

## **8. BYCATCH, INCIDENTAL CATCH, AND PROTECTED SPECIES**

Bycatch in commercial and recreational fisheries has become an important issue for the fishing industry, resource managers, scientists, and the public. Bycatch can result in death or injury to the discarded fish, and it is essential that this component of total fishing-related mortality be incorporated into fish stock assessments and evaluation of management measures. Bycatch precludes other more productive uses of fishery resources and decreases the efficiency of fishing operations. Although not all discarded fish die, bycatch can become a large source of mortality, which can slow the rebuilding of overfished stocks. Bycatch imposes direct and indirect costs on fishing operations by increasing sorting time and decreasing the amount of gear available to catch target species. Incidental catch concerns also apply to populations of marine mammals, sea turtles, seabirds, and other components of ecosystems which may be protected under other applicable laws and for which there are no commercial or recreational uses but for which existence values may be high.

In 1998, NMFS developed a national bycatch plan, *Managing the Nation's Bycatch* (NMFS, 1998), which includes programs, activities, and recommendations for Federally managed fisheries. The goal of the Agency's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch. The plan also established a definition of bycatch as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear.

### **8.1 Bycatch Reduction and the Magnuson-Stevens Act**

The Magnuson-Stevens Act defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards. Fish is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Seabirds and marine mammals are therefore not considered bycatch under the MSA but are examined as incidental catch. Bycatch does not include fish released alive under a recreational catch-and-release fishery management program.

National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation and management measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch are marlin, undersized swordfish and bluefin tuna caught and released by commercial fishing gear; undersized swordfish and tunas in recreational hook and line fisheries; species for which there is little or no market such as blue sharks; and species caught and released in excess of a bag limit.

There are benefits associated with the reduction of bycatch, including the reduction of uncertainty concerning total fishing-related mortality, which improves the ability to assess the status of stocks, to determine the appropriate relevant controls, and to ensure that overfishing levels are not exceeded. It is also important to consider the bycatch of HMS in fisheries that

target other species as a source of mortality for HMS and to work with fishery constituents and resource manager partners on an effective bycatch strategy to maintain sustainable fisheries. This strategy may include a combination of management measures in the domestic fishery, and if appropriate, multi-lateral measures recommended by international bodies such as ICCAT or coordination with Regional Fishery Management Councils or states. The bycatch in each fishery is summarized annually in the SAFE Report for Atlantic HMS fisheries. The effectiveness of the bycatch reduction measures is evaluated based on this summary.

### **8.1.1 Standardized Reporting of Bycatch**

Section 303(a)(11) of the Magnuson-Stevens Act requires that a FMP establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery. Descriptions of the methodologies to report bycatch in HMS fisheries can be found in Section 3.8.2 of the Consolidated HMS FMP (NMFS 2006a).

### **8.1.2 Bycatch Reduction in HMS Fisheries**

The NMFS HMS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued support of data collection and research relating to bycatch (Table 8.1). Additional details on bycatch and bycatch reduction measures can be found in Section 3.5 of the 1999 HMS FMP (NMFS, 1999), in Regulatory Amendment 1 to the 1999 HMS FMP (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 HMS FMP (NMFS, 2002), and in Amendment 1 to the 1999 HMS FMP (NMFS, 2003). In addition, an HMS Bycatch Reduction Implementation Plan was developed in late 2003 which identifies priority issues to be addressed in the following areas: 1) monitoring, 2) research, 3) management, and 4) education/outreach. Individual activities in each of these areas were identified and new activities may be added or removed as they are addressed or identified.

### **8.1.3 Evaluation and Monitoring of Bycatch**

The identification of bycatch in Atlantic HMS fisheries is the first step in reducing bycatch and bycatch mortality. The Magnuson-Stevens Act requires the amount and type of bycatch to be summarized in the annual SAFE Reports.

Pelagic longline discards of swordfish, billfish, large coastal sharks and pelagic sharks are estimated using data from NMFS observer reports and pelagic logbook reports. Shark bottom longline discards have been estimated using logbook data and observer reports as well. Shark gillnet discards can be estimated using logbook data.

