
7. BYCATCH

Bycatch information relevant to each gear type has already been discussed in the appropriate sections. In addition to bycatch of HMS and other species by fishermen targeting HMS, there is the issue of HMS as bycatch in other fisheries as well as the “incidental catch” of marine mammals. The Magnuson-Stevens Act refers only to finfish and turtles as bycatch. As a result, other species such as sea birds and marine mammals are considered “incidental catch.” As bycatch tends to occur in fisheries that operate across jurisdictional boundaries, governing bodies, and legal statutes, bycatch reduction often becomes a complex issue.

7.1 Comprehensive Bycatch Reduction Strategy

The NMFS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued research relating to bycatch. Details on bycatch and bycatch reduction measures can be found in Section 3.5 of the HMS FMP.

Bycatch Reporting Methodology

NMFS utilizes self-reported data, observer data, and survey data to produce bycatch estimates. These data are collected with respect to fishing gear type and have been presented by gear type in this report. NMFS compiles bycatch information from the at-sea observer program (longline and gillnet vessels), the pelagic logbook program (commercial shark and swordfish fishermen), and, in the case of recreational bycatch, via dockside and telephone surveys. The number and location of discarded fish are recorded, as is the state of the fish, i.e., alive vs. dead. Post-release mortality of HMS is accounted for in stock assessments to the extent that the data allow. Appendix III contains the forms used for collecting bycatch information, including the observer and logbook forms.

In addition to existing programs in the commercial and recreational HMS fisheries, NMFS implemented a final action in the HMS FMP to place observers on charter/headboat vessels whose owners volunteer for the program (Section 3.8.1). As with charter/headboats, NMFS has the authority to use observers to collect bycatch information from Harpoon, Purse Seine, Angling, and General category vessels fishing for tunas. Before these vessels can be selected for catch, bycatch, and effort reporting, a suitable report form must be developed for these gears. To address this, an analysis of participation in Federal logbook programs coastwide (Northeast, Southeast, and Gulf of Mexico) is being conducted to determine the "gaps" in HMS catch and effort information. Furthermore, the compatibility of logbook programs and forms already in

place is being evaluated to determine if expanding an existing logbook program would meet HMS management needs, or if a completely new program and/or forms are required.

In 1998, Cramer and Adams published the first “Pelagic Longline Bycatch” document which analyzed logbook and observer data to estimate bycatch. This document will be produced annually and used in the SAFE report to evaluate bycatch trends in this fishery. Other species may be added to the list due to ongoing concerns surrounding bycatch mortality in overfished fisheries (e.g., bigeye tuna, yellowfin tuna, bluefin tuna). NMFS collects bycatch data for rod and reel fishermen and uses these data (from LPS) to estimate bluefin tuna dead discards. However, bluefin is the only species for which expanded estimates are currently made. Beginning in 2000 (using 1999 data), NMFS plans to estimate bycatch rates by rod and reel fishermen for other highly migratory species.

Marine Mammals

NMFS relies on both fishery-dependent and fishery-independent data to produce stock assessments for marine mammals in the Atlantic Ocean, Gulf of Mexico, and Caribbean sea. The *draft* stock assessment reports are typically published around January and final reports are published around August. The draft 2000 reports are expected in January, followed by the complementary MMPA List of Fisheries (the draft reports are used to prepare the proposed list of fisheries and the final reports are used in the construction of the final list of fisheries). Generally, the proposed list of fisheries is published in June/July, followed by an MMPA mandated 90-day comment period. The timetable is designed so that the final MMPA list of fisheries can be published by December 1, leaving fishermen ample time to identify those fisheries they must register for before the year begins. However, the final MMPA list of fisheries for 1999 was not yet available at the time of publication of this document.

NMFS continues to investigate serious injuries to marine mammals as they are released from fishing gear. In April 1999, NMFS held a joint meeting of the three regional scientific review groups to further discuss the issue. Although serious injury guidelines have not been published, NMFS will apply the criteria listed by the review groups to make determinations for specific fisheries.

7.2 Bycatch of Highly Migratory Species in Other Fisheries

NMFS is concerned about bycatch mortality of Atlantic HMS in any federal or state-managed fishery which captures them. NMFS plans to address bycatch of these species in the appropriate FMPs. For example, capture of swordfish and tunas incidental to squid trawl operations is to be addressed in the Squid, Mackerel, and Butterfish FMP. Capture rates of tunas in coastal gillnet fisheries are being explored through issuance of exempted fishing permits and reporting requirements. Capture of sharks in trawl, set-net, and hook and line fisheries is being

addressed through cooperative projects with state fishery management agencies and the HMS FMP regulations (some of which are currently under injunction; refer to Section 4.5). NMFS continues to solicit bycatch data on HMS from all state, interjurisdictional, and federal data collection divisions.

