risso's dolphin, Western North Atlantic	<i>Grampus griseus</i>	12.9	Unknown

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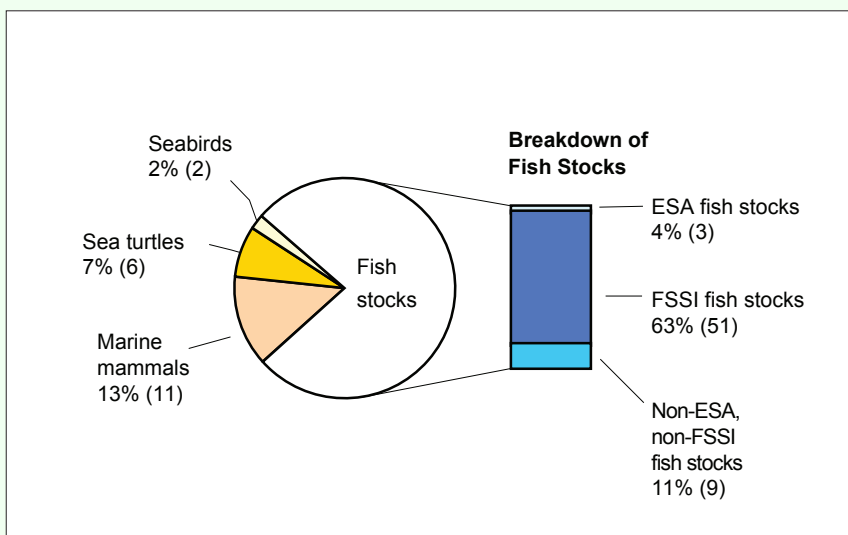
Table 4.2.4 (continued)

Key Sea Turtle Populations			
Species/stock name		Population Status	
Common name	Scientific name		
Green sea turtle	<i>Chelonia mydas</i>	Threatened (except in Florida and the Pacific coast of Mexico, where the breeding populations are endangered)	
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered	
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	
Olive ridley sea turtle	<i>Lepidochelys olivacea</i>	Threatened (except the Pacific coast of Mexico breeding populations, which are endangered)	
Key Seabird Populations Listed by ESA			
Species/stock name		Population status	
Common name	Scientific name		
Cahow	<i>Pterodroma cahow</i>	Endangered	
Roseate tern, northeast nesting population	<i>Sterna dougallii dougallii</i>	Endangered	
Key Seabird Populations Not Listed by ESA			
Species/stock name		Bycatch concern	Population status
Common name	Scientific name		
None			

^a Blue sharks and sandbar sharks are part of the Large Coastal Shark Complex under the HMS FMP, but are assessed separately.

^b Stock status based on Waring et al. (2007).

Figure 4.2.3
Number and percentage of key stocks in the Southeast Region by resource type and inclusion in FSSI.



4.2.7 Southeast Region Bycatch Estimates

Available bycatch estimates by fishery, based on data from the year 2005, or the most recent year of data if 2005 data were not available, are presented in Appendix 4.2, Tables 4.2.A–4.2.D. Bycatch estimates are included for five marine mammal, four sea turtle, and three seabird populations, in addition to 215 fish stocks or stock groups. For marine mammals and other rare-event stocks or populations, multiple years of data were used to calculate bycatch estimates. The timeframe of data used to calculate bycatch is included in Tables 4.2.A–4.2.D. Except for the North Carolina inshore (bays and rivers) gillnet fishery, bycatch estimates are averages across the years indicated. Bycatch estimates for the North Carolina gillnet fishery are totals for the years indicated.

Fish bycatch estimates are provided for nine fisheries (Table 4.2.A). For the Atlantic and Gulf of Mexico pelagic longline fishery, all fish estimates are for dead discards only. In some fisheries, bycatch estimates are available only for groups of species (e.g., bycatch estimates are provided for Chondrichthyes but not for individual shark and ray species in the Gulf of Mexico coastal migratory pelagic troll fishery) or for a management unit (e.g., coastal sharks). Members of species groups are listed in Appendix I.

Landings for both species and fisheries are reported in weights. Bycatch estimates for some fisheries were derived from logbook programs (such as in the Gulf of Mexico reef fish handline fishery) where bycatch amounts are reported in numbers of individuals. Reliable length/weight conversions were not available for these fisheries when the estimates were developed, and it was not possible to accurately calculate bycatch ratios at the fishery or species level in these cases.

Table 4.2.C lists available marine mammal bycatch estimates by fishery. Marine mammal bycatch estimates are provided for three fisheries. Many Southeast Region fisheries do not have reported incidences of marine mammal bycatch, and for those fisheries, bycatch was not estimated for this report (see Section 4.2.4 for fishery-specific details on bycatch estimation). Sea turtle bycatch estimates are available for ten Southeast Region fisheries, and are listed in Table 4.2.D. In some cases, it was not possible to identify the species of sea turtle; therefore bycatch estimates were made at a general level (e.g., for unclassified sea turtles). Seabird bycatch estimates are available for two fisheries. Available bycatch estimates for seabirds are listed in Table 4.2.E. The most recent seabird bycatch estimates for the Atlantic and Gulf of Mexico HMS pelagic longline were included; these estimates cover five different time periods: all seabird bycatch in 2004, and species-specific bycatch in the years 1995, 2000, 2004, and 2006. The total seabird bycatch estimate for this fishery is based only on 2004 data for the pooled category of all seabirds.

4.2.8 Bycatch Estimate Improvement Plans for Fisheries of Focus

Bycatch data-collection and estimation improvement plans were developed for the following 12 Southeast Region fisheries based on available information:

- Gulf of Mexico coastal migratory pelagic troll
- Gulf of Mexico reef fish bottom longline
- Gulf of Mexico reef fish handline
- Gulf of Mexico shrimp trawl
- Large coastal and small coastal shark aggregates (drift, strike, and bottom gillnet)
- North Carolina inshore (bays and rivers) gillnet
- South Atlantic coastal migratory pelagic troll
- South Atlantic snapper–grouper bottom longline
- South Atlantic snapper–grouper handline
- Atlantic and Gulf of Mexico HMS pelagic longline
- Atlantic and Gulf of Mexico shark bottom longline
- Southeastern Atlantic shrimp trawl

4.2.8.1 Bycatch estimation improvement plans

Gulf of Mexico Coastal Migratory Pelagic Troll

Tier Classes: Fish = 1; Marine Mammals = 0; Other Protected Species = 0

Bycatch and data-collection concerns: Bycatch data are currently collected through the coastal logbook program at SEFSC. Under this program, 20% of vessels are selected to report discards. Vessels are selected using a weighted (by a vessel's portion of the total effort reported from the fishery) random sample of all vessels with Federal permits that have reported deploying troll gear in the Gulf of Mexico. Estimates of total discards for the fishery are made by calculating a species-specific mean discard rate for the vessels reporting discards, and applying that rate to the calculated total effort reported from the fishery to the coastal logbook program.

- No mechanism exists to independently verify the accuracy of the discard logbook self-reported data.
- The level of compliance is impossible to estimate because fishers may submit a report of “no discards,” effectively opting out of reporting while remaining within reporting compliance. A number of fishers report “no discards” almost exclusively.
- There have been no documented takes of marine mammals.

Recommendation:

- While available data indicate that little bycatch is as-

sociated with this fishery, a short-term observer program should be implemented to confirm the amount of bycatch. It was recommended that data from the current discard reporting program, as well as from other observer programs in the region, should be used to estimate the sample size needed to achieve a 30% CV for estimates of the ten most commonly observed species.

Gulf of Mexico Reef Fish Bottom Longline

Tier Classes: Fish = 2; Marine Mammals = 1; Other Protected Species = 1

Bycatch and data-collection concerns: Bycatch data are currently collected through the coastal logbook program at SEFSC. Under this program, 20% of vessels are selected to report discards. Vessels are selected using a weighted (by a vessel's portion of the total effort reported from the fishery) random sample of all vessels with Federal permits that have reported deploying longline gear in the Gulf of Mexico. Estimates of total discards for the fishery are made by calculating a species-specific mean discard rate for the vessels reporting discards, and applying that rate to the calculated total effort reported from the fishery to the coastal logbook program.

- No mechanism exists to independently verify the accuracy of the discard logbook self-reported data.
- Through a pilot project, mandatory observer coverage of the Gulf of Mexico reef fish fishery began in 2006. The current coverage level is less than 1%, and the current bycatch estimates in this report for fish, marine mammals, and other protected species bycatch rely on self-reporting.⁵ In addition, it is difficult to allocate effort in this fishery based on logbook records.
- The level of compliance is impossible to estimate because fishers may submit a report of "no discards," effectively opting out of reporting while remaining within reporting compliance. A number of fishers report "no discards" almost exclusively. Red grouper discards reported from Gulf of Mexico longline vessels were believed to be grossly underreported during review of discard estimates for the SEDAR 12 red grouper assessment. The suspected underreporting, however, could not be confirmed by independent data.

Recommendations:

- It was recommended that current observer program coverage levels should be increased to assess and confirm the amount of bycatch for the fishery. Due to the potentially high number of discards from bottom longline ves-

sels, improvements in discard estimates from this fishery should be a high priority. Data from the discard reporting program, as well as the pilot observer program, should be used to estimate the sample size needed to achieve a 30% CV for estimates of the ten most commonly observed species. A video monitoring program could be considered to enhance observer data, reduce the need for observers, and collect data on vessels unable to carry observers.

- It was recommended that once the enhanced observer program has been in place for multiple years, self-reported discard logbooks should be compared with observer data to attempt to define an optimal combination for estimating total discards and for monitoring catch rates.
- It was the recommendation that for marine mammals and non-ESA-listed marine species, needed coverage should be estimated by species and stratum (season and area). The estimated observer DAS needed may be about ten times the current observer program coverage levels.
- Lastly, it was also recommended that changes to the logbook system that identify target by set would also enhance the data collected from this fishery.

Gulf of Mexico Reef Fish Handline

Tier Classes: Fish = 2; Marine Mammals = 1; Other Protected Species = 1

Bycatch and data-collection concerns: Bycatch data are currently collected through the coastal logbook program at SEFSC Miami. Under this program, 20% of vessels are selected to report discards. Vessels are selected using a weighted (by a vessel's portion of the total effort reported from the fishery) random sample of all vessels with Federal permits that have reported deploying handline gear in the Gulf of Mexico. Estimates of total discards for the fishery are made by calculating a species-specific mean discard rate for the vessels reporting discards, and applying that rate to the calculated total effort reported from the fishery to the coastal logbook program.

- A significant limitation of the current system is that the level of compliance is impossible to estimate because fishers may submit a report of "no discards," effectively opting out of reporting while remaining within reporting compliance. A number of fishers report "no discards" almost exclusively. Likewise, cases of underreporting have been suspected but cannot be confirmed by independent data.
- Through a pilot project, mandatory observer coverage of the Gulf of Mexico reef fish fishery began in 2006. The current coverage level is less than 1%, and the current bycatch estimates for fish, marine mammals, and other protected species bycatch rely on self-reporting.

⁵ New sea turtle bycatch estimates are now based on the observed data (SEFSC 2008).

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- It is difficult to allocate effort in this fishery based on logbook records.

Recommendations:

- It was recommended that current observer program coverage levels should be increased to assess and confirm the amount of bycatch for the fishery. Due to the potentially high number of discards from handline vessels, improvements in discard estimates from this fishery should be a high priority. Data from the discard reporting program, as well as the pilot observer program, should be used to estimate the sample size needed to achieve a 30% CV for estimates of the ten most commonly observed species. A video monitoring pilot study should be conducted in conjunction with the observer program, to determine whether electronic data can be used as a tool to enhance data collected by observers.
- It was recommended that once the enhanced observer program has been in place for multiple years, self-reported discard logbooks should be compared with observer data to attempt to define an optimal combination for estimating total discards and for monitoring catch rates.
- For marine mammals and other protected marine species, it was recommended that needed coverage by species and stratum (season and area) should be estimated. However, the estimated DAS needed may be about ten times the current observer program coverage levels.
- It was recommended that changes to the logbook system to identify target by set would also enhance the data collected from this fishery.

Gulf of Mexico Shrimp Trawl

Tier Classes: Fish = 2; Marine Mammals = 2; Other Protected Species = 2

Bycatch and data-collection concerns:

- Since the implementation of the shrimp trawl observer program in 1992 through mid-2007, sampling has been, for the most part, opportunistic.
- While CVs are low for common species, CVs are highly variable for less dominant species of interest.
- For other protected species, estimating the amount of fishing effort is problematic.
- Observers are unable to observe takes because a properly operating TED expels most non-target species before they can be observed on the deck of the shrimp trawl.

Recommendations:

- A mandatory observer program implemented in July 2007 allows for spatially and temporally stratified random sampling, thus enhancing data-collection efforts and subsequent CPUE and variance estimates. Proposed gear and landing data supplied by industry may allow for further stratification by gear type as well as other variables of interest. It was recommended that data from the current discard reporting (logbook) program and existing observer program should be used to estimate the sample size needed to achieve a 30% CV for estimates of the ten most common bycatch species.
- To improve bycatch estimates for marine mammals, it was recommended to develop and implement a marine mammal observer data form and subsequently estimate bycatch for marine mammals in this fishery.
- To improve bycatch estimates for marine mammals and other protected species, it was also recommended to develop a remote observer system (underwater video, etc.) to document takes, and to revise logbook and trip ticket programs. The primary purpose of the revision would be to better estimate effort; see Epperly et al. (2002).