**Table 8.1 Summary of Bycatch Species in HMS Fisheries, Marine Mammal Protection Act (MMPA) Category, Endangered Species Act (ESA) Requirements, Data Collection, and Management Measures by Fishery/Gear Type.**

<b>Fishery/Gear Type</b>	<b>Bycatch Species</b>	<b>MMPA Category</b>	<b>ESA Requirements</b>	<b>Bycatch Data Collection</b>	<b>Management Measures</b>
Pelagic Longline	Bluefin tuna Billfish Undersize target species Marine mammals Sea turtles Seabirds Non-target finfish Prohibited shark species Large Coastal Shark species after closure	Category I	Jeopardy finding (2000); Reasonable and Prudent Alternative (RPA) implemented 2001; Jeopardy finding and RPA implementation (2004)	Permit requirement (1985); logbook requirement (SWO-1985; SHK - 1993); observer requirement (1992), EFPs (2001-present)	BFT target catch requirements (1981); quotas (SWO - 1985; SHK - 1993); prohibit possession of billfish (1988); minimum size (1995); gear marking (1999); line clippers, dipnets (2000); MAB closure (1999); limited access (1999); limit the length of mainline (1996-1997 only); move 1 nm after an interaction (1999); voluntary vessel operator workshops (1999); GOM closure (2000); FL, Charleston Bump, NED closures (2001); gangion length, corrodible hooks, de-hooking devices, handling & release guidelines (2001); NED experiment (2001); VMS (2003); circle hook requirement (2004); mandatory safe handling and release workshops (2006)
Shark Bottom Longline	Prohibited shark species Target species after closure Sea turtles Smalltooth sawfish Non-target finfish	Category III	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); handling & release guidelines (2001); line clippers, dipnets, corrodible hooks, de-hooking devices, move 1 nm after an interaction (2004); South Atlantic closure, VMS (2005); shark identification workshops for dealers (2007)
Shark Gillnet	Prohibited shark species Sea turtles Marine mammals Non-target finfish Smalltooth sawfish	Category II	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); deployment restrictions (1999); 30-day closure for leatherbacks (2001); handling & release guidelines (2001); net checks (2002); whale sighting (2002); VMS (2004); shark identification workshops for dealers (2007)

<b>Fishery/Gear Type</b>	<b>Bycatch Species</b>	<b>MMPA Category</b>	<b>ESA Requirements</b>	<b>Bycatch Data Collection</b>	<b>Management Measures</b>
BFT Purse Seine	Undersize target species Non-target finfish	Category III	ITS, Terms & Conditions	Permit requirement (1982); observer requirement (1996, 2001 only); EFPs (2002, 2003 only)	Quotas (1975); limited access, individual vessel quotas (1982); minimum size (1982)
BFT & SWO Harpoon	Undersize target species	Category III	ITS, Terms & Conditions	Permit requirement (BFT - 1982; SWO - 1987); SWO logbook requirement (1987)	Quotas (BFT - 1982; SWO - 1985); minimum size (BFT - 1982; SWO - 1985)
Handgear - Commercial	Undersize target species Non-target finfish	Category III	ITS, Terms & Conditions	Permit requirement (BFT - 1982; SWO 1987; SHK - 1993); logbook requirement (SWO - 1985; SHK - 1993)	Regulations vary by species, including quotas, minimum sizes, retention limits, landing form
Handgear - Recreational	Undersize target species Non-target finfish	Category III	ITS, Terms & Conditions	Large Pelagic Survey (1992); MRFSS (1981)	Regulations vary by species, including minimum sizes, retention limits, landing form; BFT quotas

NMFS has not estimated swordfish harpoon bycatch. NMFS has limited historical observer data on harpooned swordfish from driftnet trips in which harpoons were sometimes used. However, swordfish harpoon fishermen are required to submit pelagic logbooks and NMFS will examine those data for use in estimating bycatch. NMFS has not estimated bluefin tuna harpoon bycatch estimates because these fishermen have not been selected to submit logbooks. NMFS has not estimated bycatch in the General category commercial rod and reel tuna fishery although anecdotal evidence indicates that some undersized bluefin tuna may be captured.

There is concern about the accuracy of discard estimates in the recreational rod and reel fishery for HMS due to the low number of observations by the Large Pelagic Survey and the MRFSS. These bycatch estimates are not currently available, except for bluefin tuna. For some species, encounters are considered rare events, which might result in bycatch estimates with considerable uncertainty. Increased numbers of intercepts (interviews with fishermen) have been collected since 2002 due to improvements in survey methodology. NMFS is planning to devote more effort into developing bycatch estimates and estimates of uncertainty from the recreational fishery. These data will be included in future SAFE Reports. Bycatch estimates may also be examined using tournament data for the recreational fishery.