Squid Mid-Water Trawl

U.S. squid trawl fishermen landed almost 10 mt of Atlantic HMS in 1998 incidental to the squid, mackerel, and butterfish fishery. These fishermen, using mid-water gear, landed yellowfin tuna, skipjack tuna, albacore tuna, bigeye tuna, and swordfish as incidental catch. Landed fish are counted through the dealer report program and by using information collected from tally sheets. In addition, squid trawl fishermen are required to report landings in the Large Pelagic Logbook or in the Multi-species Logbook. Bycatch of HMS in this fishery is not well-documented. A retention limit of five swordfish per trip allows squid trawl fishermen with swordfish limited access permits to land some of the swordfish that are encountered, although regulatory discards still occur. NMFS continues to work with squid fishermen through the observer program to reduce bycatch.

Table 7.1 Atlantic HMS Landed Incidental to Squid Trawl Fishing Operations in 1998. Data based on tally sheets submitted to NMFS.

Species	Amount (mt ww)
Yellowfin tuna	0.7
Skipjack Tuna	0.2
Bigeye Tuna	0.5
Albacore	2.4
Swordfish	5.9
Total	9.7

Menhaden Purse Seine

The Gulf of Mexico purse seine fishery for menhaden continues to have substantial bycatch of sharks. Nearly 75percent of the sharks encountered in this fishery died, 97 percent of which were large coastal shark species. An estimated 25,000 large coastal sharks were caught in both 1994 and 1995. Blacktip sharks constituted approximately 35 percent of the total shark bycatch observed in those years (Cortes, 1999). An additional issue associated with the

menhaden fishery is that of sharks “landed” into the machinery of the vessel and ground into fish meal. This mortality will be accounted for in future assessments.

Industry workers in this fishery employ a fish excluder device to reduce the retention of sharks and other large species (Rester and Condrey, 1999). In addition, a recently introduced hose cage modification may prove to be effective in reducing shark bycatch. These devices vary in effectiveness and no standards exist for such bycatch reduction measures in this fishery. In addition, there are currently no reporting requirements for takes of sharks in the menhaden purse seine fishery.

Gulf of Mexico Shrimp Trawl

Shark bycatch in the Gulf of Mexico shrimp trawl fishery consists mainly of sharks too small to be highly valued in the commercial market. As a result, few sharks are retained. The magnitude of this bycatch is not considered in the most recent large coastal shark assessment.

Summary

Although bycatch of swordfish and tunas in the squid trawl fishery is substantial, Atlantic shark bycatch in non-HMS fisheries is a greater concern. Nearly 12 percent (approximately 40,600) of the large coastal sharks accounted for in the 1998 shark evaluation workshop models were bycatch in the menhaden fishery, the longline fishery, and other coastal fisheries in the Gulf of Mexico and South Atlantic. The stock assessment models do not account for shark mortality associated with mid-Atlantic (north of North Carolina) or New England fisheries. Although the HMS FMP requires counting dead discards against Atlantic shark quotas, this management measure is currently under injunction.

7.3 Evaluation of Bycatch Reduction Measures

- Reduce length of longline to increase survival of mammals:

NMFS is not able to evaluate the effectiveness of this measure at this time as the data have not yet been prepared for analysis.

- Close area in June to decrease bluefin tuna bycatch:

NMFS is not able to evaluate the effectiveness of this measure at this time as the data have not yet been prepared for analysis.

- Atlantic Large Whale Take Reduction Plan (ALWTRP) regulations:

Observers were placed on shark drift gillnet vessels during right whale season off the East Coast of Florida between Fort Pierce and West Palm Beach (Carlson and Lee, 1999) and covered 91.3percent of the sets made during right whale season. Twenty drift gillnet sets were observed. Four marine mammals (bottlenose dolphin) were observed caught and discarded dead. No large whales were encountered by this gear during right whale season (January 8 - March 31, 1999).

- **MMPA List of Fisheries Update/Stock Assessment:**

NMFS continues to update the MMPA List of Fisheries and the proposed list is expected to be available to the public in June/July of 2000. The list will be based on updated stock assessments of marine mammals.

