have similar vertical and horizontal movement patterns in terms of time at depth, time at temperature, average horizontal displacement per day, net horizontal displacement, and directional dispersion (compass heading).

Displacements of seven white marlin tagged with PSATs ranged from 31.7 to 267.7 nmi (58.7 to 495.8 km), while displacement of one blue marlin was 219.3 nmi (406.2 km). In general, all marlin spent a high proportion of the monitoring time in the upper 25 m (27 yd) and at temperatures at or above 28° C (82° F). Minimum and maximum depth and temperatures monitored show that on most days marlin visited depths of 100 m (330 ft) or more, but generally stayed at these depths less that 10 percent of the time. Minimum temperatures ranged from 16.8° to 20.6° C (62.2° to 69° F), while maximum temperatures ranged from 28.2° to 30.0° C (82.7° to 86° F).

The characterization of adult movements and larval distribution in a potentially important spawning area is seen as a necessary "first step" towards improved management and rebuilding of depressed Atlantic billfish stocks. However, more information on the distribution of reproduction and nursery areas and on adult movement patterns is needed to help managers make more informed decisions regarding conservation of the resource.

Virginia Institute of Marine Science (VIMS) Blue Marlin and White Marlin Tagging Studies (Kerstetter, Pers. Comm.)

Scientists at VIMS have been involved with electronic tagging of blue and white marlin since 1999, some of which has been conducted in conjunction with the NOAA SEFSC. More recently, VIMS has deployed over 60 pop-up satellite archival tags (PSATs) on white marlin during the past three years from both recreational sport boats and a commercial pelagic longline vessel to determine post-release survival (paper in press). In addition to this work, VIMS is also in the process of updating information regarding habitat preferences and vertical movements of white marlin using environmental data obtained from the PSAT work, as well as other environmental data. Most of the work at VIMS, however, remains focused on the interactions of billfish with the various fisheries.

3.4 Fishery Data Update

In this section, HMS fishery data, with the exception of some data on Atlantic sharks, are analyzed by gear type; Section 3.4.6 provides a summary of landings by species. While HMS fishermen generally target particular species, the non-selective nature of most fishing gears promote effective analysis and management on a gear-by-gear basis. In addition, issues such as bycatch, and safety are generally better addressed by gear type. A summary of catch statistics can be found in Section 3.4.6 of this report.

The revised list of authorized fisheries (LOF) and fishing gear used in those fisheries became effective December 1, 1999 (64 FR 67511). The rule applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, "no person or vessel may employ fishing gear or participate in a fishery in the exclusive economic zone (EEZ) not included in this LOF without giving 90 days' advance notice to the appropriate Fishery Management Council (Council) or, with respect to Atlantic HMS, the Secretary of Commerce (Secretary)." Acceptable HMS

fisheries and authorized gear types for Atlantic tunas, swordfish, and sharks include: swordfish handgear fishery - rod and reel, harpoon, handline, bandit gear; pelagic longline fishery - longline; shark drift gillnet fishery - gillnet; shark bottom longline fishery - longline; shark recreational fishery - rod and reel, handline; tuna purse seine fishery - purse seine; tuna recreational fishery- rod and reel, handline; and tuna handgear fishery - rod and reel, harpoon, handline, bandit gear. For Atlantic billfish, the only acceptable fishery and authorized gear type is recreational fishery - rod and reel. Species whose life history characteristics may lead to their eventual categorization as highly migratory, but which are not currently under the Secretary or Regional Council management authority, are covered in two broad categories: Recreational Fisheries (Non-FMP) and Commercial Fisheries (Non-FMP). Species that fit this description may be harvested with the gears listed for these catchall categories.

Due to the nature of SCRS data collection, Table 3.19 depicts a summary of U.S. and international HMS catches by species rather than gear type. International catch levels are taken from the 2004 Standing Report of the SCRS, while U.S. reported catches, other than sharks, are taken from the U.S. National Report. The U.S. percentage of regional and total catches for HMS species are presented (Table 3.19) to provide a basis for comparison of the U.S.' catches relative to other nations/entities. Catch of billfish includes both recreational landings and dead discards from commercial fisheries; catch for bluefin tuna includes commercial landings and discards and recreational landings; and swordfish include commercial landings and discards. Historical catch levels dating back to 1950 can be found in the SCRS Report and a discussion of typical species-specific U.S. catch levels can be found in the 1999 Tunas, Swordfish, and Shark FMP. International catch and landings tables are included for the longline and purse seine fisheries in Sections 3.4.1 and 3.4.2 of this report. At this point, data necessary to assess the U.S. regional and total percentage of international catch levels for Atlantic shark species are unavailable.

Table 3.19 **Calendar Year 2003 U.S. vs International Catch of HMS (mt ww) other than sharks.** Source: SCRS, 2004.

Species	Total International Reported Catch	Region of U.S. Involvement	Total Regional Catch	U.S. Catch	U.S. Percentage of Regional Catch	U.S. Percentage of Total Atlantic Catch
Atlantic Swordfish	21,946* (includes N. & S. Atlantic)	North Atlantic	11,028*	2,524	22.88%	11.59%
		South Atlantic	10,919*	20	0.18%	
Atlantic Bluefin Tuna	30,513**	West Atlantic	2,144	1,428 (52 mt discards)	66.60%	4.68%
Atlantic Bigeye Tuna	85,088	Total Atlantic	85,088	484	0.57%	0.57%
Atlantic Yellowfin Tuna	123,929	West Atlantic	24,978	7,702	30.84%	6.21%
Atlantic Albacore Tuna	60,742 (includes N. & S. Atlantic and Mediterranean)	North Atlantic	25,516	448	1.76%	0.74%
		South Atlantic	27,811	2	0.007%	

Species	Total International Reported Catch	Region of U.S. Involvement	Total Regional Catch	U.S. Catch	U.S. Percentage of Regional Catch	U.S. Percentage of Total Atlantic Catch
Atlantic Skipjack Tuna	147,478	West Atlantic	24,053	78	0.32%	0.05%
Atlantic Blue Marlin	1,951	North Atlantic	640	19	2.96%	0.97%
Atlantic White Marlin	571	North Atlantic	191	1	0.52%	0.18%
Atlantic Sailfish	1,835	West Atlantic	1,310	53	4.04%	2.88%

* Actual catches are likely higher given significant non-compliance with ICCAT reporting requirements.
** Significant non-compliance with ICCAT reporting requirements affects SCRS from estimating aggregate 2003 eastern Atlantic bluefin tuna catches accurately.

3.4.1 Pelagic Longline Fishery

3.4.1.1 Domestic Aspects of the Atlantic Pelagic Longline Fishery

The U.S. pelagic longline fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, and bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, pelagic sharks (including mako, thresher, and porbeagle sharks), as well as several species of large coastal sharks. Although this gear can be modified (i.e., depth of set, hook type, etc.) to target swordfish, tunas, or sharks, it is generally a multi-species fishery. These vessel operators are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity of each individual trip. Pelagic longline gear sometimes attracts and hooks non-target finfish with no commercial value, as well as species that cannot be retained by commercial fishermen due to regulations, such as billfish. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles, and seabirds. Thus, this gear has been classified as a Category I fishery with respect to the Marine Mammal Protection Act. Any species (or undersized catch of permitted species) that cannot be landed due to fishery regulations is required to be released, whether dead or alive. Pelagic longline gear is composed of several parts (see Figure 3.18[5]).

[5] As of April 1, 2001, (66 FR 17370) a vessel is considered to have pelagic longline gear on board when a power-operated longline hauler, a mainline, floats capable of supporting the mainline, and leaders (gangions) with hooks are on board.

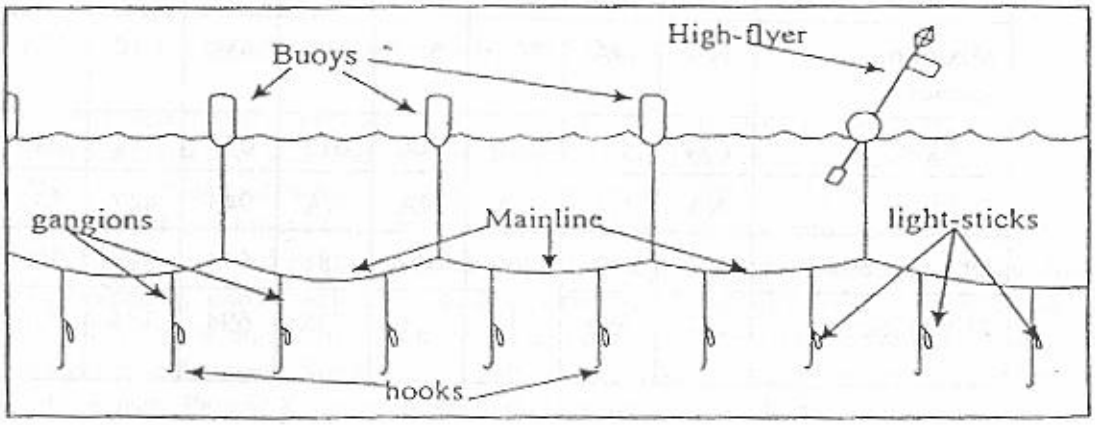

Figure 3.18 Typical U.S. Pelagic Longline Gear. Source: Arocha, 1996

The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys and periodic markers which can have radar reflectors or radio beacons attached. Each individual hook is connected by a leader to the mainline. Lightsticks, which contain chemicals that emit a glowing light are often used, particularly when targeting swordfish. When attached to the hook and suspended at a certain depth, lightsticks attract baitfish, which may, in turn, attract pelagic predators.

When targeting swordfish, the lines generally are deployed at sunset and hauled at sunrise to take advantage of swordfish nocturnal near-surface feeding habits (NMFS, 1999). In general, longlines targeting tunas are set in the morning, deeper in the water column, and hauled in the evening. Except for vessels of the distant water fleet, which undertake extended trips, fishing vessels preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface. The number of hooks per set varies with line configuration and target species (Table 3.20).

Table 3.20 Average Number of Hooks per Pelagic Longline Set, 1999 - 2003. Source: Data reported in pelagic longline logbook.

Target Species	1999	2000	2001	2002	2003
Swordfish	521	550	625	695	712
Bigeye Tuna	768	454	671	755	967
Yellowfin Tuna	741	772	731	715	723
Mix of tuna species	NA	638	719	767	764
Shark	613	621	571	640	970
Dolphin	NA	943	447	542	692
Other species	781	504	318	300	865
Mix of species	738	694	754	756	750

Figure 3.19 illustrates the difference between swordfish (shallow) sets and tuna (deep) longline sets. Swordfish sets are buoyed to the surface, have few hooks between floats, and are relatively shallow. This same type of gear arrangement is used for mixed target sets. Tuna sets

use a different type of float placed much further apart. Compared with swordfish sets, tuna sets have more hooks between the floats and the hooks are set much deeper in the water column. It is believed that because of the difference in fishing depth, tuna sets hook fewer turtles than the swordfish sets. In addition, tuna sets use bait only, while swordfish fishing uses a combination of bait and lightsticks. Compared with vessels targeting swordfish or mixed species, vessels specifically targeting tuna are typically smaller and fish different grounds.

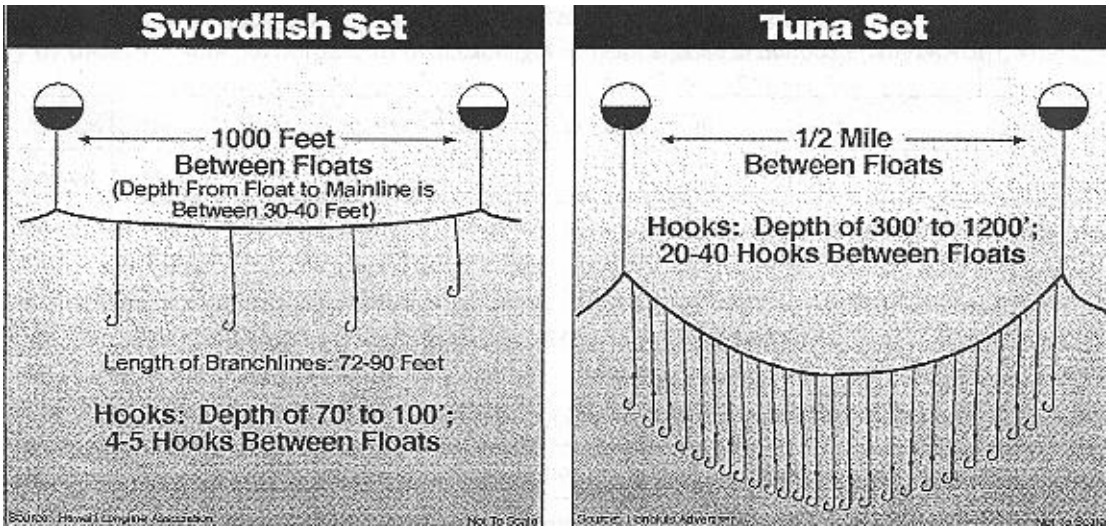

Figure 3.19 Different Pelagic Longline Gear Deployment Techniques. Source: Hawaii Longline Association and Honolulu Advertiser.

Regional U.S. Pelagic Longline Fisheries Description

The U.S. pelagic longline fishery sector is comprised of five relatively distinct segments with different fishing practices and strategies, including the Gulf of Mexico yellowfin tuna fishery, the South Atlantic-Florida east coast to Cape Hatteras swordfish fishery, the mid-Atlantic and New England swordfish and bigeye tuna fishery, the U.S. distant water swordfish fishery, and the Caribbean Islands tuna and swordfish fishery. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, segments differ by percentage of various target and non-target species, gear characteristics, and deployment techniques. Some vessels fish in more than one fishery segment during the course of the year.

<u>The Gulf of Mexico Yellowfin Tuna Fishery</u>

Gulf of Mexico vessels primarily target yellowfin tuna year-round; however, each port has one to three vessels that directly target swordfish, either seasonally or year-round. Longline fishing vessels that target yellowfin tuna in the Gulf of Mexico also catch and sell dolphin, swordfish, other tunas, and sharks. During yellowfin tuna fishing, few swordfish are captured incidentally. Many of these vessels participate in other Gulf of Mexico fisheries (targeting

shrimp, shark, and snapper/grouper) during allowed seasons. Home ports for this fishery include Madiera Beach, Florida; Panama City, Florida; Dulac, Louisiana; and Venice, Louisiana.

For catching tuna, the longline gear is configured similar to swordfish longline gear but is deployed differently. The gear is typically set out at dawn (between 2 a.m. and noon) and retrieved at sunset (4 p.m. to midnight). The water temperature varies based on the location of fishing. However, yellowfin tuna are targeted in the western Gulf of Mexico during the summer when water temperatures are high. In the past, fishermen have used live bait, however, NMFS prohibited the use of live bait in an effort to decrease bycatch and bycatch mortality of billfish (65 FR 47214, August 1, 2000). In this, and all other areas, except the NED, specific circle hooks (16/0 or larger non-offset and 18/0 or larger with an offset not to exceed 10 degrees) are currently required, as are whole finfish and squid baits.

The South Atlantic ~ Florida East Coast to Cape Hatteras Swordfish Fishery

South Atlantic pelagic longline vessels previously targeted swordfish year-round, although yellowfin tuna and dolphin fish were other important marketable components of the catch. In 2001 (65 FR 47214, August 1, 2000), the Florida East Coast closed area (year-round closure) and the Charleston Bump closed area (February through April closure) became effective. NMFS plans to analyze logbook data to determine the effectiveness of these closed areas (see Sections 2.1 and 3.8).

Prior to these closures, smaller vessels used to fish short trips from the Florida Straits north to the bend in the Gulf Stream off Charleston, South Carolina (Charleston Bump). Mid-sized and larger vessels migrate seasonally on longer trips from the Yucatan Peninsula throughout the West Indies and Caribbean Sea, and some trips range as far north as the mid-Atlantic coast of the United States to target bigeye tuna and swordfish during the late summer and fall. Fishing trips in this fishery average nine sets over 12 days. Home ports (including seasonal ports) for this fishery include Georgetown, South Carolina; Charleston, South Carolina; Fort Pierce, Florida; Pompano Beach, Florida; and Key West, Florida. This sector of the fishery consists of small to mid-size vessels, which typically sell fresh swordfish to local high-quality markets.

The Mid-Atlantic and New England Swordfish and Bigeye Tuna Fishery

Fishing in this area has evolved during recent years to focus almost year-round on directed tuna trips, with substantial numbers of swordfish trips as well. Some vessels participate in directed bigeye/yellowfin tuna fishing during the summer and fall months and then switch to bottom longline and/or shark fishing during the winter when the large coastal shark season is open. Fishing trips in this fishery sector average 12 sets over 18 days. During the season, vessels primarily offload in the ports of New Bedford, Massachusetts; Barnegat Light, New Jersey; Ocean City, Maryland; and Wanchese, North Carolina.

The U.S. Atlantic Distant Water Swordfish Fishery

This fishing ground covers virtually the entire span of the western north Atlantic to as far east as the Azores and the mid-Atlantic Ridge. Approximately 12 large fishing vessels operate

out of mid-Atlantic and New England ports during the summer and fall months targeting swordfish and tunas, and then move to Caribbean ports during the winter and spring months. Many of the current distant water operations were among the early participants in the U.S. directed Atlantic commercial swordfish fishery. These larger vessels, with greater ranges and capacities than the coastal fishing vessels, enabled the United States to become a significant player in the north Atlantic fishery. They also fish for swordfish in the south Atlantic. The distant water vessels traditionally have been larger than their southeast counterparts because of the distances required to travel to the fishing grounds. Fishing trips in this fishery tend to be longer than in other fisheries, averaging 30 days and 16 sets. Ports for this fishery range from San Juan, Puerto Rico through Portland, Maine, and include New Bedford, Massachusetts, and Barnegat Light, New Jersey. This segment of the fleet was directly affected by the L-shaped closure in 2000 and the NED closure in 2001. A number of vessels have recently returned to this fishery with the issuance of the July 6, 2004, rule (69 FR 40734) to reduce sea turtle bycatch and bycatch mortality. Unlike in other areas, vessels fishing in the NED are required to use specific circle hooks (18/0 or larger with an offset not to exceed 10 degrees) and whole mackerel and squid baits.

The Caribbean Tuna and Swordfish Fishery

This fleet is similar to the southeast coastal fishing fleet in that both are comprised primarily of smaller vessels that make short trips relatively near-shore, producing high quality fresh product. Both fleets also encounter relatively high numbers of undersized swordfish at certain times of the year. Longline vessels targeting HMS in the Caribbean use fewer hooks per set, on average, fishing deeper in the water column than the distant water fleet off New England, the northeast coastal fleet, and the Gulf of Mexico yellowfin tuna fleet. This fishery is typical of most pelagic fisheries, being truly a multi-species fishery, with swordfish as a substantial portion of the total catch. Yellowfin tuna, dolphin and, to a lesser extent, bigeye tuna, are other important components of the landed catch. Ports for this fishery include St. Croix, U.S. Virgin Islands; and San Juan, Puerto Rico. Many of these high quality fresh fish are sold to local markets to support the tourist trade in the Caribbean.

U.S Pelagic Longline Catch, Landings, and Bycatch

U.S. pelagic longline catch (including bycatch, incidental catch, and target catch) is largely related to these vessel and gear characteristics, but is summarized for the whole fishery in Table 3.21. U.S. pelagic longline landings of Atlantic tunas and swordfish for 1999 – 2003 are summarized in Table 3.22. Additional information related to landings can be seen in Section 3.4.6.

Table 3.21 Reported Catch of Species Caught by U.S. Atlantic Pelagic Longlines, in Number of Fish, for 1999 - 2003. Source: Pelagic Longline Logbook Data.

Species	1999	2000	2001	2002	2003
Swordfish Kept	67,120	62,978	47,560	49,320	51,835
Swordfish Discarded	20,558	17,074	13,993	13,035	11,829
Blue Marlin Discarded	1,253	1,443	635	1,175	595

Species	1999	2000	2001	2002	2003
White Marlin Discarded	1,969	1,261	848	1,438	809
Sailfish Discarded	1,407	1,091	356	379	277
Spearfish Discarded	151	78	137	148	108
Bluefin Tuna Kept	263	235	177	178	273
Bluefin Tuna Discarded	604	737	348	585	881
Bigeye, Albacore, Yellowfin, Skipjack Tunas Kept	114,438	94,136	80,466	79,917	63,321
Pelagic Sharks Kept	2,894	3,065	3,460	2,987	3,037
Pelagic Sharks Discarded	28,967	28,046	23,813	22,828	21,705
Large Coastal Sharks Kept	6,382	7,896	6,478	4,077	5,326
Large Coastal Sharks Discarded	5,442	6,973	4,836	3,815	4,813
Dolphin Kept	31,536	29,125	27,586	30,384	29,372
Wahoo Kept	5,136	4,193	3,068	4,188	3,919
Turtles Discarded	631	271	424	465	399
Number of Hooks (X 1,000)	*7,902*	*7,976*	*7,564*	*7,150*	*7,008*

Table 3.22 Reported Landings in the U.S. Atlantic Pelagic Fishery (in mt ww) for 1999 - 2003. Source: U.S. National Report to ICCAT, 2004 (NOAA Fisheries, 2004a).

Species	1999	2000	2001	2002	2003
Yellowfin Tuna	3,374	2,901	2,201	2,573	2,154
Skipjack Tuna	2.0	1.8	4.3	2.5	4.2
Bigeye Tuna	929.1	531.9	682.4	535.8	284.9
Bluefin Tuna	73.5	66.1	37.5	49.9	81.4
Albacore Tuna	194.5	147.3	193.8	155	110.9
Swordfish N.*	3,362.4	3,315.8	2,483	2,598.8	2,772.1
Swordfish S.*	185.2	143.8	43.2	199.9	20.9

* Includes landings and estimated discards from scientific observer and logbook sampling programs.

Marine Mammals

Of the marine mammals that are hooked by U.S. pelagic longline fishermen, many are released alive, although some animals suffer serious injuries and may die after being released.

Marine mammals are caught primarily during the third and fourth quarters in the Mid-Atlantic Bight and Northeast Coastal areas (Figure 3.20). In 2003, the incidental catch was highest in the third quarter in the Mid-Atlantic Bight.

In 2000, there were 14 observed takes of marine mammals by pelagic longlines. This number has been extrapolated based on reported fishing effort to an estimated 403 mammals fleet-wide (32 common dolphin, 93 Risso's dolphin, 231 pilot whales, 19 whales, 29 pygmy sperm whales) (Yeung, 2001). Incidental catch of pilot whales on pelagic longlines is thought to result from pilot whales preying on tuna that have been caught on the gear.

In 2001 and 2002, there were 16 and 24 observed takes of marine mammals, respectively. The majority of these interactions were observed in the Mid-Atlantic Bight, followed by the NED research experiment. In 2001, a total of 84 Risso's dolphin and 93 pilot whales are estimated to have been interacted with in the pelagic longline fishery. In 2002, the pelagic longline fishery is estimated to have interacted with 87 Risso's dolphin and 114 pilot whales. In the NED research experiment, an additional four Risso's dolphin and one northern bottlenose whale were recorded with serious injuries during 2001, as well as three Risso's dolphin, one unidentified dolphin, and one unidentified marine mammal in 2002. One striped dolphin was recorded as released alive during the NED experiment in 2001, as well as one Risso's dolphin, one common dolphin, one pilot whale, and one unidentified dolphin in 2002 (Garrison, 2003).