#### **8.1.4 Bycatch Mortality**

The reduction of bycatch mortality is an important component of National Standard 9. Physical injury to an animal may not be apparent to the fisherman who is quickly releasing a fish because there may be injuries associated with the stress of being hooked or caught in a net. Little is known about the bycatch mortality rates of many of the species managed under this FMP but there are some data for certain species. Information on bycatch mortality of these fish should continue to be collected, and in the future, could be used to estimate bycatch mortality in stock assessments.

NMFS submits annual data (Task I) to ICCAT on mortality estimates (dead discards). These data are included in the SAFE Reports and Annual Reports of the United States to ICCAT to evaluate bycatch trends in HMS fisheries (NMFS, 2007).

## **8.2 Interactions of HMS Fishing Gears with Protected Species**

This section examines the interaction between protected species and Atlantic HMS fisheries. As a point of clarification, interactions are different than bycatch. Interactions take place between fishing gears and marine mammals, sea turtles, and seabirds while bycatch consists of discards of fish. Following a brief review of the three acts (Marine Mammal Protection Act, Endangered Species Act, and Migratory Bird Treaty Act) affecting protected species, the interactions between HMS gears and each species is examined. Additionally, the interaction of seabirds and longline fisheries are considered under the auspices of the United States “National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries” (NPOA – Seabirds).

### 8.2.1 Interactions and the Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 (MMPA), as amended, is one of the principal Federal statutes that guide marine mammal species protection and conservation policy. In the 1994 amendments, section 118 established the goal that the incidental mortality or serious injury of marine mammals occurring during the course of commercial fishing operations be reduced to insignificant levels approaching a zero mortality rate goal (ZMRG) and serious injury rate within seven years of enactment (i.e., April 30, 2001). In addition, the amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations. These include the preparation of marine mammal stock assessment reports, a registration and marine mammal mortality monitoring program for certain commercial fisheries (Category I and II), and the preparation and implementation of take reduction plans (TRP).

NMFS relies on both fishery-dependent and fishery-independent data to produce stock assessments for marine mammals in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Draft stock assessment reports are typically published around January and final reports are typically published in the Fall. Final 2006 and draft 2007 stock assessment reports can be obtained on the web at: [http://www.nmfs.noaa.gov/prot\\_res/pr/sars/](http://www.nmfs.noaa.gov/prot_res/pr/sars/)

The following marine mammal species occur off the Atlantic and Gulf Coasts that are or could be of concern with respect to potential interactions with HMS fisheries.

#### **Common Name**

Atlantic spotted dolphin  
Blue whale  
Bottlenose dolphin  
Common dolphin  
Fin whale  
Harbor porpoise  
Humpback whale  
Killer whale  
Long-finned pilot whale  
Minke whale  
Northern bottlenose whale  
Northern right whale  
Pantropical spotted dolphin  
Pygmy sperm whale  
Risso's dolphin  
Sei whale  
Short-beaked spinner dolphin  
Short-finned pilot whale  
Sperm whale  
Spinner dolphin

#### **Scientific Name**

*Stenella frontalis*  
*Balaenoptera musculus*  
*Tursiops truncatus*  
*Delphinis delphis*  
*Balaenoptera physalus*  
*Phocoena phocoena*  
*Megaptera novaeangliae*  
*Orcinus orca*  
*Globicephela melas*  
*Balaenoptera acutorostrata*  
*Hyperoodon ampullatus*  
*Eubalaena glacialis*  
*Stenella attenuata*  
*Kogia breviceps*  
*Grampus griseus*  
*Balaenoptera borealis*  
*Stenella clymene*  
*Globicephela macrorhynchus*  
*Physeter macrocephalus*  
*Stenella longirostris*

Striped dolphin  
White-sided dolphin

*Stenella coeruleoalba*  
*Lagenorhynchus acutus*

Under MMPA requirements, NMFS produces an annual List of Fisheries (LOF) that classifies domestic commercial fisheries, by gear type, relative to their rates of incidental mortality or serious injury of marine mammals. The LOF includes three classifications:

1. Category I fisheries are those with frequent serious injury or mortality to marine mammals
2. Category II fisheries are those with occasional serious injury or mortality
3. Category III fisheries are those with remote likelihood of serious injury or mortality to marine mammals