- **Meeting of the Atlantic Offshore Cetacean Take Reduction Team (AOCTRT)/Future Plans:**

NMFS Office of Protected Resources hopes to reconvene the AOCTRT in 2000 to review new data for the pelagic longline fishery and to discuss the need for additional take reduction measures outside of those already being implemented under the HMS FMP.

- **Observer coverage of shark gillnet fleet:**

Due to the high costs of this observer program and limited funding, NMFS is exploring other options for observer coverage in this fishery including state-federal cooperation.

7.4 Recommendations to Reduce Bycatch

In 1998, NMFS published a National Bycatch Plan (NOAA, 1998). The plan recommended numerous actions to address bycatch mortality. Table 7.2 lists the recommendations and actions taken by NMFS thus far to address these issues.

Table 7.2 Recommendations for Addressing Bycatch Mortality in HMS Fisheries and Actions Planned or Taken to Address These Recommendations.

Recommendation	Action
Improve data on the character and magnitude of bycatch to allow quantitative estimates of discards in the fisheries for use in stock assessments and making management decisions.	Pursued submission of bycatch data by ICCAT countries for analyses to develop measures to reduce small swordfish bycatch stock-wide.
Improve gear-handling techniques to reduce mortality.	Educational workshops for recreational and commercial fishermen.
Conduct research on gear-deployment methods that will reduce interactions between and mortality of protected species that encounter fishing gear.	NMFS funded research includes: <ul style="list-style-type: none"> • A circle hook study in the Azores, FY 98 • Development of a line cutter that would decrease injuries to turtles, FY 98 Hoey and Moore (1999) report provides suggestions for gear modifications.
Work cooperatively with the fishing industry to transfer new knowledge and techniques between fishermen and researchers.	Educational workshops include research results on the agenda.
Reduce bycatch and bycatch mortality of undersized swordfish and tunas.	Swordfish are addressed in proposed time/area closures in the South Atlantic Bight and Gulf of Mexico; final rule is expected in 2000. Educational workshops for recreational fishermen.
Improve knowledge of (1) basic biology and stock status of shark species in the Northwest Atlantic and (2) the effects of bycatch mortality on shark populations.	NMFS funded research includes: <ul style="list-style-type: none"> • Center for shark research at Mote Marine Lab: shark biology, FY98 • Univ of MI: shark nursery grounds, FY98 • Gulf and South Atlantic Fishery Development Foundation: observer program and biology, FY98 • COASTSPAN: a study to identify shark nursery areas, FY 98 • Participation in pelagic shark assessment in February, 2000. NMFS is in the process of constructing a National Plan of Action for Sharks commensurate with the FAO International Plan of Action for Sharks to assess direct and indirect shark fisheries, stock status, and promote more effective and sustainable shark management.
Increase research on the role of apex predators in structuring marine ecosystems, and assess the effects of bycatch of these stocks.	NMFS funds COASTSPAN, a study to identify shark nursery areas.
Reduce mortality and bycatch mortality of billfish captured in the directed fisheries for Atlantic HMS.	Proposed time/area closures in the South Atlantic Bight and Gulf of Mexico; final rule expected in 2000

Recommendation	Action
Determine the status of sailfish populations.	Assessment to be conducted by SCRS at ICCAT in 2001*
Conduct research on post-release mortality of recreationally-caught billfish, tunas, and sharks.	Research being funded by NMFS includes: <ul style="list-style-type: none"> • MA Div. Marine Fisheries: Effects of Hook Design, FY98 • Bluefin tuna tagging Sponsored Catch and Release Conference in Nov. 1999 to share data on this topic, identify further research needs
Improve data collection and monitoring of the recreational tuna, shark, and billfish fisheries.	New voluntary Charter/Headboat observer program and logbook program Increased tournament registration and reporting.

* Because stock assessments are conducted internationally by SCRS, NMFS does not produce domestic stock assessments for ICCAT species. However, NMFS has developed overfishing criteria based on the most recent assessment (1993) and has determined that West Atlantic sailfish are overfished and overfishing continues to occur.

7.5 Summary

It is difficult to compare fishing gears due to the differences in areas and seasons fished. However, Table 7.3 gives a summary of the percent bycatch (by number of fish) for each HMS fishing gear where data were available. Table 7.4 summarizes the total percentage of mortality attributed to bycatch for Atlantic HMS.