Large Coastal and Small Coastal Shark Aggregates (Drift, Strike, and Bottom Gillnet)

Tier Classes: Fish = 3; Marine Mammals = 3; Other Protected Species = 3

Bycatch and data-collection concerns:

- Low observer coverage results in very sparse data in some strata on bycatch of marine mammal and other protected species.
- Fishing effort has been difficult to allocate, beyond "gillnet," from logbook records, and the logbooks are replete with invalid data.
- Under-reporting appears to be a problem for the fishery, which is compounded by the fact that logbook and observer data are difficult to associate.

Recommendations:

- It was recommended that changes to the logbook system to identify target by set, and specifics of gear type (i.e., sink, drift, strike gillnet), would enhance the data collected from this fishery and aid in extrapolation of expanded take estimates.
- A pilot observer program began in 2005. It was recommended that observer coverage should be expanded

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beyond the 2007 coverage levels to include all vessels fishing gillnets, regardless of target.

North Carolina Inshore (Bays and Rivers) Gillnet

Tier Classes: Fish = 0; Marine Mammals = 0; Other Protected Species = 0

Bycatch and data-collection concerns:

- The bycatch estimate is based solely upon the Pamlico Sound restricted gillnet portion of the fishery.
- No error or uncertainty estimates have been made for the bycatch estimates.

Recommendations:

- It was recommended that observer coverage is needed for operational portions of the fishery other than Pamlico Sound.
- It was also recommended that error estimates should be made for the bycatch estimates.

South Atlantic Coastal Migratory Pelagic Troll

Tier Classes: Fish = 1; Marine Mammals = 0; Other Protected Species = 0

Bycatch and data-collection concerns:

Bycatch data are currently collected through the coastal logbook program at SEFSC. Under this program, 20% of vessels are selected to report discards. Vessels are selected using a weighted (by a vessel's portion of the total effort reported from the fishery) random sample of all vessels with Federal permits that have reported deploying troll gear in the South Atlantic. Estimates of total discards for the fishery are made by calculating a species-specific mean discard rate for the vessels reporting discards and applying that rate to the calculated total effort reported from the fishery to the coastal logbook program.

- The available discard data cannot be partitioned into South Atlantic coastal migratory pelagic troll and Atlantic dolphin/wahoo troll fisheries with confidence, as target species is not reported on the discard logbook form.
- No mechanism exists to independently verify the accuracy of the discard logbook self-reported data.
- A further limitation of the current system is that the level of compliance is impossible to estimate because fishers may submit a report of "no discards," effectively opting out of reporting while remaining within reporting compliance. A number of fishers report "no discards" almost exclusively.

- For marine mammals and other protected species, bycatch estimates rely on self-reporting, and fishing effort is difficult to allocate to different sectors of the fishery from logbook records.

Recommendations:

- Available data indicate that little bycatch may be associated with this fishery/gear. It was recommended that a pilot observer program should be organized to confirm this.
- It was recommended that observers may collect target species information so that data from individual fisheries (e.g., Atlantic coastal migratory pelagic troll versus Atlantic dolphin/wahoo troll) can be identified for use in analyses as necessary.
- Another recommendation was that data from the current discard reporting program and other existing observer programs should be used to estimate the sample size needed to achieve a 30% CV for estimates of the ten most common bycatch species.
- It was recommended that the observer program should include data-collection logs for marine mammals and other protected species bycatch.
- Lastly, it was recommended that changes to the logbook system to identify target by set would also enhance the data collected from this fishery.

South Atlantic Snapper–Grouper Bottom Longline

Tier Classes: Fish = 1; Marine Mammals = 0; Other Protected Species = 0

Bycatch and data-collection concerns:

Bycatch data are currently collected through the coastal logbook program at SEFSC. Under this program, 20% of vessels are selected to report discards. Vessels are selected using a weighted (by a vessel's portion of the total effort reported from the fishery) random sample of all vessels with Federal permits that have reported deploying longline gear in the South Atlantic. Estimates of total discards for the fishery are made by calculating a species-specific mean discard rate for the vessels reporting discards and applying that rate to the calculated total effort reported by the fishery to the coastal logbook program.

- No mechanism exists to independently verify the accuracy of the discard logbook self-reported data.
- A further limitation of the current system is that the level of compliance is impossible to estimate because fishers may submit a report of "no discards," effectively opting

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out of reporting while remaining within reporting compliance. A number of fishers report “no discards” almost exclusively. Few discard reports have been received from South Atlantic longline vessels, particularly from vessels in the snapper–grouper fishery. No discard estimates for this fishery can be made due to the very small sample size (fewer than five trips reported in 2005–06)

- For marine mammals and other protected species, bycatch estimates rely on self-reporting, and fishing effort is difficult to allocate to different sectors of the fishery from logbook records.

Recommendations:

- Due to the potentially high number of discards from bottom longline vessels and the near complete lack of discard data from snapper–grouper bottom longline vessels in the South Atlantic, it was recommended that improvements in discard estimates from this fishery should be a high priority. An observer program should be developed for this fishery/gear. Data from the discard reporting program and existing observer programs (e.g., the shark bottom longline observer program) should be used to estimate the sample size needed to achieve a 30% confidence interval for estimates of the ten most commonly observed species. A video monitoring pilot study could be conducted in conjunction with the observer program to determine whether electronic data can be used as a tool to enhance data collected by observers.
- Changes to the logbook system to identify target by set would also enhance the data collected from this fishery, although this may not be a feasible recommendation.

South Atlantic Snapper–Grouper Handline

Tier Classes: Fish = 1; Marine Mammals = 0; Other Protected Species = 0

Bycatch and data-collection concerns:

Bycatch data are currently collected through the coastal logbook program at SEFSC. Under this program, 20% of vessels are selected to report discards. Vessels are selected using a weighted (by a vessel’s portion of the total effort reported from the fishery) random sample of all vessels with Federal permits that have reported deploying handline gear in the South Atlantic. Estimates of total discards for the fishery are made by calculating a species-specific mean discard rate for the vessels reporting discards and applying that rate to the calculated total effort reported by the fishery to the coastal logbook program.

- Target species is not reported on the discard logbook form.

- No mechanism exists to independently verify the accuracy of the discard logbook self-reported data.
- The level of compliance is impossible to estimate because fishers may submit a report of “no discards,” effectively opting out of reporting while remaining within reporting compliance. A number of fishers report “no discards” almost exclusively. Likewise, cases of under-reporting have been suspected but cannot be confirmed by independent data.
- For marine mammals and other protected species, bycatch estimates rely on self-reporting, and fishing effort is difficult to allocate to different sectors of the fishery from logbook records.

Recommendations:

- It was recommended to develop an observer program for this fishery/gear. Due to the potentially high number of discards from handline vessels, improvements in discard estimates from this fishery should be a high priority. Data from the discard reporting program, as well as from other observer programs in the region, should be used to estimate the sample size needed to achieve a 30% confidence interval for estimates of the ten most commonly observed species. A video monitoring pilot study could be conducted in conjunction with an observer program to determine whether electronic data can be used as a tool to enhance data collected by observers.
- It was recommended that once the enhanced observer program has been in place for multiple years, self-reported discard logs could be compared with observer data to attempt to define an optimal combination for estimating total discards and for monitoring catch rates.
- It was recommended that data should be collected on bycatch of marine mammals and other protected species in addition to fish discards.
- Changes to the logbook system to identify target by set would also enhance the data collected from this fishery, although this may not be a feasible recommendation.

Atlantic and Gulf of Mexico HMS Pelagic Longline

Tier Classes: Fish = 3; Marine Mammals = 2; Other Protected Species = 2

Bycatch and data-collection concerns:

- While coverage for fish species is high, for rare-event species (marine mammals and other protected species) current observer coverage levels are insufficient, resulting in very sparse data.

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- Logbook and observer data are difficult to associate, which prevents error checking.

Recommendations:

- It was recommended that observer coverage for this fishery should be increased to improve protected species bycatch estimates. The amount of increased coverage needed should be estimated by species and stratum (season and area). The resulting DAS needed may be about ten times the current observer program coverage level (the Pelagic Longline TRT recommends 12–15% coverage in the Mid-Atlantic Bight to adequately estimate long- and/or short-finned pilot whale bycatch, for example).
- It was also recommended that observer databases be merged and the coastal logbook system be altered to identify target by set, although this may not be feasible.
- Lastly, it was recommended that data quality may also be improved by instructing fishers to report to one logbook program (either coastal or pelagic logbook program) and by correlating the logbook and observer databases.

Atlantic and Gulf of Mexico Shark Bottom Longline

Tier Score: Fish = 3; Marine Mammals = 2; Other Protected Species = 2

Bycatch and data-collection concerns:

- For marine mammals and other protected species, sparse data are a problem in some strata.

Recommendations:

- It was recommended that observer coverage should be increased to achieve a 30% CV for bycatch estimates for nearly all strata.
- In addition, correlating observer and logbook databases was also recommended.

Southeastern Atlantic Shrimp Trawl

Tier Classes: Fish = 2; Marine Mammals = 2; Other Protected Species = 2

Bycatch and data-collection concerns:

Since the implementation of the shrimp trawl observer program in 1992 through mid-2007, sampling was, for the most part, opportunistic. A mandatory observer program implemented in July 2007 allows for random sampling that is spatially and temporally stratified, thus enhancing data-collection efforts and subsequent CPUE and variance estimates.

- While CVs are low for dominant species, CVs are highly variable for less dominant species of interest.

- For other protected species, estimating the amount of fishing effort is problematic.

- Observers are unable to record sea turtle takes because a properly operating TED expels most takes before an observer can see them on the deck of the shrimp vessel.

Recommendations:

- Proposed gear and landing data supplied by industry may allow for further stratification by gear type as well as by other variables of interest. It was recommended that data from the current discard reporting program (logbook) and existing observer program should be used to estimate the sample size needed to achieve a 30% confidence interval for estimates of the ten most commonly discarded species.

- To improve bycatch estimates for marine mammals, it was recommended to develop and implement a marine mammal observer data form and subsequently to estimate bycatch for marine mammals in this fishery.

- To improve bycatch estimates for marine mammals and other protected species, development of a remote observer system (underwater video, etc.) to document takes, and revision of the logbook and trip ticket programs were recommended. The primary purpose of the revision would be to better estimate effort; see Epperly et al. (2002).

4.2.8.2 Summary of Southeast Region Recommendations

Table 4.2.5 outlines recommendations by the Southeast Region for improvement to bycatch data collection and estimation. A total of 15 recommendations were made to improve bycatch data collection and estimation for Federal fisheries and fisheries with relevant Federal data-collection programs, with resource requirements for implementation totaling seven full-time staff members and approximately 17,500 observer DAS (Table 4.2.5). The feasibility of recommendations was evaluated by the Southeast Regional team based on overall needs, available resources, and external factors. Observer program funding for the Southeast Region was approximately \$6.538 in FY 2008. Enhancements to existing programs and implementing new pilot observer programs are recommended *in addition* to current program requirements.

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Table 4.2.5

Summary of Southeast Region recommendations in terms of full-time staff and observer DAS. All requirements are annual unless otherwise indicated. For further discussion of recommendations, see Section 5.8.

Recommendation ^a	Additional DAS ^b	Feasibility
Change logbook system to identify target by set for multiple fisheries.	NA	Low
Develop a pilot observer program, including determination of needed sample size to achieve 30% CV for the ten most commonly discarded species, for the Gulf of Mexico coastal pelagic troll fishery.	416	Moderate
Maintain and refine observer program, including determination of needed sample size to achieve 30% CV for the ten most commonly discarded species, for the Gulf of Mexico reef fish bottom longline fishery.	1,667	High
Maintain and refine current Gulf of Mexico shrimp trawl observer program.	5,000	High
Develop remote observer program (underwater video, etc.) to document takes in Gulf of Mexico shrimp trawl fishery.	416	Low
Revise logbook and trip ticket programs to better estimate effort in Gulf of Mexico shrimp trawl fishery.	NA	Low
Increase observer coverage for the large coastal and small coastal shark aggregate (drift, strike, and bottom gillnet) fishery.	540	High
Correlate fishery observer and logbook databases for the large coastal and small coastal shark aggregate (drift, strike, and bottom gillnet) fisheries.	NA	High (currently being worked on)
Expand North Carolina inshore (bays and rivers) gillnet observer program to cover any additional open components of the fishery.	250	High
Develop a pilot observer program, including determination of needed sample size to achieve 30% CV for the ten most commonly discarded species, for the South Atlantic coastal migratory pelagic troll fishery.	1,600	Moderate
Increase observer coverage for the Atlantic and Gulf of Mexico HMS pelagic longline fishery to achieve a 30% CV in all strata.	3,500	Moderate
Instruct Atlantic and Gulf of Mexico shark bottom longline fishers to report to one logbook.	NA	Low
Relate Atlantic and Gulf of Mexico shark bottom longline fishery observer and logbook databases.	NA	High (currently being worked on)
Develop a pilot observer program; including determination of needed sample size to achieve 30% CV for the ten most commonly discarded species, for the South Atlantic snapper–grouper bottom longline fishery.	1,600	High
Develop a pilot observer program, including determination of needed sample size to achieve 30% CV for the ten most commonly discarded species, for the South Atlantic snapper–grouper handline fishery.	1,600	High
Maintain and refine the current Southeastern Atlantic shrimp trawl observer program.	833	High
Develop pilot programs to test the use of electronic video monitoring on reef fish vessels in the Gulf of Mexico and South Atlantic to augment data collected by observers.	120	High (currently being worked on)
Number of new full-time staff needed to implement all data quality and estimation method improvements recommended by the Southeast Region:	7	
Total DAS requirement for all recommendations*:	17,542	

* This amount is in addition to the annual requirements of the Southeast region observer programs.