The final 2008 MMPA LOF was published on November 27, 2007 (72 FR 66048). The Atlantic Ocean, Caribbean, and Gulf of Mexico large pelagic longline fishery is classified as Category I (frequent serious injuries and mortalities incidental to commercial fishing) and the southeastern Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities). The following Atlantic HMS fisheries are classified as Category III (remote likelihood or no known serious injuries or mortalities): Atlantic tuna purse seine; Gulf of Maine and mid-Atlantic tuna, shark and swordfish, hook-and-line/harpoon; southeastern mid-Atlantic and Gulf of Mexico shark bottom longline; and mid-Atlantic, southeastern Atlantic, and Gulf of Mexico pelagic hook-and-line/harpoon fisheries. Commercial passenger fishing vessel (charter/headboat) fisheries are subject to Section 118 and are listed as a Category III fishery. Recreational vessels are not categorized since they are not considered commercial fishing vessels. For additional information on the fisheries categories and how fisheries are classified, see <http://www.nmfs.noaa.gov/pr/interactions/lof/>.

Fishermen participating in Category I or II fisheries are required to register under the MMPA and to accommodate an observer aboard their vessels if requested. Vessel owners or operators, or fishermen, in Category I, II, or III fisheries must report all incidental mortalities and serious injuries of marine mammals during the course of commercial fishing operations to NMFS. There are currently no regulations requiring recreational fishermen to report takes, nor are they authorized to have incidental takes (i.e., they are illegal).

### **8.2.2 Interactions and the Endangered Species Act**

The Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.), provides for the conservation and recovery of endangered and threatened species of fish, wildlife, and plants. The listing of a species is based on the status of the species throughout its range or in a specific portion of its range in some instances. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. §1532(20)] if no action is taken to stop the decline of the species. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. §1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine and anadromous fish species, marine mammals

(except for walrus and sea otter), marine reptiles (such as sea turtles), and marine plants. The Secretary of the Interior, acting through the U.S. Fish and Wildlife Service (USFWS), is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species.

In addition to listing species under the ESA, the service agency (NMFS or USFWS) generally must designate critical habitat for listed species concurrently with the listing decision to the “maximum extent prudent and determinable” [16 U.S.C. §1533(a)(3)]. The ESA defines critical habitat as those specific areas that are occupied by the species at the time it is listed that are essential to the conservation of a listed species and that may be in need of special consideration, as well as those specific areas that are not occupied by the species that are essential to their conservation. Federal agencies are prohibited from undertaking actions that are likely to destroy or adversely modify designated critical habitat.

**Marine Mammals**

	<b><u>Status</u></b>
Blue whale ( <i>Balaenoptera musculus</i> )	Endangered
Fin whale ( <i>Balaenoptera physalus</i> )	Endangered
Humpback whale ( <i>Megaptera novaeangliae</i> )	Endangered
Northern right whale ( <i>Eubalaena glacialis</i> )	Endangered
Sei whale ( <i>Balaenoptera borealis</i> )	Endangered
Sperm whale ( <i>Physeter macrocephalus</i> )	Endangered

**Sea Turtles**

Green turtle ( <i>Chelonia mydas</i> )	*Endangered/Threatened
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

**Critical Habitat**

Northern right whale	Endangered
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**Finfish**

Smalltooth sawfish ( <i>Pristis pectinata</i> )	Endangered
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*\*Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.*

**8.2.2.1 Sea Turtles**

NMFS has taken several steps in the past few years to reduce sea turtle bycatch and bycatch mortality in domestic longline fisheries. On March 30, 2001, NMFS implemented via

interim final rule requirements for U.S. flagged vessels with pelagic longline gear on board to have line clippers and dipnets to remove gear on incidentally captured sea turtles (66 FR 17370). Specific handling and release guidelines designed to minimize injury to sea turtles were also implemented. NMFS published a final report which provides the detailed guidelines and protocols (Epperly *et al.*, 2004) and a copy can be found at [http://www.nmfs.noaa.gov/sfa/hms/Protected%20Resources/TM\\_524.pdf](http://www.nmfs.noaa.gov/sfa/hms/Protected%20Resources/TM_524.pdf) . NMFS published a final rule in July 2004 implementing mandatory circle hook use for pelagic longline gear along with bait restrictions and required certain safe handling and release gear (69 FR 40734).