In 2003, there were 28 observed takes of marine mammals in the pelagic longline fishery. The majority of these interactions were observed in the Mid-Atlantic Bight, followed by the NED experimental fishery, and the Northeast Coastal area. This number has been extrapolated based on reported fishing effort to an estimated 300 mammals fleet wide (49 beaked whales, 16 dolphin, 30 Atlantic spotted dolphin, 46 common dolphin, 105 Risso's dolphin, 32 pilot whales, 22 minke whales). In addition, five Risso's dolphin, one striped dolphin, and one baleen whale were observed captured in the 2003 NED research experiment, with one Risso's dolphin recorded as dead (Garrison and Richards, 2004).

Sea Turtles

Currently, many sea turtles are taken in the Gulf of Mexico and Northeast Coastal areas (Figure 3.20) and most are released alive. In the past, the bycatch rate was highest in the third and fourth quarters. Loggerhead and leatherback turtles dominate the catch of sea turtles. In general, sea turtle captures are rare, but takes appear to be clustered (Hoey and Moore, 1999).

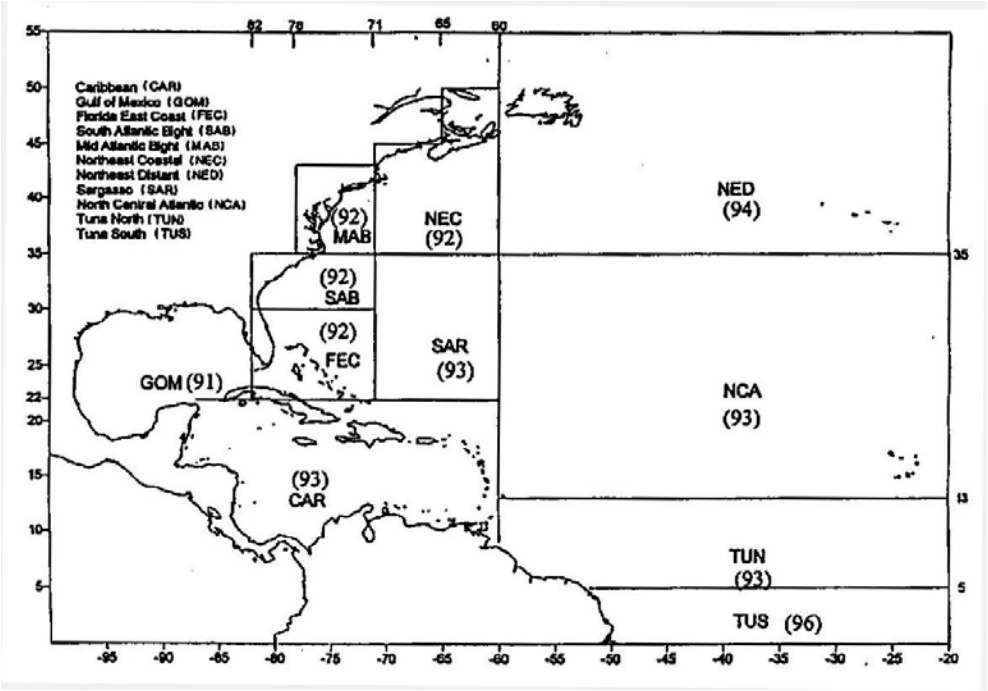

Figure 3.20 Geographic Areas Used in Summaries of Pelagic Logbook Data. Source: Cramer and Adams, 2000

The estimated take levels for 2000 were 1,256 loggerhead and 769 leatherback sea turtles (Yeung, 2001). For 2001, the estimated take levels outside of the NED closed area were 312 loggerhead and 1,208 leatherback sea turtles. For 2002, the estimated take levels outside of the NED closed area were 575 loggerhead and 962 leatherback sea turtles (Garrison, 2003). In 2003, the estimated take levels outside the NED closed area were 727 loggerhead and 1,112 leatherback sea turtles, with greatest number of takes occurring in the GOM.

As a result of the increased sea turtle interactions in 2001 and 2002, NMFS reinitiated consultation for the pelagic longline fishery and completed a new BiOp on June 1, 2004. The June 2004 BiOp concluded that long-term continued operation of the Atlantic pelagic longline fishery is not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp's ridley, or olive ridley sea turtles, but is likely to jeopardize the continued existence of leatherback sea turtles. The BiOp included a reasonable and prudent alternative (RPA) and an incidental take statement (ITS) for the combined years 2004 – 2006, and for each subsequent three-year period (NOAA Fisheries, 2004b).

A final rule published in July 2004 (69 FR 40734) prohibited the possession of "J"-style hooks in the pelagic longline fishery and required the possession and use of specific sea turtle release and disentanglement gears, handling and release protocols, as well as requiring the use of specific circle hooks and baits.

NED Research Experiment

Consistent with the conservation recommendation of an earlier, 2001 BiOp, NMFS initiated a research experiment in the NED area in consultation and cooperation with the

domestic pelagic longline fleet. The goal was to develop and evaluate the efficacy of new technologies and changes in fishing practices to reduce sea turtle interactions. In 2001, the experiment attempted to evaluate the effect of gangions placed two gangion lengths from floatlines, the effect of blue-dyed bait on target catch and sea turtle interactions, and the effectiveness of dipnets, line clippers, and dehooking devices. Eight vessels participated, making 186 sets, between August and November. During the course of the research experiment, 142 loggerhead and 77 leatherback sea turtles were incidentally captured and no turtles were released dead.

The data gathered during the 2001 experiment were analyzed to determine if the tested measures reduced the incidental capture of sea turtles by a statistically significant amount. The blue-dyed bait parameter decreased the catch of loggerheads by 9.5 percent and increased the catch of leatherbacks by 45 percent. Neither value is statistically significant. In examining the gangion placement provision, the treatment sections of the gear (with gangions placed 20 fathoms from floatlines) did not display a statistically significant reduction in the number of loggerhead and leatherback sea turtle interactions than the control sections of the gear (with a gangion located under a floatline). The treatment section of the gear recorded an insignificant increase in the number of leatherback interactions. Following an examination of the data, NMFS discovered that the measures had no significant effect upon the catch of sea turtles (Watson *et al.*, 2003).

Dipnets and line clippers were examined for general effectiveness. The dipnets were found to be adequate in boating loggerhead sea turtles. Several line clippers were tested, with the La Force line clipper having the best performance. Several types of dehooking devices were tested, with the work on these devices continuing in the 2002 and 2003 NED research experiment.

In the summer and fall of 2002, NMFS conducted the second year of the research experiment. The use of circle and “J”-hooks, whole mackerel bait, squid bait, and shortened daylight soak time were tested to examine their effectiveness in reducing the capture of sea turtles. The data indicate there were 501 sets made by 13 vessels with 100 percent observer coverage. During the course of the experiment, 100 loggerhead and 158 leatherback sea turtles were captured and 11 were tagged with satellite tags. In addition to the sea turtles, the vessels interacted with one unidentified marine mammal, one unidentified dolphin, one common dolphin, one longfin pilot whale, and four Risso's dolphins; all were released alive (Watson *et al.*, 2003).

In 2003, the research experiment tested a number of treatments to verify the results of the 2002 experiment in addition to testing additional treatments. Data indicate that there were 539 sets made by 11 vessels with 100 percent observer coverage. During the course of the experiment, one olive ridley, 92 loggerhead, and 79 leatherback sea turtles were captured; all were released alive (Foster *et al.*, 2004; Watson *et al.*, 2004). In addition to the sea turtles, the vessels interacted with one striped dolphin, one baleen whale, and five Risso’s dolphin resulting in one mortality (Garrison and Richards, 2004).

From 2001 through 2003, NMFS worked with the commercial fishing industry to develop new pelagic longline fishing technology to reduce interaction rates and bycatch mortality of threatened and endangered sea turtles. The cooperative gear technology research investigated line configurations, setting and retrieving procedures, hook types, hook sizes, bait types, and release and disentanglement gears. Ultimately, specific hook designs and bait types were found to be the most effective measures for reducing sea turtle interactions. Large circle hooks and mackerel baits were found to substantially reduce sea turtle interactions over the use of the industry standard "J"-hooks and squid baits. The gears developed to remove hooks and line from hooked and entangled sea turtles are anticipated to reduce post-hooking mortality associated with those interactions not avoided.

NMFS believes that the transfer of this information to other fishing countries will result in significant reductions in interaction rates and post-release mortalities of threatened and endangered sea turtles throughout their ranges.

Seabirds

Gannets, gulls, greater shearwaters, and storm petrels are occasionally hooked by Atlantic pelagic longlines. These species and all other seabirds are protected under the Migratory Bird Treaty Act. Seabird populations are often slow to recover from excess mortality as a consequence of their low reproductive potential (one egg per year and late sexual maturation). According to NMFS observer data from 2003, three unidentified seabirds were observed hooked between January and September. The majority of longline interactions with seabirds occur as the gear is being set. The birds eat the bait and become hooked on the line. The line then sinks and the birds are subsequently drowned.

The United States has developed a National Plan of Action in response to the Food and Agriculture Organization of the United Nations (FAO) International Plan of Action to reduce the incidental take of seabirds (http://www.nmfs.gov.gov/NPOA-S.html). Although Atlantic pelagic longline interactions will be considered in the plan, NMFS has not identified a need to implement gear modifications to reduce seabird takes by Atlantic pelagic longlines. Takes of seabirds have been minimal in the fishery, most likely due to the setting of longlines at night and/or fishing in areas where birds are largely absent. Observed seabird bycatch in the Atlantic pelagic longline fishery from 1999 - 2003 can be seen in Section 3.8.

Finfish

In the U.S. pelagic longline fishery, fish are discarded for a variety reasons. Swordfish, yellowfin tuna, and bigeye tuna may be discarded because they are undersized or unmarketable (e.g., shark bitten). Blue sharks, as well as other species, are discarded because of a limited markets (resulting in low prices) and perishability of the product. Large coastal sharks are discarded during times when the shark season is closed. Bluefin tuna may be discarded because target catch requirements for other species have not been met. Also, all billfish are required to be released. In the past, swordfish have been discarded when the swordfish season was closed. Reported catch from 1999 – 2003 for the U.S. pelagic longline fishery (including reported bycatch, incidental catch, and target catch) is summarized in Table 3.4.1.2. Additional U.S.

landings and discard data are available in the 2004 U.S. National Report to ICCAT (NOAA Fisheries, 2004a).

At this time, direct use of observer data with pooling for estimating dead discards in this fishery represents the best scientific information available for use in stock assessments. Direct use of observer data has been employed for a number of years to estimate dead discards in Atlantic and Pacific longline fisheries, including billfish, sharks, and undersized swordfish. Furthermore, the data have been used for scientific analyses by both ICCAT and the Inter-American Tropical Tuna Commission (IATTC) for a number of years.

Bycatch mortality of marlins, swordfish, and bluefin tuna from all fishing nations may significantly reduce the ability of these populations to rebuild, and it remains an important management issue. In order to minimize bycatch and bycatch mortality in the domestic pelagic longline fishery, NMFS implemented regulations to close areas to longline fishing (Figure 3.4.1.4) and has banned the use of live bait by longline vessels in the Gulf of Mexico.

As part of the BFT rebuilding program, ICCAT recommends an allowance for dead discards. The U.S. annual dead discard allowance is 68 mt ww. The estimate for the 2003 calendar year was used as a proxy to calculate the amount to be added to, or subtracted from, the U.S. BFT landings quota for 2004. The 2003 calendar year preliminary estimate of U.S. dead discards, as reported per the longline discards calculated from logbook tallies, adjusted as warranted when observer counts in quarterly/geographic stratum exceeded logbook reports, totaled 52.4 mt ww. Estimates of dead discards from other gear types and fishing sectors that do not use the pelagic longline vessel logbook are unavailable at this time, and thus, are not included in this calculation. As U.S. fishing activity is estimated to have resulted in fewer dead discards than its allowance, the ICCAT recommendation and U.S. regulations state that the United States may add one half of the difference between the amount of dead discards and the allowance (i.e., 68.0 mt – 52.4 mt = 15.6 mt, 15.6 mt/2 = 7.8 mt ww) to its total allowed landings for the following fishing year, to individual fishing categories, or to the Reserve category. NMFS proposes to allocate the 7.8 mt ww to the Reserve category quota to assist in covering potential overharvests from the previous fishing years.

The 2002 calendar year preliminary dead discard estimate, as reported in pelagic longline vessel logbooks and published in 2003 Final Initial Quota Specifications (68 FR 56783, October 2, 2003), totaled 38.0 mt ww. This preliminary estimate has been revised using the longline discards calculated from logbook tallies, adjusted as warranted when observer counts in stratum exceeded logbook reports. The revised 2002 calendar year dead discard estimate is 41.6 mt ww.

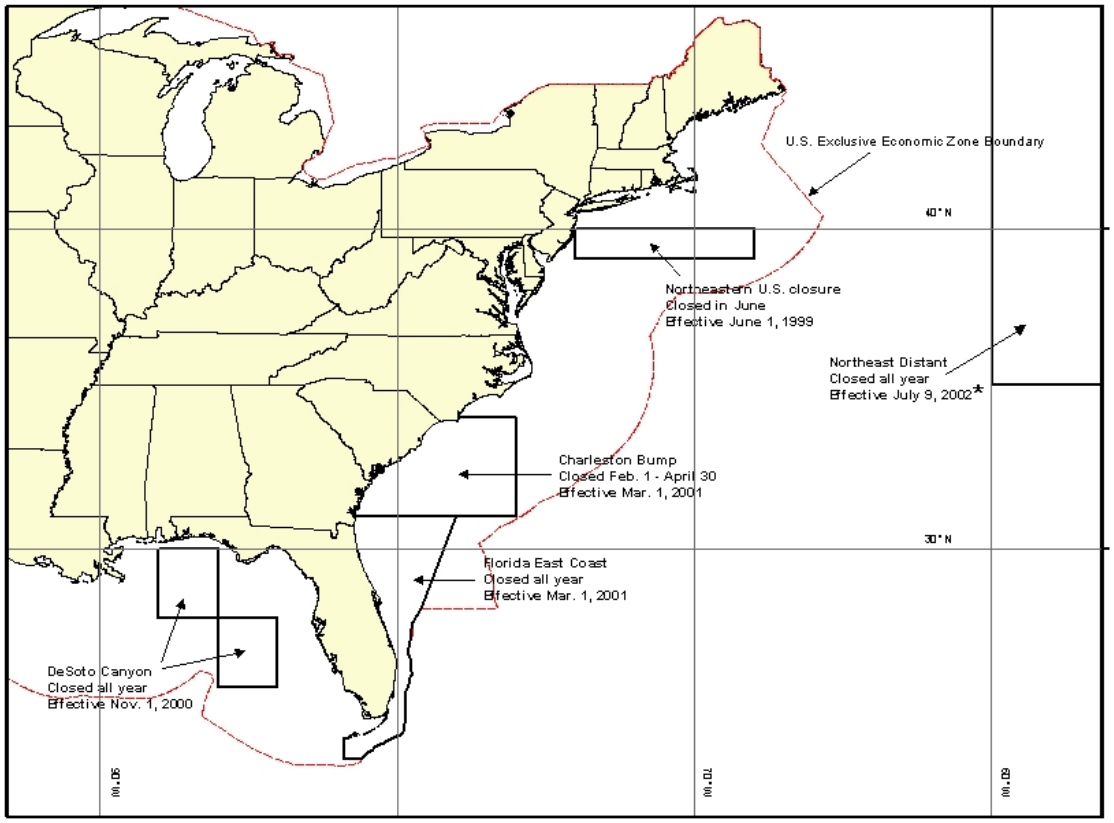

Figure 3.21 Areas Closed to Pelagic Longline Fishing by U.S. Flagged Vessels

*Closed except to vessels complying with specific conditions (see 50 CFR 635 for details).

3.4.1.2 International Aspects of the Atlantic Pelagic Longline Fishery

Pelagic longline fisheries for Atlantic HMS primarily target swordfish and tunas. Directed pelagic longline fisheries in the Atlantic have been operated by Spain, the United States, and Canada since the late 1950s or early 1960s. The Japanese pelagic longline tuna fishery started in 1956 and has operated throughout the Atlantic since then. Most of the 35 other ICCAT nations now also operate pelagic longline vessels.

ICCAT generally establishes management recommendations on a species (*e.g.* swordfish) or issue basis (*e.g.* data collection) rather than by gear type. For example, ICCAT typically establishes quotas or landing limits by species, not gear type. In terms of data collection, ICCAT may require use of specific collection protocols or specific observer coverage levels in certain fisheries or on vessels of a certain size, but these are usually applicable to all gears, and not specific to any one gear type. However, there are a handful of management recommendations that are specifically applicable to the international pelagic longline fishery. These include, a prohibition on longlining in the Mediterranean Sea in June and July by vessels over 24 meters in length, a prohibition on pelagic longline fishing for bluefin tuna in the Gulf of Mexico, and mandated reductions in Atlantic white and blue marlin landings for pelagic longline and purse seine vessels from specified levels, among others.

Because most ICCAT management recommendations pertain to individual species or issues, as discussed above, it is often difficult to obtain information specific to the international pelagic longline fishery. For example, a discussion of authorized total allowable catches (TAC) for specific species in this section of the document would be of limited utility because it is not possible to identify what percentage of quotas are allocated to pelagic longline. Division of quota, by gear type, is typically done by individual countries.

Nevertheless, ICCAT does report landings by gear type. Available data indicate that longline effort produces the second highest volume of catch and effort, and is the most broadly distributed (longitudinally and latitudinally) of the gears used to target ICCAT managed species (Figure 3.22) (SCRS, 2004). Purse seines produce the highest volume of catch of ICCAT managed species from the Atlantic (SCRS, 2004). From 1999 through 2002 (inclusive) there was a declining trend in estimated international landings of HMS for fisheries in which the U.S. participated. In 2003, international landings of HMS for fisheries in which the U.S. participated totaled 113,826 mt, which represented a modest increase over 2002 (SCRS, 2004). Detailed information on international Atlantic pelagic longline catches can be found in Table 3.24.

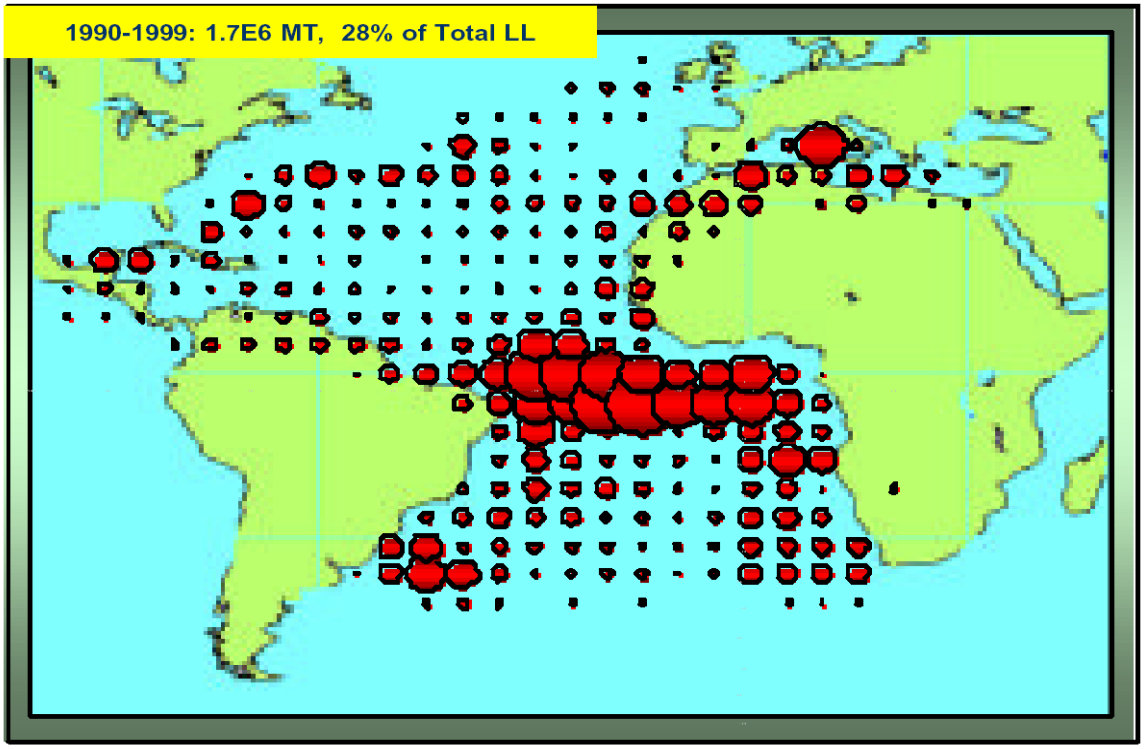

Figure 3.22 Distribution of Atlantic Longline Catches for all Countries 1990-1999. Source: SCRS, 2004

Scientific observer data are being collected on a range of pelagic longline fleets in the Atlantic and will be increasingly useful in better quantifying total catch, catch composition, and disposition of catch as these observer programs mature. Previous ICCAT observer coverage requirements of five percent for non-purse seine vessels that participated in the bigeye and

yellowfin tuna fishery, including pelagic longline (per ICCAT Recommendation 96-01), are no longer in force. There is currently no ICCAT required minimum level of observer coverage specific to pelagic longline fishing. Japan is required to have eight percent observer coverage of its vessels fishing for swordfish in the North Atlantic, which are primarily pelagic longline vessels, however, the recommendation is not specific to vessel or gear type. ICCAT recommendation 04-01, a conservation and management recommendation for the bigeye tuna fishery, will enter into force in mid-2005 and requires at least five percent observer coverage of pelagic longline vessels over 24 meters fishing for bigeye.

ICCAT has also developed a running tabulation of the diversity of species caught by the various gears used to target tunas and tuna like species in the Atlantic and Mediterranean (Table 3.23). For all fish species, longline gear shows the highest documented diversity of catch, followed by gillnets and purse seine. For seabirds, longline gear again shows the highest diversity of catch, while for sea turtles and marine mammals, purse seine and gillnet have a higher documented diversity of species for Atlantic tuna fleets (SCRS, 2004).

Table 3.23 ICCAT Bycatch Table (LL, longline; GILL, gillnets; PS, purse-seine; BB, baitboat; HARP, harpoon; Trap, traps). Source: SCRS 2004.