^a Some recommendations may require additional resource expenditures, such as equipment, which are not itemized.

^b One observer DAS includes the cost for the observer deployment as well as costs for associated equipment and program administrative functions (staffing).

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Appendix 4.2 Southeast Region Bycatch Estimates

Table 4.2.A

Subtables showing annual fish bycatch estimates and CVs (where available) for Southeast Region fisheries. In some fisheries (indicated with *), bycatch estimates were available only for a generalized stock group. Bycatch estimates are in live pounds or number of individuals, except where indicated, and reflect the average from the years identified. Key stocks are shaded. Fishery bycatch ratios = bycatch / (bycatch + landings). Some bycatch ratios (marked **) could not be developed, e.g., where bycatch was by weight and number of individuals, landings in pounds.

Subtable 4.2.A.1		GULF OF MEXICO COASTAL MIGRATORY PELAGIC TROLL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Black grouper	<i>Mycteroperca bonaci</i>	2006	18.17	Individuals	
Blacktip shark	<i>Carcharhinus limbatus</i>	2005	101.59	Individuals	
Bonito, Atlantic	<i>Sarda sarda</i>	2005	134.28	Individuals	
Cartilaginous fishes*	Chondrichthyes	2005–06	86.25	Individuals	65.60
Cobia	<i>Rachycentron canadum</i>	2005–06	19.49	Individuals	70.38
Crevalle jack	<i>Caranx hippos</i>	2005–06	23.07	Individuals	89.23
Hammerhead sharks*	Sphyrnida	2005	14.69	Individuals	
Ladyfish	<i>Elops saurus</i>	2005	1,057.48	Individuals	
Little tunny	<i>Euthynnus alletteratus</i>	2005	251.49	Individuals	
Mackerels*	<i>Scomberomorus spp.</i>	2005–06	584.27	Individuals	18.62
Red snapper	<i>Lutjanus campechanus</i>	2006	2,034.70	Individuals	
Sailfish	<i>Istiophorus platypterus</i>	2006	8.52	Individuals	
Spanish mackerel	<i>Scomberomorus maculatus</i>	2005–06	178.3	Individuals	78.25
Tarpon	<i>Megalops atlanticus</i>	2006	9.08	Individuals	
Yellowfin tuna	<i>Thunnus albacares</i>	2006	17.03	Individuals	
TOTAL FISHERY BYCATCH			4,538.41	Individuals	
TOTAL FISHERY LANDINGS			291,107.20	Pounds	
FISHERY BYCATCH RATIO			**		

Subtable 4.2.A.2		GULF OF MEXICO REEF FISH BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Amberjacks and yellowtails*	<i>Seriola spp.</i>	2005–06	1,819.86	Individuals	116.68
Atlantic angel shark	<i>Squatina dumeril</i>	2005	25.94	Individuals	
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>	2005	1,037.42	Individuals	
Barracudas*	<i>Sphyaenidae</i>	2005	691.62	Individuals	
Black grouper	<i>Mycteroperca bonaci</i>	2005–06	132.52	Individuals	80.69
Blacktip shark	<i>Carcharhinus limbatus</i>	2006	90.06	Individuals	

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Table 4.2.A (continued)

(continuation of Subtable 4.2.A.2)		GULF OF MEXICO REEF FISH BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Blowfish*	Tetraodontidae	2006	144.09	Individuals	
Bluntnose sevengill shark	<i>Notorynchus cepedianus</i>	2006	3,896.69	Individuals	
Bull shark	<i>Carcharhinus leucas</i>	2005	62.25	Individuals	
Cartilaginous fishes*	Chondrichthyes	2005	1,242.64	Individuals	
Conger eel	<i>Conger oceanicus</i>	2005	52,167.60	Individuals	
Dogfish sharks*	Squalidae	2005–06	7,880.27	Individuals	39.99
Dusky shark	<i>Carcharhinus obscurus</i>	2006	798.48	Individuals	
Finfishes, unclassified, general		2005	5,532.93	Individuals	
Flatfishes*	Pleuronectiformes	2006	108.07	Individuals	
Gag	<i>Mycteroperca microlepis</i>	2005–06	610.11	Individuals	54.65
Goliath grouper	<i>Epinephelus itajara</i>	2005–06	475.51	Individuals	80.33
Greater amberjack	<i>Seriola dumerili</i>	2005–06	955.03	Individuals	
Hakes*	<i>Urophycis</i> spp.	2005–06	47,348.96	Individuals	56.70
Hammerhead sharks*	Sphymidae	2005–06	730.39	Individuals	129.37
Moray eels*	Muraenidae	2005–06	8,460.36	Individuals	140.12
Nurse shark	<i>Ginglymostoma cirratum</i>	2005–06	264.17	Individuals	45.00
Red grouper	<i>Epinephelus morio</i>	2004–05	582,118.00	Individuals	3.01
Red snapper	<i>Lutjanus campechanus</i>	2005–06	7,619.03	Individuals	113.87
Sand tiger shark	<i>Carcharhinus taurus</i>	2006	171.54	Individuals	
Sandbar shark	<i>Carcharhinus plumbeus</i>	2005–06	304.38	Individuals	99.58
Scamp	<i>Mycteroperca phenax</i>	2005–06	383.16	Individuals	126.97
Sixgill shark	<i>Hexanchus griseus</i>	2005–06	339.4	Individuals	118.37
Skates*	Rajidae	2005–06	114.28	Individuals	74.56
Snowy grouper	<i>Epinephelus niveatus</i>	2005	248.98	Individuals	
Spinner shark	<i>Carcharhinus brevipinna</i>	2005–06	6,790.15	Individuals	47.64
Spiny dogfish	<i>Squalus acanthias</i>	2005–06	15,870.78	Individuals	47.03
Swordfish	<i>Xiphias gladius</i>	2006	567.77	Individuals	
Thornback	<i>Platyrhinoidis triseriata</i>	2006	1,091.07	Individuals	
True eels*	Anguilliformes	2005–06	25,701.52	Individuals	91.37
Vermilion snapper	<i>Rhomboplites aurorubens</i>	2006	198.94	Individuals	
Warsaw grouper	<i>Epinephelus nigritus</i>	2006	18.42	Individuals	
Worm eels and snake eels*	Ophichthidae	2006	20,452.49	Individuals	
TOTAL FISHERY BYCATCH			796,464.88	Individuals	
TOTAL FISHERY LANDINGS			6,437,581.26	Pounds	
FISHERY BYCATCH RATIO			**		

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Table 4.2.A (continued)

Subtable 4.2.A.3		GULF OF MEXICO REEF FISH HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Almaco jack	<i>Seriola rivoliana</i>	2005–06	923.22	Individuals	130.71
Amberjacks and yellowtails*	<i>Seriola</i> spp.	2005–06	52,472.86	Individuals	61.36
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>	2005	1,431.49	Individuals	
Bar Jack	<i>Caranx ruber</i>	2005–06	1,431.90	Individuals	119.06
Barracudas	Sphyraenidae	2005–06	1,263.59	Individuals	141.11
Black grouper	<i>Mycteroperca bonaci</i>	2005–06	57,221.01	Individuals	103.86
Black snapper	<i>Apsilus dentatus</i>	2005	9.7	Individuals	
Blackfin snapper	<i>Lutjanus buccanella</i>	2005	301.9	Individuals	
Blackfin tuna	<i>Thunnus atlanticus</i>	2005	925.6	Individuals	
Blacknose shark	<i>Carcharhinus acronotus</i>	2006	1,280.64	Individuals	
Blacktip shark	<i>Carcharhinus limbatus</i>	2005–06	5,780.98	Individuals	39.01
Blowfish*	Tetraodontidae	2005–06	171.62	Individuals	125.12
Blue runner	<i>Caranx crysos</i>	2005–06	2,211.31	Individuals	48.33
Bluefish	<i>Pomatomus saltatrix</i>	2005–06	34,983.06	Individuals	
Bonito, Atlantic	<i>Sarda sarda</i>	2005–06	3,410.42	Individuals	113.02
Bonnethead shark	<i>Sphyrna tiburo</i>	2005–06	2,041.10	Individuals	140.97
Breams and porgies*	Sparidae	2005–06	220.35	Individuals	135.38
Bull shark	<i>Carcharhinus leucas</i>	2005–06	1,052.21	Individuals	102.04
Caribbean red snapper	<i>Lutjanus purpureus</i>	2005–06	19.54	Individuals	
Caribbean sharpnose shark	<i>Rhizoprionodon porosus</i>	2005–06	1,770.08	Individuals	102.65
Cartilaginous fishes*	Chondrichthyes	2005–06	39,863.02	Individuals	3.26
Cobia	<i>Rachycentron canadum</i>	2005–06	2,716.21	Individuals	101.42
Crimson rover	<i>Erythrocles monodi</i>	2005–06	6,091.85	Individuals	
Cutlassfish, Atlantic	<i>Trichiurus lepturus</i>	2005–06	242.6	Individuals	
Dogfish sharks*	Squalidae	2006	65.48	Individuals	
Dolphinfish*	<i>Coryphaena</i> spp.	2005–06	1,217.12	Individuals	90.35
Dusky shark	<i>Carcharhinus obscurus</i>	2005	1,940.77	Individuals	
Finfishes, unclassified, general		2005–06	15,494.12	Individuals	56.77
Flatfishes*	Pleuronectiformes	2005	776.31	Individuals	
Gag	<i>Mycteroperca microlepis</i>	2003–04	79,505.00	Individuals	47.99
Goliath grouper	<i>Epinephelus itajara</i>	2005–06	2,823.58	Individuals	74.60
Gray snapper	<i>Lutjanus griseus</i>	2005–06	15,345.26	Individuals	130.79
Gray triggerfish	<i>Balistes capriscus</i>	2003–04	1,250.00	Individuals	5.43
Greater amberjack	<i>Seriola dumerili</i>	2003–04	259,209.00	Individuals	13.32
Groupers and sea basses*	Serranidae	2005–06	10,927.15	Individuals	138.03
Grunts*	Haemulidae	2005–06	11,298.97	Individuals	99.24
Hogfish	<i>Lachnolaimus maximus</i>	2005	161.73	Individuals	

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Table 4.2.A (continued)

(continuation of Subtable 4.2.A.3)		GULF OF MEXICO REEF FISH HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Knobbed pogy	<i>Calamus nodosus</i>	2005–06	99.97	Individuals	124.26
Lane snapper	<i>Lutjanus synagris</i>	2005	2,177.97	Individuals	
Lemon shark	<i>Negaprion brevirostris</i>	2005–06	557.1	Individuals	42.89
Lesser amberjack	<i>Seriola fasciata</i>	2005–06	1,621.13	Individuals	133.57
Little tunny	<i>Euthynnus alletteratus</i>	2005–06	250.73	Individuals	26.99
Mackerels*	<i>Scomberomorus</i> spp.	2005–06	2,236.41	Individuals	4.90
Mako sharks*	<i>Isurus</i> spp.	2005	278.18	Individuals	
Marlins and spearfishes*	<i>Tetrapturus</i> spp.	2005	1,035.07	Individuals	
Moray eels*	Muraenidae	2005–06	924.45	Individuals	30.61
Mutton snapper	<i>Lutjanus analis</i>	2005–06	2,609.02	Individuals	99.33
Nassau grouper	<i>Epinephelus striatus</i>	2005	258.77	Individuals	
Nurse shark	<i>Ginglymostoma cirratum</i>	2005–06	1,390.14	Individuals	23.97
Pinfish	<i>Lagodon rhomboides</i>	2005–06	1,470.63	Individuals	110.68
Red drum	<i>Sciaenops ocellatus</i>	2005–06	46,185.41	Individuals	121.66
Red grouper	<i>Epinephelus morio</i>	2004–05	273,665.50	Individuals	8.91
Red hind	<i>Epinephelus guttatus</i>	2005	323.46	Individuals	
Red pogy	<i>Pagrus pagrus</i>	2005–06	6,194.17	Individuals	18.78
Red snapper	<i>Lutjanus campechanus</i>	2005–06	1,701,727.37	Individuals	4.07
Remora	<i>Remora</i> spp.	2005–06	13,798.67	Individuals	69.31
Rock hind	<i>Epinephelus adscensionis</i>	2005	631.12	Individuals	
Rock sea bass	<i>Centropristis philadelphica</i>	2005–06	3,728.00	Individuals	108.7
Sand seatrout	<i>Cynoscion arenarius</i>	2005	3,881.53	Individuals	
Sandbar shark	<i>Carcharhinus plumbeus</i>	2005–06	4,114.70	Individuals	14.52
Scamp	<i>Mycteroperca phenax</i>	2005–06	33,465.70	Individuals	45.38
Sea catfishes*	Ariidae	2005	646.92	Individuals	
Sea chubs*	Kyphosidae	2005	3,881.53	Individuals	
Snappers*	Lutjanidae	2005–06	20,341.62	Individuals	34.35
Snowy grouper	<i>Epinephelus niveatus</i>	2005–06	875.93	Individuals	1.96
Spadefishes*	Ephippidae	2005	11,256.44	Individuals	
Spanish mackerel	<i>Scomberomorus maculatus</i>	2005–06	57,757.58	Individuals	17.87
Speckled hind	<i>Epinephelus drummondhayi</i>	2005–06	899.66	Individuals	92.29
Thresher sharks*	<i>Alopias</i> spp.	2005	161.73	Individuals	
Tiger shark	<i>Galeocerdo cuvier</i>	2006	656.41	Individuals	
Tilefish*	Malacanthidae	2006	317.46	Individuals	
Toad fishes*	Batrachoididae	2005	539.1	Individuals	
Triggerfishes*	Balistidae	2005–06	43,256.37	Individuals	122.34
Vermilion snapper	<i>Rhomboplites aurorubens</i>	2003–04	54,924.50	Individuals	42.34