Internationally, the United States is pursuing sea turtle conservation through international, regional, and bilateral organizations such as ICCAT, the Asia Pacific Fisheries Commission, and FAO Committee on Fisheries (COFI). The United States intends to provide a summary report to FAO for distribution to its members on bycatch of sea turtles in U.S. longline fisheries and the research findings as well as recommendations to address the issue. At the 24<sup>th</sup> session of COFI held in 2001, the United States distributed a concept paper for an international technical experts meeting to evaluate existing information on turtle bycatch, to facilitate and standardize collection of data, to exchange information on research, and to identify and consider solutions to reduce turtle bycatch. COFI agreed that an international technical meeting could be useful despite the lack of agreement on the specific scope of that meeting. The United States has developed a prospectus for a technical workshop to address sea turtle bycatch in longline fisheries as a first step. Other gear-specific international workshops may be considered in the future such as the circle hook workshop scheduled for 2008.

#### **8.2.2.2 Smalltooth sawfish**

On April 1, 2003, NMFS listed smalltooth sawfish as an endangered species (68 FR 15674) under the ESA. After reviewing the best scientific and commercial information, the status review team determined that the U.S. DPS (Distinct Population Segment) of smalltooth sawfish is in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: 1) the present or threatened destruction, modification, or curtailment of habitat or range; 2) over utilization for commercial, recreational, scientific, or educational purposes; 3) inadequacy of existing regulatory mechanisms; and 4) other natural or manmade factors affecting its continued existence. NMFS is working on designating critical habitat for smalltooth sawfish.

Smalltooth sawfish takes in the shark gillnet fishery are rare given the high rate of observer coverage. The fact that there were no smalltooth sawfish caught during 2001, when 100 percent of the fishing effort was observed, indicates that smalltooth sawfish takes (observed or total) most likely do not occur on an annual basis. Based on this information, the 2003 Biological Opinion (BiOp) estimates that one incidental capture of a sawfish (released alive) over the next five years, will occur as a result of the use of gillnets in this fishery (NMFS, 2003a).

Smalltooth sawfish have been observed caught (eight known interactions, seven released alive, one released in unknown condition) in shark bottom longline fisheries from 1994 through

2004 (NMFS, 2003a). Based on these observations, expanded sawfish take estimates for 1994-2002 were developed for the shark bottom longline fishery (NMFS, 2003a). A total of 466 sawfish were estimated to have been taken in this fishery during 1994 - 2002, resulting in an average of 52 per year. All were released alive except one. Estimates of sawfish bycatch for 2003-06 have been developed and range from 0 to 161 interactions per year (Richards, 2007a; 2007b). However, due to the sparseness of observations (interactions) and effort variables chosen for the various approaches to estimating total interactions, the results were not very precise.

### **8.2.2.3 Interactions with Seabirds**

Observer data from 1992 through 2005 indicate that seabird bycatch is relatively low in the U.S. Atlantic pelagic longline fishery (NMFS, 2006b). Since 1992, a total of 132 seabird interactions have been observed, with 93 observed killed (70.5 percent). In 2005, there were 115 active U.S. pelagic longline vessels fishing for swordfish in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea that reportedly set approximately 5.9 million hooks. A total of four seabirds were observed taken. Detailed analysis of seabird bycatch in the U.S. pelagic longline fishery can be found in the 2007 Annual Report of the U.S. to ICCAT (NMFS, 2007).

Bycatch of seabirds in the shark bottom longline fishery has been virtually non-existent. A single pelican has been observed killed from 1994 through 2005. Expanded estimates of seabird bycatch or catch rates have not been calculated for the bottom longline fishery.

### **8.2.3 Measures to Address Protected Species Concerns**

NMFS has taken a number of actions designed to reduce interactions with protected species over the last few years. Bycatch reduction measures have been implemented through the 1999 HMS FMP (NMFS, 1999), in Regulatory Amendment 1 to the 1999 HMS FMP (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 HMS FMP (NMFS, 2002), in Amendment 1 to the 1999 HMS FMP (NMFS, 2003), and in the June 2004 Final Rule for Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic Pelagic Longline Fishery (NMFS, 2004). NMFS continues to monitor observed interactions with marine mammals and sea turtles on a quarterly basis and reviews data for appropriate action, if any, as necessary.

### **8.3 Bycatch of HMS in Other Non-HMS Fisheries**

NMFS is concerned about bycatch mortality of Atlantic HMS in any Federal or state-managed fishery which captures them. NMFS plans to address bycatch of these species in the appropriate FMPs through coordination with the responsible management body. For example, capture of swordfish and tunas incidental to squid trawl operations is addressed in the Squid, Mackerel, and Butterfish FMP. Capture rates of tunas in coastal gillnet fisheries are being examined through issuance of exempted fishing permits and reporting requirements. NMFS continues to solicit bycatch data on HMS from all state, interjurisdictional, and Federal data collection programs. NMFS supports development of an interstate management plan for coastal sharks by the Atlantic States Marine Fisheries Commission (ASMFC) to protect sharks caught

incidentally in state-managed fisheries. NMFS has requested assistance from the ASMFC, the Gulf States Marine Fisheries Commission (GSMFC), and Atlantic and Gulf Regional Fishery Management Councils in identifying potential sources of bycatch of finetooth sharks in state waters fisheries or other fisheries outside the jurisdiction of this FMP.