ICCAT Bycatch Table (www.iccat.es)

Count	Group	LL	GILL	PS	BB	HARP	TRAP	OTHER
214	*All Groups*	149	110	78	12	33	20	43
		69.6%	51.4%	36.4%	5.6%	15.4%	9.3%	20.1%
12	*Skates and Rays*	10	6	6	0	2	0	1
		83.3%	50.0%	50.0%	0.0%	16.7%	0.0%	8.3%
46	*Coastal Sharks*	45	19	6	1	7	2	9
		97.8%	41.3%	13.0%	2.2%	15.2%	4.3%	19.6%
11	*Pelagic Sharks*	10	7	5	0	5	2	4
		90.9%	63.6%	45.5%	0.0%	45.5%	18.2%	36.4%
23	*Teleosts (ICCAT Species)*	23	18	16	9	6	7	11
		100.0%	78.3%	69.6%	39.1%	26.1%	30.4%	47.8%
82	*Teleosts (excluding Scombridae and billfishes)*	44	37	25	2	5	4	17
		53.7%	45.1%	30.5%	2.4%	6.1%	4.9%	20.7%
5	*Sea Turtles*	3	4	5	0	2	1	1
		60.0%	80.0%	100.0%	0.0%	40.0%	20.0%	20.0%
9	*Sea Birds*	8	2	0	0	0	0	0
		88.9%	22.2%	0.0%	0.0%	0.0%	0.0%	0.0%
26	*Marine Mammals*	6	17	15	0	6	4	0
		23.1%	65.4%	57.7%	0.0%	23.1%	15.4%	0.0%

3.4.1.3 U.S. Pelagic Longline Catch in Relation to International Catch

Highly Migratory Species

The U.S. fleet is a small part of the international fleet that competes on the high seas for catches of tunas and swordfish (Table 3.24). Although the U.S. fleet landed as much as 35 percent of the swordfish from the North Atlantic, north of 5° N. latitude in 1990, this proportion decreased to 24.3 percent by 2001. For tunas, the U.S. proportion of landings was 23 percent in 1990, decreasing to 9.4 percent of total Atlantic tuna catches by 2001 (NOAA Fisheries, 2003a).

In 2002, the U.S fleet landed 27.6 percent of the swordfish from the North Atlantic, and 11.5 percent of total Atlantic tuna catches (NOAA Fisheries, 2004c). In recent years, the proportion of U.S. pelagic longline landings of HMS, for the fisheries in which the United States participates, has remained relatively stable in proportion to international landings (Table 3.24). The U.S. fleet accounts for less than 0.5 percent of the landings of swordfish and tuna from the Atlantic Ocean south of 5° N. latitude, and does not operate at all in the Mediterranean Sea. Tuna and swordfish landings by foreign fleets operating in the tropical Atlantic and Mediterranean are greater than the catches from the north Atlantic area where the U.S. fleet operates. Even within the area where the U.S. fleet operates, the U.S. portion of fishing effort (in numbers of hooks fished) is less than 10 percent of the entire international fleet's effort, and likely less than that due to differences in reporting effort between ICCAT countries (NOAA Fisheries, 2001b).

Table 3.24 Estimated International Longline Landings of HMS, Other than Sharks, for All Countries in the Atlantic: 1999 - 2003 (mt ww)[1]. Source: SCRS, 2004.

	1999	2000	2001	2002	2003
Swordfish (N. Atl + S. Atl)	25,201	24,990	22,562	22,127	20,788
Yellowfin Tuna (W. Atl)[2]	11,596	11,465	12,684	11,578	10,178
Bigeye Tuna	76,513	70,976	55,162	46,509	51,606
Bluefin Tuna (W. Atl.)[2]	914	859	610	727	188
Albacore Tuna (N. Atl + S. Atl)	27,209	28,881	29,667	27,779	27,879
Skipjack Tuna (N. Atl + S. Atl)	51	60	70	109	106
Blue Marlin (N. Atl. + S. Atl.)[3]	2,359	2,187	1,638	1,337	1,671
White Marlin (N. Atl. + S. Atl.)[3]	981	893	593	730	557
Sailfish (W. Atl.)[3]	524	811	812	1,271	853
Total	**145,348**	**141,122**	**123,798**	**112,167**	**113,826**
U.S. Longline Landings (2003 and 2004 U.S. Natl. Report)[4]	**8,331.1**	**7,253.5**	**5,695.3**	**6,203.9**	**5,468.4**
U.S. Longline Landings as a Percent of Total Longline Landings	**5.7**	**5.1**	**4.6**	**5.5**	**4.8**

[1]Landings include those classified by the SCRS as longline landings for all areas
[2]Note that the United States has not reported participation in the E. Atl yellowfin tuna fishery since 1983 and has not participated in the E. Atl bluefin tuna fishery since 1982.
[3]Includes U.S. *dead discards.*
[4]Includes swordfish, blue marlin, white marlin, and sailfish longline discards.

Sea Turtles

From 1999 to 2003, the U.S. pelagic longline fleet targeting HMS captured an average of 772 loggerhead and 1,013 leatherback sea turtles per year, based on observed takes and total reported effort. In 2003, the U.S. Pelagic longline fleet was estimated to have captured 727 loggerhead and 1,112 leatherback sea turtles (Garrison and Richards, 2004). Since other ICCAT nations do not monitor incidental catches of sea turtles, an exact assessment of their impact is not possible. However, high absolute numbers of sea turtle catches in the foreign fleets have been reported from other sources (NOAA Fisheries, 2001b). Throughout the Atlantic basin, including the Mediterranean Sea, a total of 210,000 – 280,000 loggerhead and 30,250 – 70,000 leatherback sea turtles are estimated to be captured by pelagic longline fisheries each year (Lewiston *et al*., 2004).

Mortality in the domestic and foreign pelagic longline fisheries is just one of numerous factors affecting sea turtle populations in the Atlantic (National Research Council, 1990). Many sources of anthropogenic mortality are outside of U.S. jurisdiction and control. If the U.S. swordfish quota was to be relinquished to other fishing nations, the effort now expended by the U.S. fleet would likely be replaced by foreign effort. This could significantly alter the U.S. position at ICCAT and make the implementation of international conservation efforts more difficult. This would also eliminate the option of gear or other experimentation with the U.S. longline fleet, thus making it difficult to find take reduction solutions which could be transferred to other longlining nations to effect a greater global reduction in sea turtle takes in pelagic longline fisheries. The United States has, and will continue to make efforts at ICCAT, IATTC, and other international forums, to encourage adoption of sea turtle conservation measures by international fishing fleets. However, NMFS is not aware of the implementation of sea turtle conservation measures by foreign fleets, and in the absence of a domestic fishing fleet subject to sea turtle conservation measures, foreign vessels would likely increase their fishing effort and sea turtle mortality would likely increase. Further, NMFS continues to advance turtle conservation through participation in both domestic and international workshops.

In February 2003, the United States supported a workshop consisting of technical experts on sea turtle biology and longline fishery operations from interested nations in order to share information and discuss possible solutions to reduce incidental capture of marine turtles in these fisheries. The United States introduced the NED sea turtle bycatch mitigation research at the November 2003, ICCAT meeting in Dublin, Ireland, and co-sponsored ICCAT Resolution 03-11 which encouraged other nations to improve data collection and reporting on sea turtle bycatch and promote the safe handling and release of incidentally captured sea turtles. A poster and video describing the NED research experiment and preliminary results were displayed, as well as many of the experimentally tested release gears. In January 2004, the Northeast Distant Waters Longline Research ad hoc advisory group met in Miami, Florida. The purpose of this meeting was to present a summary of the 2001 and 2002 NED pelagic longline sea turtle bycatch mitigation research and the preliminary results for the 2003 research, and to discuss future research needs. Also in January 2004, the IATTC - CIAT Bycatch Working Group met in Kobe, Japan. The purpose of U.S. attendance at this meeting was to present results of sea turtle mitigation research by the U.S, to hear research results on bycatch mitigation from other countries, to encourage IATTC countries to evaluate or adopt sea turtle mitigation technology in their fisheries, and to address other bycatch issues in longline fisheries.

Additionally, the Inter-American Convention for the Protection and Conservation of Sea Turtles ("Inter-American Convention") was concluded on September 5, 1996, in Salvador, Brazil, and entered into force in May 2001. This is the first international agreement devoted solely to the protection of sea turtles. The Inter-American Convention calls for the Parties to establish national sea turtle conservation programs. Each party will agree to implement broad measures for the conservation of sea turtles, including the use of turtle excluder devices in commercial shrimp trawl vessels and the mitigation of impacts on sea turtles from other fisheries.

3.4.1.4 Management of the U.S. Pelagic Longline Fishery

The U.S. Atlantic pelagic longline fishery is restricted by a limited swordfish quota, divided between the North and South Atlantic (separated at 5° N. lat.). Other regulations include minimum sizes for swordfish, yellowfin, bigeye, and bluefin tuna, limited access permitting, bluefin tuna catch requirements, shark quotas, protected species incidental take limits, reporting requirements (including logbooks), and gear and bait requirements. Current billfish regulations prohibit the retention of billfish by commercial vessels, or the sale of billfish from the Atlantic Ocean. As a result, all billfish hooked on longlines must be discarded, and are considered bycatch. This is a heavily managed gear type and, as such, is strictly monitored. Because it is difficult for pelagic longline fishermen to avoid undersized fish in some areas, NMFS has closed areas in the Gulf of Mexico and along the east coast. The intent of these closures is to relocate some of the fishing effort into areas where bycatch is expected to be lower. There are also time/area closures for pelagic longline fishermen designed to reduce the incidental catch of bluefin tuna and sea turtles. In order to enforce time/area closures and to monitor the fishery, NMFS requires all pelagic longline vessels to report positions on an approved vessel monitoring system (VMS).

In June 2004, NMFS conditionally re-opened the NED to pelagic longline fishing. NMFS limited vessels with pelagic longline gear onboard in that area, at all times, to possessing onboard and/or using only 18/0 or larger circle hooks with an offset not to exceed 10 degrees. Only whole mackerel and squid baits may be possessed and or utilized with allowable hooks. In August of 2004, NMFS limited vessels with pelagic longline gear onboard, at all times, in all areas open to pelagic longline fishing, excluding the NED, to possessing onboard and/or using only 16/0 or larger non-offset circle hooks and/or 18/0 or larger circle hooks with an offset not to exceed 10 degrees. Only whole finfish and squid baits may be possessed and/or utilized with allowable hooks. All pelagic longline vessels must possess and use sea turtle handling and release gear in compliance with NMFS careful release protocols.

Permits

The 1999 Tunas, Swordfish, and Shark FMP established six different limited access permit types: 1) directed swordfish, 2) incidental swordfish, 3) swordfish handgear, 4) directed shark, 5) incidental shark, and 6) tuna longline. To reduce bycatch concerns in the pelagic longline fishery, these permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit.

Similarly, the tuna longline permit is valid only if the permit holder also holds both a swordfish (directed or incidental, not handgear) and a shark permit.

As of October 2004, approximately 208 tuna longline limited access permits had been issued. In addition, approximately 195 directed swordfish limited access permits, 99 incidental swordfish limited access permits, 241 directed shark limited access permits, and 348 incidental shark limited access permits had been issued. Vessels with limited access swordfish and shark permits do not necessarily use pelagic longline gear, but these are the only permits that allow for the use of pelagic longline gear.

Monitoring and Reporting

Pelagic longline fishermen and the dealers who purchase HMS from them are subject to reporting requirements. NMFS has extended dealer reporting requirements to all swordfish importers as well as dealers who buy domestic swordfish from the Atlantic. These data are used to evaluate the impacts of harvesting on the stock and the impacts of regulations on affected entities.

Commercial HMS fisheries are monitored through a combination of vessel logbooks, dealer reports, port sampling, cooperative agreements with states, and scientific observer coverage. Logbooks contain information on fishing vessel activity, including dates of trips, number of sets, area fished, number of fish, and other marine species caught, released and retained. In some cases, social and economic data such as volume and cost of fishing inputs are also required.

Pelagic Longline Observer Program

One thousand eighty-eight pelagic longline sets were observed and recorded by NMFS observers in 2003 (11.5% overall coverage - 100% coverage in the NED; and 6.2% coverage in remaining areas). Table 3.25 details the amount of observer coverage in past years for this fleet. The June 1, 2004, BiOp mandates that eight percent of the pelagic longline trips be selected for observer coverage. Generally, due to logistical problems, it has not always been possible to place observers on all selected trips. NMFS is working towards improving compliance with observer requirements and facilitating communication between vessel operators and observer program coordinators. In addition, fishermen are reminded of the safety requirements for the placement of observers specified at 50 CFR 600.746, and the need to have all safety equipment on board required by the U.S. Coast Guard.

Table 3.25 Observer Coverage of the Pelagic Longline Fishery. Source: Yeung, 2001; Garrison, 2003; and Garrison and Richards, 2004.

Year	Number of Sets Observed			Percentage of Total Number of Sets		
1999	420			3.8		
2000	464			4.2		
	Total	Non-NED	NED	Total	Non-NED	NED
2001*	403	217	186	3.7	2.0	100.0
2002*	856	353	503	8.9	3.7	100.0

Year	Number of Sets Observed			Percentage of Total Number of Sets		
2003*	1088	552	536	11.5	6.2	100.0

*In 2001, 2002, and 2003, 100 percent observer coverage was required in the NED research experiment.

Safety Issues Associated with the Fishery

Like all offshore fisheries, pelagic longlining can be dangerous. Trips are often long, the work is arduous, and the nature of setting and hauling longline gear may result in injury or death. Like all other HMS fisheries, longline fishermen are exposed to unpredictable weather. NMFS does not wish to exacerbate unsafe conditions through the implementation of regulations. Therefore, NMFS considers safety factors when implementing management measures on pelagic longline fishermen. For example, all time/area closures are expected to be closed to fishing, not transiting, in order to allow fishermen to make a direct route to and from fishing grounds. NMFS seeks comments from fishermen on any safety concerns they may have. Fishermen have pointed out that, due to decreasing profit margins, they may fish with less crew or less experienced crew or may not have the time or money to complete necessary maintenance tasks. NMFS encourages fishermen to be responsible in fishing and maintenance activities.

3.4.1.5 Economic Aspects of the U.S. Pelagic Longline Fishery

Costs and Revenues

The amount of economic data available for this gear type is increasing, although additional up to date information is needed. Since 1996, NMFS has been collecting economic information on a per trip basis through submission of voluntary forms in the pelagic logbook maintained in the Southeast Fisheries Science Center (SEFSC). Compared to the number of logbook reports, few economic data were collected, because submission was voluntary. In 2003, NMFS initiated mandatory cost earnings reporting for selected vessels in order to improve the economic data available for all HMS fisheries. Mandatory submission of this economic data is needed for NMFS to accurately assess the economic impacts of proposed fishery management regulations on fishermen and their communities as required by Federal laws, such as the National Environmental Policy Act (NEPA), Executive Order 12866, the Regulatory Flexibility Act (RFA), and National Standards 7 and 8 of the Magnuson-Stevens Act. Specifically, this information will be used to conduct cost-benefit analyses and develop regulatory impact analyses of proposed regulations in an effort to help NMFS develop and improve fishery management strategies.

Larkin *et al.* (2000) examined 1996 logbooks and the 1996 voluntary forms and found that net returns to a vessel owner varied substantially depending on the vessel size and the fishing behavior (i.e. sets per trip, fishing location, season, target species). This study noted that of 3,255 pelagic longline trips which reported, 642 provided the voluntary economic information. From all trips, four species (swordfish, yellowfin tuna, dolphin fish, and sandbar sharks) comprised 77 percent of all species landed and accounted for 84 percent of the total gross revenues for the fleet. Generally, vessels that were between 46 and 64 feet in length, had between 10 and 21 sets per trip, fished in the second quarter, fished in the Caribbean, or had more than 75 percent of their gross revenues from swordfish had the highest net return to the

owner (ranging from $3,187 to $13,097 per trip). Vessels that were less than 45 feet in length, had between one and three sets per trip, fished in the first quarter, fished between North Carolina and Miami, FL, or had between 25 and 50 percent of their gross revenues from swordfish had the lowest net return to the owner (ranging from $642 to $1,885 per trip).

Larkin *et al*. (in press) used the above data in a cost function model to determine if and how captains decide on levels of effort in order to minimize variable costs per trip. They found that, on average, increasing the price of bait increased the demand for light sticks (i.e. these inputs are complements); changing the price of fuel did not affect any purchase decisions; and for every additional 10 feet in vessel length, operators demanded an additional 149 light sticks, 319 pounds of bait, and 540 gallons of fuel per trip. They also found that on average increasing swordfish landings required additional light sticks, bait and fuel. Increasing tuna landings reduced the demand for light sticks while increasing the demand for bait and fuel. Additionally, some inputs (i.e. light sticks, bait demand, and fuel demand) varied significantly with region, quarter, number of sets, and target species. They also found that if the price of light sticks or bait increases, the quantity demanded falls, particularly for light sticks (i.e. own-price elasticities are negative). However, elasticities could also change depending on region, target species, or number of trips but did not change between seasons.

Porter *et al*. (2001) conducted a survey of 147 vessels along the Atlantic and Gulf of Mexico (110 surveys were completed) in 1998 regarding 1997 operations. The survey consisted of 55 questions divided into five categories (vessel characteristics, fishing and targeting strategies, demographics, comments about regulations, and economic information of variable and fixed costs). The vessels interviewed were diverse in vessel size and target species (swordfish, tuna, mixed). Information was also used from trip tickets and logbooks. They found that on average, the average vessel received approximately $250,000 annual gross revenues, annual variable costs were approximately $190,000, and annual fixed costs were approximately $50,000. Thus, vessels were left with approximately $8,000 to cover depreciation on the vessel and the vessel owner lost approximately $3,500 per year. On a per trip level, gross revenues averaged $22,000 and trip expenses, including labor, were $16,000. Labor cost the owner the most (43 percent) followed by gear. Generally trip returns were divided so the vessel owner received 43 percent and the captain and crew 57 percent. Based on 2002 data, NMFS estimates annual gross revenues of approximately $187,074.00 in 2002 (NOAA Fisheries, 2004d). Along with other studies, Porter *et al*. (2001) noted differences between region, vessel size, and target species. Porter *et al*. (2001) also noted that 1997 was probably a financially poor year due to a reduction in swordfish quota and a subsequent closure of the fishery. In all, these studies are consistent with Larkin *et al*. (1998) and Ward and Hanson (1999) in that characteristics of fishing trips can influence the success of the trip and that pelagic longline fishermen do not have large profits.

Many consumers consider swordfish to be a premier seafood product. Swordfish that bring $3.00 per pound to the vessel may sell in some restaurants at prices of over $20.00 for a six-ounce steak. Swordfish prices are affected by a number of demand and supply factors, including the method of harvest, either by distant-water or inshore vessels, and by gear type (harpoon vs. pelagic longline). Generally, prices for fresh swordfish can be expected to vary during the month due to the heavier fishing effort around the full moon. Swordfish prices also

vary by size and quality, with prices first increasing with size, up to about 250 pounds dressed weight (lbs dw), then decreasing due to higher handling costs for larger fish. "Marker" swordfish weighing 100 to 275 lbs dw are preferred by restaurants because uniform-sized dinner portions can be cut with a minimum of waste. "Pups" weighing 50 to 99 lbs dw are less expensive than markers but the yield of uniformly sized portions is smaller. "Rats" (33 to 49 lbs dw) are the least expensive but are generally not used by food service or retail buyers who require large portions of uniform size. Similarly, larger tunas are also more desirable than smaller ones. Size of fish harvested can be a substantial factor in management because regulations might have the effect of reducing catch but might raise the average size per fish caught and therefore, raise the price. Current ex-vessel prices for Atlantic HMS are summarized in Section 3.5.

3.4.2 Purse Seine

3.4.2.1 Overview of History and Current Management

Purse seine gear consists of a floated and weighted encircling net that is closed by means of a drawstring threaded through rings attached to the bottom of the net. The efficiency of this gear is enhanced by the assistance of spotter planes used to locate schools of tuna. Once a school is spotted, the vessel intercepts and uses the large net to encircle it, with the aid of a smaller skiff. Once encircled, the drawstring is pulled, closing the bottom of the net and preventing escape. The net is then lifted next to the vessel where the tunas are removed and placed onboard the larger vessel. Domestic aspects of the Atlantic tunas purse seine fisheries are described in Section 2.2.3 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP. Economic and social aspects of the fisheries are described in Sections 3.5 and 3.6 of this document, respectively.

Vessels using purse seine nets have participated in the U.S. fishery for bluefin tuna continuously since the 1950s, although a number of purse seine vessels did target and land bluefin tuna off the coast of Gloucester, MA as early as the 1930s. A limited entry system with non-transferable individual vessel quotas (IVQs) for purse seining was established in 1982, effectively excluding any new entrants to this category. Equal baseline quotas are assigned to individual vessels by regulation; the IVQ system is possible given the small pool of ownership in this sector of the fishery. Currently, only five vessels comprise the bluefin tuna purse seine fleet and the quotas were made transferable among the five vessels in 1996. Over the last few years, the Purse seine category has not fully harvested its allocated quota. This can be attributed to a number of different reasons outside of the industry's or NOAA Fisheries' control. NOAA Fisheries has issued several EFPs to address this issue and will continue to assess current regulations and their impact on providing reasonable opportunities to harvest available quota. In late December 2004, NOAA Fisheries transferred 100 mt from the Purse seine category to the Reserve category (70 FR 302, January 3, 2005).

3.4.2.2 Most Recent Catch and Landings Data

Table 3.26 shows purse seine landings of Atlantic tunas from 1999 through 2003. Purse seine landings make up approximately 20% of the total annual U.S. landings of bluefin tuna (about 25 percent of total commercial landings), but account for only a small percentage, if any, of the landings of other HMS. In the 1980s and early 1990s, purse seine landings of yellowfin

tuna were often over several hundred metric tons. Over 4,000 mt ww of yellowfin were recorded landed in 1985. In recent years, via informal gentlemen's agreements with other sectors fo the tuna industry, the purse seine fleet has opted not to direct any effort on HMS other than bluefin tuna.

Table 3.26 **Domestic Atlantic Tuna Landings for the Purse Seine Fishery: 1999-2003 (mt ww). NW Atlantic Fishing Area**. Source: U.S. National Report to ICCAT: 2004.

Species	1999	2000	2001	2002	2003
Bluefin Tuna	247.9	275.2	195.9	207.7	265.4
Yellowfin Tuna	0	0	0	0	0
Skipjack Tuna	0	0	0	0	0

3.4.2.3 ***U.S. vs. International Purse Seine Catch***

The U.S. purse seine fleet has historically accounted for a small percentage of total Atlantic landings. Over the past five years, the U.S. purse seine fishery has contributed to less than 0.15% of the total purse seine landings reported to ICCAT.

Table 3.27 **Estimated International Purse Seine Atlantic Tuna Landings in the Atlantic and Mediterranean: 1999-2003 (mt ww).** Source: SCRS, 2004

Species	1999	2000	2001	2002	2003
Bluefin Tuna	15,884	17,616	17,520	18,548	15,525
Yellowfin Tuna	83,445	80,253	102,641	95,435	79,908
Skipjack Tuna	95,367	80,762	77,995	70,750	92,805
Bigeye Tuna	20,923	17,909	22,060	16,192	22,237
Total	**215,619**	**196,540**	**220,216**	**200,925**	**210,475**
U.S. Total	**248**	**275**	**196**	**208**	**265**
U.S. Percentage	**0.12%**	**0.14%**	**0.09%**	**0.10%**	**0.13%**

Since the 1999 ICCAT meeting, ICCAT has continued to implement a FADs closed area in the Gulf of Guinea. The closure (which became mandatory in mid-1999) was in response to concern over catches of juvenile and undersize tunas by non-U.S. internationally flagged purse seiners relying on FADs. The full evaluation of this program is somewhat hindered by the multi-species nature of surface fisheries and the existence of other types of fisheries. The updated analysis indicated that this regulation appeared effective at reducing mortality for juvenile bigeye. Full compliance with this regulation by all surface fisheries will greatly increase the effectiveness of this regulation.