Table 7.3 **Percent of Total Finfish Catch as Bycatch in HMS Fisheries:** Based on Number of finfish discarded/Number of total finfish caught*

Gear	Time Period	Percent Bycatch (by number of fish)	Source
Shark Drift Gillnet	June-July 1999	37 %	NMFS observer data
Pelagic Longline	Jan-Dec. 1998	58.3%	NMFS observer data
Bottom Longline	Jan.-June 1998	7%	GSAFDF observer data
	July-Dec 1997	28%	
Purse Seine	August 1996	19% (by weight)	NMFS observer data

* It should be noted that observer coverage is limited in many HMS fisheries. Therefore, these bycatch rates are general estimates, that should be used only for comparison purposes. Particularly in the pelagic longline fishery, observer coverage does not reflect proportionally the number of sets made in each sampling area.

Table 7.4 Percent of Stock-Wide Mortality Attributed to Bycatch for HMS Stocks in 1998*. Sources: SCRS, 1999; Cortes, 1999 (sharks only).

Species/Stock	Percent of Mortality Attributed to Bycatch
North Atlantic Swordfish	4% (by weight)
South Atlantic Swordfish	less than 0.1%
West Atlantic Bluefin Tuna	3.1%
Large Coastal Sharks	12% (by number)
Pelagic Sharks**	27% (by weight)
Small Coastal Sharks***	Unknown
Blue Marlin	4%
White marlin	6.7%
Sailfish	1.8% (by weight)
Spearfish	0%

*Based on the landings and discards reported to ICCAT for stocks fished on by U.S. fishermen. It should be noted that the United States does not report discards of BAYS tunas to ICCAT.

**Pelagic shark estimates are from 1997 and can be found in Section 2.4.3 of the HMS FMP. Of the estimated 27%, 19% is attributable to blue shark dead discards.

***1997 observer data indicated that 98%, 81%, and 28% of small coastal shark landings in the North Carolina, west Florida, and south Atlantic Bight regions, respectively, were used for bait rather than landed. Due to unreported mortality of small coastal sharks caught in other fisheries and the disparity in reporting bait fish, there is insufficient information to provide a summary number. Atlantic shark numbers are higher than those for other

species partly because all data sets are from the United States where minimum sizes and no retention provisions are enforced.

In Table 3.47 of the HMS FMP, NMFS identified the significance of bycatch of certain species in various HMS fisheries. Table 7.5 below indicates action NMFS has taken to address those issues and reduce bycatch.

Table 7.5 Addressing Significant Bycatch Concerns in HMS Fisheries

Gear	Significant Bycatch Species	Action Planned or Taken
Pelagic Longline	<ul style="list-style-type: none"> • bluefin tuna • undersized target species • mammals • sea turtles 	<ul style="list-style-type: none"> • Closed area in Mid-Atlantic bight in June • Proposed rule to close South Atlantic Bight area year-round, Gulf of Mexico area March - September. • Gear modifications, educational workshops • Move after one entanglement.
Bottom Longline	<ul style="list-style-type: none"> • undersized target • prohibited shark species 	Note: Due to a court injunction, minimum sizes are no longer in effect in the commercial fishery.
Shark Gillnet	<ul style="list-style-type: none"> • undersized target • protected species • prohibited shark species 	<ul style="list-style-type: none"> • Observer coverage to collect necessary data

Section 7 References:

Carlson, J. and D. Lee. Catch and Bycatch in the Shark Drift Gillnet Fishery off East Florida During the Critical Right Whale Season, 1999. Sustainable Fisheries Division Contribution SFD-98/99-60.

Cortes, E. 1999. 1999 Shark Evaluation Annual Report. Sustainable Fisheries Division Contribution SFD-98/99-64.

Hoey, J and N. Moore. 1999. Captain's Report: Multi-Species Characteristics for the U.S. Atlantic Pelagic Longline Fishery, August 1999. 78 pp.

NOAA. 1998. Managing the Nation's Bycatch: Programs, Activities, and Recommendations for the National Marine Fisheries Service. 174 pp.

Rester, J.K. and R.E. Condrey. 1999. Characterization and Evaluation of Bycatch Reduction Devices in the Gulf Menhaden Fishery, North American Journal of Fisheries Management. 19: 42-50.

SCRS. 1999. Report of the Standing Committee on Research and Statistics, ICCAT SCRS, October 11-15, 1999. 168 pp.