### 8.3.1 Squid Mid-Water Trawl

U.S. mid-water trawl fishermen landed 10.8 mt ww of yellowfin tuna, skipjack tuna, albacore tuna, bigeye tuna, and swordfish in 2005 incidental to the squid, mackerel, and butterfish trawl fishery (Table 8.2). Bycatch of HMS in other trawl fisheries may be included as a portion of the overall reported trawl landings in Table 8.2. Swordfish landings increased but remain at a low level relative to the directed fishery landings. A retention limit of fifteen swordfish per trip allows squid trawl fishermen with swordfish limited access permits (incidental permits) to land some of the swordfish that may be encountered, although regulatory discards may still occur.

**Table 8.2 Atlantic HMS Landed (mt ww) Incidental to Trawl Fisheries, 1999 – 2005.** (Source: NMFS, 2007.)

Species	1999	2000	2001	2002	2003	2004	2005
Yellowfin tuna	4.1	1.76	2.7	0.3	2	1	0.2
Skipjack Tuna	1.0	<0.05	0.2	<0.05	0.5	0.2	0.06
Bigeye Tuna	1.2	1.7	0.4	0.5	<0.05	0.3	0.6
Albacore	0.4	<0.05	0.0	0.3	<0.05	2.6	1.7
Swordfish	7.5	10.9	2.5	3.9	6.0	7.6	8.2
Total	14.2	14.43	5.8	4.8	8.6	11.7	10.8

### 8.3.2 Menhaden Purse Seine Fishery

In the Gulf of Mexico menhaden purse seine fishery, sharks were caught incidentally in approximately 30 percent of the purse seine sets observed (de Silva *et al.*, 2001). Ten species of sharks were identified with blacktip sharks being the most common species. Approximately 20 percent of the sharks were not identified to species. At the time of release, 75 percent of sharks were dead, 12 percent were disoriented, and eight percent were healthy. The odds of observing shark bycatch was highest in April and May. Recent estimates of large coastal sharks discarded in this fishery are approximately 20,000 individuals (NMFS, 2006b).

### 8.3.3 Shrimp Trawl Fishery

Shark bycatch in the shrimp trawl fishery consists mainly of sharks too small to be highly valued in the commercial market (Table 8.3). As a result, few sharks are retained. However, requirements for turtle excluder devices in this fishery have probably resulted in less bycatch because sharks are physically excluded from entering the gear.

**Table 8.3** Estimates of (Number of Fish) of Blacknose, Bonnethead, Atlantic Sharpnose, and Finetooth Sharks in the U.S. South Atlantic Shrimp Trawl Fishery. (Source: NMFS, 2007.)

Year	Blacknose	Bonnethead	Atlantic sharpnose	Finetooth
1995	5,068	27,032	71,287	0
1996	4,437	53,496	56,197	0
1997	7,330	46,596	36,745	0
1998	4,285	18,412	57,209	0
1999	3,452	30,357	34,744	0
2000	3,967	15,318	60,202	0
2001	5,732	29,430	35,624	0
2002	3,193	34,159	71,365	0
2003	6,821	24,192	32,951	0
2004	8,240	50,689	19,356	0
2005	2,586	12,529	36,380	0

Bycatch of the SCS complex in the Gulf of Mexico shrimp trawl fishery consists mainly of Atlantic sharpnose and bonnethead sharks (Table 8.4) (NMFS, 2007). Finetooth sharks were added as a select species in shrimp trawl observer program to help determine if this fishery has bycatch of finetooth sharks as well.

**Table 8.4** Estimates of (Number of Fish) of Blacknose, Bonnethead, Atlantic Sharpnose, and Finetooth Sharks in the U.S. Gulf of Mexico Shrimp Trawl Fishery, 1995-2005. (Source: NMFS, 2007.)