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Table 4.2.A (continued)

(continuation of Subtable 4.2.A.3)		GULF OF MEXICO REEF FISH HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Warsaw grouper	<i>Epinephelus nigritus</i>	2005–06	2,917.42	Individuals	36.08
White grunt	<i>Haemulon plumieri</i>	2005	6,469.22	Individuals	
Whitebone porgy	<i>Calamus leucosteus</i>	2005	1,186.02	Individuals	
Yellowedge grouper	<i>Epinephelus flavolimbatus</i>	2005–06	1,795.30	Individuals	27.96
Yellowfin grouper	<i>Mycteroperca venenosa</i>	2005	618.45	Individuals	
Yellowtail snapper	<i>Ocyurus chrysurus</i>	2005–06	280,020.06	Individuals	31.29
TOTAL FISHERY BYCATCH			3,211,582.76	Individuals	
TOTAL FISHERY LANDINGS			11,048,862.55	Pounds	
FISHERY BYCATCH RATIO			**		

Subtable 4.2.A.4		GULF OF MEXICO SHRIMP TRAWL ^a			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE AMOUNT	UNIT	CV
Black drum, Gulf of Mexico	<i>Pogonias cromis</i>	2005	106,072.93	Pounds	14.0
Cobia, Gulf of Mexico	<i>Rachycentron canadum</i>	2005	36,582.98	Pounds	27.6
Croaker, Atlantic, Gulf of Mexico	<i>Micropogonias undulatus</i>	2005	107,109,953.67	Pounds	1.7
Grouped finfish other than listed, Gulf of Mexico		2005	321,715,655.17	Pounds	0.8
Grouped sharks, Gulf of Mexico		2005	5,751,271.68	Pounds	4.5
King mackerel, Gulf group	<i>Scomberomorus cavalla</i>	2005	380,397.44	Pounds	6.2
Lane snapper, Gulf of Mexico	<i>Lutjanus synagris</i>	2005	1,623,481.71	Pounds	11.3
Longspine porgy, Gulf of Mexico	<i>Stenotomus caprinus</i>	2005	61,490,961.63	Pounds	1.9
Non-crustacean invertebrates, Gulf of Mexico		2005	26,997,043.37	Pounds	2.6
Non-Penaeid shrimp crustacean, Gulf of Mexico		2005	88,179,006.92	Pounds	1.4
Other snapper spp., Gulf of Mexico*		2005	784,083.29	Pounds	12.1
Red drum, Gulf of Mexico	<i>Sciaenops ocellatus</i>	2005	405,795.32	Pounds	12.7
Red snapper, Gulf of Mexico	<i>Lutjanus campechanus</i>	2005	2,569,676.96	Pounds	2.8
Seatrout and weakfish, Gulf of Mexico*	<i>Cynoscion</i> spp.	2005	58,720,836.76	Pounds	1.8
Southern flounder, Gulf of Mexico	<i>Paralichthys lethostigma</i>	2005	1,306,782.10	Pounds	4.1
Spanish mackerel, Gulf group	<i>Scomberomorus maculatus</i>	2005	3,560,615.21	Pounds	4.3
Vermilion snapper, Gulf of Mexico	<i>Rhomboplites aurorubens</i>	2005	300,909.20	Pounds	4.9
TOTAL FISHERY BYCATCH			681,019,126.33	Pounds	
TOTAL FISHERY LANDINGS			213,534,624.70	Pounds	
TOTAL CATCH (Bycatch + Landings)			894,553,751.03	Pounds	
FISHERY BYCATCH RATIO			0.76		

^a Bycatch estimate for the offshore portion of the fishery only (COLREGS line [beach] out to 50 fathoms).

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Table 4.2.A (continued)

Subtable 4.2.A.5		LARGE COASTAL AND SMALL COASTAL SHARK AGGREGATES (DRIFT, STRIKE, AND BOTTOM GILLNET)			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE AMOUNT	UNIT	CV
Atlantic bumper, South Atlantic	<i>Chloroscombrus chrysurus</i>	2005	459.2	Individuals	0.05
Atlantic manta, South Atlantic	<i>Manta birostris</i>	2001–05	2.80	Individuals	1.48
Atlantic menhaden, South Atlantic	<i>Brevoortia tyrannus</i>	2005	41.64	Individuals	0.58
Atlantic moonfish, South Atlantic	<i>Selene setapinnis</i>	2000–05	14.39	Individuals	
Atlantic sharpnose shark, South Atlantic	<i>Rhizoprionodon terraenovae</i>	2005	4,690.48	Individuals	0.03
Atlantic spadefish, South Atlantic	<i>Chaetodipterus faber</i>	2005	16.62	Individuals	1.46
Banded drum, South Atlantic	<i>Larimus fasciatus</i>	2005	390.29	Individuals	394.86
Black sea bass, South Atlantic	<i>Centropristis striata</i>	2005	10.04	Individuals	2.41
Blacktip shark, South Atlantic	<i>Carcharhinus limbatus</i>	2005	292.36	Individuals	0.08
Bluefish, South Atlantic	<i>Pomatomus saltatrix</i>	2005	70.31	Individuals	0.34
Bonnethead shark, South Atlantic	<i>Sphyrna tiburo</i>	2005	567.33	Individuals	0.04
Cobia, South Atlantic	<i>Rachycentron canadum</i>	2000–05	12.45	Individuals	
Cownose ray, South Atlantic	<i>Rhinoptera bonasus</i>	2001	22.19	Individuals	1.63
Crevalle jack, South Atlantic	<i>Caranx hippos</i>	2000–05	4.46	Individuals	
Gafftopsail catfish, South Atlantic	<i>Bagre marinus</i>	2005	16.31	Individuals	1.48
King mackerel, Atlantic Group	<i>Scomberomorus cavalla</i>	2005	273.01	Individuals	0.58
Little Tunny, South Atlantic	<i>Euthynnus alletteratus</i>	2000–05	48.43	Individuals	
Red drum, South Atlantic	<i>Sciaenops ocellatus</i>	2001–05	3.80	Individuals	2.09
Sailfish, West Atlantic	<i>Istiophorus platypterus</i>	2000–05	22.32	Individuals	
Scalloped hammerhead shark, South Atlantic	<i>Sphyrna lewini</i>	2005	139.47	Individuals	1.09
Silver seatrout, South Atlantic	<i>Cynoscion nothus</i>	2005	166.97	Individuals	0.14
Spinner shark, South Atlantic	<i>Carcharhinus brevipinna</i>	2005	8.18	Individuals	18.63
Spot, South Atlantic	<i>Leiostomus xanthurus</i>	2005	26.89	Individuals	5.67
Spotted eagle ray, South Atlantic	<i>Aetobatus narinari</i>	2001–05	4.00	Individuals	2.23
Tarpon, South Atlantic	<i>Megalops atlanticus</i>	2001–05	6.84	Individuals	2.23
Tiger shark, South Atlantic	<i>Galeocerdo cuvier</i>	2005	7.24	Individuals	21.05
Yellowfin menhaden, South Atlantic	<i>Brevoortia smithi</i>	2005	224.04	Individuals	0.68
TOTAL FISHERY BYCATCH			7,542.06	Individuals	
TOTAL FISHERY LANDINGS			782,523.75	Pounds	
FISHERY BYCATCH RATIO			**		

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Table 4.2.A (continued)

Subtable 4.2.A.6		SOUTH ATLANTIC COASTAL MIGRATORY PELAGIC TROLL ^b			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Almaco jack	<i>Seriola rivoliana</i>	2005–06	110.8	Individuals	67.63
Amberjacks and yellowtails*	<i>Seriola</i> spp.	2005–06	39.24	Individuals	43.05
Barracudas*	Sphyraenidae	2005–06	65.32	Individuals	65.43
Black grouper	<i>Mycteroperca bonaci</i>	2005–06	87.02	Individuals	58.23
Black sea bass	<i>Centropristis striata</i>	2005	136.5	Individuals	
Blue runner	<i>Caranx crysos</i>	2005	27.3	Individuals	
Bluefish	<i>Pomatomus saltatrix</i>	2005–06	327.48	Individuals	139.46
Bonito, Atlantic	<i>Sarda sarda</i>	2005–06	240.22	Individuals	7.49
Cartilaginous fishes*	<i>Chondrichthyes</i>	2005–06	1,131.00	Individuals	128.54
Cobia	<i>Rachycentron canadum</i>	2005–06	27.93	Individuals	15.95
Crevalle jack	<i>Caranx hippos</i>	2005	13.65	Individuals	
Dolphinfish*	<i>Coryphaena</i> spp.	2005–06	1,173.00	Individuals	37.19
Greater amberjack	<i>Seriola dumerili</i>	2005–06	520.00	Individuals	3.54
Hammerhead sharks*	Sphyrnidae	2005–06	6.15	Individuals	36.74
Little tunny	<i>Euthynnus alletteratus</i>	2005–06	516.68	Individuals	41.03
Mackerels*	<i>Scomberomorus</i> spp	2005–06	3,210.90	Individuals	61.62
Mutton snapper	<i>Lutjanus analis</i>	2005–06	12.85	Individuals	8.83
Red grouper	<i>Epinephelus morio</i>	2005–06	81.09	Individuals	120.42
Remora	<i>Remora</i> spp.	2005	31.41	Individuals	36.82
Sailfish	<i>Istiophorus platypterus</i>	2005	32.76	Individuals	
Sandbar shark	<i>Carcharhinus plumbeus</i>	2005	46.07	Individuals	
Scamp	<i>Mycteroperca phenax</i>	2005–06	40.65	Individuals	
Skipjack tuna	<i>Euthynnus pelamis</i>	2005–06	71.72	Individuals	53.33
Spanish mackerel	<i>Scomberomorus maculatus</i>	2005–06	510.06	Individuals	91.33
Triggerfishes*	Balistidae	2005	13.65	Individuals	
Tripletail	<i>Lobotes surinamensis</i>	2005	13.65	Individuals	
Yellowfin tuna	<i>Thunnus albacares</i>	2005–06	82.64	Individuals	70.90
Yellowtail snapper	<i>Ocyurus chrysurus</i>	2005	204.74	Individuals	
TOTAL FISHERY BYCATCH			8,774.48	Individuals	
TOTAL FISHERY LANDINGS ^c			985,790	Individuals	
FISHERY BYCATCH RATIO			**		

^b Data are from logbook report; species identifications were not verified.

^c Coastal migratory pelagic troll landings for 2005–06.