3.4.2.4 Bycatch Issues and Data Associated with the Fishery

The Atlantic bluefin tuna Purse seine category fishery is currently listed as a Category III fishery under the Marine Mammal Protection Act. After a school of fish is located, a purse seine net is set by paying out the net in a circle around the school. This affords considerable control over what is encircled by the net and the net does not remain in the water for any considerable amount of time. Therefore, this gear-type is not likely to result in mortality or serious injury of marine mammals or sea turtles. As a result, the 2001 BiOp concluded that the continued operation of the purse seine fishery may adversely affect, but is not likely to jeopardize, the continued existence of any endangered or threatened species under NOAA Fisheries jurisdiction.

This fishery was observed in 1996, with near-100% coverage. Six pilot whales, one humpback whale, and one minke whale were observed as encircled by the nets during the fishery. All were released alive or dove under the nets and escaped before being pursed.

About mid-way through the 2000 bluefin tuna purse seine fishing season, large concentrations of bluefin tuna were located in one of the areas of Georges Bank that has been closed to all fishing gears in order to provide protection and rebuilding of northeast multispecies stocks, particularly for cod, haddock, and yellowtail flounder. As tuna purse seine gear was not permitted to be used in the closed areas, the purse seine fleet could not access these fish, which were behaving in a manner conducive to purse seine operations (spending time very close to the surface). Purse seine vessels have traditionally fished in or near the closed area, most often to the west, near the "BB" buoy. The 1996 observer data showed minimal interaction with demersal species. In an effort to gather information on the interaction of tuna purse seines with demersal species and avoid conflicts with other gear types, NOAA Fisheries issued EFPs to the purse seine fleet, and placed observers on the vessels. This allowed the purse seine vessels to fish in the closed area during 2000 and successfully prosecute the tuna fishery, while providing NOAA Fisheries with additional data on purse seine operations and gear interactions.

Only five observed purse seine sets were made in the closed areas during the 2000 fishing season, and there was no bycatch of groundfish reported on these sets. In order to gather additional information on the impacts of this fishery in the closed areas, and to allow the purse seine fleet to utilize their allocated quota of bluefin tuna for 2001 and avoid conflicts with other gear types, NOAA Fisheries issued EFPs to the purse seine fleet again in 2001, and placed observers on the vessels. The New England Fisheries Management Council revised the list of exempted gear in May 2004, to allow the tuna purse seiners access to the closed areas under Amendment 13 to Northeast Multispecies FMP.

3.4.2.5 Safety Issues Associated with the Fishery

There are no new safety issues associated with the U.S. Atlantic tunas purse seine fishery since the publication of the 1999 Atlantic Tunas, Swordfish, and Shark FMP.

3.4.3 Commercial Handgear

Handgear, including handline, harpoon, rod and reel, and bandit gear are used for Atlantic HMS by fishermen on private vessels, charter vessels, and headboat vessels.

Operations, frequency and duration of trips, and distance ventured offshore vary widely. An overview of the history of the HMS handgear fishery (commercial and recreational) can be found in Section 2.5.8 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP.

The proportion of domestic HMS landings harvested with handgear varies by species, with Atlantic tunas comprising the majority of commercial landings. Commercial handgear landings of all Atlantic HMS (other than sharks) in the United States are shown in Table 3.28. The fishery is most active during the summer and fall, although in the South Atlantic and Gulf of Mexico fishing occurs during the winter months. For bluefin tuna, commercial handgear landings accounted for approximately 45 percent of total U.S. landings, and almost 65 percent of commercial bluefin landings. The commercial handgear fishery for bluefin tuna occurs mainly in New England, and more recently off the coast of North Carolina, with vessels targeting large medium and giant bluefin using rod and reel, handline, harpoon, and bandit gear. Beyond these general patterns, the availability of bluefin tuna at a specific location and time is highly dependent on environmental variables that fluctuate from year to year. Fishing usually takes place between eight and 200 km from shore using bait including mackerel, whiting, mullet, ballyhoo, herring, and squid.

The majority of U.S. commercial handgear fishing activities for bigeye, albacore, yellowfin, and skipjack tunas take place in the northwest Atlantic. Rod and reel gear is also used by recreational fishermen, which is addressed in Section 3.4.4. In 2003, three percent of the total yellowfin catch, or nine percent of the commercial yellowfin catch, was attributable to commercial handgear. The majority of these landings occurred in the northwest Atlantic Ocean. Commercial handgear landings of skipjack tuna accounted for approximately 12 percent of total skipjack landings, or about 55 percent of commercial skipjack landings. For albacore, commercial handgear landings accounted for less than one percent of total albacore landings, or about three percent of commercial albacore landings. Commercial handgear landings of bigeye tuna accounted for approximately one percent of total bigeye landings and two percent of total commercial bigeye landings.

3.4.3.1 Overview of History and Current Management

A thorough description of the commercial handgear fisheries for Atlantic tunas can be found in Section 2.2.3 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP. The domestic swordfish fisheries are discussed in Section 2.3.3 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP. The domestic shark fisheries are discussed is Section 2.4.3 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP. Economic and social aspects of all the domestic handgear fisheries are described later in this document (Section 3.5 and 3.6 respectively).

3.4.3.2 Most Recent Catch and Landings Data

Updated tables of landings for the commercial handgear fisheries by gear and by area for 1999-2003 are presented in the following tables.

Table 3.28 **Domestic Landings for the Commercial Handgear Fishery, by Species and Gear, for 1999-2003 (mt ww).** Source: U.S. National Report to ICCAT: 2004

Species	Gear	1999	2000	2001	2002	2003
Bluefin Tuna	Rod and Reel	643.6	579.3	889.7	878.8	595.1
	Handline	15.5	3.2	9.0	4.5	2.5
	Harpoon	115.8	184.2	101.9	55.5	53.2
	TOTAL	**774.9**	**766.7**	**1,000.6**	**983.8**	**650.8**
Bigeye Tuna	Troll	0.0	0.0	0.0	0.0	0.0
	Handline	12.3	5.7	33.7	14.4	6.3
	TOTAL	**12.3**	**5.7**	**33.7**	**14.4**	**6.3**
Albacore Tuna	Troll	0.0	0.0	0.0	0.0	0.0
	Handline	4.4	7.9	3.9	6.6	3.4
	TOTAL	**4.4**	**7.9**	**3.9**	**6.6**	**3.4**
Yellowfin Tuna	Troll	0.0	0.0	0.0	0.0	0.0
	Handline	220.0	284.0	300.0	244.0	216.0
	TOTAL	**220.0**	**284.0**	**300.0**	**244.0**	**216.0**
Skipjack Tuna	Troll	0.0	0.0	0.0	0.0	0.0
	Handline	6.4	9.7	10.5	12.4	9.4
	TOTAL	**6.4**	**9.7**	**10.5**	**12.4**	**9.4**
Swordfish	Handline	5.0	8.9	8.9	11.7	11.7
	Harpoon	0.0	0.6	7.4	2.8	0.0
	TOTAL	**5.0**	**9.5**	**16.3**	**14.5**	**11.7**

Table 3.29 **Domestic Landings for the Commercial Handgear Fishery by Species and Region for 1999-2003 (mt ww).** Source: U.S. National Report to ICCAT: 2004

Species	Region	1999	2000	2001	2002	2003
Bluefin Tuna	NW Atl	774.4	766.7	1,000.6	938.3	650.8
Bigeye Tuna	NW Atl	11.9	4.1	33.2	13.8	6.0
	GOM	0.2	0.1	0.5	0.6	0.3
	Caribbean	0.2	1.5	0.0	0.0	0.0
Albacore Tuna	NW Atl	0.6	2.9	1.7	3.9	1.4
	GOM	≤ .05	0.0	0.0	0.0	≤ .05

Species	Region	1999	2000	2001	2002	2003
	Caribbean	3.8	5.0	2.2	2.7	2.0
Yellowfin Tuna	NW Atl	192.0	235.7	242.5	137.0	148.0
	GOM	12.7	28.6	43.4	100.0	59.0
	Caribbean	14.5	19.4	14.3	7.0	9.0
Skipjack Tuna	NW Atl	0.2	0.2	0.2	0.2	0.2
	GOM	0.4	0.7	0.0	0.0	0.0
	Caribbean	5.8	8.8	10.3	12.5	9.2
Swordfish	NW Atl	5.0	8.9	8.9	11.6	10.2
	GOM	$\leq$ .05	1.2	0.3	2.9	1.5

Handgear Trip Estimates

Table 3.30 displays the estimated number of rod and reel and handline trips targeting large pelagic species in 2001 through 2003. The trips include commercial and recreational trips, and are not specific to any particular species. It should be noted that these estimates are still preliminary and subject to change.

Table 3.30 **Estimated number of vessel trips targeting large pelagic species, 2001-2003.** Source: Large Pelagics Survey database

Year	AREA							Total
	NH/ME	MA	CT/RI	NY	NJ (north)	NJ (south) + MD/DE	VA	
Private Vessels								
2001	1,944	3,641	497	2,039	3,040	2,675	910	14,746
2002	5,090	15,180	2,558	7,692	2,762	22,757	6,524	62,563
2003	4,501	13,411	2,869	12,466	3,214	21,619	5,067	63,147
Charter Vessels								
2001	133	567	203	280	660	655	307	2,805
2002	1,132	3,357	937	1,686	1,331	6,300	1,510	16,253
2003	221	2,561	1,246	2,035	1,331	5,201	546	13,141

3.4.3.3 U.S. vs. International Handgear Catch

SCRS data do not lend themselves to organize international landings into a commercial handgear category. While some countries report rod and reel landings, these numbers may

include both commercial and recreational landings. International catches of all Atlantic HMS for 2003 are summarized in Table 3.24.

3.4.3.4 Bycatch Issues and Data Associated with the Fishery

As compared with other commercial gear types, commercial handgear produces relatively lower levels of bycatch. However, bycatch in the yellowfin tuna commercial handgear fishery is unmonitored in those areas where commercial activities occur after the Large Pelagic Survey (LPS) sampling season. Rod and reel discards of HMS, as assessed from LPS data, are discussed in the Recreational Section (3.4.4) as are new efforts in documenting catch and release survival rates. At this time, however, there is little information regarding important interactions and new data relating to commercial handgear bycatch. Anecdotal reports suggest that there may be low levels of bluefin, yellowfin, and bigeye tuna discards, but there is no supporting documentation at this point. Some regulatory discards occur because fishermen must comply with minimum size restrictions.

3.4.3.5 Safety Issues Associated with the Fishery

Section 3.9 of the 1999 Atlantic Tunas, Swordfish, and Shark FMP describes safety of human life at sea as it pertains to the fisheries for Atlantic HMS. Additional safety information regarding the commercial handgear fisheries for Atlantic HMS is presented below.

The U.S. Coast Guard (USCG) conducts routine vessel safety inspections at sea on a variety of vessels throughout the year, and during the busy General category bluefin tuna season the USCG concentrates patrol activities on General category bluefin tuna boats. Boarding officers indicate that the majority of the commercial handgear vessels have the necessary safety equipment; however, many part-time fishermen operating smaller vessels do not meet the necessary safety standards. There have been several cases of vessels participating in this fishery that have capsized due to weight while attempting to boat commercial-sized bluefin tuna (measuring 73 inches or greater and weighing several hundred pounds).

Currently, NOAA Fisheries does not require proof of proper safety equipment as a condition to obtain a commercial handgear permit. Instead, NOAA Fisheries informs permit applicants that commercial vessels are subject to the Fishing Vessel Safety Act of 1988 and advises them to contact their local USCG office for further information. The USCG District Boston office reports receiving 50 to 75 calls a week during the peak fishing season; officers speak with all callers to answer vessel questions.

Since NOAA Fisheries regulations do not require USCG inspection or safety equipment in order to obtain a commercial handgear permit, NOAA Fisheries cannot be certain that all participants in the commercial bluefin handgear fishery are adequately prepared for the conditions they may encounter. NOAA Fisheries is concerned about the safety of all vessels participating in the bluefin tuna fishery and is working with the USCG to improve communication of vessel safety requirements to commercial handgear vessel operators.

It is unlawful for Atlantic tuna vessels to engage in fishing unless the vessel travels to and from the area where it will be fishing under its own power and the person operating that vessel

brings any bluefin tuna under control (secured to the catching vessel or on board) with no assistance from another vessel, except when shown by the operator that the safety of the vessel or its crew was jeopardized or other circumstances existed that were beyond the control of the operator. NOAA Fisheries Enforcement and USCG boarding officers have recently encountered vessels participating in the bluefin tuna fishery that are unable to transit to and from the fishing grounds due to their limited fuel capacity. Occasionally these smaller vessels will work in cooperation with a larger documented vessel to catch a bluefin; others have been observed to leave lifesaving equipment at the dock to make room for extra fuel, bait, and staples. NOAA Fisheries is concerned that use of such inadequately-equipped vessels jeopardizes crew in that the vessel may not be able to safely return to shore without assistance of the larger vessel due to insufficient fuel or to adverse weather conditions.

Over the last couple of years, NOAA Fisheries has received a number of vessel permit applications from kayak owner/operators. In addition to the requirement mentioned above, NOAA Fisheries only issues permits to vessels that possess either a USCG Documentation number, a state registration number, or a foreign registration number (recreational permit only). As kayaks typically do not require such documentation NOAA Fisheries has denied all applications for a kayak to date.

Over the last few years, the USCG focused boardings on small vessels, especially those owned by “part-time” commercial bluefin fishermen, and terminated several dozen trips due to the lack of safety equipment on board. If a vessel is boarded at sea and found to be lacking major survival equipment, the USCG will terminate the trip and escort the vessels back to the dock.

NOAA Fisheries has concerns regarding individuals embarking on HMS trips by themselves. Recently there have been a few incidents of fishermen either severely injuring themselves or dying while pursing HMS by themselves. Certain hazardous situations could be mitigated by having an additional person onboard the vessel while conducting a trip targeting large pelagics. NOAA Fisheries encourages vessel owner/operators to practice safe fishing techniques.

NOAA Fisheries will consider all safety comments and information, including those from the USCG and NMFS Enforcement, when planning future General category effort control schedules and will discuss these issues in future meetings with the AP.

3.4.4 Recreational Handgear

The following section describes the recreational portion of the handgear fishery, and is primarily focused upon rod and reel fishing. The HMS Handgear (rod and reel, handline, and harpoon) fishery includes both commercial and recreational fisheries and is described fully in Section 2.5.8 of the 1999 FMP. The recreational billfish fishery is described fully in Section 2.1.3 of the 1999 Billfish Amendment. The commercial sale, barter or trade of Atlantic billfish by U.S. commercial interests is prohibited, only recreational landings are authorized.

3.4.4.1 Overview of History and Current Management

Atlantic tunas, swordfish, and sharks are managed under the 1999 FMP and Amendment 1 to the 1999 FMP, while Atlantic billfish are managed separately under the Billfish FMP, as amended. Summaries of the domestic aspects of the Atlantic tuna fishery, the Atlantic swordfish fishery, and the Atlantic shark fishery are found in Sections 2.2.3, 2.3.3, and 2.4.3, respectively, of the 1999 FMP. A history of Atlantic billfish management is provided in Section 1.1.1 of the Billfish Amendment.

Atlantic tunas, sharks, swordfish, and billfish are all targeted by domestic recreational fishermen using rod and reel gear. The recreational swordfish fishery had declined dramatically over the past twenty years, but recent information indicates that the recreational swordfish fishery is rebuilding in the Mid-Atlantic Bight, and off the east coast of Florida. Effective March 1, 2003, an HMS Angling category permit has been required to fish recreationally for any HMS-managed species (Atlantic tunas, sharks, swordfish, and billfish) (67 FR 77434, December 18, 2002). Prior to March 1, 2003, the regulations only required vessels fishing recreationally for Atlantic tunas to possess an Atlantic Tunas Angling category permit.

Recreational fishing for Atlantic HMS is managed primarily through the use of minimum size limits and bag limits. Recreational tuna fishing regulations are the most complex and include a combination of minimum sizes, bag limits, limited season-based quota allotment for bluefin tuna, and reporting requirements (depending upon the particular species and vessel type).

The recreational swordfish fishery has been managed through the use of a minimum size requirement and landings requirement (swordfish may be gutted and beheaded but may not be cut into smaller pieces). However, regulations published on January 7, 2003 (68 FR 711) established a recreational retention limit of one swordfish per person up to three per vessel per day, effective March 2003. Regardless of the length of a trip, no more than the daily limit of North Atlantic swordfish can be possessed onboard a vessel.

The recreational shark fishery is managed using bag limits, minimum size requirements, and landing requirements (sharks must be landed with heads and fins attached). Additionally, the possession of 19 species of sharks is prohibited.

Atlantic blue and white marlin have a combined landings cap (*i.e.*, a maximum amount of fish (250) that can be landed per year); however, the overall management strategy for the recreational billfish fishery is through the use of minimum size limits. There are no recreational retention limits for Atlantic sailfish, blue marlin, and white marlin. Recreational anglers may not land longbill spearfish.

ICCAT has made several recommendations to recover billfish resources throughout the Atlantic Ocean that are discussed in detail in Section 3.2.4.

3.4.4.2 Most Recent Catch and Landings Data

The recreational landings database for HMS consists of information obtained through surveys including the Marine Recreational Fishery Statistics Survey (MRFSS), Large Pelagic Survey (LPS), Southeast Headboat Survey (HBS), Texas Headboat Survey, and Recreational Billfish Survey Tournament Data (RBS). Descriptions of these surveys, the geographic areas they include, and their limitations, are discussed in Section 2.6.2 of the 1999 FMP and Section 2.3.2 of the 1999 Billfish Amendment.

Reported domestic landings of Atlantic bluefin tuna (1983 through 1998) and BAYS tuna (1995 through 1997) were presented in Section 2.2.3 of the 1999 FMP. As landings figures for 1997 and 1998 were preliminary in the 1999 FMP, updated landings for recreational rod and reel fisheries are presented in Table 3.31 through 2003. Recreational landings of swordfish are monitored by the LPS and the MRFSS. However, because swordfish landings are considered rare events, it is difficult to extrapolate the total recreational landings from dockside intercepts.

An ad hoc committee of NMFS scientists reviewed the methodology and data used to estimate recreational landings of Atlantic HMS during 2004. The Committee was charged with reviewing the 2002 estimates of U.S. recreational landings of bluefin tuna, white marlin and blue marlin reported by NMFS to ICCAT. The committee was also charged with recommending methods to be used for the estimation of 2003 recreational fishery landings of bluefin tuna and marlin. Although the Committee discovered a few problems with the raw data from the LPS and the estimation program used to produce the estimates, the Committee concluded that the estimation methods for producing the 2002 estimates were consistent with methods used in previous years. The report of the Committee is available at: http://www.nmfs.noaa.gov/sfa/hms/RecReports/2002-2003%20Bluefin-Marlin%Report-120304.pdf.

Table 3.31 **Updated Domestic Landings for the Atlantic Tunas, Swordfish and Billfish Recreational Rod and Reel Fishery: Calendar years 1996-2003 (mt ww)*.** Sources: NMFS, 2004; Large Pelagic Survey; SEFSC Recreational Billfish Survey. (Recreational shark landings are provided in **Table 3.34** through **Table 3.37**).

Species	Region	1996	1997	1998	1999	2000	2001	2002	2003
Bluefin tuna**	NW Atlantic	362	299	184	103.0	49.5	242.9	519.4	314.6
	GOM	0	0	0	0.4	0.9	1.7	1.5	0
	Total	**362**	**299**	**184**	**103.4**	**50.4**	**244.6**	**520.9**	**314.6**
Bigeye tuna	NW Atlantic	108.2	333.5	228.0	316.1	34.4	366.2	49.6	188.5
	GOM	0	0	0	1.8	0	0	0	0
	Caribbean						0	0	4.0
	Total	**108.2**	**333.5**	**228.0**	**317.9**	**34.4**	**366.2**	**49.6**	**192.5**
Albacore	NW Atlantic	277.8	269.5	601.1	90.1	250.75	122.3	323.0	333.8
	GOM	61.7	65.2	0	0	0	0	0	0
	Total	**339.5**	**334.7**	**601.1**	**90.1**	**250.75**	**122.3**	**323.0**	**333.8**
Yellowfin tuna	NW Atlantic	4,484.8	3,560.9	2,845.7	3,818.2	3,809.5	3,690.5	2,624	4,672
	GOM	13.2	7.7	80.9	149.4	52.3	494.2	200	640
	Caribbean				0	0	0.1	7.2	16
	Total	**4,498**	**3,569**	**2,927**	**3,967.6**	**3,861.8**	**4184.7**	**2,831.2**	**5,328**
Skipjack tuna	NW Atlantic	48.1	42.0	49.5	63.6	13.1	32.9	23.3	34.0
	GOM	36.4	21.7	37.0	34.8	16.7	16.1	13.2	11.0
	Caribbean				0	0	0	13.2	15.7
	Total	**84.5**	**63.7**	**86.5**	**98.4**	**29.8**	**49.0**	**49.7**	**60.7**
Blue marlin***	NW Atlantic	17.0	25.0	34.1	24.8	13.8	9.0		
	GOM	8.3	11.5	4.5	7.5	4.7	5.1		
	Caribbean	9.6	8.6	10.6	4.6	5.7	2.3		
	Total	**34.9**	**45.1**	**49.2**	**36.9**	**24.2**	**16.4**	**5.6**	**19**
White marlin ***	NW Atlantic	2.7	0.9	2.4	1.5	0.23	2.8		
	GOM	0.6	0.9	0.2	0.1	0	0.3		
	Caribbean	0.0	0.0	0.02	0	0	0		
	Total	**3.3**	**1.8**	**2.6**	**1.6**	**0.23**	**3.1**	**5.6**	**0.6**
Sailfish***	NW Atlantic	0.2	0	0.1	0.07	1.75	61.2		
	GOM	0.8	0.4	1.0	0.6	0.24	0.6		
	Caribbean	0.2	0.2	0.05	0	0.06	0		
	Total	**1.2**	**0.6**	**1.5**	**0.67**	**2.05**	**61.8**	**103**	
Swordfish	**Total**	**5.9**	**10.9**	**4.7**	**21.3**	**15.6**	**1.5**	**21.5**	**5.1**

* Rod and reel catches and landings for Atlantic tunas represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** Rod and reel catch estimates for bluefin tuna in the U.S. National Report to ICCAT include both recreational and commercial landings. Rod and reel catch of bluefin less than 73" curved fork length (CFL) are recreational, and rod and reel catch of bluefin 73 inches CFL or greater are commercial. Rod and reel catch of bluefin > 73" CFL also includes a few metric tons of "trophy" bluefin (recreational bluefin 73").
*** Blue marlin, white marlin, and sailfish landings are based on the U.S. National Report to ICCAT and consist primarily of reported tournament landings.

Atlantic Billfish Recreational Fishery

Due to the rare nature of billfish encounters and the difficulty of monitoring landings outside of tournament events, reports of recreational billfish landings are sparse. However, the RBS provides a preliminary source for analyzing recreational billfish landings. Table 3.32 documents the number of billfish landed in 2000-2003, as reported by the RBS.