Year	Blacknose	Bonnethead	Atl. Sharpnose	Finetooth
1995	40,316	215,025	567,054	0
1996	35,295	425,538	446,999	0
1997	58,309	370,649	292,293	0
1998	34,082	146,640	455,072	0
1999	27,461	241,472	276,374	0
2000	31,556	121,846	478,883	0
2001	45,593	234,102	283,371	0
2002	25,400	271,715	567,679	0
2003	54,258	192,434	262,108	0
2004	65,546	403,209	153,970	0
2005	20,568	99,659	289,384	0

### 8.3.4 Southeast Gillnet Fishery

Gillnet fisheries operating in the South Atlantic, particularly off Florida, have been shown to result in the bycatch of various species of sharks. These fisheries are primarily targeting Spanish mackerel and whiting (kingfish). Vessels participating in these fisheries either

have a mackerel permit and a commercial shark permit which allows retention and landing of sharks, or may be operating in an unmanaged fishery (e.g., whiting) that requires no permit at this time. Vessels operating in these fisheries and holding a federal permit are required to file trip reports (Coastal Fisheries Logbook). Preliminary data from observed gillnet trips not targeting sharks indicate that Atlantic sharpnose, bonnethead, blacktip, finetooth, scalloped hammerhead, blacknose, spinner and tiger sharks were caught (Carlson and Bethea, 2006). Expanding observer coverage in South Atlantic gillnet fisheries that are landing sharks could provide additional data on the extent of the bycatch of HMS species in these fisheries and thereby improve the stock assessments for these species.

#### **8.4 Effectiveness of Existing Time/Area Closures in Reducing Bycatch**

During the past several years, NMFS has implemented several time/area closures in the Atlantic Ocean and Gulf of Mexico for the pelagic longline (PLL) fishery to reduce discards and bycatch of a number of species (juvenile swordfish, bluefin tuna, billfish, sea turtles, etc.). A detailed analysis of the effectiveness of the time/area closures was conducted during the development of the Consolidated HMS FMP (NMFS, 2006a). The continued decline in reported effort (hooks set) indicates a further contraction of the PLL fleet caused by a number of factors such as regulations (time/area restrictions, gear modifications), economics, and weather (2005 hurricanes). These factors make it difficult to accurately assess the impacts of the time/area closures alone. Continued research into the effectiveness of recent mandatory gear modifications is required to accurately assess the effectiveness of these closures and their utility as future bycatch reduction tools. The reported catch and bycatch of selected species or species groups by the PLL fishery for 1995-2006, are listed in Tables 8.5 and 8.6.

**Table 8.5. Reported Catch (Kept) and Discards From the U.S. Pelagic Longline Fishery (Numbers of Fish), 1995-2006.** (Source: PLL Logbook)

<b>Year</b>	<b>Hooks Set</b>	<b>Swordfish Kept</b>	<b>Swordfish Discards</b>	<b>Bluefin Tuna Kept</b>	<b>Bluefin Tuna Discards</b>	<b>Yellowfin Tuna Kept</b>	<b>Yellowfin Tuna Discards</b>	<b>Bigeye Tuna Kept</b>	<b>Bigeye Tuna Discards</b>	<b>BAYS Kept</b>	<b>BAYS Discards</b>
1995	10184577	73036	29835	252	2894	83536	2980	22519	1326	120639	5164
1996	10393702	73764	24380	203	1716	66657	2448	17402	1169	89431	4001
1997	9674513	69222	20555	207	706	76211	1869	21985	1618	105553	4264
1998	8031333	70627	23345	237	1321	55507	2710	19324	876	82572	4018
1999	7893597	67544	20656	270	604	85307	2889	22615	906	116306	4389
2000	8021874	63535	16706	236	738	73205	1772	13890	348	95294	2968
2001	7742247	49236	14448	183	348	53751	1811	18976	559	82997	3806
2002	7229628	50439	13182	178	593	59758	1655	14056	277	80749	2599
2003	7120383	52838	12089	275	881	51988	2015	7539	348	64601	2802
2004	7325950	46950	10704	476	1031	64128	1736	8266	486	77989	3452
2005	5922566	41239	11158	376	766	43833	1316	8383	369	57237	2545
2006	5662011	38241	8900	261	833	55821	1426	12491	257	73058	2865

**Table 8.6. Reported Catch (Kept) and Discards From the U.S. Pelagic Longline Fishery (Numbers of Fish), 1995-2006.** (Source: PLL Logbook)