SOUTHEAST REGION

Table 4.2.A (continued)

Subtable 4.2.A.7		SOUTH ATLANTIC SNAPPER-GROUPER HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Almaco jack	<i>Seriola rivoliana</i>	2005–06	95.69	Individuals	89.06
Amberjacks and yellowtails*	<i>Seriola</i> spp.	2005–06	11,111.49	Individuals	51.79
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>	2005–06	7,202.64	Individuals	131.42
Ballyhoo	<i>Hemiramphus brasiliensis</i>	2005	2,995.56	Individuals	
Banded rudderfish	<i>Seriola zonata</i>	2005	246.17	Individuals	
Bank sea bass	<i>Centropristis ocyurus</i>	2005	750.81	Individuals	
Bar jack	<i>Caranx ruber</i>	2005–06	81.62	Individuals	71.85
Barracudas*	Sphyraenidae	2005–06	5,626.01	Individuals	140.02
Barrelfish	<i>Hyperoglyphe perciformis</i>	2005	13.85	Individuals	
Black grouper	<i>Mycteroperca bonaci</i>	2005–06	14,149.21	Individuals	69.59
Black sea bass	<i>Centropristis striata</i>	2005–06	14,646.93	Individuals	9.69
Blackfin tuna	<i>Thunnus atlanticus</i>	2005–06	26.45	Individuals	95.49
Blacktip shark	<i>Carcharhinus limbatus</i>	2005–06	2,500.27	Individuals	118.56
Blowfish*	Tetraodontidae	2005–06	206.20	Individuals	95.70
Blue runner	<i>Caranx crysos</i>	2005–06	5,109.27	Individuals	30.12
Bluefish	<i>Pomatomus saltatrix</i>	2005	402.54	Individuals	
Blueline tilefish	<i>Caulolatilus microps</i>	2005	35.39	Individuals	
Bonito, Atlantic	<i>Sarda sarda</i>	2005	5,780.71	Individuals	
Bonnethead shark	<i>Sphyrna tiburo</i>	2005–06	455.59	Individuals	88.06
Breams and porgies*	Sparidae	2005–06	571.86	Individuals	133.48
Bull shark	<i>Carcharhinus leucas</i>	2005	34.62	Individuals	
Butterflyfishes*	Chaetodontidae	2005	1,592.40	Individuals	
Caribbean reef shark	<i>Carcharhinus perezii</i>	2005	72.43	Individuals	
Caribbean sharpnose shark	<i>Rhizoprionodon porosus</i>	2005–06	743.50	Individuals	48.38
Cartilaginous fishes*	Chondrichthyes	2005–06	10,608.82	Individuals	103.74
Cobia	<i>Rachycentron canadum</i>	2005–06	333.62	Individuals	118.73
Conger eel	<i>Conger oceanicus</i>	2005	34.62	Individuals	
Crevalle jack	<i>Caranx hippos</i>	2005–06	274.10	Individuals	128.47
Dolphinfish*	<i>Coryphaena</i> spp.	2005–06	2,360.01	Individuals	25.39
Finfishes, unclassified, general		2005–06	1,439.45	Individuals	131.56
Flatfishes*	Pleuronectiformes	2005	92.31	Individuals	
French grunt	<i>Haemulon flavolineatum</i>	2006	133.83	Individuals	
Gag	<i>Mycteroperca microlepis</i>	2003–04	6,151.00	Individuals	24.16
Goliath grouper	<i>Epinephelus itajara</i>	2005–06	471.89	Individuals	104.25
Gray snapper	<i>Lutjanus griseus</i>	2005–06	29,825.90	Individuals	92.99
Gray triggerfish	<i>Balistes capriscus</i>	2005–06	701.57	Individuals	117.82

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Table 4.2.A (continued)

(continuation of Subtable 4.2.A.7)		SOUTH ATLANTIC SNAPPER-GROUPER HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Graysby	<i>Epinephelus cruentatus</i>	2005	17.89	Individuals	
Greater amberjack	<i>Seriola dumerili</i>	2005–06	5,613.50	Individuals	9.21
Groupers and sea basses*	Serranidae	2005	689.61	Individuals	
Grunts*	Haemulidae	2005–06	5,340.50	Individuals	24.71
Hakes*	Urophycis	2005	15.39	Individuals	
Hammerhead sharks*	Sphyrnidae	2005–06	135.63	Individuals	64.13
Hogfish	<i>Lachnolaimus maximus</i>	2005–06	76.27	Individuals	29.75
Jacks and pompanos*	Carangidae	2006	5.35	Individuals	
Jolthead porgy	<i>Calamus bajonado</i>	2005–06	65.63	Individuals	101.64
Ladyfish	<i>Elops saurus</i>	2005–06	150.58	Individuals	9.41
Lane snapper	<i>Lutjanus synagris</i>	2005–06	1,570.88	Individuals	18.52
Lemon shark	<i>Negaprion brevirostris</i>	2006	89.22	Individuals	
Little tunny	<i>Euthynnus alletteratus</i>	2005–06	1,982.35	Individuals	129.06
Mackerels*	<i>Scomberomorus</i> spp.	2005–06	24,250.20	Individuals	16.24
Margate	<i>Haemulon album</i>	2005	50.27	Individuals	
Moray eels*	Muraenidae	2005–06	160.14	Individuals	110.85
Mutton snapper	<i>Lutjanus analis</i>	2005–06	1,872.66	Individuals	84.81
Nassau grouper	<i>Epinephelus striatus</i>	2005–06	1,066.68	Individuals	40.66
Needlefish, Atlantic	<i>Strongylura marina</i>	2005–06	3,760.19	Individuals	126.32
Nurse shark	<i>Ginglymostoma cirratum</i>	2005–06	466.12	Individuals	84.18
Parrotfishes*	Scaridae	2005–06	1,022.58	Individuals	69.26
Permit	<i>Trachinotus falcatus</i>	2005	69.23	Individuals	
Pinfish	<i>Lagodon rhomboides</i>	2005	345.39	Individuals	
Porkfish	<i>Anisotremus virginicus</i>	2005	83.08	Individuals	
Rainbow runner	<i>Elagatis bipinnulata</i>	2005–06	301.81	Individuals	103.16
Rays, sawfish, and skates*	Rajiformes	2005	33.57	Individuals	
Red drum	<i>Sciaenops ocellatus</i>	2006	702.63	Individuals	
Red grouper	<i>Epinephelus morio</i>	2005–06	6,284.83	Individuals	91.98
Red hind	<i>Epinephelus guttatus</i>	2005–06	310.16	Individuals	19.37
Red porgy	<i>Pagrus pagrus</i>	2005–06	26,262.76	Individuals	33.74
Red snapper	<i>Lutjanus campechanus</i>	2005–06	16,093.00	Individuals	7.22
Remora	<i>Remora</i> spp.	2005–06	3,277.41	Individuals	109.18
Rock hind	<i>Epinephelus adscensionis</i>	2005–06	40.27	Individuals	123.80
Rock sea bass	<i>Centropristis philadelphica</i>	2005	807.74	Individuals	
Sailfish	<i>Istiophorus platypterus</i>	2005–06	398.64	Individuals	18.23
Sand tiger shark	<i>Carcharhinus taurus</i>	2005	137.32	Individuals	

SOUTHEAST REGION

Table 4.2.A (continued)

(continuation of Subtable 4.2.A.7)		SOUTH ATLANTIC SNAPPER-GROUPER HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Sand tilefish	<i>Malacanthus plumieri</i>	2005	57.70	Individuals	
Sandbar shark	<i>Carcharhinus plumbeus</i>	2005–06	381.72	Individuals	86.02
Scamp	<i>Mycteroperca phenax</i>	2005–06	3,343.78	Individuals	6.26
Scorpionfishes*	Scorpaenidae	2005	52.89	Individuals	
Sea catfishes*	Ariidae	2005–06	494.07	Individuals	12.91
Sea chubs*	Kyphosidae	2005–06	924.16	Individuals	80.72
Silk snapper	<i>Lutjanus vivanus</i>	2005	17.31	Individuals	
Silky shark	<i>Carcharhinus falciformis</i>	2005	33.57	Individuals	
Skates*	Rajidae	2005–06	36.46	Individuals	37.60
Skipjack tuna	<i>Euthynnus pelamis</i>	2005	247.57	Individuals	
Smooth dogfish shark	<i>Mustelus canis</i>	2005	110.78	Individuals	
Snappers*	Lutjanidae	2005	103.85	Individuals	
Snowy grouper	<i>Epinephelus niveatus</i>	2001–03	1,578.00	Individuals	43.56
Soldierfishes and squirrelfishes*	Holocentridae	2005	293.72	Individuals	
Spadefishes*	Ephippidae	2005	484.64	Individuals	
Spanish mackerel	<i>Scomberomorus maculatus</i>	2005	3,356.58	Individuals	13.49
Speckled hind	<i>Epinephelus drummondhayi</i>	2001–03	9,533.00	Individuals	46.15
Spinner shark	<i>Carcharhinus brevipinna</i>	2006	26.77	Individuals	
Spiny dogfish	<i>Squalus acanthias</i>	2005–06	194.99	Individuals	101.25
Spotted seatrout	<i>Cynoscion nebulosus</i>	2005–06	44.61	Individuals	
Spottail pinfish	<i>Diplodus holbrookii</i>	2005–06	1,362.63	Individuals	111.66
Swordfish	<i>Xiphias gladius</i>	2005	22.31	Individuals	
Tarpon	<i>Megalops atlanticus</i>	2005	69.23	Individuals	
Tiger shark	<i>Galeocerdo cuvier</i>	2005–06	328.38	Individuals	3.55
Tilefish*	Malacanthidae	2005	23.08	Individuals	
Toad fishes*	Batrachoididae	2005–06	398.49	Individuals	120.95
Tomtate	<i>Haemulon aurolineatum</i>	2005	15,676.52	Individuals	
Triggerfishes*	Balistidae	2005–06	1,279.98	Individuals	135.51
True eels*	Anguilliformes	2005–06	103.87	Individuals	47.16
Vermilion snapper	<i>Rhomboplites aurorubens</i>	2005–06	16,638.82	Individuals	43.23
Warsaw grouper	<i>Epinephelus nigritus</i>	2001–03	5,000.00	Individuals	124.99
White grunt	<i>Haemulon plumieri</i>	2005	701.58	Individuals	
Whitebone porgy	<i>Calamus leucosteus</i>	2005	116.93	Individuals	
Wreckfish	<i>Polyprion americanus</i>	2005–06	38.09	Individuals	31.25
Yellow jack	<i>Caranx bartholomaei</i>	2005	168.19	Individuals	40.51
Yellowedge grouper	<i>Epinephelus flavolimbatus</i>	2005	71.54	Individuals	

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Table 4.2.A (continued)

(continuation of Subtable 4.2.A.7)		SOUTH ATLANTIC SNAPPER-GROUPER HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Yellowfin grouper	<i>Mycteroperca venenosa</i>	2005–06	25.96	Individuals	40.85
Yellowmouth grouper	<i>Mycteroperca interstitialis</i>	2005	4.20	Individuals	
Yellowtail snapper	<i>Ocyurus chrysurus</i>	2005–06	129,459.39	Individuals	41.25
TOTAL FISHERY BYCATCH			423,233.1	Individuals	
TOTAL FISHERY LANDINGS			5,456,046.43	Pounds	
FISHERY BYCATCH RATIO			**		

Subtable 4.2.A.8		ATLANTIC AND GULF OF MEXICO HMS PELAGIC LONGLINE ^d			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Albacore, South Atlantic	<i>Thunnus alalunga</i>	2005	25,518.48	Pounds	
Atlantic sailfish, South Atlantic	<i>Istiophorus albicans</i>	2005	7,539.80	Pounds	
Bigeye tuna, South Atlantic	<i>Thunnus obesus</i>	2005	33,228.03	Pounds	
Blackfin tuna, South Atlantic	<i>Thunnus atlanticus</i>	2005	10,890.82	Pounds	
Blue marlin, South Atlantic	<i>Makaira nigricans</i>	2005	53,823.59	Pounds	
Blue shark, South Atlantic	<i>Prionace glauca</i>	2005	145,685.70	Pounds	
Bluefin tuna, West Atlantic	<i>Thunnus thynnus</i>	2005	288,465.71	Pounds	
Coastal shark group 1, South Atlantic		2005	287,592.68	Pounds	
Coastal shark group 2, South Atlantic		2005	173,276.52	Pounds	
Skipjack tuna, South Atlantic	<i>Katsuwonus pelamis</i>	2005	26,742.04	Pounds	
Swordfish, South Atlantic	<i>Xiphias gladius</i>	2005	478,651.66	Pounds	
White marlin, South Atlantic	<i>Tetrapturus albidus</i>	2005	37,699.00	Pounds	
Yellowfin tuna, South Atlantic	<i>Thunnus albacares</i>	2005	103,088.03	Pounds	
TOTAL FISHERY BYCATCH			1,672,202.06	Pounds	
TOTAL FISHERY LANDINGS			5,551,564.00	Pounds	
TOTAL CATCH (Bycatch + Landings)			7,223,766.06	Pounds	
FISHERY BYCATCH RATIO			0.23		

^d Estimates are for dead discards only.

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Table 4.2.A (continued)

Subtable 4.2.A.9		ATLANTIC AND GULF OF MEXICO SHARK BOTTOM LONGLINE ^e			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Atlantic sharpnose shark, South Atlantic / Gulf of Mexico	<i>Rhizoprionodon terraenovae</i>	2005–06	349,613.05	Pounds	0.25
Blacknose shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus acronotus</i>	2005–06	348,366.31	Pounds	0.36
Blacktip shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus limbatus</i>	2005–06	225,066.53	Pounds	0.65
Bull shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus leucas</i>	2005–06	156,832.68	Pounds	0.38
Dusky shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus obscurus</i>	2005–06	570,896.75	Pounds	0.40
Gag, Gulf of Mexico	<i>Mycteroperca microlepis</i>	2005–06	7,446.39	Pounds	0.80
Gag, South Atlantic	<i>Mycteroperca microlepis</i>	2005–06	10,613.99	Pounds	11.00
Goliath grouper, South Atlantic / Gulf of Mexico	<i>Epinephelus itajara</i>	2005–06	71,823.65	Pounds	19.12
Great barracuda, South Atlantic / Gulf of Mexico	<i>Sphyraena barracuda</i>	2005–06	158,611.62	Individuals	0.25
Great hammerhead shark, South Atlantic / Gulf of Mexico	<i>Sphyrna mokarran</i>	2005–06	191,774.36	Pounds	0.25
Nurse shark, South Atlantic / Gulf of Mexico	<i>Ginglymostoma cirratum</i>	2005–06	190,291.75	Pounds	0.75
Rays, sawfish, and skates, South Atlantic / Gulf of Mexico*	Rajiformes	2005–06	190,488.54	Pounds	0.80
Red drum, South Atlantic / Gulf of Mexico	<i>Sciaenops ocellatus</i>	2005–06	531.00	Individuals	0.18
Red grouper, Gulf of Mexico	<i>Epinephelus morio</i>	2005–06	51,414.25	Pounds	0.50
Red grouper, South Atlantic	<i>Epinephelus morio</i>	2005–06	6,364.50	Pounds	0.25
Sand tiger, South Atlantic / Gulf of Mexico	<i>Carcharias taurus</i>	2005–06	32,902.15	Pounds	0.69
Sandbar Shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus plumbeus</i>	2005–06	149,480.14	Pounds	0.28
Scalloped hammerhead Shark, South Atlantic / Gulf of Mexico	<i>Sphyrna lewini</i>	2005–06	116,989.17	Pounds	0.35
Silky shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus falciformis</i>	2005–06	42,322.16	Pounds	0.42
Smalltooth sawfish ^f	<i>Pristis pectinata</i>	2005–06	61.00	Individuals	0.70
Smooth dogfish shark, South Atlantic / Gulf of Mexico	<i>Mustelus canis</i>	2005–06	191,857.96	Pounds	0.42
Spotted eagle ray, South Atlantic / Gulf of Mexico	<i>Aetobatus narinari</i>	2005–06	266.5	Individuals	0.12
Stingray spp., South Atlantic / Gulf of Mexico*	<i>Dasyatis spp.</i>	2005–06	1,599.15	Individuals	0.35
Tiger shark, South Atlantic / Gulf of Mexico	<i>Galeocerdo cuvier</i>	2005–06	2,032,149.40	Pounds	0.20
TOTAL FISHERY BYCATCH			2,457.65	Individuals	
			5,095,305.35	Pounds	
TOTAL FISHERY LANDINGS			2,925,997.00	Pounds	
FISHERY BYCATCH RATIO			**		

^e Bycatch estimates for the shark bottom longline are currently being refined due to discrepancies in the calculation of total effort. Updates will be made as appropriate.