Table 3.32 **Preliminary RBS Recreational Billfish Landings (calendar year).** Source: NMFS Recreational Billfish Survey (RBS).

Species	1999	2000	2001	2002	2003
Blue Marlin	172	117	75	84	96
White Marlin	36	8	22	33	20
Sailfish	30	18	11	14	24
Swordfish	-	-	0	16	48

In support of the sailfish assessment conducted at the 2001 SCRS billfish species group meeting, document SCRS/01/106 developed indices of abundance of sailfish from the U.S. recreational billfish tournament fishery for the period 1973-2000. The index of weight per 100 hours fishing was estimated from numbers of sailfish caught and reported in the logbooks submitted by tournament coordinators and NOAA Fisheries observers under the RBS, as well as available size information. Document SCRS/01/138 estimated U.S. sailfish catch estimates from various recreational fishery surveys.

All recreational, non-tournament landings of billfish, including swordfish, must be reported within 24 hours of landing to NMFS by the permitted owner of the vessel landing the fish. This requirement is applicable to all permit holders, both private and charter/headboat vessels, not fishing in a tournament. In Maryland and North Carolina, vessel owners should report their billfish landings at state-operated landings stations. A landed fish means a fish that is kept and brought to shore. Due to large-scale non-compliance with the call-in requirement, the landings in Table 3.33 are considered a minimum estimate of the non-tournament landings of billfish.

Table 3.33 **Number of billfish reported to NMFS via call-in system by fishing year, 2002-2004.** Source: G. Fairclough, pers. comm.

Species	2002*	2003	2004**
Blue Marlin	0	7	2
White Marlin	0	1	0
Sailfish	3	16	34
Swordfish	28	188	194

Based on a fishing year of June 1 – May 31.
* Reporting requirement did not go into effect until March 1, 2003
** 2004 landings as of January 28, 2005

Swordfish Recreational Fishery

The recreational swordfish fishery in the North Atlantic Ocean has been steadily expanding in recent years, probably due to increased availability of small swordfish and an increased interest in the sport. Fishermen typically fish off the east coast of Florida and off the coasts of New Jersey and New York. Fish have also been occasionally encountered on trips off Maryland and Virginia. In the past, the New York swordfish fishery occurred incidental to overnight yellowfin tuna trips. During the day, fishermen targeted tunas, while at night they fished deeper for swordfish. This appears to have evolved into a year-round directed fishery off Florida and a summer fishery off of New Jersey. The Florida fishery occurs at night with fishermen targeting swordfish using live or dead bait and additional attractants such as lightsticks, LED lights, and light bars suspended under the boat.

Historically, fishery survey strategies have not captured all landings of recreational handgear-caught swordfish. Although some handgear swordfish fishermen have commercial permits[1], many others land swordfish strictly for personal consumption. Therefore, NOAA Fisheries published regulations to improve recreational swordfish monitoring and conservation. A final rule was published on January 7, 2003 (68 FR 711), that included a trip limit of one swordfish per person, up to three per vessel, and mandatory reporting of all recreationally-landed swordfish and billfish via a toll-free call-in system. These regulations became effective on March 2, 2003. Accordingly, all reported recreational swordfish landings will be counted against the Incidental swordfish quota.

Recreational fishing tournaments allow for the collection of a large volume of fishery-dependent data in a relatively short time period. Tournaments also provide a "snapshot" of the recreational fishery at a particular time and location. Analysis of tournament data collected over a period of years could provide valuable information regarding trends in the recreational swordfish fishery. A recent study documented recreational handgear-caught swordfish in three south Florida tournaments (J. Levesque, pers. comm. 2003). The tournaments occurred from July though September 2002, two in Lighthouse Point and the other in Ft. Lauderdale. Data was obtained through direct at-sea observation, dockside interviews with anglers landing swordfish, and a telephone interview with a tournament organizer. A total of 156 vessels and between 468 - 624 individuals participated in the three tournaments.

[6] Access to the commercial swordfish fishery is limited; hand gear fishermen however may purchase permits from other permitted fishermen because the permits are transferable.

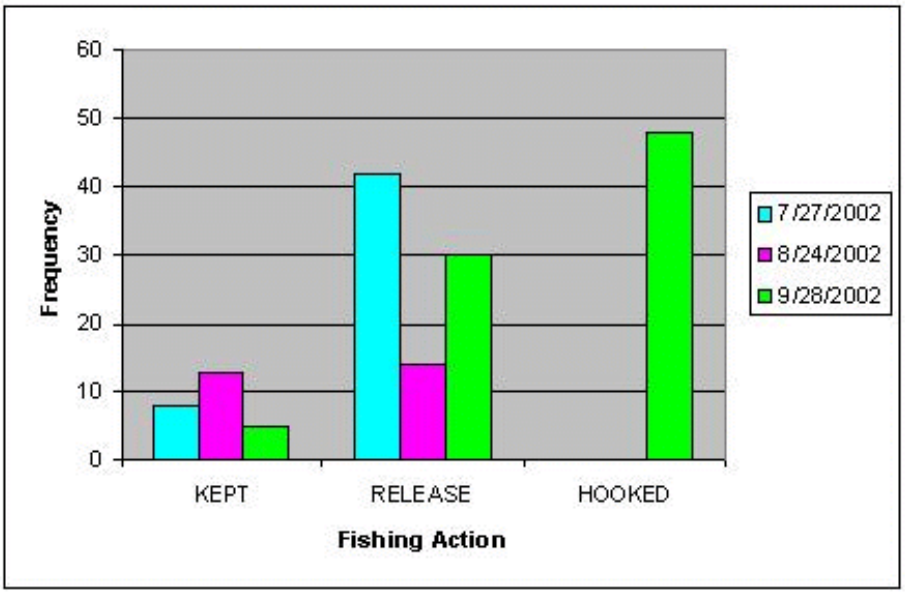

Figure 3.23 **Total Number of Swordfish Caught, Kept and Released in Three Sampled Recreational Swordfish Tournaments off Southeast Florida during 2002.** Source: J. Levesque, pers. comm. 2003.

Figure 3.23 indicates that 112 swordfish were caught during the three monitored tournaments. Of these, 26 swordfish were retained and 86 swordfish were released alive. Additional data from the September 28, 2002, tournament indicated that, in that tournament, 48 swordfish were hooked, 30 were released, and four were kept. The definition of hooked, for these purposes, was a swordfish that was on the line for any given amount of time. All hooked fish were assumed to be swordfish. The three fishing tournaments implemented a 55-inch, or 140 cm LJFL minimum size requirement for landed swordfish, although current federal regulations are 119 cm (46.9 in) LJFL.

Sizes for landed swordfish ranged from 130 - 230 cm (51.2 – 90.6 in) fork length. The mean size for landed swordfish was 160 cm (63 in) fork length. Weights for landed swordfish ranged from 36 - 144 kg (79.3 – 317.2 lb). The mean weight for the landed swordfish was 62.6 kg (137.9 lb). Estimated weights for the released swordfish ranged from 13 - 32 kg (28.6 – 70.5 lb). The mean estimated weight for released swordfish was 19.5 kg (43 lb).

The overall number of swordfish hooked per-unit-effort was .0615-swordfish/hr. or 6.15 swordfish per 100-hrs.-drifting. The catch per-unit-effort was .0143-swordfish landed/hr. or 1.43 fish per 100-hrs.-drifting.

Shark Recreational Fishery

Recreational landings of sharks are an important component of HMS fisheries. Recreational shark fishing with rod and reel is a popular sport at all social and economic levels, largely because the resource is accessible. Sharks can be caught virtually anywhere in salt water, depending upon the species. Recreational shark fisheries are oftentimes exploited in nearshore

waters by private vessels and charter/headboats. However, there is also some shore-based fishing and some offshore fishing. The following tables provide a summary of landings for each of the three species groups. Amendment 1 to the 1999 Atlantic Tunas, Swordfish, and Shark FMP limited the recreational fishery to rod and reel and handline gear only.

Table 3.34 Estimates of Total Recreational Harvest of Atlantic Sharks: 1998-2003 (numbers of fish in thousands). Source: Cortés and Neer 2002, and E. Cortés, 2005.

Species Group	1998	1999	2000	2001	2002	2003
LCS	165.5	91.0	129.4	127.8	77.9	81.4
Pelagic	11.8	11.1	13.3	3.8	4.7	4.3
SCS	169.6	115.8	184.7	211.6	153.8	134.7
Unclassified	-	-	-	22.2	2.4	16.2

Table 3.35 Recreational Harvest of Atlantic Large Coastal Sharks (LCS) by Species, in number of fish: 1998-2003. Sources: 1998-2000 (Cortés and Neer, 2002), 2001-03 (Cortés, 2005).

LCS Species	1998	1999	2000	2001	2002	2003
Basking**	0	0	0	0	0	0
Bignose*	0	0	0	0	0	0
Bigeye sand tiger**	0	0	0	0	0	0
Blacktip	82,288	34,962	67,600	48,757	42,290	38,753
Bull	1,850	3,107	6,057	4,151	1,910	3,345
Caribbean Reef*	74	3	122	0	0	0
Dusky*	4,499	5,570	2,285	5,583	1,047	2,731
Galapagos*	0	0	0	0	0	0
Hammerhead, Great	467	352	921	3,382	4	68
Hammerhead, Scalloped	1,920	1,349	3,403	1,183	1,061	2,320
Hammerhead, Smooth	375	1	1,274	703	2	1
Hammerhead, Unclassified	390	75	3,668	0	5,293	0
Lemon	2,120	146	2,782	5,488	1,683	4,002
Night*	133	50	0	0	0	0
Nurse	2,455	1,503	2,233	3,672	2,173	647
Sandbar	35,766	20,553	10,867	36,094	8,341	5,185
Sand tiger**	0	0	0	604	0	0

LCS Species	1998	1999	2000	2001	2002	2003
Silky	5,376	3,863	5,168	3,808	1,785	444
Spinner	7,522	6,391	4,474	3,651	4,134	4,460
Tiger	1,380	153	1,480	758	170	110
Whale**	0	0	0	0	0	0
White**	0	0	0	0	0	0
Large Coastal Unclassified	18,925	12,953	17,096	16,211	9,098	22,086
Total:	165,540	91,031	129,430	134,045	78,991	84,152

*indicates species that were prohibited in the recreational fishery as of July 1, 1999.
** indicates species that were prohibited as of April 1997.

Table 3.36 Recreational Harvest of Atlantic Pelagic Sharks by Species, in number of fish: 1998-2003. Sources: 1998-2000 (Cortés and Neer, 2002), 2001-03 (Cortés, 2005).

Pelagic Shark Species	1998	1999	2000	2001	2002	2003
Bigeye thresher*	0	0	0	0	65	0
Bigeye sixgill*	0	0	0	0	0	0
Blue Shark	6,085	5,218	7,010	950	0	376
Mako, Longfin*	0	0	0	0	0	0
Mako, Shortfin	5,633	1,383	5,808	2,871	3,206	3,957
Mako, Unclassified	8	9	0	0	0	0
Oceanic whitetip	0	0	0	0	0	0
Porbeagle	0	0	0	0	0	0
Sevengill*	0	0	0	0	0	0
Sixgill*	0	0	0	0	0	0
Thresher	36	4,512	528	0	1,467	0
Total:	11,762	11,122	13,346	3,821	4,673	4,333

* indicates species that were prohibited in the recreational fishery as of July 1, 1999.

Table 3.37 **Recreational Harvest of Atlantic SCS by Species, in number of fish: 1998-2003.** Sources: 1998-2000 (Cortés and Neer 2002), 2001-03 (Cortés, 2005).

SCS Species	1998	1999	2000	2001	2002	2003
Atlantic Angel*	110	0	0	0	0	0
Blacknose	10,523	6,019	10,463	15,179	11,416	6,705
Bonnethead	29,606	41,128	57,405	58,511	50,894	39,863
Finetooth	1,124	78	1,786	6,701	2,952	1,774
Sharpnose, Atlantic	128,254	68,621	114,973	131,165	88,523	86,361
Sharpnose, Caribbean*	0	0	0	0	0	0
Smalltail*	0	4	29	26	0	0
Total:	169,617	115,850	184,656	211,556	153,785	134,703

* indicates species that were prohibited in the recreational fishery as of July 1, 1999.

3.4.4.3 U.S. vs. International Catch

Important directed recreational fisheries for HMS occur in the United States, Venezuela, the Bahamas, and Brazil. Many other countries and entities in the Caribbean and the west coast of Africa are also responsible for significant HMS recreational landings. Directed recreational fisheries for sailfish occur in the Western Atlantic and include the United States, Venezuela, the Bahamas, Brazil, Dominican Republic, Mexico, and other Caribbean nations. However, of these countries, the United States is the only country that currently reports recreational landings to ICCAT. Therefore, a comparison of the percentage of U.S. landings relative to recreational fisheries in other countries is not possible. Further, total landings data are incomplete because many countries that reported landings in 1996 failed to report their 1998 and 1999 landings, which hampered the 2000 Atlantic marlin stock assessments, as well.

As part of a 1997 SCRS survey, 12 ICCAT member countries as well as Chinese Taipei and Senegal provided information on the existence of, and level of data collection for, recreational and artisinal fisheries. The survey results indicated that Brazil, Canada, France, Italy, Morocco, UK, Bermuda, and the United States have recreational fisheries in the ICCAT area of concern. Levels of data collection varied widely from country to country, making any comparison of catch levels difficult and potentially inaccurate. The wide range of recreational catches across nations and species warrants further exploration of potential data sources and the feasibility of increased recreational monitoring.

At the 1999 ICCAT meeting in Rio de Janeiro, Brazil, the Commission adopted a resolution to improve the quantity and quality of recreational data collection. Recreational fisheries were to be discussed and assessed in each country's National Report beginning in the year 2000. In addition, the SCRS was called upon to examine the impact of recreational fishing on tuna and tuna-like species. At this time additional information is not available regarding international HMS recreational catches.

At the 2004 ICCAT meeting in New Orleans, U.S., the Commission adopted a recommendation concerning prohibited gear in the sport and recreational fisheries in the Mediterranean Sea. Prohibited gear includes towed and encircling nets, seine sliding, dredgers, gill nets, trammel net and longline to fish for tuna and tuna-like species. The recommendation also prohibits the sale of sport and recreational tuna and tuna-like species and stipulates that data on these fisheries be collected and transmitted to the SCRS.

3.4.4.4 Bycatch Issues and Data Associated with the Fishery

Bycatch in the recreational rod and reel fishery is difficult to quantify because many fishermen value the experience of fishing and may not be targeting a particular pelagic species. Recreational "marlin" or "tuna" trips may yield dolphin, tunas, wahoo, and other species, both undersized and legal sized. Bluefin tuna trips may yield undersized bluefin, or a seasonal closure may prevent landing of a bluefin tuna above the minimum size. In some cases, therefore, rod and reel catch may be discarded. The Magnuson-Stevens Act (16 USC 1802 (2)) stipulates that bycatch does not include fish under recreational catch and release.

The 1999 Billfish Amendment established a catch-and-release fishery management program for the recreational Atlantic billfish fishery. As a result of this program, all Atlantic billfish that are released alive, regardless of size, are not considered bycatch. NMFS believes that establishing a catch and release fishery in this situation will further solidify the existing catch-and-release ethic of recreational billfish fishermen, and thereby increase release rates of billfish caught in this fishery. The recreational white shark fishery is by regulation a catch-and-release fishery only and white sharks are not considered bycatch.

Bycatch can result in death or injury to discarded fish. Therefore, bycatch mortality should be incorporated into fish stock assessments, and into the evaluation of management measures. Rod and reel discard estimates from Virginia to Maine during June - October could be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys). However, the actual numbers of fish discarded for many species are so low that presenting the data by area could be misleading, particularly if the estimates are expanded for unreported effort in the future. The number of kept and released fish reported or observed through the LPS dockside intercepts for 1997-2003 are presented in Table 3.38.

Outreach programs to address bycatch were included in the 1999 FMP and the Billfish Amendment. These programs have not yet been implemented, but the preparation of program designs are currently in progress. One of the key elements in the outreach program will be to provide information that leads to an improvement in post-release survival from both commercial and recreational gear. Additionally, an outreach program to encourage the use of circle hooks to increase post-release survival within HMS fisheries was introduced in a proposed rule published in 2001 (66 FR 66386, December 26, 2001). The final rule to promote the voluntary use of circle hooks published in 2003 (68 FR 711, January 7, 2003). Initial implementation of the outreach program began in 2004 with workshops conducted on the proper handling and release of sea turtles.

A study by Graves *et al.* (2002), investigated short-term (5 days) post-release mortality of Atlantic blue marlin using pop-up satellite tag technology. A total of nine recreationally-caught

blue marlin were tagged and released during July and August of 1999. All hooks employed in the study were "J" hooks. The attached tags were programmed to detach from the fish after five days and to record direct temperature and inclination of the buoyant tag to determine if the fish were actively swimming after being released. After detachment, the tags floated to the surface and began transmitting recorded position, temperature and inclination data to satellites of the Argos™ system. Three different lines of evidence provided by the tags (movement, water temperature, and tag inclination) suggested that at least eight of the nine blue marlin survived for five days after being tagged and released. One of the tags did not transmit any data which precluded the derivation of a conclusion regarding the tagged marlin's survival.

Table 3.38 **Observed or reported number of HMS kept* and released in the rod and reel fishery, Maine through Virginia.** Source: Large Pelagic Survey (LPS) Preliminary Data.

	Number of Fish Kept							Number of Fish Released Alive						
Species	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
White Marlin**	7	11	6	2	5	8	12	203	465	156	59	118	215	160
Blue Marlin**	3	3	3	0	1	0	4	30	27	28	17	14	30	39
Sailfish**	0	1	0	6	0	0	0	2	2	3	0	2	6	6
Swordfish	5	1	3	14	1	5	9	6	5	1	5	10	6	21
Giant Bluefin Tuna	51	69	56	34	20	176	58	6	11	6	0	0	8	0
Large Medium Bluefin Tuna	6	26	13	3	7	11	11	3	8	5	3	6	2	0
Small Medium Bluefin Tuna	28	19	8	30	87	62	83	34	26	44	37	5	8	13
Large School Bluefin Tuna	60	134	106	95	457	391	287	158	67	42	22	128	47	40
School Bluefin	1,000	392	212	151	338	556	509	840	412	136	159	58	200	174
Young School Bluefin	5	13	1	4	0	7	4	139	581	94	23	40	182	10
Bigeye Tuna	26	17	27	16	9	32	21	6	9	0	0	8	1	3
Yellowfin Tuna	2,472	2,646	2,501	2,366	2,423	2,595	3,216	222	645	682	97	74	328	200
Skipjack Tuna	296	261	146	32	100	117	681	468	267	88	69	130	250	526
Albacore	146	558	133	513	302	534	546	43	92	52	17	52	95	31
Thresher Shark	7	7	3	2	5	20	24	2	2	2	1	0	5	8
Mako Shark	74	78	49	49	27	72	141	94	92	49	114	65	120	208
Sandbar Shark	5	2	2	1	2	0	9	30	56	6	4	10	17	26
Dusky Shark	6	6	1	0	0	1	0	50	54	7	32	8	9	0
Tiger Shark	0	2	0	0	1	1	0	5	5	0	3	2	3	12
Porbeagle	0	1	0	0	0	1	0	5	6	0	0	0	14	3
Blacktip Shark	2	1	0	0	1	0	1	0	2	5	0	0	6	0

	Number of Fish Kept							Number of Fish Released Alive						
Species	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Atl. Sharpnose Shark	0	1	0	0	0	0	0	0	3	0	0	0	0	0
Blue Shark	27	26	11	12	2	36	65	1,897	780	572	374	141	505	2,061
Hammerhead Shark	2	1	1	1	2	0	0	4	4	5	0	1	6	38
Wahoo	10	71	45	41	34	49	68	1	2	0	0	13	6	3
Dolphin (Mahi)	1,022	7,263	2,139	955	1,294	2,509	4,209	61	194	73	48	108	111	677
King Mackerel	171	198	141	289	19	36	66	1	10	8	24	10	5	5
Atlantic Bonito	384	328	254	194	77	704	315	203	300	166	27	49	176	282
Little Tunny	428	1,231	97	139	48	240	121	1,015	1,507	133	118	118	585	443
Amberjack	3	6	9	6	19	7	44	18	40	24	20	14	57	111
Spanish Mackerel	0	2	1	13	3	5	35	1	1	0	0	0	0	1

*NOAA Fisheries typically expands these “raw” data to report discards of bluefin tuna by the rod and reel fishery to ICCAT. If sample sizes are large enough to make reasonable estimates for other species, NOAA Fisheries may produce estimates for other species in future SAFE reports.
**Amendment One to the Atlantic Billfish FMP established billfish released in the recreational fishery as a “catch and release” program, thereby exempting these fish from bycatch considerations.

3.4.4.5 Safety Issues Associated with the Fishery

The USCG does not maintain statistics on boating accidents, rescue, or casualty data specifically pertaining to recreational fishing as it does for the commercial industry. As a result, the 1999 FMP and the Billfish Amendment contain only minimal safety information regarding recreational HMS fisheries. Safety issues associated with handline fisheries for tunas is discussed in Section 3.4.3. The USCG compiles statistics on the total number of recreational boating accidents and casualties, independent of the activity or fishery in which they are engaged Table 3.39). Two common situations often place recreational boaters in potential danger. Individuals in small vessels often venture out farther than their vessels are designed to travel without proper navigational equipment, and may encounter rougher water than their boats are designed to withstand. Since fishermen targeting HMS species, particularly marlin, often travel at least 75 to 100 miles offshore, having a properly equipped vessel of adequate size is very important for the safety of recreational HMS constituents. Additionally, as the recreational swordfish fishery off the southeastern coast of Florida occurs at night and usually in small boats ranging from 23 to 40 feet in length, it presents other unique risks. Shipping traffic regularly runs through the recreational swordfish fleet, which could lead to incidents if someone is not on watch at all times. Another frequent safety concern of the Coast Guard is when someone is up in the flying bridge. Both of these situations can lead to people falling overboard. In 2003, approximately 70 percent of all boating casualties were due to drowning and in approximately 86 percent of all the drowning deaths, the victim was not wearing a personal floatation device (PFD) (Table 3.40).

Table 3.39 Overall 2003 Reported Boating Accident Types. Source: USCG Boating Statistics, 2003.

Accident Type	# Accidents	# of Injuries	# of Fatalities	Total Property Damage
Capsizing	514	330	206	$3,167,989
Carbon Monoxide	20	30	7	$0
Collision with Fixed Object	558	491	50	$4,751,034
Collision with Floating Object	152	104	3	$1,123,884
Vessel Collision	1,469	1,063	70	$7,474,678
Departed Vessel	45	6	39	$0
Ejected from Vessel	7	4	5	$0
Falls within Boat	233	253	6	$183,400
Falls on PWC	15	14	1	$0
Fall Overboard	509	354	201	$141,018
Fire/Explosion (fuel)	142	68	7	$2,921,295
Fire/Explosion (other than fuel)	68	10	2	$9,189,282
Flooding or Swamping	274	61	41	$2,383,566
Grounding	291	193	8	$4,282,148
Not Reported	158	126	20	$1,028,992
Other Casualty	80	58	4	$177,900

Accident Type	# Accidents	# of Injuries	# of Fatalities	Total Property Damage
Sinking	128	23	8	$2,021,308
Skier Mishap	451	466	6	$13,001
Struck by Boat	89	82	9	$116,350
Struck by Motor	107	103	6	$350
Struck Submerged Object	128	49	4	$1,446,179
Total	**5,438**	**3,888**	703	**$40,422,374**

Table 3.40 **Overall 2003 Reported Boating Accident Cause-of-Death Statistics.** Source: USCG Boating Statistics, 2003.