Year	Pelagic Sharks Kept	Pelagic Shark Discards	Large Coastal Sharks Kept	Large Coastal Shark Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards	Blue Marlin Discards	White Marlin Discards	Sailfish discards	Spearfish discards	Turtle Interactions
1995	5777	90352	25630	8265	72767	4182	5554	442	2876	3158	1171	432	1128
1996	5564	85468	20904	10296	38330	935	3875	541	3146	2599	1456	565	494
1997	5110	82022	13746	7869	63530	1204	4787	91	2309	2436	1765	384	267
1998	3731	45261	6458	5577	23643	299	5445	305	1301	1511	850	103	890
1999	2852	28995	6375	5477	31960	321	5285	128	1253	1971	1411	151	632
2000	3068	28048	7758	6727	29272	294	4232	48	1163	1286	1106	79	271
2001	3511	23954	6510	4892	27914	329	3084	62	659	874	358	142	421
2002	3071	23325	4077	3968	30559	185	4223	33	1181	1449	386	161	467
2003	3129	21771	5332	4882	29609	452	4020	126	606	813	280	114	399
2004	3460	25414	2304	5144	39561	295	4674	35	713	1060	425	172	370
2005	3150	21560	3365	5881	25709	556	3360	280	569	990	367	155	154
2006	2098	24113	1768	5326	25658	1041	3608	100	439	557	277	142	128

## 8.5 Evaluation of Other Bycatch Reduction Measures

NMFS continues to monitor and evaluate bycatch in HMS fisheries through direct enumeration (e.g., pelagic and bottom longline observer programs, shark gillnet observer program), evaluation of management measures (e.g., closed areas, trip limits, gear modifications, etc.), and vessel monitoring systems (VMS).

The following section provides a review of additional management measures or issues that may address bycatch reduction:

- Atlantic Large Whale Take Reduction Plan (ALWTRP)

NMFS requires 100 percent observer coverage during right whale calving season (November 15 – March 31) and 33 percent coverage outside the right whale calving season (April 1 – November 14). Observers were placed on shark gillnet vessels during 2005-06 and covered 84 strikenet, 35 driftnet, and 249 sink gillnet sets during and outside of the right whale calving season (Carlson and Bethea, 2007). No marine mammals were observed caught in either year. A total of 10 sea turtles (nine loggerhead, one leatherback) were observed caught. Five sea turtles (four loggerhead, one leatherback) were taken in drift gillnet sets, four loggerheads were taken in strikenet sets and one loggerhead was taken in a sink gillnet set.

- Atlantic Bottlenose Dolphin Take Reduction Team

NMFS published a final rule on April 22, 2006, to implement the TRP (71 FR 24776). Included in the final rule are: 1) effort reduction measures; 2) gear proximity requirements; 3) gear or gear deployment modifications; and 4) outreach and education measures to reduce dolphin bycatch below the stock's potential biological removal level. The final rule also includes time/area closures and size restrictions on large mesh fisheries to reduce incidental takes of endangered and threatened sea turtles as well as to reduce dolphin bycatch.

- MMPA List of Fisheries Update/Stock Assessment

NMFS continues to update the MMPA List of Fisheries and published the final 2008 List of Fisheries on November 27, 2007. Final 2006 marine mammal stock assessment reports and draft 2007 reports are also available. See **Section 3.1.6.1** for information on obtaining these reports.

- Pelagic Longline Take Reduction Team (PLTRT)

NMFS appointed a PLTRT in June 2005, to address issues in the longline fishery and marine mammals, specifically interactions with pilot whales. A proposed rule was published on June 24, 2008 (73 FR 35623).

- Vessel Monitoring Systems (VMS) in the pelagic longline fishery

NMFS adopted fleet-wide VMS requirements in the Atlantic pelagic longline fishery in May 1999, but was subsequently sued by an industry group. By order dated September 25, 2000, the U.S. District Court for the District of Columbia prevented any immediate implementation of VMS in the Atlantic pelagic longline fishery, and instructed NMFS to “undertake further consideration of the scope of the [VMS] requirements in light of any attendant relevant

conservation benefits.” On October 15, 2002, the court issued a final order that denied plaintiff’s objections to the VMS regulations. Based on this ruling, NMFS implemented the VMS requirement in September 2003.

- VMS in other HMS fisheries

Starting in 2004, gillnet vessels with a directed shark permit and gillnet gear onboard were required to install and operate a VMS unit during the Right Whale Calving Season (November 15 – March 31). In an attempt to better quantify bycatch, NMFS will require all vessels with Limited Access Shark Permits to participate in the Directed Shark Gillnet Observer program. Directed shark bottom longline vessels located between 33° N and 36° 30’ N need to install and operate a VMS unit from January through July.

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