^f The take of this species is prohibited without prior authorization because it is listed as endangered under the ESA.

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Table 4.2.B

Southeast Region bycatch by stock and species. Landings are not available for species groups (marked *), as it was not possible to determine the exact composition of the bycatch group and the proportions of bycatch and landings to allocate to each species. Bycatch estimates are in live weight (pounds) or number of individuals. Species bycatch ratio = the total regional bycatch of a species / (total regional landings of the species + total regional bycatch of the species); see Section 3 for details on ratio calculation. Some bycatch ratios (marked **) could not be developed when bycatch estimates were provided in both numbers of individuals and in pounds, or where landings were not available. Data on confidential landings (marked ‡) are not presented. Key stocks have been shaded.

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	
Albacore, South Atlantic	<i>Thunnus alalunga</i>	See species column		25,518.48	Pounds	41,614	Pounds	0.38
Almaco jack	<i>Seriola rivoliana</i>	See species column		1,129.71	Individuals	109,676	Pounds	**
Amberjacks and yellowtails*	<i>Seriola</i> spp.	See species column		65,443.45	Individuals	–	–	**
Atlantic angel shark	<i>Squatina dumeril</i>	See species column		25.94	Individuals	–	–	**
Atlantic bumper, South Atlantic	<i>Chloroscombrus chrysurus</i>	See species column		459.20	Individuals	–	–	**
Atlantic croaker, Gulf of Mexico	<i>Micropogonias undulatus</i>	See species column		107,109,953.67	Pounds	11,580,031	Pounds	0.90
Atlantic manta, South Atlantic	<i>Manta birostris</i>	See species column		2.80	Individuals	–	–	**
Atlantic menhaden, South Atlantic ^c	<i>Brevoortia tyrannus</i>	See species column		41.64	Individuals	See footnote	–	**
Atlantic moonfish, South Atlantic	<i>Selene setapinnis</i>	See species column		14.39	Individuals	60,579	Pounds	**
Atlantic sailfish, South Atlantic	<i>Istiophorus albicans</i>	See species column		7,539.80	Pounds	–	–	**
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>	9,671.55	Individuals	14,362.03 349,613.05	Individuals Pounds	522,459	Pounds	**
Atlantic sharpnose shark, South Atlantic	<i>Rhizoprionodon terraenovae</i>	4,690.48	Individuals					
Atlantic sharpnose shark, South Atlantic / Gulf of Mexico	<i>Rhizoprionodon terraenovae</i>	349,613.05	Pounds					
Atlantic spadefish, South Atlantic	<i>Chaetodipterus faber</i>	See species column		16.62	Individuals	–	–	**
Ballyhoo	<i>Hemiramphus brasiliensis</i>	See species column		2,995.56	Individuals	669,081	Pounds	**
Banded drum, South Atlantic	<i>Larimus fasciatus</i>	See species column		390.29	Individuals	–	–	**
Banded rudderfish	<i>Seriola zonata</i>	See species column		246.17	Individuals	39,513	Pounds	**
Bank sea bass	<i>Centropristis ocyurus</i>	See species column		750.81	Individuals	‡	–	**

SOUTHEAST REGION

Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	RATIO
Bar jack	<i>Caranx ruber</i>	See species column		1,513.52	Individuals	34,857	Pounds	**
Barracudas*	Sphyraenidae	See species column		7,646.54	Individuals	–	–	**
Barrelfish	<i>Hyperoglyphe perciformis</i>	See species column		13.85	Individuals	20,351	Pounds	**
Bigeye tuna, South Atlantic	<i>Thunnus obesus</i>	See species column		33,228.03	Pounds	383,587	Pounds	0.08
Black drum, Gulf of Mexico	<i>Pogonias cromis</i>	See species column		106,072.93	Pounds	4,588,669	Pounds	0.02
Black grouper	<i>Mycteroperca bonaci</i>	See species column		71,607.93	Individuals	332,950	Pounds	**
Black sea bass	<i>Centropristis striata</i>	14,783.43	Individuals	14,793.47	Individuals	872,930	Pounds	**
Black sea bass, South Atlantic	<i>Centropristis striata</i>	10.04	Individuals					
Black snapper	<i>Apsilus dentatus</i>	9.70	Individuals	9.70	Individuals	3,987	Pounds	**
Blackfin snapper	<i>Lutjanus buccanella</i>	301.90	Individuals	301.90	Individuals	4,740	Pounds	**
Blackfin tuna	<i>Thunnus atlanticus</i>	952.05	Individuals	952.05 10,890.82	Individuals Pounds	52,312	Pounds	**
Blackfin tuna, South Atlantic	<i>Thunnus atlanticus</i>	10,890.82	Pounds					
Blacknose shark	<i>Carcharhinus acronotus</i>	1,280.64	Individuals	1,280.64 348,366.31	Individuals Pounds	155,858	Pounds	**
Blacknose shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus acronotus</i>	348,366.31	Pounds					
Blacktip shark	<i>Carcharhinus limbatus</i>	8,472.90	Individuals	8,869.86 225,066.53	Individuals Pounds	1,357,681	Pounds	**
Blacktip shark, South Atlantic	<i>Carcharhinus limbatus</i>	292.36	Individuals					
Blacktip shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus limbatus</i>	225,066.53	Pounds					
Blowfish*	<i>Tetraodontidae</i>	See species column		521.91	Individuals	–	–	**
Blue marlin, South Atlantic	<i>Makaira nigricans</i>	See species column		53,823.59	Pounds	–	–	**
Blue shark, South Atlantic	<i>Prionace glauca</i>	See species column		145,685.70	Pounds	‡	–	**
Bluefin tuna, West Atlantic	<i>Thunnus thynnus</i>	See species column		288,465.71	Pounds	305,237	Pounds	0.49
Bluefish	<i>Pomatomus saltatrix</i>	35,713.08	Individuals	35,783.39	Individuals	3,123,949	Pounds	**
Bluefish, South Atlantic	<i>Pomatomus saltatrix</i>	70.31	Individuals					
Blueline tilefish	<i>Caulolatilus microps</i>	See species column		35.39	Individuals	181,935	Pounds	**
Blue runner	<i>Caranx crysos</i>	See species column		7,347.88	Individuals	368,751	Pounds	**

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Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	
Bluntnose sevengill shark	<i>Notorynchus cepedianus</i>	See species column		3,896.69	Individuals	–	–	**
Bonito, Atlantic	<i>Sarda sarda</i>	See species column		9,565.63	Individuals	12,918	Pounds	**
Bonnethead shark	<i>Sphyrna tiburo</i>	2,496.69	Individuals	3,064.02	Individuals	46,278	Pounds	**
Bonnethead shark, South Atlantic	<i>Sphyrna tiburo</i>	567.33	Individuals					
Breams and porgies*	Sparidae	See species column		792.21	Individuals	–	–	**
Bull shark	<i>Carcharhinus leucas</i>	1,149.08	Individuals	1,149.08 156,832.68	Individuals Pounds	185,007	Pounds	**
Bull shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus leucas</i>	156,832.68	Pounds					
Butterflyfishes*	<i>Chaetodontidae</i>	See species column		1,592.40	Individuals	–	–	**
Caribbean red snapper	<i>Lutjanus purpureus</i>	See species column		19.54	Individuals	‡	–	**
Caribbean reef shark	<i>Carcharhinus perezii</i>	See species column		72.43	Individuals	–	–	**
Caribbean sharpnose shark ^c	<i>Rhizoprionodon porosus</i>	See species column		2,513.58	Individuals	–	–	**
Cartilaginous fishes*	Chondrichthyes	See species column		52,931.73	Individuals	–	–	**
Coastal shark group 1, South Atlantic*		See species column		287,592.68	Pounds	–	–	**
Coastal shark group 2, South Atlantic*		See species column		173,276.52	Pounds	–	–	**
Cobia	<i>Rachycentron canadum</i>	3,097.25	Individuals	3,109.7 36,582.98	Individuals Pounds	159,194	Pounds	**
Cobia, Gulf of Mexico	<i>Rachycentron canadum</i>	36,582.98	Pounds					
Cobia, South Atlantic	<i>Rachycentron canadum</i>	12.45	Individuals					
Conger eel	<i>Conger oceanicus</i>	See species column		52,202.22	Individuals	3,327	Pounds	**
Cownose ray, South Atlantic	<i>Rhinoptera bonasus</i>	See species column		22.99	Individuals	–	–	**
Crevalle jack, South Atlantic	<i>Caranx hippos</i>	4.46	Individuals	315.28	Individuals	425,320	Pounds	**
Crevalle jack	<i>Caranx hippos</i>	310.82	Individuals					
Crimson rover	<i>Erythrocles monody</i>	See species column		6,091.85	Individuals	–	–	**
Cutlassfish, Atlantic	<i>Trichiurus lepturus</i>	See species column		242.60	Individuals	23,903	Pounds	**
Dogfish sharks*	Squalidae	See species column		7,945.75	Individuals	–	–	**
Dolphinfish*	<i>Coryphaena</i> spp.	See species column		4,750.13	Individuals	–	–	**

SOUTHEAST REGION

Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	RATIO
Dusky shark	<i>Carcharhinus obscurus</i>	2,739.25	Individuals	2,739.25 570,896.75	Individuals Pounds	-	-	**
Dusky shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus obscurus</i>	570,896.75	Pounds					
Finfishes, unclassified, general*		See species column		22,466.50	Individuals	-	-	**
Flatfishes*	Pleuronectiformes	See species column		976.69	Individuals	-	-	**
French grunt	<i>Haemulon flavolineatum</i>	See species column		133.83	Individuals	-	-	**
Gafftopsail catfish, South Atlantic	<i>Bagre marinus</i>	See species column		16.31	Individuals	-	-	**
Gag	<i>Mycteroperca microlepis</i>	86,266.11	Individuals	86,266.11 18,060.38	Individuals Pounds	3,388,602	Pounds	**
Gag, Gulf of Mexico	<i>Mycteroperca microlepis</i>	7,446.39	Pounds					
Gag, South Atlantic	<i>Mycteroperca microlepis</i>	10,613.99	Pounds					
Goliath grouper	<i>Epinephelus itajara</i>	3,770.98	Individuals	3,770.98 71,823.65	Individuals Pounds	-	-	**
Goliath grouper, South Atlantic / Gulf of Mexico	<i>Epinephelus itajara</i>	71,823.65	Pounds					
Gray snapper	<i>Lutjanus griseus</i>	See species column		45,171.16	Individuals	358,224	Pounds	**
Gray triggerfish	<i>Balistes capriscus</i>	See species column		1,951.57	Individuals	45,454	Pounds	**
Graysby	<i>Epinephelus cruentatus</i>	See species column		17.89	Individuals	1,349	Pounds	**
Great barracuda, South Atlantic / Gulf of Mexico ^d	<i>Sphyrna barracuda</i>	See species column		158,611.62	Individuals	See footnote	-	**
Great hammerhead shark, South Atlantic / Gulf of Mexico	<i>Sphyrna mokarran</i>	See species column		191,774.36	Pounds	‡	-	**
Greater amberjack	<i>Seriola dumerili</i>	See species column		266,297.53	Individuals	1,442,512	Pounds	**
Grouped finfish other than listed, Gulf of Mexico*		See species column		321,715,655.17	Pounds	-	-	**
Grouped sharks, Gulf of Mexico*		See species column		5,751,271.68	Pounds	-	-	**
Groupers and sea basses*	Serranidae	See species column		11,616.76	Individuals	-	-	**
Grunts*	Haemulidae	See species column		16,639.47	Individuals	-	-	**
Hakes*	<i>Urophycis</i> spp.	See species column		47,364.35	Individuals	-	-	**
Hammerhead sharks*	Sphyrnidae	See species column		886.86	Individuals	-	-	**