Cause of Death	# Fatalities	PFD Worn	
		Yes	No
Carbon Monoxide Poisoning	7	0	7
Burns	3	0	3
Drowning	481	65	416
Electrocution	3	0	3
Hypothermia	32	8	24
Other	12	5	7
Trauma	135	46	89
Not Reported	30	3	27
Total	703	127	576

3.4.5 Commercial Atlantic Shark Fishery

3.4.5.1 Overview of History and Current Management

In 1993, NOAA Fisheries implemented the Fishery Management Plan (FMP) for Sharks of the Atlantic Ocean, which established three management units: large coastal sharks (LCS), small coastal sharks (SCS), and pelagic sharks. At that time NOAA Fisheries identified LCS as overfished, and therefore implemented commercial quotas for LCS and established recreational harvest limits for all sharks. In 2003, NOAA Fisheries amended the measures enacted in the 1999 FMP based on the 2002 LCS and SCS stock assessments, litigation, and public comments. Implementing regulations for Amendment 1 to the 1999 FMP were published on December 24, 2003 (68 FR 74746). Management measures enacted in the amendment included: re-aggregating the large coastal shark complex, using maximum sustainable yield (MSY) as a basis for setting commercial quotas, eliminating the commercial minimum size restrictions, establishing three regional commercial quotas (Gulf of Mexico, South Atlantic, and North Atlantic) for LCS and SCS management units, implementing trimester commercial fishing seasons effective January 1, 2005, imposing gear restrictions to reduce bycatch, and a time/area closure off the coast of North Carolina effective January 1, 2005. As a result of using MSY to establish quotas, and implementing a new rebuilding plan, the overall annual landings quota for LCS in 2004 was established at 1,017 metric tons (mt) dressed weight (dw). The overall annual landings quota for SCS was established at 454 mt dw and the pelagic, blue, and porbeagle shark quotas were established at 488 mt dw, 273 mt dw, and 92 mt dw respectively.

The regional quotas which were established in Amendment 1 to the HMS FMP for LCS and SCS were intended to improve overall management of the stocks by tailoring quotas to specific regions based on landings information. These quotas were based upon average historical landings (1999-2001) from the canvass and quota monitoring databases. The canvass database provides a near-census of the landings at major dealers in the southeast United States (including state landings) and the quota monitoring database collects information from dealers in the South Atlantic and Gulf of Mexico.

On November 30, 2004, NOAA Fisheries issued a final rule (69 FR 69537), which established, among other things, new regional quotas based on updated landings information from 1999-2003. This final rule did not change the overall quotas for LCS, SCS, and pelagic sharks established in Amendment 1, only the percentages allocated to each of the regions. The updated information was based on several different databases, including the canvass and quota monitoring databases, the Northeast Commercial Fisheries Database (CFDBS), and the snapper grouper logbook. The new regional quotas and trimester seasons for the commercial Atlantic shark fishery became effective January 1, 2005.

3.4.5.2 Most Recent Catch and Landings Data

Commercial shark fishing effort is generally concentrated in the southeastern United States and Gulf of Mexico (Cortes and Neer, 2002). Approximately 84-91 percent of LCS, 56-64 percent of pelagic sharks, and nearly all of SCS landings came from the southeast region (Cortes and Neer, 2002). McHugh and Murray (1997) found in a survey of shark fishery participants that the largest concentration of bottom longline fishing vessels is found along the central Gulf coast of Florida, with the John's Pass - Madeira Beach area considered the center of directed shark fishing activities. Consistent with other HMS fisheries, some shark fishery participants move from their home ports to other fishing areas as the seasons change and fish stocks move.

Landings data from 1999-2002 indicate that overall LCS landings in the Atlantic commercial shark fishery decreased from 1,778 mt dw in 1999 to 1,559 mt dw in 2002, but increased to 1,866 mt dw in 2002. Preliminary data from 2003 indicate landings of 1,659 mt dw (Table 3.41). These data are subject to change as additional non-Federal (state landings) are included in the landings estimates. For SCS, landings ranged from a low of 263 mt dw in 2002 to a high of 329 mt dw in 2001 (Table 3.42). For pelagic sharks, landings ranged from a low of 139 mt dw in 2002 to a high of 182 mt dw in 1999 (Table 3.43). There are a number of other sources of mortality on LCS including discards, recreational catches, catches by other countries, and bycatch of sharks in other fisheries are listed in

Table 3.44. All of these sources of mortality are taken into account when developing stock assessments for the Atlantic commercial shark fishery.

Species-specific landings estimates from 1999-2003 for LCS indicate that sandbar and blacktip sharks were the two predominant species landed in recent years. In 2001 and 2002, sandbar sharks were the most abundant species landed in the LCS complex and accounted for 40 and 45 percent of total LCS landings respectively, whereas blacktip sharks were the most abundant species landed in 2000 with 44 percent of total LCS landings (Table 3.41).

Hammerhead sharks (all species combined) were the third most abundant species landed, ranging from 2-3 percent of total LCS landings in 2001 and 2002, respectively. Finetooth, and sharpnose sharks were the most abundant species landed in the SCS complex. In 2001, finetooth sharks represented 42 percent of total SCS landings, and in 2002 sharpnose sharks represented 32 percent of total SCS landings (Table 3.42). Shortfin mako were the most abundant among pelagic shark landings, accounting for 51 percent of that category (Table 3.43).

Regional quotas for LCS and SCS were implemented for the first time in 2004. At that time, data indicated that the Gulf of Mexico, South Atlantic, and North Atlantic regions accounted for 42, 54, and 4 percent of the total LCS landings and 4, 83, and 13 percent of the total SCS landings, respectively. Based on a review of updated landings, new regional quotas were established in 2005 (69 FR 69537) for the Gulf of Mexico, South Atlantic and North Atlantic regions at 52, 41, and 7 percent of the total LCS landings (Table 3.45) and 4, 83, and 13 percent of the total SCS landings, respectively (Table 3.46). The quota for pelagic sharks was not divided among regions.

Recreational catches account for a significant portion of LCS and SCS landings. For the two most recent years for which data are available (2000-2001), 140,400 and 142,000 LCS respectively, were estimated to have been caught by recreational fishermen. For SCS 184,700 sharks were caught recreationally in 2000 and 189,500 in 2001. For pelagic sharks 13,300 were caught recreationally in 2000 and 3,800 were caught in 2001.

Table 3.41 **Commercial landings of large coastal sharks in lb dw: 1999-2003.** Source: Cortés and Neer, 2002; Cortés, 2003.

Large Coastal Sharks	1999	2000	2001	2002	2003
Basking**	0	0	0	0	0
Bignose*	9,035	672	1,442	0	318
Bigeye sand tiger**	0	0	0	0	0
Blacktip	1,286,979	1,633,919	1,135,199	1,096,455	1,487,604
Bull	25,426	24,980	27,037	40,463	93,816
Caribbean Reef*	0	0	1	34	
Dusky*	110,950	205,746	1,884	16,367	23,288
Dusky, fins*	0	0	89	0	0
Galapagos*	0	0	0	0	0
Hammerhead, Great	0	0	0	0	0
Hammerhead, Scalloped	0	0	0	0	0
Hammerhead, Smooth	0	0	0	0	0
Hammerhead, Unclassified	53,394	35,060	69,356	107,905	153,548
Large Coastal			172,494	147,431	51,433
Lemon	23,604	45,269	24,453	56,945	80,688
Narrowtooth*	0	0	0	0	0
Night*	4,287	0	0	0	20
Nurse	1,168	429	387	69	70
Sandbar	1,299,987	1,491,908	1,404,186	1,851,447	1,436,838
Sandbar, fins		996	2,364	24,289	-
Sand tiger**	6,401	6,554	1,248	415	975
Silky	8,649	31,959	14,197	30,731	51,588

Large Coastal Sharks	1999	2000	2001	2002	2003
Spinner	629	14,473	6,970	8,447	12,133
Tiger	30,274	24,443	26,973	16,115	18,536
Whale**	0	0	0	0	0
White**	82	1,201	26	0	1,454
Large Coastal Unclassified	978,312	108,692	525,661	708,049	853,564
Unclassified fins	80,393	86,824	23,988	9,017	181,431
Total	3,919,570 (1,778 mt dw)	3,713,125 (1,684 mt dw)	3,437,955 (1,559 mt dw)	4,114,179 (1,866 mt dw)	4,421,249 (2,005 mt dw)

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.
** indicates species that were prohibited as of April 1997. *** Preliminary data, species not yet available.

Table 3.42 **Commercial landings of small coastal sharks in lb dw: 1999-2003.** Source: Cortés and Neer, 2002; Cortés, 2003. *2003 data pending.

Small coastal sharks	1999	2000	2001	2002	2003
Atlantic Angel*	0	86	0	439	1,375
Blacknose	130,317	178,083	160,990	144,616	131,511
Bonnethead	53,702	69,411	63,461	36,553	38,614
Finetooth	246,404	202,572	303,184	185,120	163,407
Sharpnose, Atlantic	239,647	142,511	196,441	213,140	190,960
Sharpnose, Atlantic, fins	0	0	209	10	0
Sharpnose, Caribbean*	2,039	353	205	0	0
Unclassified Small Coastal	136	11	51	2	25,307
Total:	672,245 (305 mt dw)	593,027 (269 mt dw)	724,541 (329 mt dw)	579,880 (263 mt dw)	549,799 (249 mt dw)

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

Table 3.43 **Commercial landings of pelagic sharks in lb dw: 1999-2003.** Source: Cortés and Neer, 2002; Cortés, 2003. *2003 data pending.

Pelagic Sharks	1999	2000	2001	2002	2003
Bigeye thresher*	17,759	4,376	330	0	0
Bigeye sixgill*	0	0	0	0	0
Blue	1,111	3,508	65	8	6,324
Mako, Longfin*	4,619	6,560	9,453	1,971	1,831
Mako, Shortfin	170,860	129,088	171,888	156,540	150,076
Mako, Unclassified	58,344	74,690	73,556	58,545	33,203
Oceanic whitetip	698	657	922	1,590	2,559
Porbeagle	5,362	5,272	1,152	2,659	1,738
Porbeagle, fins	0	0	12	7	0
Sevengill*	0	0	0	0	0
Sixgill*	0	0	0	0	0
Thresher	96,012	81,624	56,893	53,260	46,502
Thresher, fins	0	0	201	340	
Unclassified pelagic	46,056	41,184	31,639	18,392	297,126
Unclassified pelagic, fins	0	3,746	12,026	12,325	0
Total:	400,821 (182 mt dw)	350,705 (159 mt dw)	358,137 (162 mt dw)	305,637 (139 mt dw)	616,967 (280 mt dw)

* indicates species that were prohibited in the commercial fishery as of June 21, 2000.

Table 3.44 Estimates of total landings and dead discards for large coastal sharks: 1981-2003 (numbers of fish in thousands). Source: Cortes, 2002. *2002 and 2003 data pending.

Year	Commercial Landings	Pelagic Longline Discards	Recreational Catches	Unreported	Bottom Longline Discards	Mexican Catches	Menhaden Fishery bycatch	Total
1981	16.2	0.9	265.0	N/A	0.9	120.0	25.1	428.1
1982	16.2	0.9	413.9	N/A	0.9	81.9	25.1	538.9
1983	17.5	0.9	746.6	N/A	1.0	85.4	25.1	876.5
1984	23.9	1.3	254.6	N/A	1.4	120.7	25.1	426.9
1985	22.2	1.2	365.6	N/A	1.3	87.7	25.1	503.1
1986	54.0	2.9	426.1	24.9	3.1	81.8	25.1	617.9
1987	104.7	9.7	314.4	70.3	5.9	80.2	25.1	610.3
1988	274.6	11.4	300.6	113.3	15.5	89.3	25.1	829.8
1989	351.0	10.5	221.1	96.3	19.9	105.6	25.1	829.4
1990	267.5	8.0	213.2	52.1	15.1	122.2	25.1	703.3
1991	200.2	7.5	293.4	11.3	11.3	95.7	25.1	644.5
1992	215.2	20.9	304.9	N/A	12.2	103.4	25.1	681.6
1993	169.4	7.3	249.0	N/A	11.3	119.8	25.1	581.9
1994	228.0	8.8	160.9	N/A	16.3	110.7	26.2	550.9
1995	222.4	5.2	180.8	N/A	13.9	96.0	24.0	537.8
1996	160.6	5.7	191.5	N/A	7.6	106.1	25.1	493.6
1997	130.6	5.6	168.1	N/A	8.3	83.1	25.1	417.8
1998	174.9	4.3	169.6	N/A	9.9	74.1	25.1	458.1
1999	111.5	9.0	92.3	N/A	3.8	57.1	25.1	297.5
2000	111.2	9.4	131.5	N/A	4.8	52.1	25.1	343.0
2001	95.7	5.6	127.9	N/A	6.1	52.1	25.1	334.1
2002	123.4	2.4	77.9	N/A	4.9		25.1	233.7
2003	126.5	3.5	81.4	N/A	7.0		25.1	243.5

Table 3.45 Commercial landings of LCS (including unclassified sharks) in the Atlantic and Gulf of Mexico by region and year (mt dw) from 1999-2003.

Year	South Atlantic			Gulf of Mexico			North Atlantic		Total		
	Canvass	QMS	Logbook	Canvass	QMS	Logbook	CFDBS*	Logbook	Canvass	QMS	Logbook
1999	1246.9	474.5	789.2	1342.7	739.8	803.9	135.5	75.6	258.9	1415	1668.7
2000	1107	503.8	662.1	1255.3	912.1	760	168.7	167.6	2362.3	1591.3	1589.7
2001	1078.4	488.1	632.6	1270.4	639.4	898.8	254.4	98.9	2348.8	1390.1	1630.3
2002	1542	678.8	680.4	1406.5	614.7	1034.6	191.2	104	2948.5	1492.3	1819
2003	1226.7	674.9	635.7	1829.7	934.3	1168.4	178.3	64.6	3056.4	1804.9	1868.7
Total	6201	2820.1	3400	7104.6	3840.3	4665.7	928.1	510.7	13305.6	7693.6	8576.4
Average	1240.2	564.0	680	1420.9	768.1	933.1	185.6	102.1	2661.1	1538.7	1715.3
Total Combined	12526.2			15610.6			1438.8		29575.6		
Average Combined	835.1			1040.7			143.9		2019.7		
Percent	41% (416.9 mt dw)			52% (528.8 mt dw)			7% (71.2 mt dw)		100%		

*Northeast Commercial Fisheries Database System (CFDBS). There is no canvass data available for the North Atlantic.

Table 3.46 Commercial landings of SCS in the Atlantic and Gulf of Mexico by region and year (mt dw) from 1999-2003.

Year	South Atlantic			Gulf of Mexico			North Atlantic		Total		
	Canvass	QMS	Logbook	Canvass	QMS	Logbook	CFDBS*	Logbook	Canvass	QMS	Logbook
1999	391.3	317.3	198.4	11.8	14.5	26.5	3.7	2.07	403.1	335.7	226.97
2000	357.5	229.9	74.5	11.6	24.1	13	12.6	9.3	369.1	266.6	96.8
2001	446.3	309	143.9	8.8	18.9	34.5	0.1	7.8	455.1	328	186.2
2002	311.1	248.9	156.7	36.9	11.4	42.4	15.4	5.4	348	275.7	204.5
2003	168.3	197.4	147.1	47.9	46.1	73.6	0	7.4	216.2	243.5	228.1
Total	1674.5	1302.5	720.6	117.0	115.0	190.0	31.8	31.97	1791.5	1449.5	942.57
Average	334.9	260.5	144.12	23.4	23.0	38.0	6.4	6.394	358.3	289.9	188.514
Total Combined	3697.6			422			63.8		4183.4		
Average Combined	246.5			28.1			6.4		281.0		
Percent	88% (398.2 mt dw)			10% (45.4 mt dw)			2% (10.3 mt dw)		100%		

*Northeast Commercial Fisheries Database System (CFDBS). There is no canvass data available for the North Atlantic.

3.4.5.3 Bottom Longline Fishery

The Atlantic bottom longline fishery targets both LCS and SCS. Bottom longline is the primary commercial gear employed in the LCS and SCS fisheries in all regions. Gear characteristics vary by region, but in general, an approximately ten-mile long bottom longline, containing about 600 hooks, is fished overnight. Skates, sharks, or various finfishes are used as bait. The gear typically consists of a heavy monofilament mainline with lighter weight monofilament gangions. Some fishermen may occasionally use a flexible 1/16 inch wire rope as gangion material or as a short leader above the hook.

In January 2002, the observer coverage requirements in the shark bottom longline fishery changed from voluntary to mandatory participation if selected. NOAA Fisheries selects approximately 40-50 vessels for observer coverage during each season. Vessels are randomly selected if they have a directed shark limited access permit, have reported landings from sharks during the previous year, and have not been selected for observer coverage during each of the three previous seasons.

NOAA Fisheries currently manages the commercial shark observer program through a contract with the University of Florida and Florida Museum of Natural History, Commercial Shark Fishery Observer Program (CSFOP). The CSFOP trains and places observers aboard vessels in the directed shark bottom longline fishery in the Atlantic and Gulf of Mexico to collect data on the commercial shark fishery and thus improve overall management strategies for the fishery. Observers provide baseline characterization information, by region, on catch rates, species composition, catch disposition, relative abundance, and size composition within species for the large coastal and small coastal shark bottom longline fisheries.

During 2003, six observers logged 263 sea days on shark fishing trips aboard 20 vessels in the Atlantic from North Carolina to Florida and in the eastern Gulf of Mexico off Florida. The number of trips taken on each vessel ranged from one to five and the number of sea days each observer logged ranged from 9 to 35. Observers documented the catches and fishing effort on approximately 150 longline sets that fished 103,351 hooks. During 2004, five observers logged 196 sea days on 56 shark fishing trips aboard 11 vessels. Observers documented the catches and fishing effort during 120 longline sets that fished 90,980 hooks.

Data from the CSFOP between 2000 and 2002 show that LCS comprised 66.2 percent of the total catch (Burgess and Morgan, 2002). During 2003, LCS comprised 68.4 percent of the total catch. Sandbar sharks dominated the observed catches with 30.6 percent of total LCS catch (Table 3.47). The overall catch and disposition of species is listed in Table 3.48. Regional differences in sandbar shark abundance were evident. For example, in the Carolina region, sandbar sharks comprised 67.4 percent of the total catch and 77.2 percent of the large coastal shark catch. In the Florida Gulf region, sandbar sharks comprised 62.0 percent of the total catch and 66.5 percent of the large coastal catch, whereas in the Florida East Coast region, sandbar sharks comprised only 17.2 percent of the total observed catch, and 37.1 percent of the large coastal shark catch (Burgess and Morgan, 2003). Blacktip sharks comprised 13.9 percent of total observed catch and 20.3 percent of the large coastal catch (Burgess and Morgan, 2002). Tiger sharks comprised 7.5 percent of the total observed catch and 11.0 percent of the large coastal

shark catch. A majority of tiger sharks (71.7 percent) and nurse sharks (98.8 percent) were tagged and released.

During 2003, CSFOP data indicate that SCS comprised 28.0 percent of the total observed catch (Burgess and Morgan, 2003; Burgess and Morgan 2004). The SCS catch was dominated by Atlantic sharpnose shark (80.3 percent). The remainder of the small coastal catch consisted of blacknose sharks (5.5 percent), bonnethead (0.03 percent), and finetooth (0.02 percent)(Table 3.47). In previous seasons, the Atlantic sharpnose shark was the most frequently caught shark in the Florida East Coast region and accounted for 51.6 percent of the total observed catch, and 96.0 percent of the small coastal catch in that region (Burgess and Morgan, 2002).

Bottom longlining for sharks has relatively low observed bycatch rates. Historically, finfish bycatch has averaged approximately five percent in the bottom longline fishery. Finfish bycatch for the bottom longline fishery includes, but is not limited to, skates, rays, cobia, redfish, bluefish, and great barracuda. During the second semi-annual season of 2003, observer data indicate that approximately 4,320 sharks were caught compared to 432 other fish, 4 invertebrates, and 3 sea turtles (Burgess and Johns, 1999). In terms of bycatch rates, observed shark catches constitute 91 percent of the 4,759 total animals caught, with other fish comprising 10 percent, invertebrates less than .01 percent, and sea turtles less than .01 percent. For more information on bycatch see Section 3.8.

Table 3.47 **Species composition of observed bottom longline catch during 2003.** Source: G. Burgess and A. Morgan 2004.

Species	Total Number Caught	% Total Catch	% Management Category
LCS			
Sandbar shark	2719	30.63	44.78
Blacktip shark	1232	13.88	20.29
Tiger shark	665	7.49	10.95
Spinner shark	309	3.48	5.09
Scalloped hammerhead	259	2.92	4.27
Bull shark	257	2.90	4.23
Nurse shark	175	1.97	2.88
Sand tiger	108	1.22	1.78
Dusky shark	108	1.22	1.78
Silky shark	105	1.18	1.73
Lemon shark	60	0.68	0.99
Great hammerhead	55	0.62	0.91
Bignose shark	8	0.09	0.13
Night shark	8	0.09	0.13
White shark	3	0.03	0.05
Caribbean shark	1	0.01	0.02

Species	Total Number Caught	% Total Catch	% Management Category
Total	**6072**	**68.41**	**100**
SCS			
Sharpnose shark	1996	22.49	80.32
Blacknose shark	484	5.45	19.48
Bonnethead	3	0.03	0.12
Finetooth	2	0.02	0.08
Total	**2485**	**28.00**	**100.00**
Pelagics			
Sevengill	5	0.06	45.45
Shortfin mako	2	0.02	18.18
Bigeye sixgill	2	0.02	18.18
Bigeye thresher shark	1	0.01	9.09
Sixgill shark	1	0.01	9.09
Total	11	0.12	100.00
Other			
Smooth dogfish	298	3.36	
Unidentified sharks	10	0.113	

Table 3.48 **Directed bottom longline shark observed catch and disposition, 2003**. Source: G. Burgess and A. Morgan 2004. * carcassed means sharks that are retained; ** other mortality refers to sharks brought to the vessel dead but not retained.