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Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	
Hogfish	<i>Lachnolaimus maximus</i>	See species column		238.00	Individuals	51,861	Pounds	**
Jacks and pompanos*	Carangidae	See species column		5.35	Individuals	–	–	**
Jolthead porgy	<i>Calamus bajonado</i>	See species column		65.63	Individuals	10,536	Pounds	**
King mackerel, Atlantic group	<i>Scomberomorus cavalla</i>	273.01	Individuals	273.01 380,397.44	Individuals Pounds	939,675	Pounds	**
King mackerel, Gulf group	<i>Scomberomorus cavalla</i>	380,397.44	Pounds					
Knobbed porgy	<i>Calamus nodosus</i>	See species column		99.97	Individuals	21,157	Pounds	**
Ladyfish	<i>Elops saurus</i>	See species column		1,208.06	Individuals	1,932,721	Pounds	**
Lane snapper	<i>Lutjanus synagris</i>	3,748.85	Individuals	3,748.85 1,623,481.71	Individuals Pounds	48,466	Pounds	**
Lane snaper, Gulf of Mexico	<i>Lutjanus synagris</i>	1,623,481.71	Pounds					
Lemon shark	<i>Negaprion brevirostris</i>	See species column		646.32	Individuals	72,373	Pounds	**
Lesser amberjack	<i>Seriola fasciata</i>	See species column		1,621.13	Individuals	51,917	Pounds	**
Little tunny	<i>Euthynnus alletteratus</i>	3,001.25	Individuals	3,049.68	Individuals	497,551	Pounds	**
Little tunny, South Atlantic	<i>Euthynnus alletteratus</i>	48.43	Individuals					
Longspine porgy, Gulf of Mexico	<i>Stenotomus caprinus</i>	See species column		61,490,961.63	Pounds	‡	–	**
Mackerels*	<i>Scomberomorus</i> spp.	See species column		30,281.78	Individuals	–	–	**
Mako sharks*	<i>Isurus</i> spp.	See species column		278.18	Individuals	–	–	**
Margate	<i>Haemulon album</i>	See species column		50.27	Individuals	23,835	Pounds	**
Marlins and spearfishes*	<i>Tetrapturus</i> spp.	See species column		1,035.07	Individuals	–	–	**
Moray eels*	Muraenidae	See species column		9,544.95	Individuals	–	–	**
Mutton snapper	<i>Lutjanus analis</i>	See species column		4,494.53	Individuals	237,414	Pounds	**
Nassau grouper	<i>Epinephelus striatus</i>	See species column		1,325.45	Individuals	‡	–	**
Needlefish, Atlantic	<i>Strongylura marina</i>	See species column		3,760.19	Individuals	‡	–	**
Non-crustacean Invertebrates, Gulf of Mexico*		See species column		26,997,043.37	Pounds	–	–	**
Non-Penaeid shrimp crustacean, Gulf of Mexico*		See species column		88,179,006.92	Pounds	–	–	**

SOUTHEAST REGION

Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	
Nurse shark	<i>Ginglymostoma cirratum</i>	2,120.43	Individuals	2,120.43 19,0291.75	Individuals Pounds	-	-	**
Nurse shark, South Atlantic / Gulf of Mexico	<i>Ginglymostoma cirratum</i>	190,291.75	Pounds					
Other snapper spp., Gulf of Mexico*		See species column		784,083.29	Pounds	-	-	**
Parrotfishes*	Scaridae	See species column		1,022.58	Individuals	-	-	**
Permit	<i>Trachinotus falcatus</i>	See species column		69.23	Individuals	20,959	Pounds	**
Pilotfish	<i>Naucrates ductor</i>	See species column		2,582.30	Individuals			**
Pinfish	<i>Lagodon rhomboids</i>	See species column		1,816.02	Individuals	95,233	Pounds	**
Porkfish	<i>Anisotremus virginicus</i>	See species column		83.08	Individuals	-	-	**
Rainbow runner	<i>Elagatis bipinnulata</i>	See species column		301.81	Individuals	‡	-	**
Rays, sawfish, and skates*	Rajiformes	33.57	Individuals	33.57 190,488.54	Individuals Pounds	-	-	**
Rays, sawfish, and skates, South Atlantic / Gulf of Mexico*	Rajiformes	190,488.54	Pounds					
Red hind	<i>Epinephelus guttatus</i>	See species column		633.62	Individuals	16,750	Pounds	**
Red drum	<i>Sciaenops ocellatus</i>	46,888.04	Individuals	47422.84 405,795.32	Individuals Pounds	181,857	Pounds	**
Red drum, Gulf of Mexico	<i>Sciaenops ocellatus</i>	405,795.32	Pounds					
Red drum, South Atlantic	<i>Sciaenops ocellatus</i>	3.80	Individuals					
Red drum, South Atlantic / Gulf of Mexico	<i>Sciaenops ocellatus</i>	531.00	Individuals					
Red grouper	<i>Epinephelus morio</i>	862,149.42	Individuals	862149.42 57778.75	Individuals Pounds	6,588,286	Pounds	**
Red grouper, Gulf of Mexico	<i>Epinephelus morio</i>	51,414.25	Pounds					
Red grouper, South Atlantic	<i>Epinephelus morio</i>	6,364.50	Pounds					
Red porgy	<i>Pagrus pagrus</i>	32,456.93	Individuals	32,456.93	Individuals	120,657	Pounds	**
Red snapper	<i>Lutjanus campechanus</i>	1,727,474.10	Individuals	1,727,474.10 2,569,676.96	Individuals Pounds	4,236,011	Pounds	**
Red snapper, Gulf of Mexico	<i>Lutjanus campechanus</i>	2,569,676.96	Pounds					
Remora*	<i>Remora</i> spp.	See species column		171,07.49	Individuals	-	-	**
Rock hind	<i>Epinephelus adscensionis</i>	See species column		671.39	Individuals	17,603	Pounds	**

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Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	
Rock sea bass	<i>Centropristis philadelphica</i>	See species column		4,535.74	Individuals	237	Pounds	**
Sailfish	<i>Istiophorus platypterus</i>	439.92	Individuals	462.24	Individuals	-	-	**
Sailfish, West Atlantic	<i>Istiophorus platypterus</i>	22.32	Individuals					
Sand seatrout	<i>Cynoscion arenarius</i>	See species column		3,881.53	Individuals	72,830	Pounds	**
Sand tiger shark	<i>Carcharhinus taurus</i>	308.86	Individuals	308.86 32,902.15	Individuals Pounds	‡	-	**
Sand tiger shark, South Atlantic / Gulf of Mexico	<i>Carcharias taurus</i>	32,902.15	Pounds					
Sand tilefish	<i>Malacanthus plumieri</i>	57.70	Individuals	57.70	Individuals	5,750	Pounds	**
Sandbar shark	<i>Carcharhinus plumbeus</i>	4,846.87	Individuals	4,846.87 149,480.14	Individuals Pounds	1,657,123	Pounds	**
Sandbar shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus plumbeus</i>	149,480.14	Pounds					
Scalloped hammerhead shark, South Atlantic ^e	<i>Sphyrna lewini</i>	139.47	Individuals	139.47 116,989.17	Individuals Pounds	See footnote	-	**
Scalloped hammerhead shark, South Atlantic / Gulf of Mexico ^e	<i>Sphyrna lewini</i>	116,989.17	Pounds					
Scamp	<i>Mycteroperca phenax</i>	See species column		37,233.29	Individuals	659,292	Pounds	**
Scorpionfishes*	Scorpaenidae	See species column		52.89	Individuals	-	-	**
Sea catfishes*	Ariidae	See species column		1,140.99	Individuals	-	-	**
Sea chubs*	Kyphosidae	See species column		4,805.69	Individuals	-	-	**
Seatrout and weakfish spp., Gulf of Mexico*	<i>Cynoscion</i> spp.	See species column		58,720,836.76	Pounds	-	-	**
Silk snapper	<i>Lutjanus vivanus</i>	See species column		17.31	Individuals	53,261	Pounds	**
Silky shark	<i>Carcharhinus falciformis</i>	33.57	Individuals	33.57 42,322.16	Individuals Pounds	10,897	Pounds	**
Silky shark, South Atlantic / Gulf of Mexico	<i>Carcharhinus falciformis</i>	42,322.16	Pounds					
Silver seatrout, South Atlantic ^f	<i>Cynoscion nothus</i>	See species column		166.97	Individuals	See footnote	-	**
Sixgill shark	<i>Hexanchus griseus</i>	See species column		339.40	Individuals	-	-	**
Skates*	Rajidae	See species column		150.74	Individuals	-	-	**

SOUTHEAST REGION

Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	RATIO
Skipjack tuna	<i>Euthynnus pelamis</i>	319.29	Individuals	319.29 26742.04	Individuals Pounds	2,513	Pounds	**
Skipjack tuna, South Atlantic	<i>Katsuwonus pelamis</i>	26,742.04	Pounds					
Smalltooth sawfish ^g	<i>Pristis pectinata</i>	See species column		61.00	Individuals	–	–	**
Smooth dogfish shark	<i>Mustelus canis</i>	110.78	Individuals	110.78 191,857.96	Individuals Pounds	666,709	Pounds	**
Smooth dogfish shark, South Atlantic / Gulf of Mexico	<i>Mustelus canis</i>	191,857.96	Pounds					
Snappers*	Lutjanidae	See species column		20,445.47	Individuals	–	–	**
Snowy grouper	<i>Epinephelus niveatus</i>	See species column		2,702.91	Individuals	427,889	Pounds	**
Soliderfishes and squirrelfishes*	<i>Holocentridae</i>	See species column		293.72	Individuals	–	–	**
Spadefishes*	<i>Ephippidae</i>	See species column		11,741.08	Individuals	–	–	**
Spanish mackerel	<i>Scomberomorus maculatus</i>	61,802.52	Individuals	61,802.52 3,560,615.21	Individuals Pounds	5,269,670	Pounds	**
Spanish mackerel, Gulf Group	<i>Scomberomorus maculatus</i>	3,560,615.21	Pounds					
Speckled hind	<i>Epinephelus drummondhayi</i>	See species column		10,432.66	Individuals	90,660	Pounds	**
Spinner shark	<i>Carcharhinus brevipinna</i>	6,816.92	Individuals	6,825.10	Individuals	42,342	Pounds	**
Spinner shark, South Atlantic	<i>Carcharhinus brevipinna</i>	8.18	Individuals					
Spiny dogfish	<i>Squalus acanthias</i>	See species column		16,065.77	Individuals	18,865	Pounds	**
Southern flounder, Gulf of Mexico	<i>Paralichthys lethostigma</i>	See species column		1,306,782.10	Pounds	1,894,981	Pounds	0.40
Spot, South Atlantic	<i>Leiostomus xanthurus</i>	See species column		26.89	Individuals	1,746,559	Pounds	**
Spottail pinfish	<i>Diplodus holbrookii</i>	See species column		1,362.63	Individuals	9,508	Pounds	**
Spotted eagle ray, South Atlantic ^h	<i>Aetobatus narinari</i>	4.00	Individuals	270.50	Individuals	–	–	**
Spotted eagle ray, South Atlantic / Gulf of Mexico ^h	<i>Aetobatus narinari</i>	266.50	Individuals					
Spotted seatrout	<i>Cynoscion nebulosus</i>	See species column		44.61	Individuals	234,155	Pounds	**
Stingray spp., South Atlantic / Gulf of Mexico*	<i>Dasyatis</i> spp.	See species column		1,599.15	Individuals	–	–	**

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Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	
Swordfish	<i>Xiphias gladius</i>	590.08	Individuals	590.08 478,651.66	Individuals Pounds	2,075,140	Pounds	**
Swordfish, South Atlantic	<i>Xiphias gladius</i>	478,651.66	Pounds					
Tarpon	<i>Megalops atlanticus</i>	78.31	Individuals	86.15	Individuals	-	-	**
Tarpon, South Atlantic	<i>Megalops atlanticus</i>	6.84	Individuals					
Thornback	<i>Platyrrhinoidis triseriata</i>	See species column		1,091.07	Individuals	-	-	**
Thresher sharks*	<i>Alopias</i> spp.	See species column		161.73	Individuals	-	-	**
Tiger shark	<i>Galeocerdo cuvier</i>	984.79	Individuals	992.03 2,032,149.40	Individuals Pounds	38,603	Pounds	**
Tiger shark, South Atlantic	<i>Galeocerdo cuvier</i>	7.24	Individuals					
Tiger shark, South Atlantic / Gulf of Mexico	<i>Galeocerdo cuvier</i>	2,032,149.40	Pounds					
Tilefish*	Malacanthidae	See species column		340.54	Individuals	-	-	**
Toad fishes*	Batrachoididae	See species column		937.59	Individuals	-	-	**
Tomtate	<i>Haemulon aurolineatum</i>	See species column		15,676.52	Individuals	-	-	**
Triggerfishes*	Balistidae	See species column		44,550.00	Individuals	-	-	**
Tripletail	<i>Lobotes surinamensis</i>	See species column		13.65	Individuals	6,978	Pounds	**
True eels*	Anguilliformes	See species column		25,805.39	Individuals	-	-	**
Vermilion snapper	<i>Rhomboplites aurorubens</i>	71,762.26	Individuals	71,762.26 300,909.20	Individuals Pounds	2,995,399	Pounds	**
Vermilion snapper, Gulf of Mexico	<i>Rhomboplites aurorubens</i>	300,909.20	Pounds					
Warsaw grouper	<i>Epinephelus nigritus</i>	See species column		7,935.84	Individuals	162,303	Pounds	**
White grunt	<i>Haemulon plumieri</i>	See species column		7,170.80	Individuals	18,469	Pounds	**
White marlin, South Atlantic	<i>Tetrapturus albidus</i>	See species column		37,699.00	Pounds	-	-	**
Whitebone porgy	<i>Calamus leucosteus</i>	See species column		1,302.95	Individuals	6,836	Pounds	**
Worm eels and snake Eels*	Ophichthidae	See species column		20,455.28	Individuals	-	-	**
Wreckfish	<i>Polyprion americanus</i>	See species column		38.09	Individuals	‡	-	**
Yellow jack	<i>Caranx bartholomaei</i>	See species column		168.19	Individuals	-	-	**
Yellowedge grouper	<i>Epinephelus flavolimbatus</i>	See species column		1,866.84	Individuals	920,704	Pounds	**

SOUTHEAST REGION

Table 4.2.B (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH ^a		TOTAL SPECIES BYCATCH		SPECIES LANDINGS ^b		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 LANDINGS	UNIT	RATIO
Yellowfin grouper	<i>Mycteroperca venenosa</i>	See species column		644.41	Individuals	9,739	Pounds	**
Yellowfin menhaden, South Atlantic	<i>Brevoortia smithi</i>	See species column		224.04	Individuals	See footnote	–	**
Yellowfin tuna	<i>Thunnus albacares</i>	99.67	Individuals	99.67 103,088.03	Individuals Pounds	3,446,030	Pounds	**
Yellowfin tuna, South Atlantic	<i>Thunnus albacares</i>	103,088.03	Pounds					
Yellowmouth grouper	<i>Mycteroperca interstitialis</i>	See species column		4.20	Individuals	575	Pounds	**
Yellowtail snapper	<i>Ocyurus chrysurus</i>	See species column		409,684.19	Individuals	1,325,387	Pounds	**

^a Bycatch at the stock level is listed only for species with bycatch of more than one substock. If one or no substocks occur, total bycatch is listed in the “species” column.

^b Landed weights are for catch sold only.

^c Southeast Region landings were not reported by menhaden species, but were reported for menhaden in general. Landings for 2005 for *Brevoortia* were 828,842,807 pounds, but could not be used to develop a bycatch ratio for menhaden species, as the exact composition of the *Brevoortia* group was unknown.

^d Landings data for great barracuda were not available. It is possible that landings for this species are grouped with Sphyraenidae (barracudas), along with other Sphyraenidae species. Southeast Regional landings for Sphyraenidae were 126,158 pounds for the year 2005.

^e Landings data were not available for scalloped hammerhead shark. It is possible that these landings were included in landings for Sphyrnidae (hammerhead sharks, generally) along with other hammerhead shark species. Southeast Regional landings for Sphyrnidae were 273,298 pounds for the year 2005.

^f Landings data were not available for silver seatrout. It is possible that landings for this species were included in the weakfish landings (another common name for seatrout), along with other seatrout species. Southeast Region landings for weakfish were 428,767 pounds in 2005, but could not be used to develop a bycatch ratio for silver seatrout, as the exact composition of the weakfish group is unknown.

^g Take of smalltooth sawfish is prohibited without prior authorization because this species is listed as endangered under the ESA.

^h Landing spotted eagle ray is not federally prohibited, but is prohibited by the State of Florida. Spotted eagle rays are not landed elsewhere.

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Table 4.2.C

Subtables showing marine mammal bycatch estimates and associated CVs (where available) for Southeast Region fisheries (source: Waring et al. 2007). Bycatch estimates are in numbers of individuals and include incidental mortality and serious injury. Key stocks/populations are shaded. Where multiple years of data are indicated, the estimate is an annual average.

Subtable 4.2.C.1		LARGE COASTAL AND SMALL COASTAL SHARK AGGREGATES (DRIFT, STRIKE, AND BOTTOM GILLNET)			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Bottlenose dolphin, Western North Atlantic Coastal	<i>Tursiops truncatus</i>	2000–04	5	Individuals	0.49
TOTAL FISHERY BYCATCH			5	Individuals	

Subtable 4.2.C.2		ATLANTIC AND GULF OF MEXICO HMS PELAGIC LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Pilot whale (long- and/or short-finned)	<i>Globicephala</i> spp.	2000–04	70	Individuals	0.37
Risso's dolphin, Western North Atlantic	<i>Grampus griseus</i>	2000–04	46	Individuals	0.37
Spotted dolphin, Atlantic, Western North Atlantic	<i>Stenella frontalis</i>	2001–05	6	Individuals	1
Spotted dolphin, pantropical, Western North Atlantic	<i>Stenella attenuata</i>	2001–05	6	Individuals	1
TOTAL FISHERY BYCATCH			116	Individuals	

Subtable 4.2.C.3		ATLANTIC AND GULF OF MEXICO SHARK BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Bottlenose dolphin, Western North Atlantic Coastal	<i>Tursiops truncatus</i>	2003	100.25	Individuals	
TOTAL FISHERY BYCATCH			100.25	Individuals	

Subtable 4.2.C.4 (SUMMARY BY SPECIES)		TOTAL SPECIES BYCATCH	
COMMON NAME	SCIENTIFIC NAME	AMOUNT	UNIT
Bottlenose dolphin, Western North Atlantic Coastal	<i>Tursiops truncatus</i>	105.25	Individuals
Pilot whale (long- and/or short-finned)	<i>Globicephala</i> spp.	70	Individuals
Risso's dolphin, Western North Atlantic	<i>Grampus griseus</i>	46	Individuals
Spotted dolphin, Atlantic, Western North Atlantic	<i>Stenella frontalis</i>	6	Individuals
Spotted dolphin, pantropical, Western North Atlantic	<i>Stenella attenuata</i>	6	Individuals
TOTAL FISHERY BYCATCH		233.25	Individuals

SOUTHEAST REGION

Table 4.2.D

Subtables showing sea turtle bycatch estimates and associated CVs (where available) for Southeast Region fisheries. Bycatch estimates are in number of individuals. Estimates are for live and dead releases in all fisheries with the exception of the shrimp trawl fisheries, where estimates are for mortalities only. Key stocks/populations are shaded. Where multiple years of data are indicated, the estimate is an annual average.

Subtable 4.2.D.1		GULF OF MEXICO REEF FISH BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Unclassified sea turtles		2005	10.37	Individuals	
TOTAL FISHERY BYCATCH			10.37	Individuals	

Subtable 4.2.D.2		GULF OF MEXICO REEF FISH HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Loggerhead sea turtle	<i>Caretta caretta</i>	2006	24.42	Individuals	
TOTAL FISHERY BYCATCH			24.42	Individuals	

Subtable 4.2.D.3		GULF OF MEXICO SHRIMP TRAWL ^a			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Green sea turtle	<i>Chelonia mydas</i>	2002	486	Individuals	
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	2002	3,884	Individuals	
Leatherback sea turtle	<i>Dermochelys coriacea</i>	2001	63	Individuals	
Loggerhead sea turtle	<i>Caretta caretta</i>	2001	2,416	Individuals	
TOTAL FISHERY BYCATCH			6,849	Individuals	

^a Bycatch mortality estimates for Southeast shrimp fisheries from the NMFS 2002 Biological Opinion on the Shrimp Fisheries of the Southeastern United States. Since that time effort in the shrimp fishery and associated bycatch have decreased markedly.

Subtable 4.2.D.4		LARGE COASTAL AND SMALL COASTAL SHARK AGGREGATES (DRIFT, STRIKE, AND BOTTOM GILLNET) ^b			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Leatherback sea turtle	<i>Dermochelys coriacea</i>	2002	3.40	Individuals	0.69
Loggerhead sea turtle	<i>Caretta caretta</i>	2002	1.70	Individuals	1.00
TOTAL FISHERY BYCATCH			5.10	Individuals	

^b Estimates are only for the directed shark drift gillnet portion of the fishery.

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Table 4.2.D (continued)

Subtable 4.2.D.5		NORTH CAROLINA INSHORE (BAYS AND RIVERS) GILLNET^a			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Green sea turtle	<i>Chelonia mydas</i>	2006	37	Individuals	
Leatherback sea turtle	<i>Dermochelys coriacea</i>	2005–07	19	Individuals	
Loggerhead sea turtle	<i>Caretta caretta</i>	2005–07	4	Individuals	
TOTAL FISHERY BYCATCH			60	Individuals	

^a Bycatch estimates for this fishery are a sum over the years indicated, not averages.

Subtable 4.2.D.6		NORTH CAROLINA SOUTHERN FLOUNDER POUND NET			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Green sea turtle	<i>Chelonia mydas</i>	2003 Fall	107.7	Individuals	0.235
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	2003 Fall	13.6	Individuals	0.421
Loggerhead sea turtle	<i>Caretta caretta</i>	2003 Fall	536.8	Individuals	0.114
TOTAL FISHERY BYCATCH			658.1	Individuals	

Subtable 4.2.D.7		SOUTH ATLANTIC SNAPPER-GROUPER HANDLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Unclassified sea turtles		2005	3.22	Individuals	
TOTAL FISHERY BYCATCH			3.22	Individuals	

Subtable 4.2.D.8		ATLANTIC AND GULF OF MEXICO HMS PELAGIC LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Leatherback sea turtle	<i>Dermochelys coriacea</i>	2005	350.90	Individuals	0.22
Loggerhead sea turtle	<i>Caretta caretta</i>	2005	273.80	Individuals	0.18
TOTAL FISHERY BYCATCH			624.70	Individuals	

SOUTHEAST REGION

Table 4.2.D (continued)

Subtable 4.2.D.9		ATLANTIC AND GULF OF MEXICO SHARK BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Leatherback sea turtle	<i>Dermochelys coriacea</i>	2005	83.20	Individuals	0.76
Loggerhead sea turtle	<i>Caretta caretta</i>	2005	420.00	Individuals	0.43
Unidentified sea turtle		2004	31.80	Individuals	1.00
TOTAL FISHERY BYCATCH			535.00	Individuals	

Subtable 4.2.D.10		SOUTHEASTERN ATLANTIC SHRIMP TRAWL ^d			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Green sea turtle	<i>Chelonia mydas</i>	2001	28	Individuals	
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	2002	324	Individuals	
Leatherback sea turtle	<i>Dermochelys coriacea</i>	2001	17	Individuals	
Loggerhead sea turtle	<i>Caretta caretta</i>	2001	1,532	Individuals	
TOTAL FISHERY BYCATCH			1,901	Individuals	

^d Bycatch estimates from the 2002 shrimp fishery Biological Opinion. Since that time, effort in the shrimp fishery (and thus associated bycatch) have decreased dramatically.

Subtable 4.2.D.11 (SUMMARY)		TOTAL SPECIES BYCATCH	
COMMON NAME	SCIENTIFIC NAME	AMOUNT	UNIT
Green sea turtle	<i>Chelonia mydas</i>	658.7	Individuals
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	4,222	Individuals
Leatherback sea turtle	<i>Dermochelys coriacea</i>	536.5	Individuals
Loggerhead sea turtle	<i>Caretta caretta</i>	5,209	Individuals
Unidentified turtles		45.39	Individuals
TOTAL BYCATCH		10,670.91	Individuals

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Table 4.2.E

Subtables showing seabird bycatch estimates for Southeast Region fisheries. Estimates reflect the annual average from the years identified, and are in numbers of individuals.

Subtable 4.2.E.1		ATLANTIC AND GULF OF MEXICO HMS PELAGIC LONGLINE			
COMMON NAME	SCIENTIFIC NAME	Data Source	Bycatch	Unit	CV
Greater shearwaters	<i>Puffinus gravis</i>	2004	75	Individuals	
Gull		2004	61	Individuals	
Northern gannet	<i>Morus bassanus</i>	2000	22	Individuals	
Wilson's storm petrel	<i>Oceanites oceanicus</i>	1995	24	Individuals	
Unspecified seabirds		2004	6	Individuals	
TOTAL FISHERY BYCATCH			142 ^a	Individuals	

^a Separate total sea bird estimate (see Hata 2006), not the sum of the by-species estimates.

Subtable 4.2.E.2		SOUTH ATLANTIC COASTAL MIGRATORY PELAGIC TROLL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	BYCATCH	UNIT	CV
Northern gannet	<i>Morus bassanus</i>	2006	24.09	Individuals	
TOTAL FISHERY BYCATCH			24.09	Individuals	

Subtable 4.2.E.3 (SUMMARY)		TOTAL SPECIES BYCATCH	
COMMON NAME	SCIENTIFIC NAME	AMOUNT	UNIT
Greater shearwaters	<i>Puffinus gravis</i>	75	Individuals
Gull		61	Individuals
Northern gannet	<i>Morus bassanus</i>	44.09	Individuals
Wilson's storm petrel	<i>Oceanites oceanicus</i>	24	Individuals
Unspecified seabirds		6	Individuals
TOTAL STOCK BYCATCH		186.09 ^b	Individuals

^b Sum of the two fisheries totals, not the sum of the by-species estimates.