	Number caught	Percent total mortality	Number Carcassed*	Percent Carcassed	Other mortality**	Percent other mortality	Number Tagged released	Percent Released
Small Coastal	2,485	94.85	295	11.87	2,062	82.98	127	5.11
Large Coastal	6,072	86.68	4,677	77.03	586	9.65	809	13.32
Pelagic	11	90.91	2	18.18	8	72.73	1	9.09
Large coastal sharks:								
Sandbar	2,719	97.35	2,597	95.51	50	1.84	72	2.65
Blacktip	1,232	99.51	1,207	97.97	19	1.54	6	0.49
Tiger	665	40.60	41	6.17	229	34.44	395	59.40
Spinner	309	100.00	302	97.73	7	2.27		0.00
Scalloped hammerhead	259	98.84	86	33.20	170	65.64	3	1.16
Bull	257	96.89	248	96.50	1	0.39	8	3.11
Nurse	175	0.57	0	0.00	1	0.57	174	99.43
Dusky	108	76.85	38	35.19	45	41.67	25	23.15
Sand tiger	108	0.00	0	0.00	0	0.00	108	100.00
Silky	105	97.14	78	74.29	24	22.86	3	2.86
Lemon	60	86.67	52	86.67	0	0.00	8	13.33
Great hammerhead	55	96.36	25	45.45	28	50.91	2	3.64
Bignose	8	75.00	3	37.50	3	37.50	2	25.00
Night	8	100.00	0	0.00	8	100.00		0.00
White	3	33.33	0	0.00	1	33.33	2	66.67
Caribbean	1	0.00	0	0.00	0	0.00	1	100.00
Small coastal sharks:								
Sharpnose	1,996	96.24	14	0.70	1,907	95.54	74	3.71
Blacknose	484	89.05	276	57.02	155	32.02	53	10.95
Bonnethead	3	100.00	3	100.00	0	0.00	0	0.00
Finetooth	2	100.00	2	100.00	0	0.00	0	0.00
Pelagic sharks:								
Bigeye thresher	5	100.00	0	0.00	5	100.00	0	0.00
Sevengill	2	0.00	0	0.00	2	100.00	0	0.00
Shortfin mako	2	0.00	2	100.00	0	0.00	0	0.00
Sixgill	1	0.00	0	0.00	0	0.00	1	100.00
Bigeye sixgill	1	0.00	0	0.00	1	100.00	0	0.00

3.4.5.4 Gillnet Fishery

In the southeast shark gillnet fishery, NOAA Fisheries modified the requirement to have 100 percent observer coverage at all times on March 30, 2001 (66 FR 17370), by reducing the level required to a statistically significant level outside of right whale calving season (100 percent observer coverage is still required during the right whale calving season from November 15 through April 1). This modification of observer coverage reduced administrative costs while maintaining statistically significant and adequate levels of coverage to provide reasonable estimates of sea turtle and marine mammal takes outside the right whale calving season. The level of observer coverage necessary to maintain statistical significance will be reevaluated annually and adjusted accordingly. Additionally, in 2001, NOAA Fisheries established a requirement to conduct net checks every two hours to look for and remove any protected species.

The southeast shark gillnet fishery is comprised of several vessels based primarily out of ports in northern Florida (South Atlantic Region) that use nets typically 456 to 2,280 meters long and 6.1 to 15.2 meters deep, with stretched mesh from 12.7 to 22.9 cm. This fishery is currently prohibited in the state waters off South Carolina, Georgia, and Florida, thereby forcing some of these vessels to operate in deeper waters under Federal jurisdiction, where gillnets are less effective. The entire process (set to haulback) takes approximately 9 hours (Carlson and Baremore, 2002a). A total of 41 strikenet sets, in which a smaller second vessel actively sets the net around a school of sharks, were observed on 3 vessels from January through September 2003. However, 51 additional trips were made when the observer departed with the vessel but no strike was made. Reasons for not striking for sharks included the inability to locate the school, sharks located in state waters, and poor weather conditions (Carlson and Baremore, 2003).

On September 23, 2002, NOAA Fisheries implemented a restricted area to reduce bycatch of right whales from November 15 through March 31 (67 FR 59471). In this area, only gillnets used in a strikenet fashion can operate during times when right whales are present. Operation in this area at that time requires 100 percent observer coverage. Vessels fishing in a strikenet fashion used nets 364.8 meters long, 30.4 meters deep, and with mesh size 22.9 cm. Observed catch in the strikenet fishery consisted of 6 species of sharks (96.7 percent of total number caught) and 7 species of teleosts and rays (3.3 percent of total number caught). No marine mammals or sea turtles were observed caught. The blacktip shark made up 97.5 percent of the number of sharks caught, and 86 percent of the overall catch. Bycatch included crevalle jack, red drum, and great barracuda (Table 3.49).

A total of 24 driftnet sets were observed on 5 vessels from February through September, 2004. Driftnet vessels carried nets ranging in length from 547.2-2736 m; depths from 7.6-13.7 m and stretched mesh sizes from 12.7-22.9 cm. The most frequently used mesh size was 12.7 cm. For all observed driftnet sets, set duration averaged 0.4 hrs. Sets were made in sea water averaging 15.4 m deep. Haulback and processing of the catch averaged 3.4 hrs. Average soak time for the driftnet (time net was first set minus time haulback began) was 10.8 hrs.

The observed driftnet catch consisted of 9 species of sharks. Three species of sharks made up 92.9 percent (by number) of the observed shark catch (Table 3.50). These species were the Atlantic sharpnose shark, blacknose shark, and finetooth shark. By weight, the shark catch

was made up of Atlantic sharpnose shark, (55.3 percent), blacknose shark (17.1 percent), blacktip shark (10.7 percent), and finetooth shark (10.3 percent). Total observed catch composition (percent of numbers caught) was 79.0 percent sharks, 20.7 percent teleosts, 0.3 percent rays, and 0.03 percent protected species (i.e marine mammals, sea turtles, sawfish).

There were 23 species of teleosts, 2 species of rays, and 1 species of marine mammal observed caught during the driftnet season (Table 3.50). Four species of teleosts and rays made up 90.8 percent by number of the overall non-shark species in observed strikenet catches. These species were little tunny (45.6 percent); king mackerel (23.3 percent); great barracuda (11.8 percent); and red drum (10.2 percent). For incidental driftnet catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was Atlantic sailfish, (100.0 percent), king mackerel (78.3 percent), and cobia, (28.7 percent). Red drum had the highest discard proportion alive (98.1 percent)(Carlson and Baremore, 2003). Observed driftnet sets caught 23 species of teleosts and rays and no sea turtles or marine mammals. Only the great barracuda were retained, with all remaining bycatch discarded alive (Carlson, 2002).

Outside of right whale calving season, observed drift gillnet catch consisted of 26 species of teleosts and rays and one species of marine mammal, which was discarded dead. Five species of teleosts and one species of ray made up 90.6 percent by number of the overall non-shark catch. Little tunny (44.1 percent), king mackerel (20.8 percent), great barracuda (12.5 percent), Atlantic moonfish (9.4 percent), and cobia (3.8 percent) dominated the bycatch (Carlson and Baremore, 2002). During drift gillnet fishing, the highest proportion of species discarded dead (for species with greater than 10 individuals) was for tarpon, crevalle jack, king mackerel, and red drum. Cownose rays and red drum had the highest proportion of discarded alive with 78.1 percent and 50.0 percent, respectively (Carlson and Baremore, 2002).

Table 3.49 Total Strikenet Shark Catch and Bycatch by Species in order of Decreasing Abundance for all Observed Trips, 2003. Source: Carlson and Baremore, 2003.

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Blacktip shark	6,401	97.5	.6	1.9
Blacknose shark	343	100.0	0	0
Crevalle jack	215	96.2	3.3	.5
Red Drum	18	0	100	0
Great barracuda	13	92.3	0	7.7
Manta ray	10	0	100	0
Bull shark	8	75	12.5	12.5
Permit	8	50	37.5	12.5
Nurse shark	1	0	100	0
Spinner shark	1	100	0	0
Finetooth shark	1	100	0	0
Cobia	1	100	0	0
Atlantic bonito	1	0	0	100
Total	**7,021**			

Table 3.50 **Total Shark Catch by Species and Species Disposition in Order of Decreasing Abundance for all Observed Driftnet Sets, 2003.** Source: Carlson and Baremore, 2003.

Species	Total Number Caught	Kept (%)	Discarded Alive (%)	Discarded Dead (%)
Atlantic sharpnose	6,917	99.8	0	.2
Blacknose	799	100	0	0
Finetooth	620	100	0	0
Blacktip	375	45	24	31
Bonnethead	168	100	0	0
Scalloped Hammerhead	62	3.2	0	96.8
Spinner	20	5	0	95
Great Hammerhead	6	100	0	0
Lemon	1	0	100	0
Total	**8,968**			

Table 3.51 **Total bycatch in NOAA Fisheries observed drift gillnet sets in order of decreasing abundance and species disposition for all observed trips, 2003.** Source: Carlson, 2003.

Species	Total Number Caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
Little tunny	1169	92.6	0	7.4
King mackerel	596	21.5	.2	78.3
Barracuda	300	100	0	0
Red drum	262	0	98.1	1.9
Cobia	80	70	1.3	28.7
Blackfin tuna	36	100	0	0
Atlantic sailfish	30	0	0	100
Cownose ray	22	0	59.1	40.9
Spanish mackerel	11	100	0	0
Remora	9	0	33.4	66.6
Crevalle jack	8	0	0	100
Blue runner	8	87.5	0	12.5
Tarpon	5	0	0	100
Manta ray	5	0	100	0
Dolphin	5	100	0	0
Tripletail	4	100	0	0
Spotted eagle ray	2	0	100	0
Blue marlin	2	0	0	100
Balloonfish	2	0	0	100
Wahoo	1	100	0	0
Pompano	1	100	0	0
Rainbow runner	1	100	0	0
Black drum	1	0	100	0
Bluefish	1	0	0	100

3.4.5.5 Pelagic Longline Fishery

The U.S. pelagic longline (PLL) fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, or bigeye tuna in various areas and seasons and catches sharks incidentally. Although this gear can be modified (i.e., depth of set, hook type, etc.) to target swordfish, tuna, or sharks, like other hook and line fisheries, it is a multi-species fishery. For more information on the PLL fishery see Section 3.4.1. Longline gear sometimes attracts and hooks non-target finfish with no commercial value, as well as species that cannot be retained by commercial fishermen, such as billfish or some species of sharks. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles and sea birds.

From May 1992 through December 2000, the Pelagic Observer Program (POP) recorded a total of 4,612 elasmobranchs (15 percent of the total catch) caught off the southeastern U.S. coast in fisheries targeting tunas and swordfish (Beerkircher *et al.*, 2004). Of the 22 elasmobranch species observed, silky sharks were numerically dominant (31.4 percent of the elasmobranch catch), with silky, dusky, night, blue, unidentified, tiger, and scalloped hammerhead sharks making up the majority (84.6 percent) (Beerkircher *et al.*, 2004).

3.4.5.6 Protected Resources

Under the Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.) the Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities), and the shark bottom longline as Category III (remote likelihood or no known serious injuries or mortalities) (July 20, 2004, 69 FR 43338). On October 29, 2003, NOAA Fisheries issued a biological opinion (BiOp) pursuant to the Endangered Species Act (ESA) regarding Atlantic shark fisheries. This BiOp concluded that the level of anticipated take in the Atlantic shark fishery resulting from measures implemented in Amendment 1 to the 1999 FMP (68 FR 74746), were not likely to jeopardize the continued existence of endangered green, leatherback, and Kemp's ridley sea turtles, the endangered smalltooth sawfish, or the threatened loggerhead sea turtle. Furthermore, it concluded that the actions in the rule were not likely to adversely affect marine mammals. As a result of this conclusion, NOAA Fisheries (NOAA Fisheries, 2003) anticipates that the continued operation of the shark bottom longline program will result in a 5-year total incidental take of the following numbers of sea turtles: Leatherback - 172; loggerhead - 1370; a total of 30 in any combination of hawksbill, green, and Kemp's ridley sea turtles. NOAA Fisheries also anticipates a 5-year take of 261 smalltooth sawfish, of which no lethal takes are expected. If the actual calculated incidental captures or mortalities exceed the incidental take statement, a formal consultation for that gear type must be re-initiated immediately. More information is available in Amendment 1 to the 1999 FMP and the October 2003 BiOp and is not repeated here.

Loggerhead Sea Turtles

In the bottom longline fishery a total of 55 sea turtles were observed caught from 1994 through 2004 (Table 3.52 and Figure 3.24). Seasonal variation indicates that most of the sea turtles were caught early in the year. Of the 55 observed sea turtles, 43 were loggerhead sea turtles, of which 26 were released alive. Another nine loggerheads were released in an unknown

condition and eight were released dead. Based on extrapolation of observer data in Amendment 1 to the 1999 FMP, it was estimated that a total of 2,003 loggerhead sea turtles were taken in the shark bottom longline fishery from 1994 through 2002 (NOAA Fisheries, 2003a). An additional 503 unidentified sea turtles were estimated to have been taken. On average, 222 loggerhead sea turtles and 56 unidentified sea turtles were estimated to have been taken annually during this time period in the shark bottom longline fishery.

In the shark gillnet fishery, loggerhead sea turtles are rarely caught. During the 1999 right whale calving season no loggerhead sea turtles were caught in this fishery (Carlson and Lee, 1999). No loggerhead sea turtles were observed caught with strikenets during the 2000-2002 right whale calving seasons (Carlson 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a). However, three loggerhead sea turtles have been observed caught with drift gillnets during right whale calving season, one each year from 2000 to 2002 (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a; Garrison, 2003). In 2004 there were no observed sea turtle interactions in either the strikenet or drift gillnet fisheries.

No loggerhead sea turtles were caught outside of the right whale calving season in 2002 (Carlson and Baremore, 2002b), and no loggerhead turtles were observed caught during or after the right whale calving season in 2003 or 2004 in the directed shark gillnet fishery (Carlson and Baremore 2003; Carlson pers. comm). One loggerhead sea turtle mortality was reported in abandoned fishing gear in January 2004, and was not considered part of normal fishing operations.

Leatherback Sea Turtles

Of the 55 observed sea turtle interactions in the bottom longline fishery from 1994-2004, four were leatherback sea turtles of which one was dead and three were released with their condition unknown (Figure 3.24). Based on extrapolation of observer data, it was estimated that 269 leatherback sea turtles were taken in the shark bottom longline fishery from 1994 through 2002 (NOAA Fisheries, 2003a). On average, 30 leatherback sea turtles each year were taken in the shark bottom longline fishery during 1994 through 2002. This analysis only estimates takes without discriminating between live and dead releases. Of the observed leatherback takes, 25 percent were lethal. Applying the observed mortality rate of 25 percent to the total leatherback takes and an additional 42 percent post-release mortality estimate due to hook ingestion to the remaining, results in an estimated total number of leatherbacks killed as a result of the selected action at 17 per year. The leatherback mortality is very conservative because it is known that leatherbacks rarely ingest or bite hooks, but are usually foul hooked on their flippers or carapaces, reducing the likelihood of post-hooking release mortality. However, leatherback-specific data for this fishery is not available and therefore the most conservative estimate is used.

In the shark gillnet fishery, leatherback sea turtles are sporadically caught. During the 1999 right whale calving season, two leatherback sea turtles were caught in this fishery, and both were released alive (Carlson and Lee, 1999). No leatherback sea turtles were observed caught with strikenets during the 2000-2002 right whale calving seasons (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a). Leatherback sea turtles have been observed caught in shark drift gillnets including 14 in 2001 and two in 2002 (Carlson, 2000; Carlson and Baremore, 2001; Carlson and Baremore, 2002a; Garrison, 2003). NOAA Fisheries temporarily

closed the shark gillnet fishery (strikenetting was allowed) from March 9 to April 9, 2001, due to the increased number of leatherback interactions that year (66 FR 15045, March 15, 2001).

From 2003-2004, no leatherback sea turtles were observed caught in gillnets fished in strikenet or driftnet methods (Carlson and Baremore 2003; Carlson pers. comm.).

Smalltooth Sawfish

As of April 1, 2003, NOAA Fisheries 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 continued existence of the U.S. Distinct Population Segment of smalltooth sawfish was in danger of extinction throughout all or a significant portion of its range from a combination of the following four listing factors: the present or threatened destruction, modification, or curtailment of habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

To date there has been only one observed catch of a smalltooth sawfish in shark gillnet fisheries (Table 3.53). The sawfish was taken on June 25, 2003, in a gillnet off southeast Florida and was released alive (Carlson and Baremore, 2003). The set was characteristic of a typical drift gillnet set, with gear extending 30 to 40 feet deep in 50 to 60 feet of water. Prior to this event it was speculated that the depth at which drift gillnets are set above the sea floor may preclude smalltooth sawfish from being caught. Although sometimes described as a lethargic demersal species, smalltooth sawfish feed mostly on schooling fishing, thus they would occur higher in the water column during feeding activity. In fact, smalltooth sawfish and Atlantic sharks may be attracted to the same schools of fish, potentially making smalltooth sawfish quite vulnerable if present in the area fished. The previous absence of smalltooth sawfish incidental capture records is more likely attributed to the relatively low effort in this fishery and the rarity of smalltooth sawfish, especially in Federal waters. These factors may result in little overlap of the species with the gear. The sawfish was cut from the net and released alive with no visible injuries. This indicates that smalltooth sawfish can be removed safely if entangled gear is sacrificed.

Given the high rate of observer coverage in the shark gillnet fishery, NOAA Fisheries believes that smalltooth sawfish takes in this fishery are very rare. 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 BiOp estimated 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 (NOAA Fisheries, 2003a).

However, 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 (Morgan pers. comm., 2003, Burgess and Morgan 2004) (Figure 3.25). Based on these observations, expanded sawfish take estimates for 1994-2002 were developed for the shark bottom longline fishery (NOAA Fisheries, 2003a). A total of 466 sawfish were estimated to

have been taken in this fishery from 1994-2002, resulting in an average of 52 per year. All but one of the observed sawfish was released alive.

Four delphinids have been observed caught and released alive between 1994 and 2004 (G. Burgess, pers. comm. 2004). One pelican was observed caught and killed off the Florida Gulf Coast in January 1995 (G. Burgess, pers. comm. 2001). Bycatch estimates for the shark bottom longline fishery have not been extrapolated for marine mammals. Observed takes of marine mammals in the Southeast Atlantic shark gillnet fishery during 1999-2004, totaled 12 bottlenose dolphins and four spotted dolphins. Extrapolated observations from these data suggest serious injury and mortality of 25 bottlenose dolphin and one Atlantic spotted dolphin in the shark gillnet fishery from 1999 through 2002 (Garrison, 2003).

Table 3.52 Observed Sea Turtle Interactions by Month for Years 1994-2004 in the Shark Bottom Longline Fishery. Source: A. Morgan pers. comm.

Month	Number of Sea Turtle Interactions
January	13
February	17
March	5
April	4
May	1
June	0
July	9
August	3
September	3
October	0
November	0
December	0
TOTAL	55

Table 3.53 Protected Species Interactions in Drift Gillnet Sets During the Directed Shark Gillnet Fishery for All Observed Trips, 2003. Source: Carlson, 2003.

Species	Total Number Caught	Released Alive	Discarded Dead	Released Condition Unknown or Comatose
Bottlenose dolphin	2	0	1	1
Smalltooth sawfish	1	1	0	0

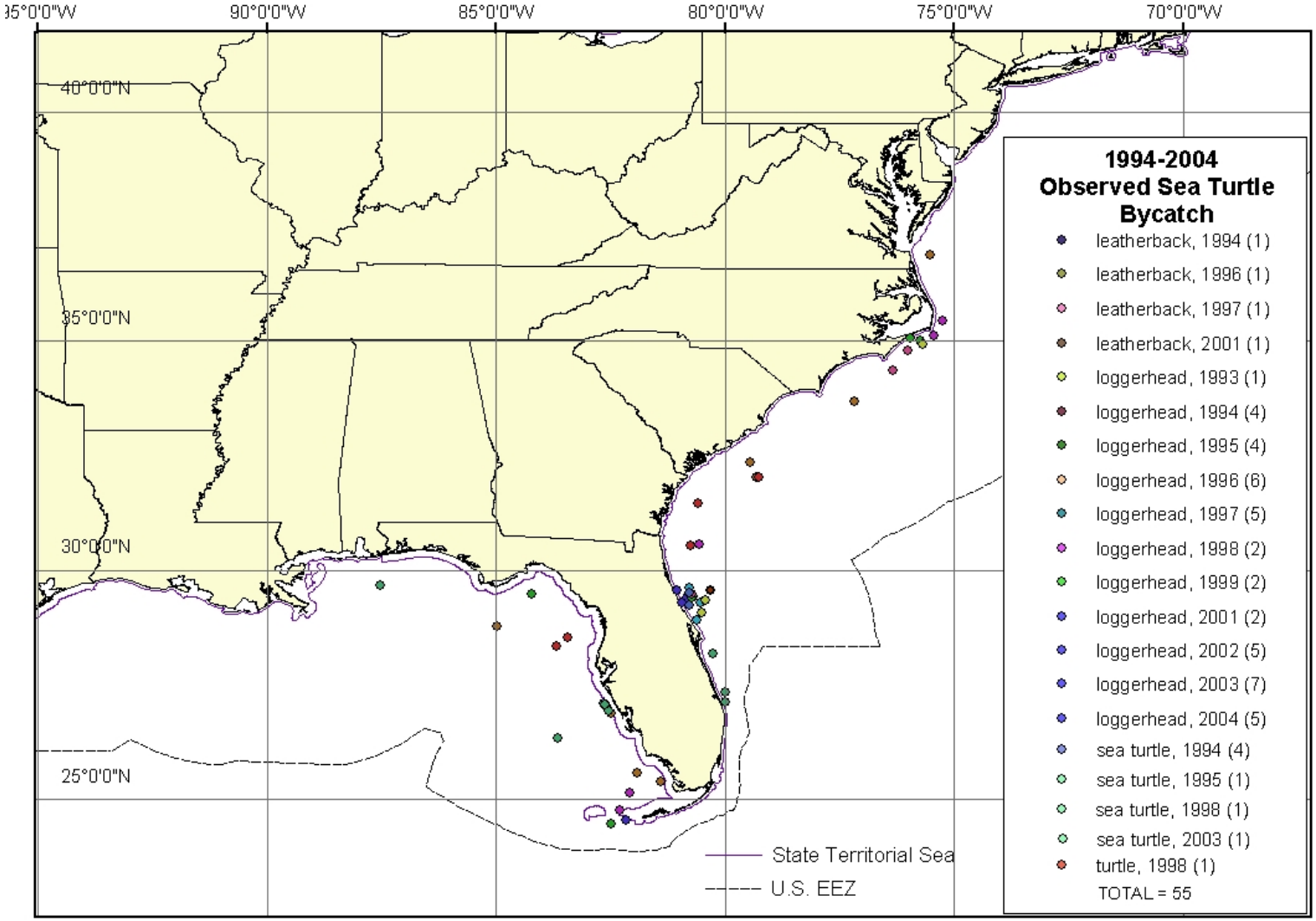

Figure 3.24 Observed sea turtle interactions in the shark bottom longline fishery from 1994-2004.

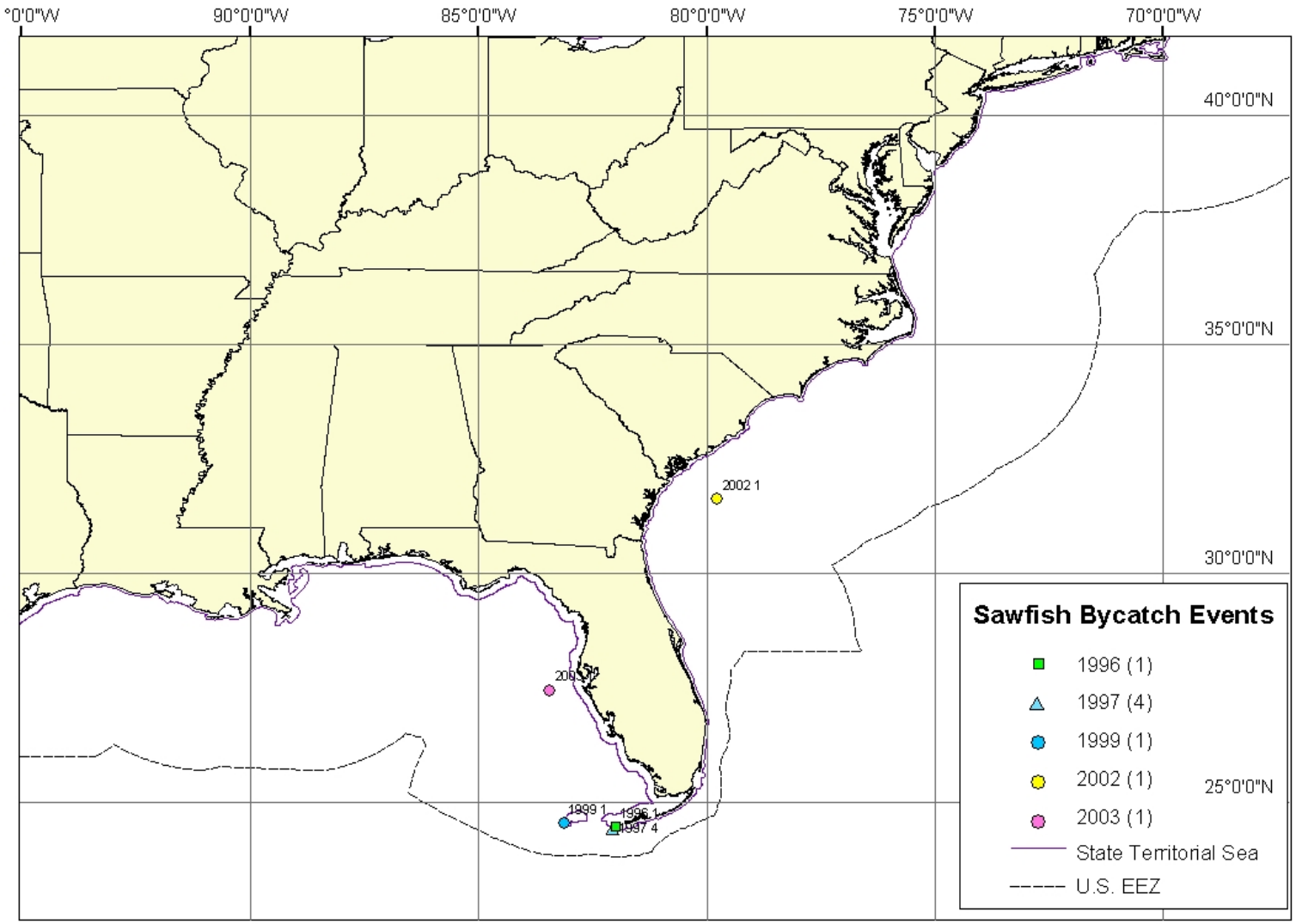

Figure 3.25 Observed sawfish interactions in the shark bottom longline fishery from 1994-2004.

National Plan of Action for the Conservation and Management Of Sharks

On February 15, 2001, NOAA Fisheries released the final National Plan of Action (NPOA) for the Conservation and Management of Sharks (66 FR 10484). The NPOA was developed pursuant to the endorsement of the International Plan of Action (IPOA) by the United Nations' Food and Agriculture Organization Committee on Fisheries Ministerial Meeting in February 1999. The overall objective of the IPOA is to ensure conservation and management of sharks and their long-term sustainable use. The final NPOA, consistent with the Magnuson-Stevens Act, requires NOAA Fisheries and the Regional Fishery Management Councils to undertake extensive data collection, analysis, and management measures in order to ensure the long-term sustainability of U.S. shark fisheries. The NPOA also encourages Interstate Marine Fisheries Commissions and State agencies to initiate or expand current data collection, analysis, and management measures and to implement regulations consistent with federal regulations, as needed. For additional information on the U.S. NPOA and its implementation, see http://www.nmfs.noaa.gov/.

Shark Finning Prohibition Act

On December 21, 2000, President Clinton signed the Shark Finning Prohibition Act into law (Public Law 106-557). This amended the Magnuson-Stevens Fishery Conservation and Management Act to prohibit any person under U.S. jurisdiction from (i) engaging in the finning of sharks; (ii) possessing shark fins aboard a fishing vessel without the corresponding carcass; and (iii) landing shark fins without the corresponding carcass. NOAA Fisheries published final regulations on February 11, 2002 (67 FR 6194). No changes were made to regulations affecting Atlantic federal commercial shark permit holders.

3.4.5.7 U.S. vs. International Breakdown of Landings

There is currently no comprehensive international reporting system for Atlantic shark catches and landings. While there are some international data, not all countries report shark catches and landings and those that do use varying reporting methods. The most recent landings reports for blue and shortfin mako sharks are presented in Table 3.54 and Table 3.55, respectively. In 2001, ICCAT passed a resolution on Atlantic sharks to determine needed improvements in data collection for Atlantic shortfin mako and blue sharks, and to conduct an interim meeting in 2003 to discuss the issue. In addition, the resolution called upon contracting parties and non-contracting parties to: (1) submit catch and effort data on Atlantic shortfin mako, porbeagle, and blue sharks; (2) encourage the release of live sharks that are caught incidentally; (3) minimize waste and discards from shark catches; and (4) voluntarily agree not to increase fishing effort targeting Atlantic porbeagle, shortfin mako and blue sharks until sustainable levels of harvest can be determined through stock assessments.

At its annual meeting in New Orleans in 2004, ICCAT adopted a recommendation to, among other things, ban shark finning, require vessels to fully utilize their entire catches of sharks, encourage the release of live sharks that are caught incidentally and are not used for food, and to review the assessment of shortfin mako sharks in 2005, and reassess blue sharks and

shortfin mako no later than 2007. The ICCAT recommendation also encouraged countries to engage in research to identify shark nursery areas, and collect data on shark catches.

Table 3.54 **Nominal catches of blue shark reported to ICCAT (landings and discards in t) by major gear and flag between 1990 and 2002.** Source: ICCAT Report 2004-2005(I).

		1990	1991	1992	1993	1994	1995	1996	19
Atlantic Total		2348	3533	2343	7879	8310	8422	9036	36
LANDINGS	longline	1387	2265	1667	5749	7366	7501	7767	36
	others	220	496	491	994	372	300	558	43
DISCARDS	longline	741	772	184	1136	572	618	609	18
	others	0	0	0	0	0	3	102	0
LANDINGS	BENIN	0	0	0	0	0	0	0	6
	BRASIL	0	0	0	0	0	0	743	11
	CANADA	0	0	0	0	0	276	12	11
	CAP-VERT	0	0	0	0	0	0	0	0
	CHINA.PR	0	0	0	0	0	0	0	0
	EC-CYPRUS	0	0	0	0	0	0	0	0
	EC-DENMARK	2	1	1	0	1	2	3	1
	EC-ESPANA	0	0	0	0	0	0	0	29
	EC-FRANCE	130	187	276	322	350	266	278	21
	EC-IRELAND	0	0	0	0	0	0	0	0
	EC-PORTUGAL	1387	2257	1583	5726	4669	5569	5710	39
	EC-U.K	1	0	0	0	0	12	0	0
	JAPAN	0	0	0	0	2596	1589	1044	99
	MEXICO	0	0	0	0	0	0	0	0
	NAMIBIA	0	0	0	0	0	0	0	0
	PANAMA	0	0	0	0	0	0	0	0
	SENEGAL	0	0	0	0	0	0	0	0
	SOUTHAFRICA	0	0	0	0	0	0	0	0
	TRINIDAD&TOBAG	0	0	0	0	0	0	0	0
	U.S.A	87	308	215	680	29	23	283	21
	UK-BERMUDA	0	0	0	0	0	0	0	1
	URUGUAY	0	8	84	15	93	64	252	28
DISCARDS	CANADA	0	0	0	0	0	0	0	0
	U.S.A	741	772	184	1136	572	618	710	18
	UK-BERMUDA	0	0	0	0	0	3	1	0

Table 3.55 **Nominal catches of shortfin mako shark reported to ICCAT (landings and discards in t) by major gear and flag between 1990 and 2002.** Source: ICCAT Report 2004-2005(I)

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Atlantic Total		486	538	511	1824	1352	2646	1680	5300	4105	3731	4366	4522	4792
LANDINGS	longline	218	328	235	1137	1017	1177	1421	5125	3941	3630	4044	4278	4527
	others	268	210	250	667	317	1440	259	175	165	100	322	244	266
DISCARDS	longline	0	0	26	20	18	29	0	0	0	2	0	0	0
LANDINGS	BRASIL	0	0	0	0	0	0	83	190	0	27	219	409	226
	CANADA	0	0	0	0	0	111	67	110	69	70	78	69	78
	CHINA.PR	0	0	0	34	45	23	27	19	74	126	306	22	208
	COTE D'IVOIRE	0	0	0	0	0	0	15	0	0	10	9	15	0
	NA	0	0	0	0	0	0	0	3777	3347	2895	2679	2921	2859
	TUGAL	193	314	220	796	649	749	785	519	425	446	706	523	471
		0	0	0	0	0	0	0	0	0	2	3	2	1
		0	0	0	0	0	0	213	248	0	0	0	0	0
		0	0	0	0	0	10	0	0	0	0	10	16	0
	A	0	0	0	0	0	0	0	0	0	1	0	0	459
	A	0	0	0	0	0	0	0	0	0	25	1	0	0
	AFRICA	0	0	0	0	0	0	0	0	19	13	0	79	19
	ENT	0	0	0	0	0	0	0	0	0	3	0	0	0
	AD&TOBAGO	0	0	0	0	0	0	0	0	0	0	0	0	1
		268	210	250	945	628	1703	465	408	148	69	292	395	413
	MUDA	0	0	0	0	0	0	1	1	2	0	0	0	0
	AY	25	14	15	29	12	21	24	28	21	43	63	70	58
DISCARDS	MEXICO	0	0	0	0	0	1	0	0	0	0	0	0	0
		0	0	26	20	18	28	0	0	0	0	0	0	0
	MUDA	0	0	0	0	0	0	0	0	0	2	0	0	0

3.4.6 Fishery Data: LANDINGS BY SPECIES

The following tables are taken from the 2004 National Report of the United States to ICCAT (NAT-035) (NMFS, 2004). The purpose of this section is to provide a summary of recent landings of HMS on a species by species basis for comparison to Sections 4.1 through 4.5 of the 2004 HMS SAFE report. Landings for sharks can be found in Sections 3.4.4 and 3.4.5.

Table 3.56 U.S. Landings (mt) of Bluefin Tuna by Gear and Area, 1997-2003. Source: NMFS, 2004

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NW Atlantic	Longline	26.0	30.5	25.1	22.8	17.7	7.8	16.3
	Handline	17.4	29.2	15.5	3.2	9.0	4.5	2.5
	Purse Seine	249.7	248.6	247.9	275.2	195.9	207.7	265.4
	Harpoon	97.5	133.1	115.8	184.2	101.9	55.5	87.9
	*Rod and reel (>145 cm LJFL)	752.6	610.4	657.5	632.8	993.4	1,001.7	676.4
	*Rod and reel (<145 cm LJFL)	178.9	166.3	103.0	49.5	242.9	519.4	314.6
	Unclassified	2.2	0.6	0.1	0.2	0.5	0.0	0.0
Gulf of Mexico	Longline	23.8	18.3	48.4	43.3	19.8	32.8	53.8
	*Rod and reel	0.0	0.0	0.4	0.9	1.7	1.5	0.0
NC Area 94a	Longline			0.0	0.0	0.0	9.3	11.3
All Areas	All Gears	1,348.1	1,237	1,214.1	1,212.1	1,582.8	1,840.2	1,428.2

* Rod and Reel catches and landings represent estimates of landings and dead discards when available based on statistical surveys of the U.S. recreational harvesting sector.

Table 3.57 U.S. Landings (mt) of Yellowfin Tuna by Gear and Area, 1997-2003. Source: NMFS, 2004.

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NW Atlantic	Longline	838.9	464.9	581.3	734.5	631.8	400	272
	Rod and reel*	3,560.9	2,845.7	3,818.2	3,809.5	3,690.5	2,624	4,672
	Troll	218	177.5	0.0	0.0	0.0	0.0	0.0
	Purse seine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Gillnet	1.3	1.7	0.2	0.2	7.6	5	1
	Trawl	1.9	0.7	4.1	1.8	2.7	0	2
	Harpoon	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Handline	34.3	0.0	192	235.7	242.5	137	148
	Trap	**	0.1	0.8	0.5	0.1	0.0	0.0
	Unclassified	0.0	0.0	2.1	1.3	6.8	**	0.0
Gulf of Mexico	Longline	2,571.3	1,864.5	2,736.6	2,133	1,505.5	2,109	1,828
	Rod and reel*	7.7	80.9	149.4	52.3	494.2	200	640
	Handline	55.6	60.8	12.7	28.6	43.4	100	59
	Gillnet	0.0	0.0	**	0.0	0.0	0.0	0.0
	Unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caribbean	Longline	135.4	58.6	24.4	11.8	23.1	12	7
	Troll	19.6	0.0	0.0	0.0	0.0	0.0	0.0
	Handline	0.7	3.9	14.5	19.4	14.3	7	9
	Gillnet	**	0.0	0.0	0.1	0.3	0.0	**
	Trap	0.1	0.0	0.1	0.3	0.3	0.0	0.0

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NC Area 94a	Longline	6.1	4.6	0.2	2.1	3.5	0.0	5
SW Atlantic	Longline	221.9	55.3	32.4	19.8	36.2	52	42
All Areas	All Gears	7,673.7	5,619.2	7,569	7,050.9	6,702.8	5,646	7,685

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05 mt

Table 3.58 U.S. Landings (mt) of Skipjack Tuna by Gear and Area, 1997-2003. Source: NMFS, 2004.

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NW Atlantic	Longline	1.0	0.7	0.3	0.0	0.1	**	0.9
	Rod and reel*	42.0	49.5	63.6	13.1	32.9	23.3	34.0
	Troll	0.6	0.4	0.0	0.0	0.0	0.0	0.0
	Purse seine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Gillnet	8.9	16.9	26.5	1.9	3.6	**	0.9
	Trawl	0.0	0.2	1.0	0.0	0.2	**	0.5
	Handline	0.1	0.0	0.2	0.2	0.2	0.2	0.2
	Trap	0.0	0.0	17.5	0.0	0.0	**	1.5
	Pound	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gulf of Mexico	Longline	1.3	0.6	0.4	0.2	0.2	**	**
	Rod and reel*	21.7	37.0	34.8	16.7	16.1	13.2	11.0
	Handline	0.0	0.0	0.4	0.7	0.0	0.0	**
	Trap	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caribbean	Longline	1.2	0.0	1.3	1.6	4.0	2.5	3.3
	Gillnet	0.2	0.0	0.4	0.6	1.6	0.6	0.4
	Harpoon	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Handline	0.0	0.0	5.8	8.8	10.3	12.5	9.2
	Trap	**	0.0	0.1	0.3	0.4	0.7	0.2
	Troll	7.3	0.0	0.0	0.0	0.0	0.0	0.0
	Unclassified	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SW Atlantic	Longline	**	0.0	0.0	0.0	0.0	0.0	0.0
All Areas	All Gears	84.3	105.3	152.3	44.1	69.6	53.0	62.1

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05 mt

Table 3.59 U.S. Landings (mt) of Bigeye Tuna by Area and Gear, 1997-2003. Source: NMFS, 2004.

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NW Atlantic	Longline	476.3	544.3	737.8	333.2	506.1	328.6	168.7
	Rod and reel*	333.5	228.0	316.1	34.4	366.2	49.6	188.5
	Troll	3.9	4.0	0.0	0.0	0.0	0.0	0.0
	Gillnet	**	0.4	0.2	0.0	0.2	0.0	0.0
	Handline	2.7	0.0	11.9	4.1	33.2	13.8	6.0
	Pairtrawl	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Trawl	1.0	0.5	1.2	1.7	0.4	0.5	**

	Harpoon	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Haul Seine	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Unclassified	0.5	0.0	0.9	0.0	1.8	0.0	0.0
Gulf of Mexico	Longline	33.9	25.6	54.6	44.5	15.3	41.0	27.5
	Rod and reel*	0.0	0.0	1.8	0.0	0.0	0.0	0.0
	Handline	**	0.1	0.2	0.1	0.5	0.6	0.3
Caribbean	Longline	50.0	48.5	23.2	13.7	31.9	29.7	7.2
	Handline	0.0	0.0	0.2	1.5	0.0	0.0	0.0
NC Area 94a	Longline	91.8	48.4	35.3	63.1	61.0	45.2	36.9
SW Atlantic	Longline	142.8	28.5	78.2	77.4	68.2	91.3	44.6
All Areas	All Gears	1,136.4	928.3	1,261.4	573.7	1,084.8	600.3	479.7

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05

Table 3.60 U.S. Landings (mt) of Albacore Tuna by Gear and Area, 1997-2003. Source: NMFS, 2004.

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NW Atlantic	Longline	140.0	155.4	179.5	130.5	171.7	124.0	95.6
	Gillnet	42.8	40.1	27.0	0.8	3.3	2.6	0.1
	Handline	4.8	0.0	0.6	2.9	1.7	3.9	1.4
	Trawl	2.6	2.4	0.4	**	0.0	0.3	**
	Troll	1.6	5.8	0.0	0.0	0.0	0.0	0.0
	Rod and reel*	220.2	601.1	90.1	250.8	122.3	323.0	333.8
	Pair Trawl	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Pound	1.3	0.9	0.4	0.0	0.0	0.0	0.0
	Unclassified	0.2	0.0	0.0	0.1	0.1	0.0	0.0
Gulf of Mexico	Longline	16.9	3.9	3.8	4.1	4.9	9.5	7.7
	Rod and reel*	49.3	0.0	0.0	0.0	0.0	0.0	0.0
	Handline	0.0	0.0	**	0.0	0.0	0.0	**
Caribbean	Longline	16.1	17.8	8.3	9.2	8.7	8.4	4.0
	Troll	3.6	0.0	0.0	0.0	0.0	0.0	0.0
	Gillnet	**	0.0	0.2	0.1	0.5	**	**
	Trap	**	0.0	**	0.2	0.3	0.6	0.2
	Handline	0.0	0.0	3.8	5.0	2.2	2.7	2.0
NC Area 94a	Longline	11.4	1.6	1.5	2.6	6.1	4.8	1.6
SW Atlantic	Longline	4.7	1.4	1.4	0.9	2.4	8.3	2.0
All Areas	All Gears	515.5	830.4	317	407.2	324.2	488.1	448.4

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.
** ≤= 0.05 mt

Table 3.61 U.S. Catches and Landings (mt) of Swordfish by Gear and Area, 1997-2003. Source: NMFS, 2004.

Area	Gear	1997	1998	1999	2000	2001	2002	2003
NW Atlantic	*Longline	1,262.2	1,624.1	1,872.3	1,547.6	1,220.8	1,132.8	1,347.0
	Gillnet	0.4	36.3	0.0	0.0	0.0	0.1	0.0
	Pair Trawl	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Handline	1.3	0.0	5.0	7.7	8.6	8.8	10.2

	Trawl	8.0	5.9	7.5	10.9	2.5	3.9	6.0
	Troll	0.4	0.7	0.0	0.0	0.0	0.0	0.0
	*Unclassified	11.9	9.1	3.8	1.4	1.8	0.1	0.0
	Harpoon	0.7	1.5	0.0	0.6	7.4	2.8	0.0
	***Rod and Reel	10.9	4.7	21.3	15.6	1.5	21.5	5.1
	Trap	0.0	0.1	**	0.0	0.0	**	0.1
Gulf of Mexico	*Longline	759.9	633.1	579.6	631.7	494.6	549.1	515.8
	Handline	0.0	0.0	**	1.2	0.3	2.9	1.5
Caribbean	*Longline	688.9	516.0	260.5	331.9	347.0	329.0	276.4
	Trap			0.0	0.3	0.0	0.1	**
NC Atlantic	*Longline	688.2	658.6	650.0	804.6	420.6	587.9	632.9
SW Atlantic	*Longline	417.9	170.1	185.2	143.8	43.2	199.9	20.9
All Areas	All Gears	3,850.7	3,660.2	3,585.2	3,497.3	2,548.3	2,838.9	2,815.9

* Includes landings and estimated dead discards from scientific observer and logbook sampling programs.
** $\leq$ = 0.5 mt
*** Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

Table 3.62 U.S. Landings (mt) and dead discards of Blue Marlin, White Marlin and Sailfish by Gear and Area, 1998-2002. Source: NMFS, 2003.

		Blue Marlin					White Marlin					Sailfish				
Area	**Gear**	**1998**	**1999**	**2000**	**2001**	**2002**	**1998**	**1999**	**2000**	**2001**	**2002**	**1998**	**1999**	**2000**	**2001**	**2002**
NW Atlantic	Longline*	23.3	22.0	28.8	10.9	17.3	15.3	18.6	10.3	5.1	11.5	6.4	13.7	11.2	2.2	0.4
	Unclassified*	0.6	0.0	0.1	0.0	0.2	0.7	0.1	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0
	Rod and reel**	34.1	24.8	13.8	9.0	9.8	2.4	-	-	-	-	0.1	-	-	-	-
Gulf of Mexico	Longline*	18.5	55.2	29.6	9.4	17.8	11.8	31.5	29.9	10.1	15.6	17.0	57.4	33.9	8.2	6.3
	Rod and reel**	4.5	7.5	4.7	5.1	4.4	0.2	-	-	-	-	1.0	-	-	-	-
Caribbean	Longline*	2.3	1.6	0.5	1.2	0.8	1.3	5.0	0.5	0.7	1.5	0.2	0.5	0.1	0.0	0.2
	Rod and reel**	10.6	4.6	5.7	2.3	2.9	<.05	-	-	-	-	0.05	-	-	-	-
	Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unknown & NC Area 94a	Longline*	6.1	1.6	0.7	0.9	0.5	2.8	1.1	0.1	0.6	0.7	0.8	<.05	0.1	0.3	<.05
SW Atlantic	Longline*	1.6	1.7	0.0	0.0	0.0	0.9	0.5	0.0	0.0	0.0	2.7	<.05	0.1	0.0	0.0
NW Atlantic& Caribbean & Gulf of Mexico	Rod and reel***	-	-	-	-	-	-	5.2	1.3	3.4	5.6	-	163.0	75.7	57.8	103.0
All Areas	All Gears	101.6	119.0	83.9	38.8	54.7	35.4	62.0	42.1	19.9	35.3	28.3	234.6	121.1	68.5	109.9

* Includes landings and estimated discards from scientific observer and logbook sampling programs.
** Recreational billfish landings estimates are based on tournament reports and the Large Pelagic Survey (see Section 2.3 of the Billfish Amendment).
*** Estimation method no longer provides area-specific information.